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Proceedings of the Hawaiian Live Stock Breeders Association

Honolulu

1902-1907

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THE PROCEEDINGS

OF THE

HAWAIIAN

Live Stock Breeders' Association

FIRST ANNUAL MEETING

HONOLULU, HAWAII

NOVEMBER 17-18, 1902

HONOLULU:
HAWAIIAN GAZETTE CO.
1903

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MEETING

OF THE

HAWAIIAN LIVE STOCK BREEDERS' ASSOCIATION,

IN THE JUDD BUILDING.

MONDAY, NOVEMBER 17, 1902, 10 A. M.

MR. PAUL R. ISENBERG, PRESIDING.

PRESENT.

Paul R. Isenberg,
A. W. Carter,
A. F. Judd,
J. P. Mendonca,
E. P. Low,
L. L. McCandless,
G. C. Munro,
J. H. Raymond, by A. B. Wood.
O. R & L. Co., by H. M. von Holt.
Robert Hind,
H. Waterhouse & Co., by A. B. Wood.
Samuel Parker, by A. W. Carter.
John Ii Estate, by A. W. Carter.
Lihue Plantation Co., by Paul R. Isenberg.
C. Bolte, by J. P. Mendonca.
Dowsett Co., by H. M. von Holt.
E. A. Knudsen.

Secretary read minutes of last meeting, held on March 17, 1902. Approved as read.

Secretary read his report from March 17th to November 17th of this year. p.23

Moved by Mr. von Holt, and seconded by Mr. McCandless that the report be placed on file. Carried.

Moved by Mr. Carter that the Secretary be authorized to communicate with the Planters' Association, in session in town, that the report of Prof. Perkins on "Lantana Destroy-
P.28 ing Insects" might be read in a joint meeting with them. Seconded by Mr. von Holt. Carried.

Treasurer's report read by Mr. A. B. Wood. Moved by Mr. von Holt, and seconded by Mr. E. P. Low that the report be accepted and placed on file. Carried.

Meeting here adjourned on motion till 2 o'clock this afternoon.

At 2 P. M. the joint meeting with the Planters' Association was held at which time Prof. Perkins read his report.

2:30 P. M. Nov. 17, 1902. JUDD BUILDING.

PRESENT.

Paul R. Isenberg,
A. W. Carter,
H. R. Hitchcock,
H. M. von Holt,
E. A. Knudsen,
J. P. Mendonca,
Palmer Woods,
Otto Meyer,
A. F. Judd,
E. P. Low,
G. C. Munro,
W. G. Irwin, by P. R. Isenberg.
F. M. Swanzy, by P. R. Isenberg.
C. Bolte, by J. P. Mendonca.

Mr. Carter moved, seconded by Mr. Palmer Woods, that the By-Laws be read until there is some objection to any of the articles. Carried.

Articles 1 to 5 passed as read. After reading Article 6.

Mr. Palmer Woods moved, seconded by Mr. von Holt that four members, instead of five, constitute a quorum. Carried.

After reading Article 10, Mr. McCandless moved that the Article be amended to read "by a majority present," instead of "one-fourth." Seconded by Mr. Mendonca. Carried.

Mr. McCandless moved, seconded by Mr. Palmer Woods p.15
that the By-Laws be adopted as amended and read. Carried unanimously.

Mr. Carter moved, seconded by Mr. von Holt, that Mr. Jared Smith, of the Agricultural Experiment Station in Honolulu, be made an honorary member of the association. Carried unanimously.

The President instructed the Secretary to notify Mr. Smith of this fact.

The President then said:

Gentlemen: I would like to say a few remarks if you will permit me. I think that our Secretary deserves a great deal of credit for the way in which he has carried on his work in this association. He has at times been in quite a tight pinch, not being able to get the executive committee together. I know that I once or twice promised to be present, and forgot about it; others have done the same, but he has gone ahead with his work, and has done a great deal of correspondence; and I wish to say, and no one here I think feels differently, that he deserves a vote of thanks for the excellent work he has done during the last year.

Mr. Carter moved, seconded by Mr. Palmer Woods, that Mr. Paul R. Isenberg be re-elected to the position of President. Carried unanimously.

Mr. McCandless moved, seconded by Mr. P. Woods that Mr. Low be re-elected to the office of Vice-President. Carried unanimously.

Mr. Palmer Woods moved, seconded by Mr. Hitchcock that Mr. A. F. Judd be re-elected Secretary. Carried unanimously.

Mr. McCandless moved, seconded by Mr. Hitchcock, that Mr. A. B. Wood be re-elected Treasurer. Carried unanimously.

Mr. von Holt moved, seconded by Mr. Carter, that the name of Mr. Knudsen be substituted for that of Mr. Gay of Kauai as a member of the executive committee. Carried.

Mr. Judd moved, seconded by Mr. von Holt, that the present board be re-elected: Mr. Monsarrat for Hawaii; Mr. Cornwell, Maui; Mr. McCandless, Oahu; Mr. Carter, Molokai; with Mr. Knudsen for Kauai. Carried unanimously.

Secretary read communication from Mr. Jared Smith, relating to the compilation of a list of Hawaiian grasses and forage plants.

Mr. Carter moved, seconded by Mr. Hitchcock, that the Secretary acknowledge receipt of the letter, and that he immediately write a circular letter to each member of the Association to obtain the data Mr. Smith requested. Carried.

The meeting here adjourned, 3:40 P. M., on motion of Mr. Carter, seconded by Mr. Hitchcock, till 10 A. M. tomorrow, November 18, 1902.

TUESDAY, NOV. 18TH, 1902. JUDD BUILDING, 10 A. M.

MEETING OF THE HAWAIIAN LIVE STOCK BREEDERS' ASSOCIATION. ADJOURNED FROM YESTERDAY AFTERNOON.
MR. PAUL R. ISENBERG PRESIDING.

PRESENT.

Paul R. Isenberg,
A. F. Judd,
A. W. Carter,
H. M. von Holt,
Jared Smith,
Wray Taylor,
Francis Gay,
J. P. Mendonca,
G. C. Munro,
H. R. Hitchcock,
Otto Meyer,
E. P. Low,

L. L. McCandless,
H. Greenwell,
Allen Herbert,
E. A. Knudsen,
Robert Hind,
W. H. Cornwell,
Samuel Parker.

Meeting called to order at 10:15 by the President.

Mr. E. P. Low read his report on "Herefords," on request of the President. p.36

Mr. von Holt. I often thought that the Hereford, mixed with the rest of the stock on the Railroad ranches has been a factor in producing heavy beef stock; the larger animals have been those with the Hereford strain. I think those Herefords came from the Colonies; the general impression has been Herefords do better at a high elevation.

Mr. Low. Altitude makes no difference to them; they are always in condition.

Mr. von Holt. The only difficulty I notice in Herefords on these Islands, is a proneness amongst certain classes of them to warts and sores along their backs, also eye trouble, but I don't think to a great extent.

Mr. Low. Sores on the back is a very common thing on the white short horns; you never would find it in a pure or better graded animal; it may be Mr. von Holt has discovered this in a poor, inbred animal; the disease is always in the worst bred of the animals.

Mr. Munro. I would like to ask now if your steer (mentioned in paper) had any special treatment? If an animal keeps its first fat from the time it is young until it is slaughtered it weighs much heavier than if it loses its first fat.

Mr. Low. That animal was a grade between a Hereford and a Holstein; as a calf it went through my milking pen and was deprived of its natural fully supply of milk, therefore it was set back a good deal on the start, but not set back far enough to injure the growth of the calf; it only had the

ordinary grass that was on the land, the same as the others. I made a statement in my paper in regard to a wild grade Hereford and Shorthorn; evidently it was Shorthorn, but you could see the strain of the Hereford * * * that was the steer weighed 1015 lbs.; he was 24 hours hanging in the trees in the mountains, and there was a great shrinkage in the carcass; if it had been killed at the ranch and weighed immediately, I believe it would have gone twelve or thirteen hundred pounds.

Mr. Munro, at the request of the President, here read his
p.42 paper on "Sheep Grazing, its effects on the pastures, and on the cattle pastured there."

Mr. Low. Is it a standing rule in New Zealand to pasture cattle and sheep together?

Mr. Munro. No, it is not, but it can be successfuly done.

Mr. Low. In the United States they condemn that method entirely. From the knowledge of the sheepmen and the cattlemen in the United States the sheep and the cattle cannot run together; and they are the worst enemies. The manuring or even the walking of the sheep is obnoxious to the bullocks—the smell of it; they will never touch a spear of grass the sheep have manured on.

Mr. Munro. The Molokai ranch has carried sheep and cattle for a large number of years; they were on a large, open range; of course it means judicious stocking; wild sheep cannot be compared to them; on the Molokai ranch cattle have no antipathy to the sheep, so long as the sheep are not too heavily stocked on the land.

Mr. Carter. I have been watching the carrying of sheep on the same range for the last five years on the range at Molokai * * * it seems to me there are locations on most of the large cattle ranches on the Islands that are better adapted to sheep than cattle, and where this condition exists it is possible to carry both classes profitably. On Molokai certain sections are better adapted to sheep; a portion of the year they do not make good cattle ranges. I think the statement of Mr. Munro that the sheep materially improve cattle ranges is

strictly correct. Whether or not sheep should be allowed to run with cattle, I have my doubts, but on a ranch where a portion is well adapted to the raising of sheep, and not for cattle, it pays to carry sheep * * * and to run them at intervals on the portion of the ranch that carries cattle, because it does improve the feed if it is not overstocked.

Mr. Jared Smith. I think the antipathy between the sheep and the cattlemen in the States is due almost entirely to the fact both range their cattle and sheep on free lands, for which they pay no rent or taxes. Of course the pasturage belongs to the man who can get his stock on it. If the sheepmen run their sheep first, the cattlemen cannot get anything for their cattle on it; and I think that is responsible for the antagonism between the sheep and the cattlemen. The sheep eat weeds which cattle do not, however.

Mr. McCandless. I would like to ask Mr. Munro what effect sheep would have on the land where young lantana is growing?

Mr. Munro. Yes, they will keep the lantana in check if they are put on the land, before the lantana has much hold, also the same with guavas, but they must be kept continuously on the land.

Mr. Isenberg. I had a little experience on Lihue Plantation. We have a great deal of trouble with the sensitive plant * * * we used to have to hoe the lands before we plowed them. We got some sheep and starved them for about four days, and put them on this, and they commenced to eat it; and when they once get used to it they will take it all off; and whenever there was a field to be plowed the manager would take the sheep on the field, and they would clean off everything, then when the grasses would sprout up he would turn the working cattle in. I think this demonstrates sheep will eat almost any kind of weed there is. Sheep I think would also keep down the guavas.

Mr. Low. In regard to sheep keeping down the guava. The land in Kona is overrun with guava; sheep will keep down

the guava if there is nothing else to eat, but the guava leaves are so full of acid the stock will not touch them if there is other feeding in sight. The sheep turning in after the cattle I think is a good thing, but I doubt if the two will run together.

Mr. Munro. They eat the guava more as a medicine than as a food, I will admit.

Mr. von Holt. Pasture lands which have always shown the best feed have been pointed out to me as the lands which in olden days had a great number of sheep running on them. On Kahuku on Oahu, part of the lands in the olden days carried a great many sheep, and these are the best lands now. I cannot say whether the sheep are responsible or not.

Mr. Low. I think we cannot attribute it entirely to the sheep eating the pasture down; it is caused by the fertilizer that the sheep drop. In my lands there is a jagged *Aa* flow, where the sheep have had their runs * * * there is nothing but a field of soil; the ground is just fertilized, and I never saw land where the grass is more luxuriant.

Mr. Isenberg. Do the cattle eat this grass where the sheep have been?

Mr. Low. Yes.

Mr. McCandless, at the request of the President, here read
p.44 his paper on "Angus Cattle."

Mr. Isenberg. Don't you believe that the Poll Angus after it has been in pasture for a while will become very wild?

Mr. McCandless. I have found wilder cattle among the horned cattle than among the Poll Angus. The horned cattle are more dangerous to handle than the Poll Angus.

Mr. Knudsen. Are not the Poll Angus soft; would they stand walking on a hot road?

Mr. McCandless. My experience with my imported Angus cattle was as follows: I had them in the country three weeks, and took them a trip of forty miles in two days, and have frequently brought them a drive of forty odd miles, bringing them to town in two days; young calves, fat as they could be

from their mothers, and I have never lost one yet; they have traveled just as well as the half-breeds or other cattle.

Mr. Carter. Mr. McCandless undoubtedly imported a fine herd of cattle, and undoubtedly knows more about Poll Angus than any man in the country. I think his advice should be given great weight. My limited experience tends to lead me to believe that Poll Angus after they are bred out to about a quarter strain become slab-sided and do not carry the conformation that the Hereford of same grade do; a quarter-blooded Hereford, as a rule, shows in his conformation the good qualities of the Hereford stock. That is the principal objection I have against the Poll Angus.

Mr. McCandless. I would like to ask Mr. von Holt if he can give light on the Poll Angus brought here in the Sixties?

Mr. von Holt. My feelings go almost entirely with the Poll Angus cattle, but I agree with Mr. Carter unless you keep up the quality of the Poll Angus they revert unfavorably. If you have a quarter-breed shorthorn, they will show up better than a quarter-breed Poll Angus. Where you take a herd of cattle and bring them in from the range, the Poll Angus will bring up the average of the whole herd of cattle; simply because they hold their own on our poor pastures. Where you drive in a herd say of a thousand cattle, the Poll Angus always appear in fair shape, even in the dry season. While I believe in mixed stock, I am in favor of the Poll Angus; so far they are our best cattle. I have not found them any more trouble to handle than horned cattle; I have not found any tendency to being soft.

Mr. Isenberg. I have had some experience with Angus cattle. Twelve years ago I bought fifty heifers from Mr. Dowsett. As far as beef is concerned I do not think they can be improved on, like in ranches like Waialae where they hustle a great deal for their feed; but I have never had such poor milkers as Poll Angus, some of the cows hardly being able to raise their calves. From the Holstein I am going into the red Polls, mostly on the advice of Professor Stubbs who was

here a few years ago. As far as black Angus are concerned I think they are awful poor milkers.

Mr. McCandless. I put a great many cows in the Star Dairy, also on the range our cows do well; I have pretty good milkers; in the Star Dairy they average five and a half quarts per cow per day, and there is a great number of Angus cattle among them. Whereas the other dairies about town are said to give about three and a half quarts per cow per day. The red Poll came from the Poll Angus cattle; once in a while a red calf comes from the black Angus.

Mr. Isenberg. I do not deny there are good milkers among the black Angus, but I think the percentage of good milkers among the Angus is very small.

Mr. von Holt. My experience is that they do not excel as milking stock. The cattle we have from the same class of cattle have not turned out as good milkers as the rest of the Poll Angus we have in our herd. I think they average as well though, if not better than the ordinary range cattle; we have a great many Poll Angus cattle milking now; my experience is that all of those Poll Angus cattle are as good milk producers as anyone else's, in many cases better; I think it depends on the particular breed you get.

Mr. Low. In referring to the milking qualities of the Angus, the records in the States and the Experiment Stations show it is outclassed almost as bad as the Herefords. Of course, you find individual cows that give milk the same as the Herefords. No one would ever dream of getting an Angus for a dairy, as they would in buying a Hereford for a dairy. As far as stamina is concerned, Mr. McCandless speaks of driving a thoroughbred herd forty miles in two days. If he drove them two hundred miles in two days there might be something in it. A man cannot compare his experience with another's because of the difference in his location. To drive them over pahoehoe and aa for two days would be something. But I differ that they are the best animals for stamina, though

I cannot say I have made a thorough test, and cannot state such and such is the best of the lot.

The Secretary here, at the request of the President, read Mr. Horner's paper on "Holsteins." p.50

Some little discussion followed, regret being expressed over Mr. Horner's absence.

Mr. Carter. In regard to the reports, I think it would be in order that they be printed, the number to be in the discretion of the Secretary, and I also include in that motion that he write Mr. Monsarrat, who I think has completed his report, to have it printed with the other reports that would go out, together with the by-laws.

Seconded by Mr. Cornwell and carried.

The Secretary here read the report of the Governor of the Territory of Hawaii to the Secretary of the Interior for 1902, regarding the notice of the Hawaiian Live Stock Breeders' Association, and statistics thereon. p.52

Mr. von Holt. I would like to move a vote of thanks to the Merchants' Association for the use of this room, and that the Secretary be instructed to convey the thanks.

Seconded by Mr. Herbert and carried.

Conversation followed re the advisability of having an Exhibit of live stock in Honolulu, or elsewhere, in the near future.

Mr. Cornwell. I would make a motion that this Exhibit we have been talking about be left to the executive committee. Seconded by Mr. Mendonca and carried.

Mr. Low. I think it is the sense and duty of this convention to pass a vote of thanks to our Secretary. He has done a lot of work which is very appreciable indeed, and I think it is nothing but right this convention before adjourning should pass a vote of thanks.

Seconded by Mr. Carter.

Mr. Herbert. I make a motion that a vote be tendered to all the executive officers.

Mr. Isenberg. I will say this: although the Secretary's

salary is very small, the executive committee have thought of that matter very carefully; and I doubt that we would have made so much headway if our worthy Secretary had not been so energetic to go ahead. I am very thankful to Mr. Low for moving that a vote of thanks should be given to him. I think the executive committee felt the same way, and I, as the President of the Association, personally wish to thank the Secretary, and on behalf of the executive committee wish to thank him specially for the good work he has done for this association. Motion carried unanimously.

The meeting here adjourned sine die, 11:50 M.

BY-LAWS

OF THE

Hawaiian Live Stock Breeders' Association.

ARTICLE I.

NAME.

This association shall be known as the "HAWAIIAN LIVE STOCK BREEDERS' ASSOCIATION," and shall have for its object the development of all live stock industry in the Islands.

ARTICLE II.

MEMBERSHIP.

Members of this association may be owners of all classes of stock, or those that may be interested in the breeding of stock on the Islands.

Any resident of the Territory of Hawaii, of good moral character, recommended by three members of this association, may apply for membership by filing with the secretary a written or printed application on the form furnished by the secretary.

Three negative votes at the time of application will reject such application for membership.

Partnership and corporations may hold memberships.

Names of new members must receive the approval of the

executive committee, and upon payment of one year's dues shall be added to the list of members.

The initiation fee for each person to become a member shall be Twenty-five Dollars ($25.00) and the annual dues shall be Twelve Dollars ($12.00).

On the unanimous vote of all members present at any regularly called meeting of the association persons who have been of assistance to this association or who have furthered the objects of this association may be made honorary members. No initiation fee or dues shall be required of such members.

ARTICLE III.

ANNUAL MEETING.

There shall be an annual meeting of the members of this association in the months of October or November of each year, on such day and at such place in the cities of Honolulu and Hilo, alternately, as the president of the association may direct.

The next meeting shall be held at Hilo and of which annual meeting the secretary shall give thirty (30) days' written notice to all members. But other and further meetings of the association may be held at such times as the president may direct, or upon the call of the secretary issued at the request of one-eighth ($\frac{1}{8}$) of the members of the association.

The regular order of business at the annual meeting shall be as follows:

First.—Calling the roll of members and submitting of proxies.

Second.—Reading minutes of previous meeting and action thereon.

Third.—Annual address of the President.

Fourth.—Report of the Secretary.

Fifth.—Report of the Treasurer.

Sixth.—Report of Committees.

Seventh.—Election of the President.
Eighth.—Election of the Vice-President.
Ninth.—Election of Treasurer.
Tenth.—Election of Secretary.
Eleventh.—Election of the Executive Committee.
Twelfth.—Miscellaneous Business.

The regular order of business may be suspended at any time by a two-third (⅔) vote of the members present or represented by approved proxies.

ARTICLE IV.

VOTING.

At a meeting of the members of this association one-fourth (¼) of the number of the members must be represented to make a quorum for the transaction of business.

Voting may be done by proxy, notice of which must be given to the secretary in writing.

A majority of all votes cast at such meeting shall decide all questions except as herein provided in Article X.

ARTICLE V.

ELECTION.

The executive committee for the transaction of the business of the association shall be elected by the members of the annual meeting.

ARTICLE VI.

EXECUTIVE COMMITTEE.

The business of the association shall be conducted by the executive committee, nine in number, who shall be interested in the live stock business, and must be members of the association, and who shall be elected by a majority of all the votes cast at the annual meeting of the members as provided in

Article V, and who shall hold their offices for the term of twelve (12) months, or until their successors shall be duly elected.

Four members of the executive committee shall constitute a quorum for the transaction of business, and all questions shall be decided by a majority of the votes cast by the executive committee present, each member of the executive committee being entitled to cast one (1) vote.

Vacancies in the executive committee may be filled temporarily by remaining members of the committee.

The executive committee shall meet at all times and places as the president may direct, or upon the call of the secretary sent at the request of three or more members of the committee.

They shall direct all the affairs of the association, and appoint such agents or other officers as may be necessary to carry on the business for which the association is organized.

ARTICLE VII.

OFFICERS.

The officers shall consist of a President, Vice-President, Secretary and Treasurer who shall be members of the executive committee.

It shall be the duty of the President to preside at all meetings of the association and of the executive committee; to sign, upon the approval of the executive committee, all contracts and other instruments binding the association.

It shall be the duty of the Vice-President to perform the duties of the President whenever the latter shall be absent or incapacitated.

It shall be the duty of the Treasurer to countersign all contracts or instruments binding the association, and receipt therefor, and take charge of all moneys put into the association, and safely keep all moneys, instruments of value, and evidences of property belonging to the association. He shall

keep accounts of the financial transactions, and make annual statements of the same to be kept in the office or headquarters of the association for the benefit of the members; he shall exhibit his accounts, vouchers, evidences of property whenever requested to do so at any meeting of the executive committee.

It shall be the duty of the Secretary to keep the minutes of the proceedings of the association, and of the executive committee, and to enter the same in his book of record. He shall give notice of the annual meeting and all other meetings of the association and of the executive committee. He shall keep on file every resolution submitted in writing, unless withdrawn by the member offering it.

He shall receive and verify all entries for insertion in the herd book, subject to the By-Laws.

He shall sign and issue all certificates of membership and register and keep a record of all such certificates issued. He shall edit and prepare a herd book for publication under the immediate control and approval of the executive committee, and shall revise the proofs and superintend the publication thereof. He shall keep on file documents constituting the authority for pedigree, and hold them subject to the inspection of any member of the association.

He shall keep a record of all transfers of the ownership of animals.

He shall be the corresponding and record officer of the association.

He shall be paid such a salary as shall be fixed by the executive committee.

ARTICLE VIII.

EXPULSION.

If any member of this association shall be accused of any misrepresentation, deception or fraud in relation to the registry of animals in the herd book, or of any infraction of the

By-Laws of the association, or any act or conduct which shall endanger the good order, welfare and credit of the association, the executive committee shall examine into the matter, and if the charge be sustained by sufficient proof, after an opportunity has been given him to appear before the executive committee in his defense, the offending member shall be expelled providing a majority of the executive committee vote in favor thereof; said vote, if so desired by the accused to be subject to the approval of the majority of the members represented in person at a regular annual meeting.

ARTICLE IX.

RULES FOR HERD BOOK.

SECTION 1. The association shall publish the "Hawaiian Live Stock Breeders' Association Herd Book" at intervals of not less than three years.

SECTION 2. Each volume of the herd book shall contain the By-Laws and a list of members, and such other matter of interest as the executive committee may deem advisable, together with an accurate register of all cattle, horses, sheep and swine accepted for entry.

Such entry shall set forth the number of animal, the sex, the date of birth, the name and address of the breeder and first owner, the name and number of sire and dam; the color of the animal, with such extension of the pedigree as may be approved by the executive committee.

The herd book shall contain no plates, engravings or publications of the records of animals.

The price for each volume of the herd book to non-members shall be its cost and postage. To members it shall be free.

SECTION 3. No animals shall be entitled to entry in the herd book unless its sire and dam are registered stock, or unless satisfactory evidence is adduced before the executive committee that such animal was at some time entitled to registry in the country from which the country was imported.

The latter provision shall apply only to such stock as were imported prior to the date of the organization of this association.

SECTION 4. Application for entry must be filled out in ink and upon blank forms procured from the Secretary, and no entry can be made unless on this form.

Applications must state the sex of the animal, the date when born, the color and different markings, the names and American Herd Book numbers of sire and dam, or the names of sire and dam and their numbers in any foreign association herd book; the signature and address of breeder, and name and address of first owner, and signature and address of present owner.

Transfers will be required from the first and succeeding owners to the present application for entry.

When an animal is a twin it must be so stated.

SECTION 5. No two animals shall have the same name.

In case the name given is in use or claimed, the Secretary will notify the owner of said animal to send four (4) names for him to choose one that is not already recorded.

SECTION 6. Transfers. In case of change of ownership, of an animal, the buyer must obtain from the seller a certificate of transfer, written in ink upon a blank form procured from the Secretary, which will, when returned to the Secretary, be entered upon the records.

Transfers upon the back of certificates of entry will not suffice.

In case of the neglect or refusal of a seller to give such application for transfer, the record of the transfer may be made by the Secretary upon the written approval of the executive committee on evidence of the sale and delivery of the animal.

SECTION 7. The ownership of sires and dams must be reported before progeny can be accepted for entry.

SECTION 8. No application for entry or transfers will be considered until the fees are paid, nor shall any number be as-

signed to the animal by the Secretary until all requirements shall have been complied with.

All transactions with the Secretary's office shall be for cash.

SECTION 9. The certificate of entry and transfer given by the Secretary shall constitute the receipt for the fees, and no such certificate shall be binding upon the association in case of error.

SECTION 10. The fee for registration in herd book, and for the certificate of registration issued by the Secretary shall be One Dollar ($1.00) to members of the association, and Two Dollars ($2.00) to non-members.

The fee for certificate of transfer of ownership, if reported within six months from sale to members of the association shall be free; to non-members fifty cents (50c.) If reported after six months from sale, to all fifty cents (50c.)

SECTION 11. All blanks shall be furnished to the members of this association free of charge. To non-members twenty-five cents (25c.) shall be charged for each blank.

SECTION 12. Extended pedigrees of registered animals, bearing the seal of the association, will be furnished upon application for One Dollar ($1.00).

SECTION 13. A duplicate of an official pedigree or certificate of registration may be obtained on the payment of the same fees as for an original on return of the original in a mutilated or defaced condition; a duplicate of an official pedigree or certificate of registration may be obtained on affidavit of the recognized owner that the original has been lost or destroyed.

These duplicates shall be plainly marked as such.

ARTICLE X.

AMENDMENTS.

These By-Laws may be altered and amended at any meeting of the members, as heretofore provided, by a majority vote of all the members of the association present at the meeting.

Report of the Secretary.

To the President and Members of the Hawaiian Live Stock Breeders' Association.

Gentlemen:—Your Secretary desires to lay before you his report from March 17th to November 17th of this year.

EXECUTIVE COMMITTEE.

The quorum provided for under our By-Laws is six. Experience demonstrates that this number is too large as we have not been able to get a quorum together at any time and have had to resort to the unsatisfactory expedient of informal meetings. The By-Laws should be changed in this respect and the number necessary for a quorum decreased. I also call your attention to the fact that the Island of Kauai is not represented on the executive committee, Mr. Francis Gay not having accepted our invitation to join the association.

NEWSPAPERS.

The Secretary has on file in his office the Breeders' Gazette and has received sample copies of the Denver Record-Stockman. He has also received sample copies of papers from New Zealand, The Star, The Lyttleton Times, Otago Witness, Canterbury Times, all of which were forwarded in response to his request, his idea being to get in touch if possible with the graziers of New Zealand. These papers do not seem satisfactory however for our purposes as they contain little of interest to us.

Much correspondence has been had with the United States Department of Agriculture, resulting in the sending to the

Secretary of a number of bulletins upon various interesting subjects and it is the Secretary's pleasure to record the fact that our association has been placed upon the list of the regular recipients of the bulletins.

NATIONAL ASSOCIATION.

Letters to the Secretary of the National Live Stock Association have brought forth the fact that our association would be welcomed as a member, that the initiation fee is Twenty-five Dollars and that the dues are fifty cents for each thousand head of stock represented by this association. The Secretary has not had means for calculating this last item but his superficial knowledge of our stock statistics leads him to believe that for the present these dues are prohibitive and he has written the same to the National Secretary. It might be well and of value to have these statistics collected provided their collection be kept confidential among the members of the association.

STOCK FOR SALE.

Several inquiries have been made to the Secretary by members of the association and outsiders as to where on these Islands certain thoroughbred and graded stock could be obtained, either by purchase or exchange. The issuing of the stock book of our association will enable the Secretary to intelligently answer these inquiries. The Secretary has assisted the committee on Stock Book and By-Laws, in their report which will be presented at this meeting.

LANTANA DESTROYING BUGS.

By far the most important work of the past months has been the work of Prof. Perkins on the lantana bugs. This subject will be more fully set forth by Prof. Perkins himself in a paper to be presented before this meeting. As you are aware the Planters' Association and the Government sent Prof. Koebele to Mexico early in the year to hunt for such

insects. The necessity of having the consignments of insects received in Honolulu and properly taken care of by an expert entomologist became apparent at once. This Prof. Perkins undertook receiving a small stipend from the Territorial Bureau of Agriculture. A flattering offer from London to Prof. Perkins made him feel that he must give the work up and return to England.

At this juncture your Secretary was unable to get the executive committee together but being directed by your President to proceed in the matter, solicited the assistance of the Planters' Association and asked for an appropriation of $82.50 per month from them and guaranteeing the like amount from our association until December 31st of this year in order to bring Prof. Perkins' salary to $250.00 a month. The Secretary asks you to suspend judgment upon this irregular proceeding until you have listened to Prof. Perkins' report.

HORN FLY.

Through Professors Koebele and Perkins your Secretary has obtained from Mexico one consignment of tumble bugs, which on the 4th of August last were set at liberty in your Secretary's dairy yard in Honolulu. These bugs are expected to feed on cattle dung where the horn fly lays its larvae, thus reducing in number the scourge which has worried so many of the ranches.

Your Secretary has communicated with Mr. Bryan the ornithologist of the Bishop Museum with reference to getting a bird to feed on the horn fly, and through Mr. Bryan the problem has been presented to expert bird men of the Mainland. Negative results alone have been obtained from these gentlemen. They know of no bird that could be guaranteed a success and which will continue to eat the horn fly after it got here. The difficulties of importation are almost prohibitive as the birds would have to be carefully fed on flies while in transit. Upon this subject your Secretary has also corresponded with the scientific men of the Leland Stanford Junior University, having heard indirectly that they had studied the

horn fly pest there but they are unable to shed any further light on the subject. Your Secretary has also corresponded with several gentlemen in Porto Rico in the hopes of finding there a tropical tumble bug which could be imported here. He was disappointed to learn that tumble bugs are not found in Porto Rico. The Department of Agriculture's bulletins on the horn fly deals with the pest as found in a dairy where it can be successfully combated, but its treatment on an open ranch is not discussed.

Experiments on the tumble bugs will be continued from time to time until our hopes in this matter are either justified or proven false. The tumble bugs which have been liberated have not been disturbed in order that may breed unmolested. If they multiply successfully, they will be distributed among the members who want them.

FUNDS.

Your Secretary urges that some method be decided at this meeting for increasing the financial resources of the association. He makes this recommendation as the result of the experience of the lantana bug experiments. He believes that more coherent force will be obtained if the association as such is continually at work along on one or more lines of experiments and investigation for the common good of its members and that without this coherent force our association may not fullfil its promises.

The Secretary further urges that the papers to be read before this meeting be printed in order that they may be preserved and studied. This cannot be done without more funds. The papers to be read are as follows:

Herefords ..... E. P. Low
Holsteins ..... Robert Horner
Water ..... Palmer Woods
Angus Cattle ..... L. L. McCandless
Island Horses ..... Julian Monsarrat

Sheep Grazing, Its effects on the pastures and on cattle pastured with them.....G. C. Munro
Lantana Destroying Insects .....R. C. L. Perkins
Imported Meats .....G. J. Waller

All of the above report is respectfully submitted.

ALBERT F. JUDD, Secretary.

November 17th, 1902, Honolulu.

Enemies of Lantana.

The following report dealing with the importation of insects and other enemies of lantana cannot be considered more than a preliminary sketch of the subject, because the work itself is still far from being finished, and it must of necessity be a considerable time before the results of what has already been done can be ascertained. Naturally for much of the information contained herein, I have drawn upon the letters written to me by Prof. Koebele, with whom I have been in constant correspondence since the beginning of his work in Mexico, and to whom I have from time to time put many questions not only on matters of importance concerning the treatment of the material forwarded by him and its condition on arrival here, but also on matters of general interest, such as the effect of the insects on the lantana in Mexico, the abundance of the plant, the nature of the country where it grows best, and so on.

As is well known, two species of lantana were introduced into these Islands in 1858, one of which, the present pest, owing to the fact that its berries were greedily devoured by the imported mynah and the doves, quickly spread over a large extent of country, and still is spreading. The other, perhaps, because its berries are less palatable, remained practically as a cultivated plant.

I had hoped that in Mexico there might be some bird which would feed on the unripe berries and in this way get ahead of the dove and mynah, bu there appears to be none.

It is quite clear that while the dove and mynah remain abundant and the lantana seeds freely as it now does, no destruction of the plant unless universal can ever check it. Even though many acres are cleared constant vigilance will be needed to destroy the young plants which spring from the

seed carried from an adjoining lands and dropped by these birds. Both these birds take extremely long flights in ranging for food, passing from the coast to the uplands or vice versa in the course of the day. If however one can to a very large extent destroy the flowers or the berries before they ripen, one can very greatly check the rate at which the plant is spread, and then proceed to destroy the grown bushes, with some confidence that they will not be easily replaced by fresh seedlings.

As in these Islands, so in Mexico, the lantana camara, our common species, grows in very different localities. Thus in Orizaba it is comparatively wet, rain nearly every day in the wet season, and the lantana is rather soft and spongy and liable to the attack of fungoid diseases. There it grows along the path by rocky hill-sides and along well drained roads but is not numerous, often half a mile without a single plant. On a very steep rock hill it was found most numerously, a plant every fifty yards or so.

In the dry district of Morelos, it is found in the same scattered manner, a plant to about 500 yards, growing with other trees which are familiar here, the algaroba, and the glue-bush (Acacia farnesiana). In a six mile walk along a river not a plant was found, but three other kinds of lantana were noticed rarely. In quite open grass land only three or four plants were found, and it was noticed that it was here eaten by the goats. In the best locality a plant was found every hundred yards in a half mile square, growing three or four feet high and generally the top nipped off by cattle.

In some ways unfortunately, the rain this year in Mexico was unusually late so that at the beginning of Mr. Koebele's work, from June onwards, the outlook was not very promising. On the 13th day of August, after rain had set in, he writes of Morelos, "the place has now become very interesting," (after 2 months' absence) "and I take more hopes." At the same time the information gathered as to the best localities for the lantana and the knowledge of the habits of some of the insects before the best season commenced was certainly

well worth finding out in advance. In September seeing that Koebele had now acquired an extensive knowledge of the localities for lantana and had seen a good deal of the insects attacking it, I wrote to obtain his opinion as to whether it was certainly these that checked the plant, so far as he could ascertain. His answers of October 8th was, "Most positively the various insects keep the lantana in check in Mexico; no young plants are met with, it must be exceedingly rarely that these come up."

In a letter written October 14th, Mr. Koebele gives me a list of what he considered the most important insect enemies of lantana. This list consists of 23 different species, to which may be added two fungoid growths which attack the plant. These however by no means constitute the whole number of enemies, those which attack the foliage in general being entirely left out, since Mr. Koebele considers them of little importance. On this one point we are inclined to differ as it seems to me that some of these are likely to thrive especially well here, and few plants can stand repeated defoliation at certain seasons of the year. Nor does the list include those insects which we think will prove dangerous to the vegetation, nor even those of which we are suspicious and which require experimenting with before they can be released. Some of these in reality may eventually prove to be of great service.

Classifying the species included in the list according to their habits:

5 live to large extent on the seed, though sometimes eating buds, young shoots, etc.

10 chiefly feed on flowers and buds.

2 from galls on the flowers.

1 chiefly on growing shoots and flower buds.

2 are borers in the twigs.

1 is a large borer in the roots.

1 is a large borer in the lower parts of stem.

1 destroys or deforms the young leaves.

Some of these species I have yet to see and of a large proportion, I have so far only received very few individuals, far too few to lead me to expect that I have been successful in establishing them. This fact leads me to speak at some length of the difficulties inseparable from making introductions of this kind in a new and distant country, the more so as I find few people appreciate how great these really are. They are mainly due to three causes: (1) To the length of the journey from Mexico to these Islands and the climatic changes passed through on the way. (2) To the parasite enemies and diseases of the insects themselves. (3) That it is not easy to get required insects to breed when imported unless very large numbers are received.

On the first head it must be remembered (A) that the insects in Mexico are collected at an elevation of 4000 ft. and upwards and between the collecting ground and California have to pass through a very much hotter belt before they arrive at San Francisco and are put on ice for shipment here. In passing through this heat an enormous proportion of such species as have to be sent in their earlier stages, hatch out and die, at least in the hotter months. (B) It is extremely difficult to keep the food required on the journey in good condition, the flowers of the lantana being very delicate, and when shut up in quantities together all the parts of the plant readily go mouldly and the insects are destroyed. We have practically overcome this difficulty by the use of chemicals and special modes of packing.

(2) The lantana-eating insects are by themselves all subject to the attacks of parasites, and the attack is always fatal. In many of the species that would be most serviceable here the number that escape these parasites is extremely small. As an instance of this I may refer to a consignment of berries recently received. These berries were very badly attacked by two insects living internally in the seeds and entirely destroying these—one, the caterpillar of a small moth, the other the larva of a small fly. On the second day there

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emerged from the berries two individuals of the fly, not one of the moth but 45 parasites (of several different species) each one of the 45 being bred at the expense of one of the lantana-feeders. It is hardly necessary to say that the utmost care has to be taken that not one of these parasites is allowed to escape, since the efficiency of the work on the lantana by the various insects attacking it is enormously increased by the absence of parasites. It might be argued that as in Mexico the destroyers are efficient in spite of these parasites they would also be so here, but the cases are widely different. Here the lantana has had a start of over 40 years practically without enemies with much to favor its growth in soil and climate and latterly birds in great numbers to scatter the seed. In Mexico no doubt there is between the plant and its destroyers and between these and their parasites a state of equilibrium which might have been the case here had these been brought with the plant. Now, however, a great multiplication of the lantana destroyers is necessary, and it is on the excessive increase which should take place in the lantana insects introduced without parasites which I should base the hope of success. What this increase may be, climate and other things being favorable, may be judged from that of the so-called lantana blight of Maui which is practically without enemies. It is very unlikely that more than a few individuals of this were accidentally imported on some fruit tree or ornamental tree or bush, and yet now countless myriads are found in a very limited area.

Besides the parasites some of the most efficient destroyers are subject to fungoid diseases. This is especially the case with a large borer—grub living in the stem, and a caterpillar which not only bores into the stems and roots, but comes out at night and eats complete grooves round the former. In one consignment of stems and roots I estimated that over a hundred of these two destroyers were sent but only two or three were alive on arrival. The others were simply converted into a mass of the parasitic fungus, and those still alive died within a day or two of the same disease. If one or two in the con-

signment are diseased some of the myriads of spores produced are sure to reach the others and infect them.

Two of the species, at least, that are subject to this disease are of great importance and their introduction should be attempted again and again till successful. How few of the larvae escape disease may be judged from the fact that neither Koebele in Mexico nor myself here have been able so far to breed the perfect insect. That these species survive at all is probably due to their being extremely prolific, and for this reason, if exempt from disease here, they should be very efficacious.

(3) Many of the most important destroyers of the lantana have so far been received only in very small numbers (largely owing to the extent to which they are parasitized) and at the same time they will not lay their eggs nor even pair in confinement. Owing to the presence in the Islands of the scale-bug known as the lantana blight, I find that there is a general impression that the Mexican insects are of the same sluggish character requiring to be spread by hand to be effective. On the contrary some of these are extraordinary active, and an individual liberated here in the morning, might easily be at the other end of the island by mid-day. If well established this certainly will greatly facilitate the spread of such species but when one has only two or three individuals to turn out which starts off in different directions one cannot overlook the possibility that they may never meet again, to effect a pairing. Had the nature of the habits of many of these important insects been known beforehand, I believe that by making preparations for their reception on a large scale they could have been induced to breed in captivity, but they certainly will not do so, when enclosed over a single growing bush in the open.

As to the final success of the work of importing lantana enemies personally I should not at present care to express a decided opinion. The experiment is, so far as I know, absolutely unique, nothing of a similar kind having been attempted in other countries. I can only say that Mr. Koebele believes

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that he will succeed, provided that he is allowed his own time. I have all along estimated the time necessary for the work to be longer than he has, though latterly I find he inclines to my view. The best season in Mexico is comparatively short, and I think it unlikely that we shall get all the destroyers already known to us imported before this ends. Moreover there is a lantana country south as yet uninvited, where there may be a large number of other destroyers. I have made no attempt to estimate the amount spent in recent years on clearing land of lantana, but I imagine it to be so large as to make the cost of the present experiment insignificant even if Mr. Koebele is given all the time he wants for further researches. Collecting in the hot country in Mexico is (as I myself have experienced) extremely laborious, and I have at times feared that he might find it necessary to give up, or be unable to return there, if this is desirable. This would be a matter for much regret as his knowledge is now invaluable and it would no doubt take another man more than a season's work to arrive at this.

As to the species that have already been turned loose in greater or less numbers, none of these so far as possibly can be forseen, are likely to do damage to plants other than lantana. One or two which might have been established have been discarded at least temporarily, from perhaps an excess of caution. Many excellent enemies of lantana in Mexico are of course out of the question, since they would certainly damage other plants.

Incidentally in bringing the things over here to eliminate parasites, many interesting facts were observed. Thus the parasites of some seed-eating species would do excellent service in the forests here, where the seeds are much damaged by introduced insects. Similarly various other parasites were bred which might greatly reduce the Kou worm and that of the cocoanut, as well as the one now so injurious to citrus and other trees and the caterpillars of the Koa trees. Some time ago, Mr. Koebele wrote to me to do as I liked about introducing these parasites, but in no case have I done so, as

there is no doubt that some of the best lantana destroyers would thereby lose some 90 per cent of their effectiveness and I think that these should be given every chance for some time to come. I may say that Mr. Koebele in his latest letter has fully approved of the course taken by me in this matter.

R. C. L. PERKINS.

HEREFORDS

MR. PRESIDENT AND GENTLEMEN OF THE CONVENTION.

You have assigned the subject on Herefords to me. In submitting my report on this special subject to the convention, I must say you have honored me, and I will tell this convention what little I know about this grand breed of cattle on the Islands.

I have prepared my subject and intend to make it as brief as possible so as not to take up too much of your valuable time. It is not strictly necessary to narrate the full history of this celebrated class of cattle, but will give you a few facts only.

I am sure you all are in possession of this knowledge; it has its ancient descent as the short-horn; that this breed has won by force of merit in the cattle world is undoubtedly unquestioned.

There is no authentic record of the importation of this class of cattle to America earlier than 1816, the first pair being purchased from England by Henry Clay for his ranch in Kentucky. But since, the exodus of this noble breed came fast and plentiful, till America can show to her mother country that across the Atlantic, cattle to this breed can cope for places in the show rings.

From ancient record the Hereford has been notorious as a raising breed; they are a low, thick set animal for beef-making and not for dairy purposes.

The Hereford in ancient records is not exactly uniform in color. In 1766, some were recorded as dark red or very dark brown with mottled faces, roan, ticked face, hail backed. The breeding of to-day has brought the Hereford down to as close

a uniform color and marking as possible, with a pure snow white face, extending clean around the head and jaws and down end of neck or throat to brisket, with good clean, white line to top of shoulder or chine, four white stockings, a white switch, and white line on belly, pouch white.

Mr. Tompkins as far back as 1720 was noted as a breeder of the Hereford and had in his celebrated herd different colors as above stated, and any Hereford animal in whose veins the Tompkins' blood predominated was considered in the ranks of the high classed. In 1847 "Symmetry," the champion mottled face bull, was a cup winner at Tredegor & Leonminster shows, in England, and was a royal winner at North Hampton; another royal winner was the "Duchess of Norfolk" in 1851, red with spotted face. This winner's sire was "Tom Thumb," whose daughter in 1852 was also a royal winner, her name was "Grey Daisy" a roan. Mr. W. P. Griffiths bred in twenty years to pure white faces, from mottled face heifers.

In Lord Berwick's sale in 1861 "Silver," the wonderful Hereford cow, her nose was black as the ace of spades. Her progency, eight in number, were conspicuous in the great animal shows in England. Color is least regarded in all exhibitions, as long as you produce the pedigree that is all that is required. The individual merit, regardless of color, in all competitive exhibits is what forces an animal to the front.

It is by judicious mating that makes breeding to color or any line perfect. I cannot go into every detail as regards the great merits at the blocks or markets, but would like to refer you to the great official weights of Herefords and Shorthorns at the National Hereford Shorthorn show at Kansas city, October 21-26, 1900, where the Hereford outclassed her rivals the Shorthorns in all ages from three years to six months, and in 1901, the Shorthorn was a little the best of the white faces. The white face meat is always preferable over and above other beeves except the Shorthorns and Angus. So you can readily understand the reason of the great demand of the white faces as weighty and good close grain carcass.

The white faces have great redeeming qualities, as rustler

and early maturer. The Hereford, as rustler, is champion of all cattle. This is undisputed. The record shows as far back as 1795 that the Hereford is spoken of as the greatest rustler, and the most profitable of all cattle for scant and rough ranges where pasture feeds are unreliable and scarce.

The qualities of the beef of the Hereford, as above stated, are unquestioned.

In one of the sales made in December, 1901, graded Herefords and Shorthorns, averaging 1465 pounds, a gain in feeding of 514 pounds in six months, sold at a very high price of $7.95. The Hereford, according to statistics, is the quickest to fatten over his other rivals.

S. L. Brock, one of the most prominent Hereford breeders of America, in reply to queries made by his friends, as regards Herefords, answered as follows:

First. Cattle that mature early.

Second. Cattle that are gentle and easily restrained on the farm.

Fourth. Cattle that are uniform in type and coloring.

Fifth. Cattle that most thoroughly mark their grade offspring with their own likeness.

This same man of experience tells of the docility of this breed and its rustling qualities over and above his rivals.

Another letter from T. F. Reynolds, a man of great experience with the Herefords, replies as follows to Dr. Cagle's inquiry, with regard to the different breeds of pure bred cattle: "I want it understood that I am not breeding pure bred cattle of any breed for sale, so that I am disinterested. I have been watching the different breeds with much interest for a number of years with the idea of selecting the breed that is the best rustler. Four years ago this fall some people here bought between 400 and 500 Wyoming yearling heifers. They were represented to be from pure bred bulls of Shorthorn, Angus and Hereford blood, running about two-fifths Shorthorns, two-fifths Herefords and one-fifth Angus. They were in fine condition in October. I thought I never saw a prettier

bunch of heifers for so large a herd. They were taken to a ranch in Custer Co., Neb. to rustle. The grass was fine buffalo and had not been grazed through the summer. They had some hay and plenty of wheat and oat straw when snow was on the ground. They seemed to do pretty well until the spring rains set in and calves began to come. Then grief began.

"I was with them the last of April and until May 30, and I thought in this instance it was a thoroughly demonstrated fact that the Herefords were the cattle for the Nothwest, as there were scarcely any deaths among the Herefords, and a very small per cent lost their calves, while the loss in grade Shorthorns was very heavy and they lost fully one-half of the Angus heifers. They were thin and weak, and when they came to calve they would only make one or two efforts and then give up, would not labor when we were assisting them. The Angus were the worst in this respect, and Shorthorn second, although there was not nearly so large a per cent of loss among the Shorthorns as among the Angus. There have been several other instances where I have noticed the same results, although not so marked as in this. Perhaps the surroundings or environments in Arkansas are different, but if I was choosing rustlers for this latitude, I would take the Herefords first, the Galloways second, all the time."

Take my own experience with this class of cattle for the Islands. I cannot say too much or high enough praise for its quick growth and rustling qualities. As far as docility or timidity is concerned, it possesses both,—you can make him as tame as a child, and you can make him as wild as a lion. I think you can force that in every animal.

I have a herd of pure breds from New Zealand of the two great rivals, Shorthorns and Herefords. From the day the two herds were landed the Herefords took to the land and went about their business, and turned us in good results, and were marking their progeny, till I had to abandon recording the calves, for they came in so fast, and adhered strictly to recording only the very finest. These Herfords were never found grazing in one particular spot but were found in differ-

ent localities only by the distinct sounds of their bells. You will find them in one section of the field one day, and the next day you will find them in another.

Her rivals on the other hand, the Shorthorns, had to be cared for, fed and watered, and you can always find them in the same location, and they are more delicate, requiring the very best of pastures. Their progeny are a little more delicate in constitution than the Herefords.

In 1899 we caught a wild graded Hereford, aged, that dressed 1015 pounds, his hide weighing 101 pounds. In the early part of this year we sent a 20 months', or, put it down as a two year old to the Metropolitan Meat Co., a young graded Hereford Holstein steer that dressed 598 pounds.

This plainly demonstrated without quoting thousands of testimonials that this grand Hereford is one of the great beef producing animals of the age.

In 1901, the prize two year fat carload of steers went to the Herefords. The Angus took the ribbon in 1900.

It is authoritatively stated that the Hereford strain has hardly a record of being tained with tuberculosis, and I can safely vouch for this, as my experience shows on our ranch. Whenever an animal affected with tuberculosis was discovered, it was always found in the Shorthorns.

I have heard a good many complaints that Herefords could not be successfully raised on Kauai on account of their eyes being affected with some kind of a disease. Whether this is true or not I cannot authoritatively state. If such is the case the cause is unknown to me, and same does not appear on our ranch, aswe have graded and three-quarter bred Herefords as far down as the beach line, and they are not affected.

Our neighbors, the Parker ranch and J. A. Maguire, are beginning to realize the great merits of the Hereford and they

have imported quite a herd for the improvements of their herds.

For the Islands, where our seasons are so unreliable and feed so poor and scant, none can better be imported or raised than Herefords for beef producing qualities.

EBEN P. LOW.

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EBEN P. LOW.

SHEEP.

Their Effect on the Pastures, and on Cattle Grazing With Them.

MR. PRESIDENT AND GENTLEMEN OF THE ASSOCIATION.

I have heard so much said against sheep grazing as being injurious to the pastures, and also against the system of carrying sheep and cattle together, that it would seem that there is much misunderstanding on the subject.

On most kinds of pastures judicious stocking with sheep improves the land and the feed, and there are few pastures where sheep and cattle cannot be successfully carried together, provided that the proper proportion of both animals be kept on the land at the same time, and cattle pastures can be much improved by periodical heavy stocking with sheep at the proper seasons when the cattle are on other lands. Sheep being close feeders it is not to be expected that cattle would thrive where the pastures were heavily stocked with them.

On the superior pastures of temperate climates the good effect of sheep grazing is very marked, they keep back the weeds and by close cropping and even manuring the best grasses are much strengthened and invigorated.

And also on the Hawaiian dry areas where a series of fairly wet seasons have so favored the growth of brush as ilima, etc., that the land is covered so densely that the annual grasses have little chance to germinate so much light being excluded from the surface of the soil, by heavy stocking for a

short time with sheep just before the first annual rains they will eat back the brush and thus favor a heavier crop of grass, enabling the grazier to relieve his more permanent pastures during the wettest months and so fit them in a better way to carry his stock in good condition through the dry season. The brush is a good standby during the dry season but should not be allowed to choke out the annuals.

Such pastures as are taken up principally by maniania or pili grass will not be improved by continuous or heavy stocking with sheep, the tendency being to reduce the number and quantity of other plants to the detriment of the pasture. Valuable as these grasses are their value is increased by an admixture of other plants with them. By continuously stocking with sheep pastures adjoining guava covered land this pest can be kept out, as the sheep crop off the young plants as they come through the grass. They will also hold lantana in check, but at the same time other desirable plants may also be kept back. The prejudice against sheep arises in a great measure from the feuds between sheep and cattlemen on the large Government ranges of the Southwestern States, where very large numbers of sheep are herded together and clean up the pastures wherever they go, leaving nothing for the cattle herds that may have previously pastured on the range.

G. C. Munro.

The Aberdeen or Angus Polled Cattle.

MR. CHAIRMAN, AND GENTLEMEN OF THE HAWAIIAN LIVE STOCK BREEDERS' ASSOCIATION.

Even the great Charles Darwin, author of the "Origin of Species," did not consider it beneath his dignity to make research in the field of the first sub-heading to be treated in this unpretentious paper on the Aberdeen or Angus Polled Cattle. He said, writing but a few months before his death, in the year 1882: "No one can give any explanation—though there no doubt must be a cause—of the loss of horns, any more than of the loss of hair, both losses strongly tending to be inherited. It is, I think, possible that the loss of horns has occurred often since cattle were domesticated, though I can call to mind only a case in Paraguay about a century ago."

To reach a verdict or a fact quickly it may be said that the authorities having been consulted and their conclusions weighed, there is justifiable the statement that the absence of horns was due first to sudden organic changes. Then selection in breeding fixed the new feature as an original character, for it is certain that all the principal races of polled cattle are entitled to be classed as distinct breeds.

It is in Scotland and England that the best works on domestic cattle have been produced. The subject has a splendid literature and all the rules of exact science have been brought to bear on the compilation of pedigrees and the arrangement of herd statistics.

Selection in the breeding of cattle has been observed and followed and written upon from the earliest historic times. Virgil spread knowledge upon the breeding of both horses and cattle, speaking of horses for the Olympic games and bullocks for the plough. To obtain best results in the line of a beast

of burden he strongly advised attention to the "make of the mother."

It has been established that there were polled cattle distinctly bred in the counties of Aberdeen and Angus as early as 1752. They were first called "humlies" or were said to be "dodded." It was doubtless their natural development that early brought them into highest favor both for the butcher block and the pail. For many years they were generally spoken of as "black cattle," though there were herds of both reds and grays. To this day color variation is not infrequent and is not regarded as a serious fault. There are authorities presenting statements that hornless cattle were known in Scotland "from time immemorial," but the most careful historians discard this vague term and in speaking with positiveness on date fail to venture further back than a few years after 1700, A. D.

The chief characteristics of the Aberdeen or Angus polled cattle are the same today as two hundred years ago. The following description has well stood the test of time: "The head of the polled male should not be large, but should be handsome and neatly set on. The muzzle should be fine; the nostrils wide; the distance from the nostrils to the eyes of only moderate length; the eyes mild, large and expressive; the poll high; the ears of fair size, lively and well covered with hair; the throat clean, with no development of skin and flesh beneath the jaws, which should not be heavy; the neck pretty long, clean, and rising from the head to the shoulder top, and surmounted by a moderate "crest," which contributes to masculine appearance—a desirable point in a bull. The neck should pass neatly and evenly into the body, with full neck-vein. The shoulder blades should lie well backwards, fitting neatly into the body, and not lying awkwardly outside it; they should show no undue prominence on the shoulder top, on the points or at the elbow. An upright shoulder in cattle is general accompanied by a light waist—an important and in all breeds a much too common defect. The chest should

be wide and deep, so as to give plenty of room for lung development. The bosom should stand well forward between the fore-legs, and underneath should be well covered with flesh and fat. The crops should be full and level, with no falling off behind them; the ribs well sprung—springing out barrel-like and neatly joined to the crops and loins; the back level and broad; the loins broad and strong; the hook bones not too wide—narrower than in an average Shorthorn; the quarters long, even and rounded, with no hollow from the hooks to the tail; the tail should come neatly out of the body, not too far up the back and not higher at the root than the line of the back; the tail should hang straight down, close to the body all the way till it comes near to the level of the flank. On both sides of the tail the quarters should turn away in a rounded manner, swelling out downwards and ultimately passing into thick, deep thighs. The twist should be full and the hind legs set well apart and not detached from the body till the level of the flank is reached. The flank should be full and soft so that a good hand-full may be got out of it. The bottom line should be as even as the top and side lines; and the bones of the legs, fine, flat and clean with plenty of muscle and flesh above the knees on the fore-legs. The body should stand neatly and gracefully on the legs, and when the animal is stationary the fore-legs should be perfectly straight and the hind-legs very slightly bent forwards below the hock. All over the frame there should be a thick and even coating of flesh. Even the hook-bones and other prominent parts should be well covered and above all there should be no patchiness—no hollows and no rolls of hard flesh with spaces of soft, useless fat between them, such as are always to be found in a patchy animal. Except in rare cases the skin is fairly thick, but soft and pliable; it ought to be especially free over the ribs. The hair as a rule is not long, but is fairly thick and soft; and in the best animals shows two growths or rather lengths—one short and thick and the other longer and thinner. When walking a really good animal presents a compact, graceful and symmetrical appearance. In appearance it has

hardly any equals and no superiors. As a matter of course the cows differ considerably from the bulls. The head is much finer, the neck thinner and cleaner, with no crest, the shoulder top sharper, the bone altogether finer, the skin not quite so thick; the udder large and milk vessels large and well defined." It is told as well authenticated that the leg bones of one of the prize block animals of this breed "were no larger than those of a deer!" As milkers the cows of this breed have always more than held their own. In many competitions in Scotland, England, Ireland, the Colonies and the United States they have easily taken first honors for both quantity and quality and have been particularly noted for the excellence of the butter produced.

The Aberdeen or Angus polled cattle reach maturity as early as any of the other leading breeds. They are gentle and have remarkable independence, thriving under lack of care approaching in every feature almost absolute neglect.

It is as beef that the "Blacks" have become famous the world over. In the United States, at Chicago, the greatest beef market in the world, they have been first many times and hold the record to this day. At their home and on the continent, they have won against the keenest rivalry. In one of the numerous herd books of Scotland there are seventeen closely printed pages of regular size devoted to enumeration of the prizes taken by the band listed. At all sales they have brought the highest prices. The meat has a fineness, a flavor, a very look that impresses both the butcher and the customer and that is invariably found to have been innocent of deception. One of the greatest live stock shows ever held was that of the Paris Exposition of 1878. Here the Aberdeen or Angus polled breed carried off every single honor for which it was entitled to compete. In their winnings it has not been a case of single groups or individuals being taken from place to place winning, but the prizes have been distributed amongst widely separated herds.

The most satisfactory cross—for beef—ever produced with

the Angus or Aberdeen cattle, was with the Shorthorn. This cross breeding was at one time such an absolute craze that the very lives of the two breeds were threatened. Happily the leading owners of the "Blacks" saw far enough ahead to stem the tide of the fad and preserve better than ever the wonderful polled cattle.

It is between thirty-five and forty years ago that the marked movement of the Aberdeen or Angus polled cattle to the United States began. There are now many magnificent herds on the mainland of our country—east, west, north and south and the reports from all directions are that they are more than satisfactory. The cows have considerable fame as milkers. There is constant experiment in cross breeding and with cheap grades it has at times been found to be profitable in every way. The American growers still continue to send their agents to Scotland for special sales.

Here in Hawaii the breed under discussion is well and favorable known as the "Polled Angus." Importers for breeding—other than myself—whom I call to mind are Hon. S. M. Damon from England, Joseph Mendonca from California, the Oahu Railway & Land Company, Ltd., from the States. My own investment or importation and a venture which I have never had any cause to regret, consisted of an even half hundred well selected thoroughbreds brought here by sailing vessel from the State of Washington in the year 1896. I have even a number of the oldest cows yet. Of the whole of the herd none have ever been "kept up" or feed, excepting the milch cows. Drought has not hurt them. Neither the grown stock nor the calves were hurt by the dry season of 1898. All do well on the native grasses. I have found them in the pastures to be what the western stockmen of the Mainland call "good hustlers"—I may say better than even the native Island cattle. The half breed Polled Angus cattle here mature earlier and put fat on more rapidly than part Durham or part Holsteins under the same conditions. This is given as my own experience. The Polled Angus beef is of course prime and the carcasses of the half-breeds are in every way

satisfactory. The meat here sustains its reputation. On the whole it may be asserted as the conclusion of experience that the Aberdeen or Angus polled stock is peculiarly well adapted to Hawaiian pasturage. The thoroughbreds that I brought here proved to be good milkers and the half-breeds, with care used in selection seem to be as good for the pail as the thoroughbreds. I have dairy statistics where the half breed Polled Angus cows form a goodly portion of the herd and the average per animal ranks with the best here.

In conclusion I may say that I unqualifiedly recommend the improvement of all our herds in Hawaii, whether or no I have convinced the breeders that in the grading the Aberdeen or Angus polled cattle should be first choice.

Yours respectfully,

L. L. McCandless.

HOLSTEINS.

To the President and Members of the Hawaiian Live Stock Breeders' Association.

Gentlemen:—Being requested to write on the subject of Holsteins by your committee I herewith give a little history and personal experience with this noble breed.

The Holstein Friesian cattle are the descendants of cattle bred by the Friesians or Hollanders dating back to near the beginning of the Christian Era. The Holsteins are the oldest pure breed on record. It was celebrated throughout Europe before the foundation of any of the other breeds was laid.

The Holstein Friesian cattle are rapidly occupying the richer and more important dairy sections of the world. From the earliest records of dairying these cattle have been developed for dairy purposes.

According to a statistical authority on stock matters this breed is found in more countries, occupying more territory and probably producing more milk, cheese and butter than all the other dairy breeds combined and in the end have a good carcass for beef.

It is claimed by some authorities that the early importation of Dutch cattle exercised great influence on the formation of the Shorthorn breed.

The American breeders of Holstein Friesians were among the first to recognize real merit as of more importance than mere pedigree. And their association published what is styled an Advanced Register, in which only such animals are eligible to register as have been officially tested for productive ability and found to reach certain standards adopted by the associ-

ation. Such standards varying with the age of the animals and the length of time after calving. These rules require that a two-year old shall have given not less than 9 lbs. of butter in seven consecutive days, or not less than 6,500 lbs. of milk in ten consecutive months. The five-year old cow must give not less than 15 lbs. of butter or 10,700 lbs. of milk in the period named above.

Volume I of this Advanced Register published in 1887 contained the names of over 350 cows and heifers, the property of about twenty different owners. Of these, 12 head each gave in a year 18,000 lbs. of milk; and 102 head each gave over 15 lbs. of butter in a week.

Their milk.—it is difficult to exhaust a subject of this kind as there are so many tests going on all over the world. And knowing there should be a limit to a paper read before an association of this kind, suffice it to say that stockmen handling the Holsteins do not hesitate to admit that the Holstein milk contains a lower percentage of fat than the Jersey, but in view of the large quantity of milk they produce that can be used for other purposes, such as feeding swine, etc., all goes to the credit of the Holsteins.

Since starting the Kukaiau or Horner's ranch we have imported the Holstein cattle yearly and find they do exceedingly well, standing the severe drouths we experience a few months of every year better than any other breed excepting probably the Herefords, and as soon as the rains commence the Holsteins take on flesh and are soon in a marketable condition.

Thanking you gentlemen for your kind attention, I remain,

Very respectfully yours,

ROBERT HORNER.

Excerpt from Report of Governor of Hawaii for 1902.

During the year the Hawaiian Live Stock and Breeders' Association has been organized for the improvement of live stock breeding, the introduction of new pasture grasses, and the preserving and restoring of such forest growth as may be beneficial to grazing lands.

Such an organization has been much needed in the past. It is likely to have a very beneficial influence toward the improvement of ranch management in the Territory, which heretofore, with few exceptions, has been conspicuously without system or any application of scientific principles.

Consumption of Hawaiian cattle and sheep in Honolulu.

	Number	Value	Weight	Average weight	Average price
			Pounds	*Pounds*	
Cattle	4,998	$225,399 75	2,352,841	422 7	$40 10
Calves	588	9 672 51	....	....	16 45
Sheep	8,352	26,043 93	279,315	33.44	3 12

	Pounds
Largest average weight of cattle from any ranch	584
Smallest average weight of cattle from any ranch	282
Largest average weight of sheep from any ranch	38
Smallest average weight of sheep from any ranch	29

Meats brought into the Territory (approximate).

	Quantity	Value
	Pounds	
Beef	1,170,153	$104,303 45
Corned beef	....	1,896 27
Venison (50 carcasses)	3,372	2,409 92
Veal	169,366	17,991 07
Lamb and mutton	320,260	31,536 96
Turkeys, chickens, etc	116,824	19,331 16

NOTE.—The weights mentioned in the foregoing tables are for dressed meats.

List of Officers and Members,

NOVEMBER 17 1902.

President.....Paul R. Isenberg.
Vice-President.....Eben P. Low.
Secretary.....Albert F. Judd.
Treasurer.....A. B. Wood.

EXECUTIVE COMMITTEE.

For Kauai.....E. A. Knudsen.
" Oahu.....L. L. McCandless.
" Molokai.....A. W. Carter.
" Maui.....W. H. Cornwell.
" Hawaii.....J. Monsarrat.

Bolte, C.....Address, Honolulu.
Carter, A. W..... " "
Cornwell, W. H..... " Waikapu, Maui.
Damon, S. M..... " Honolulu.
Dowsett Co., Ltd..... " "
Hawaiian Agricultural Co...Care of C. Brewer & Co., Hon.
Herbert, Allen.....Address, Honolulu.
Hitchcock, H. R..... " "
Ii Estate, John Ltd..... " "
Isenberg, Paul R..... " "
Irwin & Co., W. G..... " "
Kukaiau Ranch..... " Paauilo, Hawaii.
Knudsen, E. A..... " Kekaha, Kauai.

Lihue Plantation Co., Ltd.	Address.	Lihue, Kauai.
Low, Eben P.	"	Kawaihae, Hawaii.
McCandless, L. L.	"	Judd Bldg., Honolulu.
Mendonca, J. P.	"	Honolulu.
Molokai Ranch	"	Kalae, Molokai.
Monsarrat, J.	"	Pahala, Hawaii.
Oahu Railway & L. Co., Ltd.	"	Honolulu.
Parker, Samuel	"	"
Raymond, J. H.	"	Makena, Maui.
Robinson, Aubrey	"	Makaweli, Kauai.
Robinson, M. P.	"	Honolulu.
Searle, R. C.	"	Lahaina, Maui.
Smith, Jared G.*	"	Honolulu.
Swanzy, F. M.	"	"
Shipman, W. H.	"	Hilo, Hawaii.
Waller, G. J.	"	Honolulu.
Waterhouse & Co.	"	"
Wight, Dr. Jas.	"	Kohala, Hawaii.
Wilcox, A. S.	"	Lihue, Kauai.
Wilcox, G. N.	"	" "
Wilcox, S. W.	"	" "
Woods, J. F.	"	Mahukona, Hawaii.
Woods, Palmer P.	"	" "

* Honorary member.

1903

THE PROCEEDINGS

OF THE

HAWAIIAN

Live Stock Breeders' Association

SECOND ANNUAL MEETING

HONOLULU, HAWAII

DECEMBER 21, 1903

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HONOLULU:
HAWAIIAN GAZETTE CO., LTD.
1904

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MEETING

OF THE

HAWAIIAN LIVE STOCK BREEDERS' ASSOCIATION,

IN THE JUDD BUILDING, HONOLULU,

MONDAY, DECEMBER 21, 1903, 9 A. M.

Held in the rooms of the Merchants' Association, fourth floor of the Judd Building, in the City of Honolulu, Territory of Hawaii, on Monday, the twenty-first day of December, A. D. 1903, at 9 a. m.

ROLL CALL.

PRESENT: A. M. Brown.
J. F. Brown.
John Cullen.
H. R. Hitchcock (by A. F. Judd, proxy).
Haleakala Ranch (by L. von Tempsky, Manager.)
Hawaiian Agricultural Company (by J. Monsarrat, proxy.)
John Ii Estate (by C. A. Brown).
E. A. Knudsen.
L. L. McCandless (by A. F. Judd, proxy.)
Molokai Ranch (by A. W. Carter.)
J. Monsarrat.
W. T. Robinson (by A. W. Carter, proxy.)
R. C. Searle (by L. von Tempsky, proxy.)
W. H. Shipman (by Julian Monsarrat, proxy.)
A. S. Wilcox (by A. F. Judd, proxy.)
S. W. Wilcox (by A. F. Judd, proxy.)
Total—15

Arriving later: O. R. & L. Co., by H. von Holt, proxy; Dowsett Company, by H. von Holt, proxy; E. P. Low, by Fred Wundenberg, proxy; J. F. Woods, by Fred Wundenberg, proxy; Samuel Parker, by F. Wundenberg, proxy; Dr. James Wight, by R. W. Shingle, proxy; Palmer P. Woods, by R. W. Shingle, proxy; Jared G. Smith and D. P. R. Isenberg.

Present, also, L. A. Thurston, President Board of Commissioners of Agriculture and Forestry; R. C. L. Perkins, Assistant Entomologist; J. E. Higgins and Dr. Shorey of Hawaii Experiment Station; F. G. Krauss, Agricultural Instructor of the Kamehameha Schools.

The Secretary thereupon announced that fifteen members were present, that the same constituted a quorum, that President Isenberg had been delayed and had requested him to call the meeting to order, and that he would proceed under these instructions, unless there was objection.

The Secretary. The second order of business is the reading of the minutes of the previous meeting and action thereon. These minutes were published in the last proceedings of the Association, and I presume have been read by all those present.

Mr. Carter. I move the reading be dispensed with, as everyone has been supplied with the annual report.

Mr. von Tempsky. I second the motion.

Motion put and carried.

The Secretary. The third order of business is the annual address of the President. Mr. Isenberg will be a little late at this meeting, and I presume will present his address later. The next is the report of the Secretary.

(Secretary reads report.) See page 32.

Mr. Isenberg having arrived during the reading of the Secretary's report at its conclusion took the chair.

President Isenberg. What is the pleasure of the members with regard to the report of the Secretary?

Mr. von Tempsky. I move that it be accepted and placed on file.

Mr. Carter. I second the motion.

Motion put and carried unanimously.

The Secretary. The Treasurer has asked me to present his report. (Reads report of the Treasurer.) See page 38.

The President. What is the pleasure of the Association with regard to the report of the Treasurer?

Mr. von Tempsky. Have we an Auditor?

The President. No.

Mr. von Tempsky. I move it be adopted.

Mr. C. A. Brown. I second the motion.

Motion put and carried.

Mr. President. Reports of Committees.

(No reports offered.)

Mr. President (continuing). Gentlemen, as President of this Association, I have no report to make. I have just returned from a trip on the mainland, and only arrived Saturday. I did not think this meeting was going to take place until January, and being away, I have no report to make; but wish to say that a good many meetings of the Executive Committee have been held; that the Committee has endeavored to do all it possibly could in regard to improvements. That I, as retiring President, would like to thank Mr. Judd, our Secretary.

I am sorry that I was unable to make a report on the dairy business in this community. As I said, I went away on account of not being well, and I was unable to get down to work, although I have a lot of data gathered together in regard to the dairy business and dairy work, which I will only be too glad in a few weeks to turn over to the Secretary. And if he sees fit, and the Executive Committee sees fit, copies of the paper can be distributed among the members. I have, as you gentlemen all know, gone thoroughly into the kiawe bean question. I think that stock raisers and the graziers of this community do

not realize to-day the importance of the algaroba bean. I have made some experiments. Reports from Prof. Stubbs, from New Orleans, on some kiawe bean fodder I sent him, have been received, and he says that the analysis is one of the best; that the fodder, ground up, is one of the best fattening fodders there is, as far as milk production is concerned. He says it should be mixed either with bran or rice-bran; he prefers the rice bran. Our Secretary has touched upon this subject in his report, and I assure you that before the next kiawe season comes, I hope to be able to give to the Association some thorough data. The only drawback so far is that I have not been able to find machinery that will grind the bean in its present state, and the drying process is an expensive one. Mr. Francis Gay, of Kauai, who is also much interested in this subject, and myself, are both at work on this now, but I have not seen Mr. Gay to find out his latest reports from manufacturers in the United States in regard to the machinery.

I consider it best for this Association, to elect a new set of officers, with the exception of the Secretary, whom I do not want to see out of office. As far as I am concerned, I want to thank the Executive Committee and members of the Live Stock Breeders' Association for their kindness in permitting me to be President of this Association for two years. We will now proceed with the election of officers, and first is that of President.

Mr. Carter. Mr. President, I take pleasure in nominating Mr. Julian Monsarrat as President for the coming year. It is unnecessary for me to make any remarks in regard to his qualification, as everyone knows him. It is a perfectly fitting thing and proper that a man of his great experience should head this Association.

Mr. Monsarrat. Mr. President, I thank Mr. Carter very much for placing me in nomination, but seeing that I am not a resident of the Island of Oahu, and feeling that the President

of this Association should be elected from this Island, I ask my name to be withdrawn and Mr. A. W. Carter be placed in nomination instead.

Mr. von Holt. I second Mr. Monsarrat's nomination.

Mr. C. A. Brown. I move the nominations close, and the Secretary cast the ballot for Mr. Monsarrat.

Mr. Jared Smith. I second the motion.

Motion put and carried.

Thereupon the President announced that Mr. Julian Monsarrat was the duly elected President of the Association for the coming year.

The Secretary. I would like to call attention to the fact that the officers and the other members of the Executive Committees are nine, and it would be well, in view of the necessity of getting meeting of that Committee sometimes in a great hurry, that five, at least five, out of the nine should be residents of Honolulu.

Election of Vice-President.

Mr. Monsarrat. I will place in nomination the name of Mr. A. W. Carter for Vice-President.

Mr. Wundenberg. As Eben P. Low has occupied that office in the past, and as he is away, I do not think he should be passed over in that way. I will put his name in nomination.

Mr. Monsarrat. Mr. President, it is right enough, but as I said, when my name was placed in nomination, I believed it should be an Oahu man, and as the Secretary has said, there must be a President or Vice-President in Honolulu. Then take my name out and let Eben P. Low be made President. I would rather be an every-day member than hold an office.

The President. There are two nominations before us.

Mr. von Holt. I second Mr. Carter's nomination.

Mr. C. A. Brown. I was going to second Low's nomination, but I believe that either the President or the Vice President

should be a resident of Honolulu. Therefore, I do not second Mr. Low's nomination.

The President. Any further nominations?

Mr. von Holt. Before this is put to a vote, I would like to express my feeling in the matter; that is, I do not believe in the continuation of a set of officers. I believe in the infusion of new blood at all times, and I do not think anybody will feel hurt under the circumstances. if he should not be made President or Vice-President. There is no intention on the part of the Association to slight Mr. Low by not voting for him.

The President. Any further nominations? If there are no further nominations, we will proced to ballot.

Secretary casts the ballot for A. W. Carter for Vice-President.

The President. A. W. Carter has been elected Vice-President.

Election of Treasurer.

Mr. C. A. Brown. I nominate Mr. A. B. Wood, the retiring Treasurer.

The Secretary. In view of the fact that Mr. Wood will be away most of the coming year, I would suggest that his name be withdrawn. If agreeable, in his place I would nominate Mr. R. W. Shingle of the same firm.

Mr. von Holt. I second the motion.

The President. Any further nominations?

Mr. C. A. Brown. I move the Secretary cast the vote of the Association for Mr. Shingle.

The President. There being no objections, the Secretary will cast the vote. (The Secretary casts the ballot.)

The President. Mr. R. W. Shingle has been elected Treasurer.

Election of Secretary.

Mr. von Holt. I put in nomination A. F. Judd, our present Secretary.

Mr. von Tempsky. I second the motion.

Mr. C. A. Brown. I move the nominations close.

Mr. von Tempsky. I second the motion.

Motion put and carried.

Mr. von Holt. I move the President cast the ballot for the election of Mr. Judd for Secretary.

Mr. Monsarrat. I second the motion.

The President. A. F. Judd has been elected Secretary.

The President. Election of the Executive Committee.

Mr. Carter. I nominate Mr. von Tempsky as representative from Maui.

Mr. C. A. Brown. I second that nomination.

The President. Any further nominations?

Mr. Monsarrat. I move the nominations close.

Mr. C. A. Brown. I second the motion.

Motion put and carried.

Mr. C. A. Brown. I move the Secretary cast the vote for Mr. von Tempsky as one of the Executive Committee.

(Secretary casts ballot.)

The President, (announcing): Mr. L. von Tempsky has been elected member of the Executive Committee for Maui.

Mr. Carter. I nominate Mr. Robert Horner to represent Hawaii.

Mr. von Tempsky. I second the motion.

The President. Any further nominations?

Mr. C. A. Brown. I move the nominations close.

Motion put and carried.

(Secretary casts the ballot on motion of Mr. C. A. Brown, seconded by Mr. L. von Tempsky, and duly carried.)

The President. Mr. Robert Horner has been elected member of the Executive Committee for Hawaii.

Mr. Judd. I nominate Mr. A. M. Brown to represent Molokai.

Mr. von Tempsky. I second the motion.

The President. Any further nominations?

Mr. Carter. I move the nominations close.

Mr. von Tempsky. I second the motion.

Motion put and carried.

Mr. Monsarrat. I move the Secretary cast the ballot.

Mr. von Tempsky. I second the motion.

Motion put and carried.

(Secretary casts the ballot.)

The President, (announcing): Mr. A. M. Brown has been elected a member of the Executive Committee to represent the Island of Molokai.

Mr. C. A. Brown. I nominate the present incumbent, Mr. E. A. Knudsen to represent the Island of Kauai.

Mr. von Tempsky. I second the motion.

The President. Any further nominations?

Mr. Carter. I move the nominations close.

Motion put and carried.

Mr. C. A. Brown. I move the Secretary cast the ballot.

Mr. von Tempsky. I second the motion.

Motion put and carried.

(Secretary casts the ballot.)

The President, (announcing): Mr. E. A. Knudsen has been elected member of the Executive Committee, representing the Island of Kauai.

Mr. Carter. I would like to nominate H. M. von Holt to represent Oahu.

Mr. von Tempsky. I second the nomination.

Mr. Carter. I move nominations close.

Mr. von Tempsky. I second the motion.

Motion put and carried.

The President. Are there any objections to the Secretary casting the ballot? (No reply.)

(The Secretary casts the ballot.)

The President, (announcing): Mr. H. M. von Holt has been elected a member of the Executive Committee for the Island of Oahu.

Miscellaneous business.

The President. There are several papers prepared for this meeting. First is Mr. Julian Monsarrat's on "Island Horses, Past and Present."

(Secretary reads paper entitled "Island Horses, Past and Present.") See page 40.

The President. What is the wish of the Association with regard to this paper of Mr. Monsarrat, "Horses of the Island, Past and Present?"

Mr. von Tempsky. I move a vote of thanks of this Association to Mr. Monsarrat for the interesting paper, and that it be printed with the rest of the papers.

Mr. Carter. I second the motion.

Motion put and carried.

Mr. Monsarrat. I would like in connection with the paper to have this paper by Mr. A. F. Judd, Sr., which gives a number of the old stallions, and the breeding of a number of them, put on record. (See page 48.)

Mr. von Tempsky. Very good.

Mr. Monsarrat. I only got this the other day from our Secretary, who found it among his father's papers.

Mr. Carter. I move it be published with the report.

Mr. von Holt. I second the motion.

The President. This is a register of Hawaiian horses, and the motion is that it be printed with the annual report.

Motion put and carried.

The President. Are there any remarks or discussions in regard to this paper, "Island Horses, Past and Present?"

Mr. Monsarrat. Although it is not exactly in point, I would like to say that the experiment I have been conducting of rais-

ing hinnies has at last succeeded. I do not believe that they are as strong as a mule. If you have a lot of worthless land and a lot of these Kona nightingales running around doing nothing, it is a pretty cheap process to put them in with a stallion and raise hinnies. They make good pack animals for plantations. In fact, some would make good road animals. It takes some time, of course, and a good deal of patience, to get a stallion to serve the jennies. But if they are situated in such a way that the stallion with them cannot see or come near mares, he will eventually serve them.

The President. What do they look like?

Mr. Monsarrat. They take more after the horse. Their ears are very much shorter than a mule, and they are much higher withered.

The President. If there are no further remarks, we will take up the next paper, "Some Green Dairy Fodders," by Mr. Cullen. The paper is here and we will get the Secretary to read it.

(Secretary reads paper, entitled "Green Dairy Fodders." See page 56.)

The President. What is the wish of the Association in regard to Mr. Cullen's paper on "Some Green Dairy Fodders"?

Mr. von Holt. I move it be printed with the report.

Mr. Monsarrat. I second the motion.

Motion put and carried.

Mr. Carter. I would like to ask Mr. Cullen what has become of the Johnson grass he planted at Moanalua?

Mr. Cullen. It is still there; but it has not done very well at that elevation.

Mr. Carter. I ask because I understand that it is one of the most difficult of all grasses to get out when started.

Mr. Cullen. Yes, it is pretty hard to get it out, when it is in; but it is too cold for it at that elevation,—six hundred feet—for it to do well.

Mr. Monsarrat. It does well with me at Kau, Hawaii, as high as two thousand feet.

The President. If I may be permitted to say something in regard to the Johnson grass: I very foolishly, seven or eight years ago, planted a little of it at Waialae, not knowing what it was, having read in the catalogues that it was a fine fodder; and since then I have been, especially after Prof. Stubbs was here and warned me, trying to get rid of it, and I am sorry to say that, though very careful, it is on the increase all over the ranch, and I think it is a pest. It comes up in the alfalfa fields and work it out. It will grow right through. Waialae soil is very rich, and being very rich and very hot, I do not hesitate to say it is just the climate for Johnson grass.

Mr. Monsarrat. Is it a good pasture grass?

The President. No; and as far as my experiences are concerned, nor is it good fodder. I notice the horses, and especially the milk cows would rather starve than eat it. As Mr. Monsarrat says, at an elevation of two thousand feet, if animals are accustomed to it, they eat it; but at Waialae they will throw out the feed from the boxes for the other fodder I am growing.

Mr. Carter. I have always understood that Johnson grass was a good range grass, but the difficulty with it was, if it got into cultivated fields at all, it was the worst thing under the sun to get out.

Mr. Monsarrat. The more you cultivate, the more it grows.

The President. I had a small corner where it was growing dug up, and in the winter, when the rains came, it came up and flourished. It would die down in the summer and disappear entirely, and after the first rain it would come up again. For dairy stock I do not think it is very good. In fact, I know Mr. Gay and other people in Lihue, Kauai, have had the same experience.

Mr. Monsarrat. You don't consider it a good pasture grass?

The President. I have not had the experience, but I heard it was; others condemn it, and say it cannot stand pasturing, and that it was not a good grass. But personally, as far as Waialae is concerned, I have never had experience with it as a pasture grass.

Mr. von Holt. We have Jared Smith here; he might give us more light on the Johnson grass.

Mr. Smith. I do not know as I have any additional information to what has been given. Johnson grass is considered by stock men of the United States as being very fine for their purposes, and by the farmers of the South as being the worst curse on the face of the earth.

Mr. von Tempsky. Do you mean the ranchmen consider it as a good pasture grass or fodder?

Mr. Smith. I mean for growing so well.

Mr. von Tempsky. Not as pasture grass?

Mr. Smith. No; it requires a good deal of water. For ranch purposes we want something here that will grow in a dry range country. Most of the Southern and Western ranges are dry. I think there is a good deal of danger in planting Johnson grass, because of the fact that it spreads quite rapidly, and if it gets into cultivable ground, it causes trouble, because it is almost impossible to eradicate it from rich soil.

The President. Another trouble is, that in alfalfa fields, when it crops up, it ripens faster than the alfalfa even with me, who, I think, hold about as high a record for alfalfa raising as anybody, even in the United States. I am not afraid to say so. I have cut as high as from fifteen to sixteen crops a year at Waialae. I will be very glad, indeed, to have any one of the Association, if they have time, come out and see the fields. I have almost seventy acres and I consider it the best fodder for us. I am feeding it with algaroba beans, and I have thrown out everything, except guinea grass, which I consider very fine grass for stock. Just at present my alfalfa is not looking well.

I have had a tremendous attack of caterpillars, and it seems to have given the alfalfa a set-back. At present I am fertilizing land heavily. When in California the other day, I told a farmer in the Sacramento valley I had cut fifteen crops from the ground in twelve months. He nearly had a fit. He looked at me as though I was a jolly liar. In the summer months, with plenty of water, we cut alfalfa, and in twenty-one days it is in blossom again. With the rainy season now, we cut alfalfa perhaps every twenty-nine or thirty days. The cold nights keep it back.

Mr. Thurston. What tonnage to the acre?

The President. That is a thing, I am sorry to say, I cannot report on, as I have no scales at Waialae. Prof. Stubbs of Louisiana induced me to plant alfalfa. He was out at Waialae —I only had twenty acers cultivated then—and he urged me to plant more, as he thought it would do well. But we have had the same experience as Mr. Cullen, that is, it is a most expensive crop to start. For the benefit of the members I would say the only months in which I can start it successfully are from June to September. We have no caterpillars in those months; it is very dry. The land is thoroughly prepared and we flood our patches before we plant. I flood them, because the cutworms, it seems, are drowned out, and we have no trouble. But if I plant it later, when we get our first southerly weather, we always have the caterpillars to contend with. When they cut it down it never comes up again. My experience has been that May, June, July, August and September are the best months to plant alfalfa. We have to pump water for what is growing, and it takes twice as much water as cane. My lands are very heavy lands, and I have to treat them a lot differently than others. I run a disc harrow over the patches once or twice a year, as it is necessary. That loosens up all the roots and everything. Then I take the manure from the barn and spread it over, and the

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alfalfa comes up as if sown. In fact, I have land now that was sown five years ago and it is doing as well as land sown a few months ago.

Mr. von Holt. I would like to say that I have been growing alfalfa at Honouliuli for the last seven or eight years, with the same result as mentioned by Mr. Isenberg. In the summer months it flowers every twenty-one days, but our experience has been different in regard to the time of planting. If we plant in the summer we do not get a head of it. It does not come up at all. It seems to get scalded. But our experience teaches us to plant in December and January and February,—the cold months. We are not bothered with caterpillars, but alfalfa planted in hot weather does not seem to come up at all. One method of preventing the hardening of the soil is to cut a deep drainage ditch on the side of the alfalfa patch, and to irrigate through it and not by flooding the whole patch; that is, letting the water come up to a certain height only in the ditch. Let the ditch, as it were, fill up the rest of the patch with water. By letting the water rise and settle on top of the patch it creates no difficulty by making the soil hard.

The President. That is a very good idea. I have sent, through a firm in San Francisco, to Europe for Afghanistan Alfalfa. Mr. Smith says he has been promised some from the Washington Agricultural Department. Is that so, Mr. Smith?

Mr. Smith. It is here now.

The President. I had been advertising in several papers for it, and could not get it. The firm has written to Germany, and if I get it, and any member wants a few pounds, I would be willing to let him have it. It will grow up to—well, I have seen it in Switzerland growing to five or six thousand feet, just as heavy as ordinary alfalfa. It can stand a drought better than anything I have ever seen.

Mr. von Tempsky. Does it require irrigation?

The President. No, it will grow on steep hillsides without any irrigation whatever.

Mr. von Holt. What is your method, Mr. Isenberg, of curing alfalfa? Do you keep it a certain length of time?

The President. That is another thing which has puzzled me a good deal. I cannot make hay out of alfalfa at Waialae. Why, I do not know. I have tried everything almost, with the exception of putting it on a boiler and drying it. I have left in the fields, and turned it over and treated it just as in California, with the result that when I put it into the building, it became mildewed and tremendous heat developed, so much so that I was afraid and threw it out. Then I tried taking it out on the makai beach land and let it get thoroughly dry. The minute I put it back into the house I had the same experience as before. It became moist and I had to throw it out. It was so spoiled that animals would not eat it. Mr. Gay, at Kekupua, Kauai, makes beautiful hay out of it. I have an experienced man who has grown alfalfa in California on a dairy farm for several years. He is puzzled and does not know what it is. It is the dampness, I suppose. I have had no success with hay making.

Mr. von Holt. I have experimented with throwing salt on it in the barn in layers.

Mr. von Tempsky. Don't you think you cut it perhaps too long for hay?

The President. No; I have cut it in all stages of growth. We generally cut alfalfa in blossom, that is, just when it is coming to blossom. I have treated the old and the young with the same lack of success. That I cannot make hay is a tremendous drawback, for in the summer I have so much alfalfa I can't use it all, and if I could make hay of it I could sell it in

town. Drying it by machinery is far too expensive. We would like to hear from Mr. Smith about the hay-making of alfalfa.

Mr. Smith. I must confess that I have never had any practical experience with it; so I think that probably the advice of practical men would be better under the circumstances.

The President. Any further remarks on this? If not, we will take up Mr. Perkins' paper report on Lantana Bugs.

(Mr. Perkins reads paper. See page 58.)

(Mr. Perkins exhibits a piece of lantana, without foliage, and apparently dead.)

Mr. Perkins. This is the result I have reported on (referring to specimen of lantana in his hand.) It is not dead, if you will notice; the main stems are still green. But all the smaller branches are dead. It has not exactly killed the plant.

Mr. von Tempsky. Would that grow again, if left?

Mr. Perkins. If that bug is with it it will eventually die, but if the plant got ahead of the bug, it would eventually live. I have experimented considerably with this particular bug.

Mr. von Tempsky. Where is the bug?

Mr. Perkins. Only on this Island at the present time. I had an idea that if it could get the bushes pretty much in this condition, grass would grow underneath and cattle would go into it and break it down a good deal, when they would not do it otherwise. I planted some lantana in tubs and put this thing in. When it got into this condititon, I found about six months afterwards, grass came up beautifully underneath it; whereas, in other instances, no grass came at all.

Mr. Thurston. Is there any place where you can get any quantity of these bugs now?

Mr. Perkins. Yes; in fair numbers now.

Mr. Thurston. Whereabouts?

Mr. Perkins. In the neighborhood of your house on Bates street. I can get these now. It was one of the things I wanted to experiment with before I made any distribution, but I think it is

perfectly safe now. I might say that before these things were introduced we went very carefully into the verbenia family of plants before making any distribution at all. The only two things attacked were the lantana and vrebenia weed, oi. It will eat that. (Exhibits boxes of bugs, which are inspected by all members present.)

Mr. von Tempsky. I move a vote of thanks from this Association to Mr. Perkins for his very able article, and that it be printed with the other papers.

Mr. von Holt. I second the motion.

Motion put and carried.

The President. I would like to request the members of this Association to make thorough reports in writing to Mr. Perkins in regard to the different bugs and flies sent around as soon as possible.

Mr. Monsarrat. I would like to ask, if this bug that you speak of, or fly, whatever it is, where there is no lantana and plenty of this oi, will it attack the oi?

Mr. Perkins. It apparently will; but whether it will thrive I do not know. I have starved it for a week, and it had to eat oi or die.

Mr. Monsarrat. Will it attack anything else?

Mr. Perkins. No; nothing else I know of.

Mr. Monsarrat. If it will do that it will be a great thing for the ranges.

Mr. Perkins. It will not look at oi where there is any lantana.

Mr. Monsarrat. There is no lantana at all on my ranch.

Mr. Perkins. It might do it there.

Mr. Monsarrat. It will be a god-send if it works. I would like to ask Mr. Perkins if it would be possible to get some of these bugs. I would like to get some to try as an experiment on oi, and would be perfectly willing to pay any expenses to get them up with me.

Mr. Perkins. All we want is a tin to put the bugs in, left in the office two or three days before the bugs are to be shipped.

The President. I would like Mr. von Tempsky, while Mr. Perkins is here, to read his paper on Pamakani. (Mr. von Tempsky reads paper. See page 62.)

The President. What is the wish of the members of this Association in regard to this paper?

Mr. Carter. I move the paper be published in the annual report.

Mr. Judd. I second the motion.

Motion put and carried.

The President. Any discussion on the subject?

Mr. Perkins. I think the plants referred to in Hildebrand's "Flora" are nothing like the specimen here. I know of another plant, with bright yellow flowers, the natives call Pamakani.

Mr. Thurston. I was through the crater of Haleakala and down to Kaupo, on the old trail, in 1896 or 1897, and some of this weed was scattered here and there. I had never seen it before. I was there in last summer and the old trail had been abandoned for miles; it was impossible to force your horse through it. There is nothing else growing there. It has run over the very finest pasture lands there.

The President. Does it grow below the two thousand foot elevation?

Mr. Thurston. I have never seen it. It may. I do not think it does. It flourishes best at four thousand feet, where the richest soil is.

Mr. Perkins. I would say I was all over the crater in 1897, and there was nothing approaching this there then.

Mr. Thurston. Any cow could get through all right?

Mr. Perkins. Yes.

Mr. von Tempsky. You can't get through it now in any manner, shape or form.

Mr. C. A. Brown. How high does it grow?

Mr. von Tempsky. In very favorable places, six or seven feet high, but this is generally the height you find it. (Exhibits specimen of the weed about three and a half feet high.)

The President. We would like to hear from Mr. Jared S. Smith on this subject.

Mr. Smith. I received a specimen from Mr. von Tempsky some time ago, and identified it as *Ageratum Conyzoides* from Southern Asia, possibly Hongkong; but as I have no herbarium with which to compare it, that is a tentative determination. It is a plant which is quite abundant in Southern Asia. I would say in this regard, that we have with us now, and are getting at frequent intervals, great numbers of bad weeds. I think it would be a very good idea if we knew a little more about them. There is Johnson grass, and Canada thistle ,and Scotch thistle. Mr. von Tempsky has a burr on Maui which is very bad, something that comes from the West Indies. Whenever we get hay, seeds, or grain from the United States, we get weed seeds with them. The subject of weed destruction will have to come up some time. I think it will be a very good idea to get up a list of our bad weeds, possibly for submission to this Association.

The President. I would like to hear from Mr. von Holt, whether he has had any experience on Oahu with pamakani.

Mr. von Holt. I do not know it at all.

Mr. Smith. It just has occurred to me that a method is sometimes used in the destruction of weeds in the United States, that of spraying the plants with a solution of arsenite of soda. This is a very efficient poison and kills by direct contact with the leaves. I do not know whether it would serve in this country on account of the rain. I am doubtful about it; but if you could poison it and burn it,—possibly that could be tried.

The Secretary. I would suggest, reasoning from the lantana bug experiment, that the way to fight pamakani would be by hunting for some bug around Hongkong. It would be far more

efficacious than squirting poison broadcast over thousands of acres.

Mr. Perkins. I think it would be a good thing to get a few well preserved specimens of the plants and send them to one of the very best authorities on plants, and get his opinion as to what the native home of the thing is, as to where it originally same from.

Mr. von Tempsky. I will send you down some, Mr. Perkins.

Mr. Carter. I think it would be a wise idea for the Secretary to be instructed to communicate with the Commissioners of Agriculture and Forestry and ask them if they will take up the subject of noxious weeds and locate the different plants and ascertain whether or not there are any natural enemies which could be introduced.

Mr. von Tempsky. I second the motion.

Motion put and carried.

The Secretary. I would say, that as Secretary I wrote to the executive officer of the Board of Agriculture during the summer with reference to the horn fly and pamakani, during the incumbency of Mr. Cooper as Superintendent of Public Works, but I think the letter must have been mislaid, as it never was acknowledged.

Mr. Thurston. It never was before the Board.

Mr. Perkins. I think the letter was mislaid. It has just been sent to our office; it was in Mr. Cooper's office when Mr. Holloway took the office.

The President. If there are no further remarks, we will have Mr. Munro's paper, "Devons for Dry Ranges."

(Secretary reads Mr. Munro's paper. See page 64.)

The President. What is the wish of this Association with regard to this paper?

Mr. Carter. I move it be pritned with the anual report.

Mr. von Tempsky. I second the motion.

Motion put and carried.

The President. Discussion?

Mr. Monsarrat. I want to say in connection with the Devons, that I am a great Devon fancier. I have had them since 1895, and found them to be, as Mr. Monro says, great hustlers. I had one herd of twenty-five which dressed in Hilo market five hundred and ten pounds. They are good on the mountains and on the low lands. You can place them anywhere. They fatten easily. After a drought, I do not care how poor they get, you will find they will come around quicker than any other breed.

Mr. Carter. Our experience on Molokai has been similar to Mr. Monsarrat's. I imported a lot of Devons in 1898. I think for a rough range country, if hustling qualities are required, there is nothing can beat the Devon. Everything depends upon the nature of the country. I think certain sections of country, portions of Hawaii for instance, are better adapted for Herefords. Herefords are the best beef animals in the world, but I think there are some ranges in the Islands better adapted to Devons.

The President. I would like to ask Mr. Monsarrat if he agrees with Mr. Munro that the Devons are not good milkers.

Mr. Monsarrat. They are not good milkers, but they are fairly good. They do not compare with the Holstein. There is one thing with the Devons,—where you make any lengthy drive they will hold their weight better than any other cattle. We have had Herefords, Holstein and other breeds at Kapapala. I find, where you drive for fifty miles, they will arrive in better condition than any other.

The President. We would like to hear from Mr. Smith in relation to any question that might be of interest to the graziers.

Mr. Smith. There are a number of lines in which the Experiment Station might be helpful to the graziers. When in Washington recently, I called to see Dr. Salmon, Chief of the Bureau

of Animal Industry. He had received letters sent from various bodies here, asking for the appointment of an Inspector of the Bureau at this port, to inspect cattle coming from the mainland and foreign countries, to prevent the introduction into the Islands of Texas fever ,say, or black leg, or pluro-pneumonia, or anthrax, or any of the serious diseases which affect cattle on the mainland or in foreign countries. Dr. Salmon, Dr. True, the director of the Office of Experiment Stations, who is my chief, and myself went to see the Secretary of Agriculture, Hon. James Wilson. He was very favoraby impressed with the idea that there should be an Inspector at this port, and has agreed to recommend, or to ask Congress, for an appropriation for this purpose. I made the suggestion to Dr. Salmon, and he looked upon it very favorably, that we need not only an Inspector, but also a man who could, besides inspection duties, unite those duties with those of an expert in animal husbandry, the feeding of cattle for dairy purposes and for beef, and cattle breeding; a man who is acquainted with breeding problems; and he agreed, or the agreement was entered into, that the Bureau of Animal Industry would supply a man to take up these two lines of work. Of course there are a good many steamers coming with no cattle, and not very many cattle are imported during the course of the year. It would be necessary that what stock is imported should be inspected, but the man would not have very much to do in the meantime, and so, to make full use of his services, Doctor Salmon has agreed, that if Congress makes this appropriation, the man who is appointed will take up the two lines of work, and I am assured from what was done and said, an appropriation will be secured at the present session of Congress. Dr. Salmon said he had in mind for this position a man who has been Inspector at the port of Liverpool for a number of years, who wants to make a change to come back to the United States, and he thought he would be an excellent man for the position. There are a number of lines of work we at the Ex-

periment Station would like to take up, and especially if we have a man especially trained in animal husbandry to carry on the work. One is the introduction of new grasses and fodder plants and the testing of the feeding value of the same. A great many forage plants are under cultivation, and a great many of the best grazing grasses have been introduced and are growing now on the ranges all over the Islands. I have a list—I think there are fully forty or more—of the "cultivated" grasses, so-called, growing on ranches I have visited during the last two years and a half. There are grasses suited for the higher elevations and for the lower elevations. I think that the introduction of new forage plants, of new range plants, new grasses and clovers, is one of the very best lines of work to be undertaken. Manienie is the principal feed at low elevations, and Hilo grass, and other related grasses, at the higher elevations. These grasses monopolize the soil to the exclusion of the other species. We all know that the best results can be obtained in fattening cattle, in the growing of beef, in the production of milk and butter, and for the production of beef, if there can be a good deal of variety in the feeds given cattle; that is, cattle feeding on a pasture containing only one species or one dominant species, do not make as good growth during the year as if there were a mixed pasture, containing a good many varieties of grasses. Take manienie; it is best at certain seasons of the year. In smmer time, especially in a dry summer, the feed which it affords is very poor. If you could get good grasses to grow with the manienie—and I believe there are such—it would help out during dry seasons, or would give feed at a time when these two dominant pasture grasses are not in their best condition, I believe that you could grow cattle cheaper, that you could raise better cattle, and that you could fatten cattle more rapidly than at present. To produce the best result, you want to keep the cattle in good condition all the time. To do it, you must have a change of pastures to supply succulent forage

during the entire season. I think we can give our assistance to the graziers, to the stock raisers, by the introduction and distribution and trying of good grasses, other than those you now have. In connection with this work, a similar line of work would be a test of cultivated forage plants, with relation to the soils, fertilizers, cultivation and that sort of thing. Of course, a great deal of work has been done in that line. I do not believe that we could add very much to what has been done. Certainly, I do not think that we could cut alfalfa any more than sixteen times a year or get a species of alfalfa that you could cut thirty times a year. I do not think it will be possible. I think what really has been done is good. But I believe that there are some things still to be done, work the Station could take up. A line of work which will be extremely interesting, it seems to me, would be an experiment in stall or corral feeding of cattle. I do not know whether the time is ripe for such work in the Islands. I am rather doubtful; but I think the day will come when you will find it profitable to feed cattle for market, after they come off from the grass. For this purpose we will be somewhat at a disadvantage, because we have not in the Islands any concentrated feed, with the exception perhaps of algaroba beans, which could be used for fattening. We do not produce cotton seed meal, and hence cannot get it as cheaply as it can be purchased by the graziers on the mainland. We have not corn for fattening purposes. I think that there undoubtedly are some forage plants which can be grown and which in a measure can be used as a substitute for these concentrated feeds. The Station, as you know, has no facilities for carrying on such work, nor the work of feeding cattle. In the first place, we have no money, but if this new arrangement goes through, we will have, and we will take up that work, and when that time comes, if it is the sense of the Association that feeding experiments should be carried on, I would like very much to take up co-operative work with one or more of the

ranchmen on the Islands, to make experiments with regard to the fattening of cattle for beef purposes and the feeding of cattle for better and cheaper milk production, or better and cheaper butter production. In this connection I have an idea, it is not original, in regard to the utilization of waste molasses, for instance, and cane tops on the plantations. Of course, the cane tops are used to a great extent for feeding plantation stock, but very considerable quantities are destroyed every day. I believe that many more cattle than to-day, if there were a market for them, a great many more cattle, could be produced on the Islands than are now grown, by the utilization of the wasted cane tops and molasses. I think that that line of work will be a profitable one at some time, whether it would be to-day or not. If cane tops cannot be fed green, it is possible that they might be preserved in the form of silage. The use of silage is quite an important factor in the profitable production of stock. There is another point in this connection with the feeding of cattle, one which is often disregarded, and that is the enormous value of the manure from stall-fed or stable cattle. At the Ontario Agricultural College experiments have been carried on for ten or fifteen years, and they find that the manure from a single head of stock is worth about $40 per annum for fertilizing purposes, provided it can be taken care of. This use of manure from cattle for the fertilization of land, or the cane fields, would, I believe, be extremely profitable.

There are other lines of animal husbandry that ought to be investigated. There is more or less tuberculosis amongst our cattle. There is the disease known as "red water" on Maui, and also on Hawaii, in the district around Hualalai, and there are a good many diseases of a minor nature among the herds on the Island, such as sheep scab, liver-fluke, etc. A study could be made of the diseases which we now have among our herds to determine methods of prevention or the treatment of infected animals.

Mr. Carter. I move a vote of thanks from the Association to Mr. Smith for his services in behalf of the Islands while at Washington.

Mr Monsarrat. I second the motion, and I move, Mr. President, that Mr. Smith be requested to write a paper in regard to the subjects suggested, and that it be printed with the reports.

Mr. Smith. I would be very glad if the Association would indicate in some way what lines of work they think the Station could best take up. It would be very helpful to me.

Mr. Carter. Personally, I think the work Mr. Smith has been doing is the most valuable he can tackle at this time, which is the introduction of grazing grasses, particularly grasses that would be adapted to the low and dry lands. Mr. Smith, I might say at this time, while he was in Washington, did considerable work on that subject, and as a result, I have had sent to me from the Department of Agriculture certain seeds of grasses which are known as dry range grasses of the Southwest, which will be experimented with and reported on as time goes on. I think the Station has done very valuable work in these Islands, and I think a continuation of it is really the best way they can help us out.

Mr. Thurston. I would like to second that proposition. I have been around during this year and during a number of years before, around through the ranges of Maui and Hawaii, and within the last ten years a tremendous change has come over them, particularly the upland ranges, on both these islands. Twenty years ago I was all around Mauna Kea, the Parker Ranch and Humuula Sheep Station, between Mauna Loa and Mauna Kea. The upper ranges at that time did not afford particularly good feed. To go there, as I have this last September with Mr. Carter and Mr. Hall, in connection with forestry matters, was a matter of astonishment because of the tremendous change which has taken place. On the western portion of Mauna Kea there is blue grass and on the Hilo slopes other

grasses. On one of these we saw large growth of clover and what they call mesquite grass. I think the same grass is called on Maui soft meadow grass. The grass certainly looks very much the same. Down near the volcano, on the upper Olaa lands, an association, the name of which I have forgotten, has cleared out the fern for a couple of hundred acres and planted this mesquite grass there, where absolutely no grass was grown before; and these acres are now supporting a much larger number of cattle per acre than any other grazing land I know of in the country. Mr. Peter Lee told me they had two hundred acres in which this grass was growing well, and some twenty-five or thirty where the grass was much younger, on which they were running fifty head of cattle. His cattle had been on the land for four or five months prior to my being there, and they were making no impression on the grass at all, and were rolling fat. On the slopes of Haleakala, where I had not been before this summer for seven years, a complete revolution has taken place. In the district where Cornwell's ranch is there is a very heavy growth of blue grass coming in. Over on the Haleakala Ranch end of the mountain, white clover and the soft meadow grass are spreading. Several other kinds of grasses, that Mr. von Tempsky had imported and spread around, having taken hold, so that since my boyhood I have never seen such a growth of herbage on Haleakala as now, all due to the introduction of this limited number of grasses, the seed of which, I believe, was imported by Mr. von Tempsky some eighteen years ago. It gives evidence of how a little exertion in the matter of introduction of new grasses and a little attention until they get started, will produce great results. If we have such results from the very small efforts made in the past, I do not know what we may not expect with the assistance of the Experiment Station conducting systematic work in that direction. If we can secure continued assistance, as Mr. Smith has already given in the past year or two, it seems to me that we may be able to

keep up the stock industry, even though the lantana has injured so many thousand acres of land, simply by improving the character of the grasses on the land that is free.

Mr. von Holt. You were speaking only of pastures at high elevations, were you not?

Mr. Thurston. Yes.

Mr. Monsarrat. In connection with the mesquite grass, I would say I have been planting it for the last seven years.

The President. At what elevation?

Mr. Monsarrat. From twenty-five hundred up to seven thousand feet. I planted last year over one thousand pounds and have on hand now twenty-seven hundred pounds to put in. I find that it grows splendidly and the stock do well on it. During the droughts we found out in our upper pasture that when all the Hawaiian grasses were dead, the mesquite was the only green grass we had there. Of course, the cattle had fed it down very close. As soon as the winter months come on, it will come up. I have places where I sowed and let it come to seed, and hope that the first rain will start the seed and in that way get it to cover a great area.

The President. Gentlemen, we have here one more paper by Mr. Krauss of the Kamehameha Schools.

Mr. Krass here appeared before the meeting and exhibited tubes containing specimens of prepared algaroba beans in connection with his paper on "Modern Methods in Animal Husbandry." See page 67.

Mr. Carter. If there is no further business, I move we adjourn.

Mr. Monsarrat. Before adjourning, I wish to thank the Association for making me President, though I still maintain that the President should be a resident of Honolulu.

Mr. von Holt. I move a vote of thanks to the Merchants' Association for these rooms.

Motion duly seconded and carried.

Mr. Monsarrat. There is one matter I would speak of, that is the section in the By-Laws relating to the holding of meetings. This meeting should have been held in Hilo. (Secretary reads from the By-Laws re holding the next meeting at Hilo.)

The Secretary. I touched on this question in my report. The Executive Committee experienced a great difficulty in drumming up the members to make the trip.

Mr. Monsarrat. I move that Section III. of the By-Laws in its first paragraph, be amended so as to read: "There shall be an annual meeting of the members of this association in the months of October or November of each year, on such day and at such place in the Territory as the Executive Committee shall direct, and of which annual meeting the secretary shall give thirty (30) days' written notice to all members. But other and further meetings of the association may be held at such times as the president may direct, or upon the call of the secretary issued at the request of one-eighth ($\frac{1}{8}$) of the members of the association."

Mr. von Tempsky. I second the motion.

Motion put and carried unanimously.

Mr. C. A. Brown. I move we adjourn.

Mr. von Tempsky. I second the motion.

Motion put and carried.

Secretary's Report.

To the President and Members of the Hawaiian Live Stock Breeders' Association.

Gentlemen:—I have the honor to submit my second annual report as the Secretary of the Hawaiian Live Stock Breeders' Association for the year ending December 21st, 1903.

LANTANA DESTROYING INSECTS.

During March of this year, Mr. Albert Wilcox, a member of our Association, made the suggestion that an insectory, or bug house, be constructed in order that Prof. Perkins might, with greater ease, properly breed the lantana destroying insects. Such a structure was by permission of the Superintendent of Public Works Cooper erected at the Government Nursery on King street, Honolulu, at a cost of $125.00, with funds subscribed mainly from members of the Association, and collected by your Secretary.

This building, constructed with a shingle roof and wire gauze sides, proved a great success, and demonstrated that had it been erected sooner some of the beneficial insects sent from Mexico which were lost, might have been successfully propagated.

A short paper, descriptive of the progress of the bugs in their beneficial work, will be presented at this meeting by Prof. Perkins.

AGRICULTURAL BILL.

During the session of the last Legislature, the Committee of the Senate on Agriculture requested various organizations,

among them our Association, to meet and confer on the matter of legislation regarding agriculture and its allied subjects.

Several meetings were had at which were present, besides the Committee of the Senate and members of the Committee of the House of Representatives, representatives from the Planters' Association, Chamber of Commerce and our Association, together with the officers of the Federal Experiment Station. The result of these conferences led to the drafting of an Agricultural Bill by L. A. Thurston, Esq. This bill, which provided among other things, for a Board of Agriculture and Forestry, became law; the necessary appropriations were passed in due time, and Governor Dole appointed the following Board: L. A. Thurston, J. D. Dole, W. M. Giffard, J. F. Brown and A. W. Carter. It will be noticed that the last two named are members of our Association.

The Secretary considers it not presumptuous on his part to urge the members of the Association to read this law carefully. It shows that the Territory is now in a position, through its Board of Agriculture, to assist the breeder of live stock in many ways. The Secretary will send copies of this law to any member of the Association upon application.

It may be well to record that the Association paid for one argument in favor of the bill, by standing the expense of transporting a majority of the members of the House and most of the Senate in hacks to visit the insectory of Prof. Perkins, and to see for themselves that the insects of Mexico were really destroying lantana.

HORN FLY.

The scourge of the Horn Fly continues with us, although in some localities it is reported to be less virulent than formerly. The tumble bugs imported from Mexico through Prof. Koebele and Prof. Perkins have apparently made no headway, if, in fact, they survived the long trip.

PAMAKANI.

A plant pest known by this name by the Hawaiians is causing great damage on the pastures on the island of Maui. A paper descriptive of the pest, will be presented before you at this meeting. As far as is known, the pest is confined to the island of Maui. Should, however, it appear elsewhere, its presence should be reported at once, either to the Secretary or to the Board of Agriculture.

VISIT OF FORESTER HALL.

At the request of the Board of Agriculture, Mr. William L. Hall, Chief of the Division of Forestry, was detailed to make an investigation of our forest conditions in order to recommend to the Board some man, a trained forester, who would be qualified for the position of Superintendent of Forestry under the Board of Agriculture.

Mr. Hall visited Kauai, Oahu, Molokai, Maui and Hawaii, accompanied most of the time by one or more members of the Association.

It may not be out of place to state here Mr. Hall's conviction of the necessity of forests to the proper regulation of rainfall on the range, and that this matter should be regarded in each locality by itself, the locality to be determined by the topography of the surrounding country.

It is Mr. Hall's hope that the Federal Bureau may detail the forester to the Territory to work in collaboration with the Territorial officials, and whose special work may be the study of proper trees to be planted in each locality.

If this be done, the benefit to the members of the Association will not be a small one. The question of fencing has to be solved on each ranch, and it is money in the purse of the rancher to grow his own fence posts along the line of his present fences. But at the present time few ranchers know what kind of trees to plant.

The result of Mr. Hall's visit is the coming of a Mr. Hosmer, a trained forester from the Federal service, to take charge of the forestry department of the Territory.

MEMBERSHIP.

During the past year the membership of the Association has increased to forty-six, the additions having been ten.

NEW FODDER PLANTS AND GRASSES.

The experiment on Molokai in the introduction of drought resisting plants and grasses, under the supervision of the Federal Experiment Station, still continues, and in due course a full report will be available for our Association.

Substantial results in the introduction of new low-level grasses in moist localities have been had on Kauai at Lihue and Hanalei. Your Secretary regrets that a report on these grasses, though promised for this meeeting, is not available.

HERD BOOK.

During the past year there have been but fifteen entries in the Herd Book, all of them made by one ranch. The value of this record depends entirely upon its being used. If it is worth while to breed pure stock, it is worth while to keep a record of their blood.

The Herd Book fees are small and the rules governing the entries are simple and clearly set forth in the report of the last annual meeting.

OPPORTUNITIES.

Much has been written about the "Small Farmer" and still more has been talked. It is not out of place for me to point out to the members of the Association that the two institutions, the Federal Experiment Station and the Board of Agriculture, with

their trained scientists, are for the use of the grazier as well as the small farmer. They are both ready to assist in the improvement of the pastures; the eradication of plant and insect pests; and the many local problems of animal husbandry.

STATISTICS.

When the proceedings of this meeting go to press, I will be able, through the courtesy of Mr. G. J. Waller, to insert the statistics for the past year concerning the consumption of beef and mutton in Honolulu. (See last page.)

Repeated inquiries have been made to the Secretary by members of the Association concerning the number of cattle in the Territory, and to each inquiry the Secretary has had to reply that the Association has compiled no statistics.

Your Secretary respectfully urges that proper steps be taken at this meeting to inaugurate such a census. Such statistics are kept everywhere else in the United States. Why should not Hawaii take her proper place?

INSPECTION OF IMPORTATION.

Animals imported here, upon their arrival undergo inspection by Territorial officials, acting under the authority of a statute passed when Hawaii was an independent sovereignty. Is this enough protection for the interests we represent? Should we not ask for an inspector of the Bureau of Animal Industry to be stationed here?

We are now a Territory of the United States, but the connection between our graziers and the Federal scientific authorities on the mainland are nearly as remote as before annexation.

NATIONAL ASSOCIATION.

The National Live Stock Association meets in Portland, Oregon, on January 12th to 15th, 1904. The Governor of this

Territory and the Chamber of Commmerce have power to send delegates to the convention. Our Association is eligible to membership as a breeders' association by the payment of $15.00 iniation fee and $2.50 for every 25 members. Should we not join this Association?

AGRICULTURAL FAIRS.

At the last meeting of the Association this subject was informally discussed and action deferred. By the last Legislature the sum of $1,250.00 was appropriated for the assistance of such fairs. Are we ready now to go ahead, say in conjunction with the Merchants' Association?

ANNUAL MEETING.

This meeting would regularly have been held in Hilo, Hawaii, November 19th, but was postponed by vote of the Executive Committee, when, as that date drew near, it appeared, from various causes, that the meeting would not be well attended. Subsequently the Committee voted to set the meeting in Honolulu on December 21st.

I call your attention to Section 3 of the By-Laws, with the suggestion that an amendment may be necessary thereto.

CONCLUSION.

The outlook for the coming year is a bright one. Our ranges have had a series of good seasons. Better blood is being infused into our herds. More thought is being used in the solving of ranch problems. There is, however, much work to be done. There is no ranch or dairy in these Islands that can not be benefited by new ideas. Fodders can be improved. Someone can show us how to prepare kiawe beans for fodder so that their true nutritive value can be utilized, and how to preserve the fodder when so prepared, until the next crop of beans comes along.

The recital of work that should be done could be continued, but I will not lengthen my report. Respectfully submitted,

ALBERT F. JUDD,
Secretary.

Report of Treasurer.

1902.			
	Cash Receipts—		
Nov. 1	—Balance on hand.....	$ 838.40	
1903.			
Nov. 21	—H. S. P. Ass'n., ℅ Sal. Mr. Perkins.....	412.50	
Nov. "	—Entry Fees	15.00	
Nov. "	—Initiation Fees	175.00	
Nov. "	—Dues.....	442.00	
	Cash Disbursements—		
1902.			
Nov. 24	—P. M. McMahon, Stenographer		$ 27.56
Dec. 6	—R. C. L. Perkins, ℅ Salary—Nov.		165.00
" 8	—Miss McTigue, Stenographer		7.20
" 18	—Wall, Nichols & Co., bill....		5.00
" 27	—Wall, Nichols & Co., bill....		.60
1903.			
Jan. 15	—A. F. Judd, Wrappers.....		2.10
" 17	—Haw'n Gazette, bill.....		85.75
" 31	—A. F. Judd, ℅ Salary to 1-31		100.00
Feb. 2	—R. C. L. Perkins, ℅ Salary to 1-31		330.00
Mch. 10	—R. C. L. Perkins, ℅ Salary to 2-28.....		165.00
Apr. 3	—A. F. Judd, ℅ Salary to 3-31.		66.67

May	1—R. C. L. Perkins, ⅛ Salary to 3-31		165.00
"	6—Postage		.80
"	8—A. F. Judd, Hack Hire		24.00
June	4—A. F. Judd ⅛ Salary to 5-31		66.67
Aug.	28—Postage		1.00
Oct.	2—A. F. Judd, ⅛ Salary to 9-30		133.33
"	29—Postage		3.00
Nov.	13—Haw'n Gazette Co., bill		3.50
Dec.	7—Postage		3.00
"	18—A. F. Judd, ⅛ Salary to Nov. 30th		66.67
	Balance on hand		461.05
		$1,882.90	$1,882.90

Respectfully submitted,

ARTHUR B. WOOD,

Treasurer.

Dec. 21, 1903.

Horses of the Islands, Past and Present.

JULIAN MONSARRAT, MANAGER KAPAPALA RANCH, KAU, HAWAII.

When requested to write a paper on the above subject, I thought it would be an easy matter to collect data, but after I started I had to say, "this is no cinch."

Such kamaainas as Capt. Thomas Cummins, Capt. John Meek, Mr. Moffit, J. I. Dowsett, C. H. Judd, Sr., A. F. Judd, Sr., Jules Richardson, James Campbell and a few others, who were interested in horses and their breeding, having passed away, it is a difficult matter to collect data on the early horses of the Islands. Thanks are due to J. A. Cummins and H. G. Crabbe, about the only "old-time" horsemen left, for some of the facts contained in this paper. Though it is far from being complete, still the writer has endeavored to make it interesting.

One of the first stallions of whose breeding anything definite is known, and who was well known throughout the group as a sire of some of the finest saddle and cattle horses of his day, was "Oregon," (thoroughbred) son of "Diomed," imported from Oregon in 1845 by the late Thomas Cummins and "Young" John Meek, oldest son of Capt. Meek.

They had him at the "Big Tree," Lihue, Ewa, Oahu. At the death of John Meek, Jr., "Oregon" passed into the hands of Capt. Meek, and was turned out with a flock of mares at Lihue, where he sired some fine horses. Thomas Cummins had "Oregon" at Waimanalo, Oahu, for a time, and his blood was probably the foundation and making of that ranch, once famous for good saddle horses. I remember as a boy, when good, honest horse racing took place in Honolulu, on the Plains, near the spot where the former baseball grounds were, that the Wai-

manalo horses captured a majority of the prizes. Thomas Cummins and Capt. Meek were great admirers of horses, and took a great interest in their breeding. There was a great deal of good natured rivalry between these gentlemen, as to the respective qualities of their horses, and both maintained their racing "strings," trained on manienie grass and oats at a fabulous price.

When Capt. Cummins retired, his son, J. A. Cummins, took up the game and continued it so long as it remained clean and honest. Among the many horses bred on these ranches and raced when the writer was a boy, were "Boston," "Jack of Diamonds," "Young Jimmie," "Cruper," "Charlotta," and "Carry the News."

"Oregon" sired "General Butler," dam, "Lady Eleanor," a three-quarter thoroughbred mare. "General Butler" was a very dark brown in color, with one white eye, a most beautiful animal under the saddle, but never a success as a stallion. "General Grant," the finest of "Oregon's" colts, was purchased by Kamehameha V. and sent to the Molokai Ranch. "Jupiter," dam "Lady Eleanor," was sold to Mr. Moffitt and taken to Kahuku Ranch, on Oahu, where he bred some useful animals. "Capt. Cator," a son of "General Grant," bred by the Holt Brothers, and owned by the late Governor Dominis. bred some of the finest saddle horses seen on the streets of Honolulu. In color most of "Oregon's" colts were sorrels. The old horse died in the early 70's, and his equal as a producer of cattle horses has yet to be imported.

"Thompson," an Arabian stallion, imported by a gentleman of that name, produced some fine colts, that were prized as bullock horses; not so much for their speed as their staying qualities and powers of endurance, two very essential things in the make-up of a "cow-pony."

There were a number of other stallions imported in "early" days that are worthy of passing mention, but as the writer

has been unable to procure data in regard to the date of their importation, begins them as they came to mind.

"Waimanalo" (thoroughbred) imported by the late Capt. Cummins and used as a private stallion in his stud, was a "good one," as the saying goes.

"Laurel" (thoroughbred) was another imported horse, whose blood has been, and is, highly prized. In some of the finest mares the blood of "Laurel" can be traced.

A pure black stallion, imported from South America by Vida, father of the late "Dan" Vida, was a very showy animal, and his colts took after him in this respect. The black stallion driven by Prince Cupid is a descendant of this stallion. It has been impossible to get any trace of this stallion's breeding.

"Wonder" (thoroughbred) was imported from Australia by the late "Ned" Boyd, father of J. H. Boyd, and later sold to the late C. H. Judd, and used by him as a private stallion on his ranch at Kualoa, Oahu. "Wonder's" colts made fairly good cattle horses, and as saddle horses were very good. I believe "Wonder" is now dead.

"Boswell" by "Almont" (Standard), purchased by King Kalakaua from General Withers of Fairlawn Farm, Lexington, Kentucky, and imported some time in the early 80's with a lot of fine mares from the same farm, was destroyed for glanders, and never had a chance to make a record in the stud. "Boswell, Jr," dam "Maud," is one of his colts. Had "Boswell" not been destroyed, I feel sure that his colts would have made their mark as carriage horses and roadsters.

While on a trip to California, the late "Harry" Turton of Lahaina purchased a thoroughbred grey stallion, "Waterford," one of the first horses to race on the old "Bay District" track of San Francisco. "Waterford" was a four mile horse, and won many a race at this distance, and was thoroughly game. The writer saw him run a two-mile race at Kapiolani Park in the early 80's on three legs, and win. "Waterford" was the sire of

"Perry's Waterford," (dam a "Laurel" mare), one of the fastest Hawaiian bred horses of his day. The saying goes, that the most Perry would ever wager on his horse, though he generally won, was a watermelon and a bottle of soda water. Unfortuately, owing to poor management and his being uncertain as a foal getter, "Waterford" had but very few colts. He died at the Parker Ranch, Hawaii, a few years ago.

One of the best stallions imported to this country was "Governor Stanford," (thoroughbred) named after the gentleman who had bred him. He was imported by the late Thomas Cummins. Shortly after the arrival in the Islands he was taken to Waimanalo Ranch, Oahu, where in leading him out for exercise he escaped from the boy, and in his mad career across country, fell and broke his foreleg. He was put in a sling, where he remained for something like a year, eventually recovering, having a stiff leg for the remainder of his life. None too much credit is due John Cummins for the recovery of this horse, who has passed into the horse history of these Islands as a sire of some of the finest saddle and cattle horses, and whose blood will always command a premium.

The late James Campbell, another gentleman who loved a good horse, and price never stood in the way of his buying, if the animal suited, imported "Shenandoah" by "Shanon," he by "Monday," early in 1886. "Shenandoah" was bred by "Lucky" Baldwin, and as a two-year old ran a mile in 1:41. As a producer "Shenandoah" was very sure, but judging from what the writer has seen of his colts, they have tempers of their own, though they make good animals if handled at an early age. "Shenandoah has a large number of serviceable horses to his credit.

One of the very few standard-bred stallions whose colts ever amounted to much as saddle horses, was "Baby," imported by the late Jules Richardson and sold to James Campbell, when Kahuku Ranch, on Oahu, passed into the latter's hands. The crossing of "Shenandoah" and "Baby" blood has produced good

all-around horses. "Baby" died in 1900 at Kahuku Ranch, Oahu.

"Kealia," by "Norfolk," he by "Lexington," foaled 1881, was bred by the late Governor Stanford at Palo Alto, Cal., and imported by Z. S. Spalding of Kauai; very highly strung and speedy, which qaulities he imparted to his get. "Kealia" died a few years ago, but he has left his mark in such horses as "Amarino," "Amethyst," "Amaranth" and others. Nearly all of "Kealia's" speedy colts are out of imported thoroughbred mares. One other stallion owned by Z. S. Spalding, who has gone where all good horses have to go, was "Patrol" by Wildidle," a four-mile horse. The colts he produced are excellent saddle animals, having the qualities of endurance and style.

Some time in the 80's two colts, bred by Theo. Winters, were brought to the Islands by the late S. C. Bowley. One was purchased by C. W. Macfarlane, and named "Garfield:" the other by the late G. Markham, and christened "Hancock." Neither of these animals did much in the stud, but what few colts they did produce were very good. "Garfield" died in Kona, Hawaii; "Hancock" at Waimea, Hawaii.

With these two stallions ends the list (as far as the writer can ascertain) of those stallions that are dead and gone. Now to come to the present horses.

The first on the list is "Hawaii," dam "Lizzie Brown," foaled in 1888, and imported by the Horner Brothers of Kukaiau Ranch. The Horner Brothers are among the few who started right, and to-day, in consequence, ride good horses of their own breeding. "Hawaii" is a sure foal getter and a producer of good all-around horses, and his colts can be placed anywhere.

"Joe Stacy," by "Joe Hooker," dam "Lady Stacy," is another of the Horner stallions, foaled in 1889. Judging from his breeding he ought to produce fine animals.

"Duke Spencer," a noted "ringer" in the coast, with some crosses of "Norfolk" in him, was imported by the late William

Rickard. "Duke Spencer" never was a sure foal getter, though he may be doing better in the hands of the present owner, J. A. McGuire of Kona. "Duke Spencer" has had a very checkered career, running under a number of aliases on the coast, and many a man has dropped a pile of money on him. So far as the writer can ascertain, he has but very few colts.

W. H. Rice, of Kauai, is a gentleman who has for years interested himself in horses and their breeding, and some of the finest saddle horses on our streets to-day were bred by Mr. Rice. "Willie" Rice, aside from being a good fellow, is an accomplished horseman and knows a good horse when he sees him, never hesitating to pay the price, if the animal is the one he wants. In the list of animals owned by Mr. Rice I notice such well-bred horses as "Spraydon"—"Traducer," imported from Australia by the Sinclairs; "Boswell, Jr.,"—"Almont"—"Maud," bred by H. J. Agnew; "Santa Teresa"—"Sable Wilkes"—"Lyle A." Mr. Rice is also an admirer of "Oregon" and "Laurel," as I notice "Bismarck"—"Hector"—"Oregon Mare," "Laurel"—"Laurel"—"Oregon Mare," "Charley"—"Wonder—"Oregon Mare." Mr. Rice is also breeding draft horses, and has three fine stallions in "Rover," "Capt. Growl," and "Solon, Jr."

"Signal" by "McClellan"—"Signal" mare, imported in 1884 by Hoaeae Ranch, Oahu, has produced a number of stylish saddle and carriage horses. All of his colts are well proportioned.

"The Mallard," by "Fellowcharm" out of "The Teal" by "Hindor," was foaled in 1891, and imported in 1895 by Kapapala Ranch. In size he is 16.1 hands, and in color a bay. His colts are good cattle and saddle horses.

The writer has before him a list of over sixty imported stallions, standard, thoroughbred, Arabian, Cleveland Bays, Draft and Mustang, and it is far from being complete. In looking down the list I find the blood of such world-famous horses as

"Longfellow," "Lexington," "Leamington," "Great Tom," "Norfolk," "Wilkes," "Almont," "Joe Hooker," "Wildidle," running through the veins of these stallions, and this question arises in my mind: "To what is due the lack of good horses in these Islands? It is certainly not for the want of good blood. In the opinion of the writer, it is the lack of good judgment in breeding and good brood mares. There is no question in my mind but that had the stallions of "early days" and the present day, for that matter, had proper care and advantages, the Islands would have been stocked with a fine lot of brood mares, and to-day, instead of importing, would have been exporting horses. The custom of turning out an imported stallion, who, from birth, has been accustomed to be well cared for, stabled and fed, with a lot of mares on inferior pasture, and expect him to produce good, hardy colts, in the writer's opinion, is all wrong. I know of ranches in these Islands where the stallion is turned winter and summer, and never taken in when the feed is short, and the owners expect this stallion to get first-class colts. If a stallion can be turned out where feed is good, from January to December, well and good; but there are not many ranches where this can be done. Feed your stallion, have your mares in good condition always, and you will get good results.

A fact that strikes the writer very forcibly is that the best of our saddle horses and "cow ponies" have the thoroughbred blood in their veins, being quick on their feet, a quality lacking in a standard bred. I don't believe we can infuse better blood into our range horses than thoroughbred, and I think most of you will agree with me in this. In selecting a thoroughbred stallion with an idea of breeding horses, one should be careful to select an animal who has descended from long-distance horses. Unfortunately, all over the United States they are breeding sprinters, and it is hardly ever a four-mile race is heard of now.

Don't buy a stallion just because he is cheap, or you will regret it, but if you find a stallion who is "right," buy him, even if you have to pay a long price. Good things come high. Seeing most of the ranches allow their colts to run until they are three or four year sold, before handling, it is well to select a stallion of good disposition.

A great mistake made is that of allowing colts to run with their dams after they are yearlings. This is a dangerous practice, as a risk is run in having the colts cover their dams. The writer has seen this time and time again.

It may interest some of you to know that a number of the fast ones (pacers and trotters) of early days, took passage to horse heaven from these Islands. "Defiance," (pacer) imported by "Bill" Levi; "George Treat," imported by Sam Graham; "Fisherman" and "Butcher Boy," by S. C. Bowley; "Ragpicker," by John McKeague; "Ivanhoe" and "Joe Dake" by Porter.

There is no doubt but that the climate of our Islands will do a great deal for cripples, for of the above named horses, not one of them was able to go a fast half without retiring to the hospital for a week or so, when they first arrived; but in a short space of time were able to do as much work as a number of the young ones.

Register of Hawaiian Horses.*

I request all interested in stock-raising to make whatever additions or corrections occur to them in this book, the intention being to make a Stock Book eventually.

(Signed) A. F. JUDD.

Honolulu, June 13, 1878.

"Oregon," chestnut stallion, imported by Benj. Stark when 5 years old, in 1848; came from Oregon; supposed to be a Kentucky horse, owned by John Meek, Jr. Capt. Meek bought him at auction for $300.00. High spirited. His get had beautiful shape and were spirited horses—legs faulty—disposed to wind galls and splints. Died in 1874. Had a numerous progeny. Bred to "Jenny," imported chestnut mare, had

1. "'Traveler,' (Monsarart's sorrel gelding); also
2. "Koloa Plantation." Brought across the plains. Indians stole mare and foal.

Bred to Cummins' black mare; had "Virago," "Bates," "Gipsy" and "Frank." Took first prize for imported stallions by R. H. A. S. in 1852.

"Laurel," a black stallion, imported from Australia by W. L. Green in 1854, with "Lady Eleanor," a dark brown mare. This pair had only one colt, "Laurel Second." "Laurel" had some colts on Oahu, but was sent to Hawaii, where he had a numerous get. Slender—good legs and good bottom. Was sent to Guam.

"Lady Eleanor" bred to "Oregon," had "General Grant" also "Lady Godiva;" and by "Laurel" had "Laurel Second." "Oregon" had Holt mare and "General Butler."

* This Register was recently discovered among the papers of the late Chief Justice Judd.

"Lady Godiva" bred to "Bismarck," had Jupiter," dead. Bred to ——— had "Grecian Bend," mare; bred to "Wonder" had "General."

"Admiral" ("Thompson Horse"), small dark bay stallion, with black points; clean limbs, high spirited. Imported about 1850 and brought from Australia by Sam Thompson. Was bred to mares at Hoaeae, Oahu, Waikapu, Maui, and went to Kaupakea, Hawaii; owned last by G. Waller. His get all show the sire's qualities, clean legs, small, but spirited. Have habit of tossing head. Is dead.

This horse supposed to have Arabian blood.

Mentioned in 1852 in R. H. A. S. transactions as being, besides "Oregon," the only other imported stallion here then.

Sire of a roan horse of Sumner and Dowsett.

"Kossuth," dark brown stallion. Imported in 1859 (?) from California by Dr. Ford and Rev. R. Armstrong. Supposed to be a "Morgan." Had not many colts. W. W. Hall's black horse, "General Grant," is one.

"Young Hector," a bright bay stallion, trotter. Supposed to be a "Black Hawk." Is now a gelding owned by J. T. Waterhouse. Bred to Hoffman's "Topsy," had "Capt. Smith." Imported by William Duncan.

"Chilian," a small black stallion, very spirited. Imported from Chili, owned by Vida, owned by Dr. Judd. A fine saddle horse, but too small. Father of Hoffman's "Topsy."

"Waimanalo," imported from Oregon by T. Cummins in 18—. A large, dark bay stallion, rather hollow backed. Bred to many mares at Waimanalo, Oahu, and at Waimea, Hawaii, by the Parkers.

His get are large horses, better fitted for harness than for saddle. Is now dead. Sired the large gray draft horses of C. P. Ward.

"Gov. Stanford," imported by T. Cummins from California

in 1869(?) Gray stallion, high spirited and well built, which qualities his get show, *vide*—

"Telephone," "Stanford Colt," "Poni Moi," "Lala Rookh."

Pedigree is—

"Wonder," imported by E. H. Boyd from Australia in 1869 (?) Red roan stallion. Bred to mares at Kailua by E. H. Boyd, and at Kualoa by C. H. Judd. Is large and bony. Supposed to be an English horse of racing stock. Marks his foals well. C. H. Judd has 25 colts from him. Now the property of O. J. Holt, at Waialua, Oahu.

Sire of strawberry filly, "Venus," out of Markham's "Oregon Mare." Dead.

Isenberg's stallion, name is ("Elmo") at Lihue, Kauai, imported from California in 1877. A solid sorrel horse, strong legs and short pasterns. Supposed to be half Mustang. Had white strip in face.

Bailey's Hambletonian, name is "Reciprocity," imported stallion, brought from Oregon in 1876, by Wm. H. Bailey. A large chestnut horse. His foals are large with high hind quarters. Is at Makawao, Maui. Died 1882.

Sinclair's stallion "Spraydon" at Niihau. Imported by F. Sinclair from New Zealand in 1876. Of the best English racing stock. Large, blood bay.

Pedigree—"Traducer," imported from England, out of a daughter of an Arabian mare. Owned in 1882 by W. H. Rice.

"Tadasco" ("Baby"), imported from California by J. L. Richardson in 1877. Owned by J. Campbell at Honolulu, Oahu. A bright chestnut, with light mane and tail. High spirited and promises well for saddle horses.

Dowsett's Hambletonian "Major," dark, dappled chestnut, imported from Oregon by J. I. Dowsett in 1878, and bred to mares at Moanalua, Waianae and Puuloa. Colts are easily kept and tractable.

J. Ross imported a stallion. Suposed to be a Mustang. Dark brown, compact. Dead.

Parker's imported stallion.

"Victoria," a draft mare imported from Australia. Bred to "Oregon" and had "Fanny." Bred to "Chilian" and had Hoffman's "Topsy." "Fanny" bred to "Laurel Second," had "Tutu," a bay carriage mare, driven by C. H. Judd; and bred to "Laurel Second" again, had "Topsy Second," a carriage mare, owned by A. F. Judd.

"General Grant," by "Oregon," imported, out of "Lady Eleanor," imported, dark brown, handsome horses; not a sure foal getter. Bred to Capt. Meek; is now at Molokai. Dead?

"General Butler," by "Oregon" and out of "Lady Eleanor." Dark brown stallion, one white eye. Bred by Captain Meek. His get are large horses, suitable for carriage. Dead.

"Cator," by "General Grant" out of imported "Dougherty Mare." Bred by Kamehameha V.; bought in 1873 by J. O. Dominis. A bright bay stallion and a fine saddle horse. His get are fine saddle horses.

"Lunalilo," now at Kualoa Ranch. By "Norwalk" (?) out of "Lady Woodburn."

Pedigree is: Foaled in 1873 in Honolulu. Mother imported by Kamehameha V.

"Bismarck," bred by Moffit—"Young Hector" and an Oregon mare. Died on Kauai.

"Koloa Plantation" stallion. Now dead; high spirited. By "Oregon" out of "Jinny." Sold by T. Cummins, who bred him to Koloa Plantation, where he was taken. Is a sire of numerous progeny at Kauai, of good horses for all work. Marked his colts well.

"Lance," dark brown stallion. C. P. Ward. By "Oregon" out of "Fanny," imported.

"Lance," a bay stallion, owned by Kamehameha IV. Bred to mares at Waimea, Hawaii. By "Oregon" out of ——.

"Capt. Smith," by "Young Hector," out of Hoffman's "Topsy," now a gelding. Driven in harness by A. F. Judd. Bright bay, small, compactly built; hard mule hoofs. Had numerous progeny. Bred to ——, had McGrew's span; bred to ——, had "Jimmy" race horse.

Shot, 4th of July, 1885, with glanders.

"Kapapala Stallion," by "General Grant" out of A. B. Bates' "Gipsy." "Gipsy" was by "Oregon" out of Cummins' "Black Mare." Sent when young by C. H. Judd to Puuhue Ranch and sold to Kapapala Ranch in 1877. A well-built, bay stallion. His get are good saddle horses.

"Laurel Second," by imported "Laurel" out of "Lady Eleanor," imported. Coal black stallion, no white spot on him. Rather long legs and slender, good legs and

Bred to mares by C. H. Judd on Oahu, and at Haiku, Maui, by S. T. Alexander, and is now at Makaweli, Kauai, owned by W. H. Rice.

"Emerald" stallion, by "Capt. Smith," out of ——; a small, chestnut stallion, stocky and well ribbed up; mane and tail. Now property of W. H. Bailey at Makawao. Since has gone to Kauai.

"Waterford," imported dappled gray stallion; owned by H. Turton, (1878). Tall, well built race horse. Has colts at Kahuku, Honolulu and Maui.

The Thoroughbred Stallion "Waterford," by "Langford."

PEDIGREE.

"1st dam—Margaretta by Lexington,
"2nd dam—Eleanor Margrave by Imp. Margrave,
"3rd dam—Fanny Wright by Silverheels,
"4th dam—Aurora by Lloyd's Vindt'un,
"5th dam—Pandora by Grey Diomed,
"6th dam—By Hall's Union,
"7th dam—By Leonidas,

"8th dam—By Imp. Othello,
"9th dam—By Imp. Juniper,
"10th dam—By Mortin's Imp. Traveler,
"11th dam—Imp. Selina by the Godolphin Arabian.

RECORD.

"Sacramento, Cal., May 4th, 1874, won Golden Eagle"
" Hotel Plate for three-year-olds, mile heats ,beating Wood-"
" bury, Electra, and a colt of "Norfolk;" time, 1.46, 1.47"
" 1.49. Sacramento, Sept. 21st ,1874, won purse of three-"
" year-olds, one mile and a half, beating Electra, Belle, Mow-"
" ry, Lada Amada and Bill Hazel; time, 2.42 1-2. San Fran-"
" cisco, April 24th, 1875, won a race of two-mile heats, taking"
" second and third heats in 3.37, 3.39, beating Woodbury and"
" Hock Hocking. Honolulu, June 11th, 1884, two-mile dash"
" beating Idle Girl and Telephone; time, 3.58 1-2. "
" This great race horse will stand for ten good mares for"
" the next three weeks. "
" Terms, $40. Mares not proving in foal can be returned"
" the following season free of charge. Good enclosed pastur-"
" age at $2 per month, and care will be taken to avoid acci-"
" dents and escapes' but the owner must take the risk. "
" W. H. Cornwell."

"Little Giant," imported bay stallion, owned by G. W. Macfarlane (1878), dark blood bay and black pints. Harness. Gone to Australia.

"King William," dappled gray stallion, owned by John McKeague.

"Boswell," bright bay stallion, black pints, thin tail. Imported by C. H. Judd from General Withers farm, Lexington.

Pedigree: "Almont."

"Triumph," dark bay, black pints. Imported by C. H. Judd

from General Withers Farm, Lexington, Kentucky, in 18— Pedigree:

"Bily Vernon," white or light gray stallion, large and heavy. Owned by Dillingham.

"Fairy," blood bay stallion, owned by Dillingham.

"Patchen Vernon," flee-bitten gray pacing stallion. Imported by H. J. Agnew.

"Venturo," chestnut stallion, owned by J. Campbell.

"Gloster." (Dead.)

" 'Ivanhoe.' This well known thoroughbred stallion will "
" stand the remainder of the season of 1886 at Kalia, on the "
" road to Waikiki, also known as Major Moehonua's place. "
" 'Ivanhoe' was sired by 'Bayswaters,' he by 'Lexington,' "
" dam 'Bayleaf,' by imported 'Yorkshire. 'Ivanhoe's' dam "
" 'Linden,' by Comb's 'Collier;' he by 'Collier,' dam by John "
" Richard's 'Collier,' by 'Sir Charles;' 'Sir Charles' by 'Sir "
" Archie.' 'Linden's' dam, known as "Gothard Mare,' by "
" 'Littleton,' by 'Brown Eclipse,' dam by 'Pritchard.' In "
" color 'Ivanhoe is a rosewood bay, standing 15 3-4 hands "
" high, weighing 1,050 pounds. His disposition is gilt-edge, "
" combining all the courage of the thoroughbred with the "
"docility of a well-broken family horse. Any lady or child "
" can drive him. As a racehorse we claim him to be the "
" equal to any, he beating his field in 1885, at Kapiolani "
" Park, ae one mile and a quarter, in the fast time of 2.14 1-4, "
" by several lengths, in a big canter. As a foal getter he has "
" proven exceptionally sure, having stood several seasons at "
" Maui with great success. We are willing to compare his "
" colts with any in the Kingdom, all being of good size and "
" substance, inheriting the fine finish of their sire; in color "
" they are all bay or brown, no off-coloring ones having come "
" under our observation. Parties desiring information we "
"refer to Mr. A. Smith, Grove Ranch Plantation, who is in "
" possession of quite a number of Ivanhoe's colts. "

" Terms, 30 dollars for the season. "

" Pasturage will be furnished at a reasonable rate, and due "
" care taken of the mares, but no responsibility assumed for "
" accidents and escapes should they occur. L. Howson. "

"Rover," Percheron, dark brown. W. H. Rice.

"Langford, Jr." Miles. Chestnut.

"Basswood." Dark bay. C. B. Makee.

"General Hancock." Light bay. S. C. Bowley.

"General Garfield."

————————. C. A. Alexander.

Morgan Dark Bay.

"Inception," coach horse; dark bay, black pints. W. H. Bailey.

"Young Venture," black stallion. Miles Bros.

"Young Kossuth"—"Lady Eleanor," by "Kossuth"—now at Waianae.

"Kaiser," imported by Dowsett from San Francisco, Cal. A large bay horse; '81.

Some Green Dairy Fodders.

JOHN CULLEN, MANAGER MOANALUA DAIRY, OAHU.

In treating this subject, I will give you what little experience I have with the following fodders:

ALFALFA.

I think it can take the lead as a milk producer, but I am doubtful if the milk will be of the best quality, because all fodders that produce a large flow of milk have a tendency to be poor. Therefore it should be fed with sorghum or whatever other grasses that have fat producing qualities. I always feed sorghum along with it and it makes a very good feed and in rainy season, I feed with it corn cut green. Corn makes a good change of diet which I consider a good thing for stock. Also it helps to clean the land and improves it for some other crop, either sorghum or alfalfa. Alfalfa should have a good light soil as heavy soil gets hard with irrigation, and in a short time begins to deteriorate. I find it is a very hard matter to keep it clean and free from weeds. I have tried cultivating it from two or three inches deep with a two horse cultivator, then harrow it well and clean all weeds out of it. I find this makes a great improvement. I grade the land and sow it broadcast, using fifteen to twenty pounds of seed per acre. The great trouble is to get it started. I have had to resow some pieces of land five and six times, being all eaten with cut worms, therefore sometimes it is an expensive crop to start. I have tried several things to stop the worms, such as lime and fertilizer, but keeping the alfalfa well irrigated, prevents them as much as anything, as they don't get along so well in the damp soil.

SORGHUM.

I consider it a very good fodder for dairy purposes. It is a sure cropper, and produces a large yield per acre, and will rattoon from one to two years, providing the soil is well ploughed and cultivated. It is generally grown in rows, but I think there is a great waste of land to grow it that way. I have tried grading and sowing it broadcast. It produces a much larger yield, but I am doubtful if it will ratoon so long, but the larger yield will repay the ploughing and sowing of the land oftener. When graded and laid off in beds it can be cut with a hay mower which saves time and labor.

GUINEA GRASS.

I have tried the growing of this grass as dairy fodder, but have not been very successful with it. The land has to be in a high state of cultivation to grow it, because if the crop gets stunted in growth it becomes so hard in the stalk, that it is hard to harvest. Therefore, I have discontinued the growing of it, although I believe it is a good fodder if properly cultivated.

IMPROVING MOUNTAIN PASTURE.

I have tried the experiment of ploughing about ten acres at an elevation of six hundred feet. I sowed oats and wheat the first year and had a fair crop of hay. I reploughed it again, and planted sweet potatoes on four acres: they started all right, but cut worms made their appearance and ate them up. However, I left it alone all the rainy season and the manienie started to grow, and at the present time, it is a fine pasture. The other six acres I sowed with wheat, sorghum and Johnston grass. After it got a certain height, I let the cows graze it. Now the manienie has started to grow on this piece also, and I expect with a season's rain, it will be all covered.

Later Notes on Lantana Insects.

R. C. L. Perkins, Assistant Superintendent Division of Entomology, Territorial Board of Agriculture, Etc.

In order to bring up to date the account of the insects that were imported from Mexico to check the growth or spread of lantana, I have drawn up these brief additional notes.

My earlier reports on these insects have already been published in past numbers of the Planters' Monthly.

Excluding those species of which only a single mature specimen was obtained alive at any one time, and which consequently could not become established in the islands, I find that Mr. Koebele supplied me with the following number of species:

Butterflies and moths	14
Beetles	2
Bugs	1
Flies	2
Total	19

In addition to these, at least ten other species were sent over from Mexico, either for immediate introduction, or for experimenting on with a view to introduction, if this were safe. All these, however, failed to survive the long journey, or died from the attacks of parasites or fungous diseases with which they were affected. All the difficulties encountered in importing the lantana insects from Mexico to the islands have been fully discussed in my earlier papers, and need not be referred to again on this occasion.

To return to the 17 imported species of which adults were obtained alive, I find that of the 14 butterflies and moths, three

species were destroyed by me as being decidedly dangerous to other vegetation; two others were not liberated because they were liable to become injurious; and one, of which only a solitary pair were obtained, failed to breed. Subtracting all these, eight species of butterflies and moths were liberated in numbers sufficient to render their establishment possible. Three of these species soon showed up in large numbers—some four months after they were liberated; two others were not seen at all until nine months after they had been turned loose, but are both now in very large numbers, and rapidly extending their range; while of the three others, two at least will probably prove to have established themselves, and the remaining one to have died out.

Of the two beetles neither have been seen at present, but one of these was hardly likely to increase sufficiently to become noticeable under two years; and the other, since we considered it of minor importance in its effect on lantana, has not been looked for in the spots where it was liberated.

Of the two species of flies the success of the one was instant and phenomenal; the second was also quite successfully established, but is of comparatively small economic value.

The solitary species of true bug of which only half-a-dozen sickly individuals reached here, is now firmly established. Its effectiveness is not yet fully ascertained, since it has natural enemies, in the shape of certain other bugs which have been present in the islands for many years.

As to the other imported lantana insects, they are at present practically free from attacks from other predaceous or parasitic insects; and it is quite certain that the parasites, which in Mexico destroy at least 90 per cent. of the individuals of the lantana-eating species were entirely eliminated here, before the latter was liberated. To this fact is due the astonishing rapidity of increase of some of the quicker-breeding insects in these Islands, so that after three months, from two or three dozen of the

berry-eating fly, originally liberated, the progeny had already run into many millions.

The imported insects enumerated above are almost all feeders on the seed, unripe berry, flower, bud or shoot. Those do not in any way destroy the bush itself, but they are highly effective in checking any further spread of the plant, and render it possible for any one to clear lantana-covered land once and for all, without fear of having to perform this work at intervals of every few years. Amongst these, however, are a few which have a more serious effect on the health of the plant. One of the two imported beetles lives as a larva in the tap-root, and if it proves to be established and becomes numerous it will probably destroy many bushes. The true bug, that I have specially mentioned above, is extremely injurious to lantana, and in localities, where it thrives best, is quite capable of entirely killing a bush. Its effectiveness will probably vary much according to the nature of the locality, and also on the number of the predaceous insects that, as I have mentioned, already attack it.

This finally brings up the question whether lantana should be, if possible, entirely destroyed. Most owners of a lantana-covered ranch will have but one answer. Many persons, however, who are interested in forestry and agriculture are opposed to any such total destruction. The question appears to me one to be decided only by an expert forester, not on superficial examination, but only after having spent at least many months in fully examining all the conditions here.

The insects that have now been imported are, I believe, sufficient to fully check any further spread of the pest, but insufficient for its destruction. That total destruction could be effected by importation of other insects can hardly be doubted; but so much care would be necessary, that it would certainly require the individual attention of several entomologists for at least two seasons to complete the work. It must be remembered that in the work already accomplished

only those insects which appeared safest to introduce were handled, and even of these some were discarded as dangerous. Other species would require the most careful and prolonged experimenting with before they could be liberated.

As to the results obtained from the seed-destroying species distributed throughout the island, I cannot personally supply much information. Although scores of parcels of the insects have been distributed, only four or five of those interested have reported results. I can only say that in the immediate neighborhood of Honolulu, where I distributed the insects myself, complete success was rapidly attained. Throughout the length of the Pacific Heights car line it is hardly possible to obtain a good seed, and in many places the insects are actually starving from their excessive numbers. Frequently some solitary flower on a bush contains several eggs of one or other insect, though it is quite insufficient alone to bring to maturity even one of these.

The small seed-eating fly flourishes as high as 2,000 feet in the mountains and has been reported to me as having reached 2,500 feet. I have no doubt some of the other insects will extend to greater elevations still, or at least as high as the extreme range of the lantana itself. No doubt members of the Association can supply full information on the spread and effect of the lantana insects in many districts of the islands. Such information is much needed by me, as it is the intention of the Entomological Division of the Board of Agriculture to prepare a Bulletin, giving a full account of the work that has been accomplished.

To show the complicated nature of the problem that presented itself to Mr. Koebele when he was at work in Mexico, I may mention that the collection of insects made by him from lantana in that country amounted to nearly four hundred distinct species, and to these must be added about one hundred more, chiefly very minute parasites, bred by me here from material forwarded from Mexico. A large number of these species I have brought with me for inspection by those interested.

Pamakani, a Dangerous Plant Pest.

L. von Tempsky, Manager Haleakala Ranch, Maui.

My attention was first drawn to Pamakani about 1885 or 1886, at Ulupalakua. It must have been growing there right along, but it was only when it began to spread over the mauka land that it first attracted itself to me. It was then growing at at altitude of approximately 3,500 feet on the side of a steep hill, the soil being composed principally of cinders with a little loamy top soil; prior to the advent of the Pamakani, Pipiwai and Oi grew there quite profusely; but they were very soon obliterated by the Pamakani. From that time I noticed a steady increase, slowly at first, but as it began to spread and attain a larger area from which to draw its seed supply more rapidly; growing both mauka and makai till now it can be found as low as 2,000 and as high as 6,000 feet. The elevation it does best at is from four to five thousand feet. In 1899 it had reached Makawao, and Kaupo in 1900; a distance of about twenty miles in either direction.

To give an illustration of the rapidity with which it can spread itself when it reaches a locality which is suitable to its growth, I may tell you that in Feb., 1901, I went from Kaupo to Makawao through the crater of Haleakala. At an elevation of about 4,500 feet I noticed a few scattering plants of Pamakani. When I made the same trip in May of this year, lands to the extent of about five hundred acres, was so completely covered with it, that it is impossible for either man or beast to get through.

The conditions in that locality are frequent light rains and a soil composed of loam and gravel.

I have so far seen no Pamakani on the northern side of Maui

from Kaupo to Makawao. It may, of course, be there, but it doesn't seem to be known as a pest in that part of the island. Pamakani will, however, grow in the parts of Maui where the trade wind rains occur, as I have seen a patch of it in the woods near Kailili growing up amongst dense Hilo grass.

Pamakani is, I understand, referred to in Hillebrand's Flora of Hawaii as *Senecio,* and also *Phyllanthus,* there being evidently two plants of that name.

This shows that Pamakani must have grown on the Islands for a long period, and the only reason I can deduce for its not having spread before 1885 and 1886, is that probably prior to that date there may have been some insect or blight that kept it in check, which insect or blight must about that time have disappeared.

The so-called Maui black blight kills Pamakani, but very slowly. Also I have noticed this year for the first time, the Olinda beetle in certain localities has stripped it perfectly clear of leaves; but as it comes up again from the roots, I cannot hold out much hope from that source for any material help towards its extermination.

Pamakani is perennial, grows in a bunch of stems, starting direct from the roots; color of stems nearly claret; has a dark green, diamond-shaped serrated leaf, and a fluffy cluster of white flowers at the extreme end of each stem. The seed is very minute and light, therefore easily carried by the wind. The plant grows in very favorable localities to a height of six and seven feet, but usually about three or four is what is found. It is not a hard plant to dig out, having when young very shallow roots. I have no difficulty in keeping it out of my lands in Makawao. It is only when it becomes thoroughly established that it is hard and expensive to eradicate.

Devons for the Dry Ranches.

G. C. Munro, Manager Molokai Ranch.

In considering the most suitable breeds of cattle to use to improve and keep up the quality of the Island herds, where beef production is the principal aim, and taking into consideration the peculiar conditions existing on many of the ranches, periodical scarcity of feed, occasional protracted droughts, long distance to water, driving on very hot and dusty roads, or rough, rocky trails, and shipping off the coast under very awkward and dangerous conditions, it seems to me that there is more in favor of, or less objection to, the Devon herd than any other class of cattle.

The characteristics of the Devons, quoting from "Breeds of Dairy Cattle," Farmers' Bulletin No. 106: "Compactness and general beauty, hardiness, activity, intelligence, docility, aptitude to fatten, and quality of milk," are all desirable points to meet the conditions here, and being only a medium size is an advantage, considering that they are heavy weighers for their size, and it is quite likely that on the dry ranches as much weight will be attained by Devon grades as by the grade of heavier breeds.

As beef animals the Devons have no superiors, unless in size, the steers being profitable alike to the grazier and the butcher, to the former in the good use made of the feed consumed, and to the latter in the amount and quality of the beef on the carcass.

As milkers they do not hold first place, but they rear their calves exceptionally well, and on many ranches would probably be as profitable milkers as other breeds; some fair milking records have been made by Devons.

As working cattle the steers are first-class, getting over the ground more quickly than others, and in Devonshire were considered equal to horses for plowing.

The Devon bulls are very active and aggressive, and if other bulls are on the same pasture the Devons will leave the majority of calves, their strength and sagacity fitting them to vanquish much larger rivals. Their best points are also readily transmitted to their offspring. In my personal experience I have found that under favorable conditions in New Zealand the Devons do not compare with the Durham Shorthorn as a general purpose animal, being inferior in milk supply and in furnishing the largest class of store steers that are in demand there.

On the Makaweli ranch, where a fine class of Shorthorn grade cows were kept some years ago, a change having been made from Devons originally carried there, the Shorthorns were too delicate for the range, and it was found desirable to go back to the Devons. The steers from the Devon bulls used in this change were splendid animals, with good points of both breeds and the rustling quality of the Devons, the ranch having good beef cattle during a series of dry years. The Makaweli changes were exactly the opposite of my early experience in New Zealand, and are an example of difference in conditions giving different results, not that the Devons did not do well there, but the Shorthorns were more profitable, the opposite being the case at Makaweli.

The grade steers from an importation of Devon bulls to the Molokai Ranch a few years ago, and bred with a fair lot of cows of various strains, are just coming into the market, and they are well marked amongst the other stock, their bodies being very full and rounded before the purse fills, whilst other grades with a full purse, denoting prime condition, show considerable slackness in the beef points; a few of the Devons sold last year gave weights up to that of older and larger animals of other

breeds. Of course some allowance must be made for the fact that the Devons were nearer the pure blood than the others.

The Devon grades keep in better condition during the dry season and pick up quicker when the feed improves than most other strains.

Other ranches have, I believe, used the Devon cattle in improving their herds with favorable results.

Modern Methods in Animal Husbandry, with Suggestions for Local Conditions.

F. G. Krauss, Instructor in Agriculture, Kamehameha Schools.

INTRODUCTION.

To compare the methods of to-day with those of yesterday, and our own with those of our neighbors, should prove interesting and instructive to some degree, and I trust, under present Island conditions, encouraging as well. This I had in mind when I accepted your kind invitation to address you at this meeting. I did not pretend to be sufficiently acquainted with your very diversified conditions to make special suggestions or recommendations, as might be supposed from the title of my paper; but it seemed to me that a brief review of what had been done, and an outline of modern methods as practiced elsewhere, especially in America, where notable work is being done in animal husbandry, might be appropriate, and suggestive for this occasion.

HISTORICAL.

Let use briefly review the early history of live-stock conditions in Hawaii. Unfortunately the early records concerning the first domestic animals, especially of cattle brought to Hawaii are extremely meager; however, we are told that when Captain Cook made his first visit to the Islands in 1778, he found fowl and swine, which were doubtless brought by the natives when they made their exodus from the South Sea Archipelago—we have no record of earlier navigators.

At this time Captain Cook left goats and swine of English

breed on one of the Island, and upon his return, fourteen years later, these had materially multiplied; but we are not advised of the further introduction of live stock until Captain Calvert's visit, in 1792, when he left a ram and a ewe on Kauai. In 1793, Vancouver visited the Islands a second time, leaving a number of geese, goats, sheep and the first cattle, the latter being protected by royal decree against slaughter for ten years, except in the case of an excess of male animals. Horses are said to have been introduced in 1823, and between 1824 and 1838 "many cargoes were landed from California." As might be expected, little attention was given to the improvement or selection of breeds, and after a time the deteriorated progeny of the early importations had, under the favorable existing conditions, multiplied to such an extent as to become a considerable nuisance in some sections.

In 1850 the Royal Hawaiian Agricultural Society was organized, the object of which, among other important work, was the improvement of breeds of horses, cattle, sheep, swine and poultry; and in the report of the first exhibit, horses, cattle and "monstrous swine" are commented upon.

We now come to the period of the first importations of thoroughbred cattle, which appears to have been made by J. I. Dowsett on Oahu, who imported a small herd of Polled Angus in the eighties. At about this same period Judge McCully imported Holsteins from Germany. The James Campbell herd of Shorthorns at Kahuku, Oahu, and several other small importations, seem to cover the principal work done along improved lines up to 1893 or to about some ten years ago.

Compared with what has been done since the early nineties, these early importations appear to have had only slight influence on the Island herds, but it was an important beginning, and doubtless gave a strong impetus to the splendid work which had followed and is now showing such excellent results in many quarters.

Contrasted with the Hawaiian Island, a brief history of the introduction of cattle into America, and the preliminary work done in Europe, especially England, may be of interest—it seems to me to offer several valuable suggestions, besides we now look to the United States for much of our pure blooded stock.

Prior to the discovery of America, there were no cattle in the Western Hemisphere. Columbus is accredited with having brought a number of domestic cattle to the West Indies Islands in 1493, and from these islands they were taken by the Spaniards into Mexico about 1525; thence they spread into the territory now included in California, New Mexico, Arizona and Texas, and became the progenitors of what is now known as "Texas cattle." The Spaniards also introduced cattle into Florida and established herds from which, with slight modifications, are descended most of the cheap cattle now found in that and adjacent States.

Following the introduction of Spanish cattle came those from Northern Europe, beginning about 1624, from which are descendant the greater portion of the cattle of the United States. During the earlier history of the Colonies, the following breeds of English cattle were introduced: Devons, Hartfords, Shorthorns, Polled, Gallaways and a few Alderneys, but these for the most part were of inferior strain, and as they became intercrossed, their identity became almost wholly lost, the "native cattle" of the Eastern United States resulting.

Early in the nineteenth century, the memorable English improvement in cattle set in, but nothing was attempted in fine breeding in the United States until about 1830, when the remarkable success of Bakewell, Colling, Bates, the Booth Bros., and others in England, awakened American breeders to the great possibilities to be derived from careful selection and judicious crossing. Up to Bakewell's time we find a class of cattle of no uniformity, of little value as high class meat producers, usually late maturing and of poor quality generally.

A fair idea of the cattle that were the typical native stock of Great Britain up to the middle of the eighteenth century may be found by a study of the noted "Blackwell Ox." He was over five years old when slaughtered at Darlington, Dec. 17, 1799. The following data concerning weight and dimensions may be of interest:

WEIGHT AND DIMENSIONS OF THE BLACKWELL OX.*

	Weight.		
	St.	lbs.	U. S. Lbs.
Fore quarters	76	7	1,071
Hind quarters	76	3	1,067
Tallow	11	.	154
Total	163	10	2,292

	Dimensions.	
	Ft.	In.
Height at crop	6	..
Height at shoulders	5	9¼
Height at loins	5	8
Height from breast to ground	2	1
Length from horn to rump	9	3½
Breadth over shoulders	2	10½
Breadth across hips	2	10½
Girth before shoulders	9	7½
Girth behind shoulders	10	6
Girth at loins	9	6½

*Transactions of the Highland and Agricultural Society of Scotland, 1896.

These figures show an animal with good grazing qualities, strong constitution, but slight in flesh carrying capacity some coarseness and doubtlessly a poor feeder. This was the old Teeswater type, from which the Shorthorn breed was decendent, and represents a period about midway between the beginning of Bakewell's work and that of Collings'—this was the crude beginning; there was no fixed type as yet, and no definite method by which a type could be readily fixed.

Under these new conditions in America, the Shorthorn breed early assumed a foremost position, and although popularly called the "milk breed," their value as beef cattle was fully recognized; and their great popularity was shown in 1873, when the famous Mills sale occurred in New York,—109 head being sold for $380,000. British breeders acknowledged that the United States possessed better Shorthorns than could be found in England, and sent over agents to take back some at any price. Herein may hide a hint for the expert Hawaiian breeder, with his peculiar advantage of isolation.

I have dwelt at some length on the remarkable early rise of the cattle industry here and abroad, and yet much of interest might be said; but I must pass on to the present status of the cattle business, and the methods practiced to bring about such results, or else change the title of my paper, "Present Status of the Cattle Industry."

In parts of the United States the present improvement and expansion of the cattle industry is extraordinary. Up to the opening of the Trans-continental railways, cattle raising was carried on in the sections east of the Missouri river; but no sooner had the vast territory beyond been opened up and its great opportunities for grazing became known, than an abnormal growth set in; then the reaction set in, but only the superstructure collapsed. A sound foundation had been built, and upon this a substantial and healthy progress is now going forward. Quality is being bred into the range herds by the use of

pure-bred sires, and the range steer is no longer the long-horned, wild-eyed creature of a decade or two ago. Is not a similar revolution taking place on the ranges of Hawaii? From all that I have been able to learn, I think it is, and it is a healthy sign that promises even better for the future.

According to the twelfth U. S. census, Hawaii has a total of 198 stock farms (Farms deriving their principal income from animal products, exclusive of dairy produce) covering 1,441,529 acres, of which 21,596 acres are improved,—less than two per cent., as against 48.9 per cent. for the whole United States—a lot of room for improvement, considerable over a million acres, and this, if true, should cause us to ponder.

The total value of these farm properties in June, 1900, is placed at $4,529,174; the livestock alone at $1,121,964. The value of produce from the improved area was in 1899 $447,450, none of which, it is stated, was fed to livestock! Expenditures during the same year for labor is given at $206,280; fertilizers, $100! The average value per farm is $22,875; its livestock, $5,667.

From reliable local sources I have an estimate of about 130,000 cattle for the Islands, or an average of about 656 head per farm; but as these have not been classified as to age, etc., we have no means of judging their individual valuation.

Of course, we expect the census to give only the broadest kind of approximations, and I do not know how nearly the given figures are correct, but they are the best available, and if reliable, they show some interesting facts.

The items that stand out most conspicuously, compared with the figures given for other States and Territories of the Union, (excepting Alaska), are, 1st, the number of livestock farms in Hawaii; 2nd, their large average area; 3rd, the small percentage of improved land; 4th, the apparent total lack of home-grown produce fed to the stock, and 5th, the proportional large amount of capital invested in these farms, they exceeding both

in average size and value those of any other State or Territory.

Another interesting fact brought out by the above figures, is the estimate of one head of stock to a little of 11 acres,—a good average, when we consider that at no time of the year is soiling practiced.

Although we have no official statistics as to the percentage of increase in Hawaii, it is generally known that only very recently the supply of the home product was unequal to the home demand, while at present, no beef is imported, and from present appearances Hawaii bids fair to hold her own in this respect.

Naturally, the fear of over-production and the consequent lowering of prices, also presents itself at this particular stage of your development. But I share the opinion of at least one of your members in that there are no grounds for fear on that score, at least not for some time to come. Your growth has been so gradual and the available land so thoroughly stocked that an equilibrium as to the quantity has about been reached; the past season or two have been unusually favorable on some ranges, more so than can uniformly be expected, and instead of a marked increase, the reverse is likely to be true.

At this point it is interesting to note a decrease of 8 9-10 per cent. in the number of neat cattle in the United States from 1890-1900, but the value of the remainder, as reported by the census, was $426,346,789.

These figures show the large gain in average value of 46 7-10 per cent. This falling off in numbers is largely due to the country's general prosperity since 1898, with its increased consumption of meat, resulting in a corresponding reduction in the number of beef cattle, thus causing the production of beef to fall behind the consumption, and resulting in the advance of prices, which began in 1889. That a considerable part of the increase in the values, as shown in the foregoing comparison, is due to the introduction of pure-blooded cattle, may be referred from the fact that the greatest increase in average prices has

been in regions paying most attention to stock improvement, and the least in those where practically no consideration has been given to the subject. I have been a long time in coming to the main point of my subject, but it has also been a slow, gradual evolution that has brought the cattle breeder to a position where he began to recognize the herd as the foundation of his business, and the sire as half the herd.

MODERN AIMS AND METHODS.

The object uppermost in the mind of the up-to-date breeder, whether he produce horses, dairy cows, beef cattle, mutton, wool or swine, is the economical production of quality and quantity; in order that he may realize this to the fullest extent, two factors must especially be taken into account. One is the adaptability of the animal under consideration,—the individual and breed characteristics,—the other is the amount and kind of food fed.

The best authorities are agreed that *"blood and feed will tell,"* and for detailed consideration let us take up beef cattle, for which the *final test* has been worked out to a nicety, namely, their market classification, which I find in our local market still quite crude. You should both assist and insist on ratings of definite market classes and grades now that your cattle begin to show that quality which can come only from skillful handling and favorable conditions. Such recognition cannot but help result to the mutual benefit of all concerned.

As established in modern practice in the large cattle centers, cattle are now divided into the following classes: beef, butcher stock, cutters and canners, veal calves and stockers and feeders. The grades are: prime, choice, good, medium, common and inferior. The various classes indicate the uses to which the cattle are put: the grades refer to quality, condition, and conformation; the relative importance of which factors, so far as they influence market values, is indicated by the order in which they have been given, quality being of greatest importance, condi-

tion next, and conformation of least importance, this latter condition at least giving the breeder leeway in the choice of breeds, and therefore largely location as well.

Weight has relatively but small influence in determining the grade and price of fat cattle. Quality and condition largely govern both.

As a basis for comparison and study of other grades, the breeder should early become familiar with the characteristics of prime steers and choice feeders, though as yet, I understand, little or nothing has been done in the way of stall feeding. These, however, are standard grades elsewhere, and that demand would spring from a regular supply, I am certain. In other markets fluctuation affects these grades less than others, a very important consideration. When once established it will be a good plan when practicable to follow your consignment to the market and learn the desirable and objectionable points about your cattle from the standpoint of the market.

Do you wish to consider possible export? I do not think you will need to do so for yet awhile; but if so, then let me add that the most desirable steer for export, for shipping, and for the best grade of dressed beef, either for domestic or foreign trade, is the same in each instance. But the best grade of any class of cattle must be practically above criticism. This is a goal worth striving for, and I believe possible of attainment by the earnest Hawaiian breeder. When he has done so his beeves will command a premium, while the scrub will go begging. It is the kind of business I should care to enter.

What has been said of beef cattle is equally and even more applicable to dairy stock, since in the latter we have the proof in daily returns; besides, if anything, dairying has become the most intensified branch of animal husbandry. No more wonderful advancement has been made along agricultural lines than in dairying, and yet from a sanitary standpoint, no other division offers more room for improvement; but of this we

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shall speak later. The greatest advance has probably been in the development of the extraordinary individual milk and butter records of the representative breeds, and whole herds now average higher than the several record-breakers of a few decades ago. Much of this is due to expert breeding, as in the case of the modern beef type, but scientific feeding, united with exceptional management, has much to do with the fine results which are each year becoming more universal. I regret to find so little tendency in that direction in Hawaii, or rather Oahu, to which my observation has mainly been confined. As a rule, poor grades of milch cows predominate in every dairy herd, and little attempt is made for improvement. The twenty-quart cow is here an exception, comparatively few average more than half that amount, and a large proportion average not more than a fourth.

The balanced ration is almost unheard of, and I know of no dairyman who tests his milk regularly, and very few keep daily individual yield records. And the sanitary conditions about the dairies, with a few notable exceptions, are the worst I have ever seen. Surely here is room for improved methods. We have made a beginning at Kamehameha; first, from the health standpoint,—we have three hundred boys and girls depending upon the wholesomeness of the product. Our cows have been inspected and pronounced free from disease; the best of feed and clear, fresh water is provided in abundance; the cow yards are free from mud in the rainest season; stable have been floored with concrete and the walls, inside and out, are twice annually whitewashed. The cow udders are washed before each milking, and the milk is carefully strained; droppings are removed after each feeding, and the cow sprayed before being turned out to pasture.

We grow all the roughage fed in the dairy; it is of considerable variety, and includes sorghum, sweet-corn fodder, Kafir corn, milo maize, etc.; cow-peas, Para grass, and manienie,

the latter of which we have some twenty acres planted to lawn, provides an excellent fodder during the rainy season, when we mow one or two times monthly.

The cow-peas give promise as a valuable substitute for part of the extensive grain ration, because of their high protein content. With the corn and sorghum all are familiar. Algaroba beans form a part of the concentrates composing our dairy ration during a part of the year. Our present ration has been carefully computed according to the standard (Wolff's) and then modified to suit our own peculiar conditions as experience suggested:

Kamehameha Farm Dairy ration, based on cows in full milk, weighing 1000 lbs.:

40 lbs. chopped sorghum, corn or manienie, together or separate, and mixed with cow-peas when available.

3 lbs. wheat bran.

2 lbs. middlings, or shorts.

2 lbs. linseed or cocoanut meal.

5 lbs. chopped algaroba beans.

The above ration is divided equally into a morning and evening meal. Its cost is from 18c to 20c per cow per day, our cows averaging about 900 lbs. in weight. This is high feeding compared with Honolulu standards, but we find it pays. Of course, we do not follow the standard blindly; it is a base which judgment will need to modify according to the peculiarity of the individual cow and other local conditions. Further:

Punctuality in milking and feeding is insisted upon and our students, by whom all the dairy work, as well as the farm work in general is done, receive a valuable training in good habits, as well as in this important branch of agriculture.

A daily record is kept of the yield of each cow, morning and evening; her milk is tested by the Babcock method twice monthly. This data we use as a guide in culling our herd once yearly, and for every cow culled we aim to replace as good a one as it

is possible to obtain. We still find much room for improvement, but from our experience and observation we believe that the dairy business offers exceptional opportunities when rightly conducted. I have been asked for further data concerning our dairy operations, and a summary of the business end for the year ending December 31, 1902, is as follows: Average number of cows milking during the year, 9 75-100 per cent.; total yield as actually sold (no allowance being made for amount fed to calves, which is inconsiderable, owing to the small number of calves fed to a weaning age); 25,531 quarts, or 55,657½ lbs. An average yield of 2,618 quarts, or 5.708 lbs. per cow per annum. The gross price realized for the total yield was $2,274.18. Cost of feed was $634.25, which includes an allowance of $4 per ton for green fodder produced on the school farm, and $5 per cow per annum for pasturage, which is a generous allowance, considering that our pasture affords little else than exercise. The cost of labor for the year was $236.63, all dairy work being performed by student labor, which is paid for at the rate of 8c to 10c per hour. Deducting the cost of feed and labor we have $1,403.30 net remaining. The Schools' dining halls crediting the Dairy Department at the rate of 9c and 10c per quart for all milk used.

Although the primary object of our dairy is to supply the pupils with pure, nutritious milk (ours averaging 44.2 butter fat) it is proving an important educational factor and leaves a profit besides.

The above instance illustrates the average results from average conditions, and would not in itself be sufficient to arouse enthusiasm, were it not for the record of our best cow, a thoroughbred California-bred Jersey, six years old at the time of giving birth to her fourth calf, April 18, 1902, and between that date and April 20, 1903, she produced 4,380 quarts of milk, an equivalent to 9,485 lbs. Twelve tests for butter fat were made during the twleve

months covered in the record, and these gave an average of 5.1 per cent. Taken as a whole, I consider this quite a remarkable performance for local conditons, and I think it shows possibilities of a high order.

The ration fed this cow was practically as earlier mentioned, and its total cost for the year, including apportionment of labor, was $73, the value of her milk product at 9½c per quart was $386 for the year; but we do not expect her to do as well by 30 per cent. this year; the period of lactation was extended too long, up to August 15th (a period of seventeen months), when she again calved—a tremendous strain, but it was unavoidable; it seemed impossible to dry her off.

I have entered so fully on this case because of its authenticity and its operation within our midst; it strikingly shows the great influence of feed and care on the individuality of milk cows when the best modern methods are practiced. That the reverse of our experience at Kamehameha is often true is not to be wondered at when it is explained that ignorant Japanese and Chinese help feed, milk and generally superintend the dairy.

The general fundamental principles which underlie the breeding, feeding and care of dairy cows, also applies to beef cattle and live stock in general, and without such knowledge the stock breeder gropes about in darkness. The best modern methods have for their foundations, underlying principles, and an understanding of the laws of heredity, the principles of nutrition, the composition and the anatomy of the bodies of farm animals, the value of feeding stuffs, the selection and compounding of rations, the tests of forage and fodders, all play their parts in rounding out the perfect whole.

To summarize and add a passing thought: The past and present years have been prosperous ones for the cattle raiser here and elsewhere, due to his own advancement as much as to external causes. He need not fear the slump of a prime article,

is possible to obtain. We still find much room for improvement, but from our experience and observation we believe that the dairy business offers exceptional opportunities when rightly conducted. I have been asked for further data concerning our dairy operations, and a summary of the business end for the year ending December 31, 1902, is as follows: Average number of cows milking during the year, 9 75-100 per cent.; total yield as actually sold (no allowance being made for amount fed to calves, which is inconsiderable, owing to the small number of calves fed to a weaning age); 25,531 quarts, or 55,657½ lbs. An average yield of 2,618 quarts, or 5.708 lbs. per cow per annum. The gross price realized for the total yield was $2,274.18. Cost of feed was $634.25, which includes an allowance of $4 per ton for green fodder produced on the school farm, and $5 per cow per annum for pasturage, which is a generous allowance, considering that our pasture affords little else than exercise. The cost of labor for the year was $236.63. all dairy work being performed by student labor, which is paid for at the rate of 8c to 10c per hour. Deducting the cost of feed and labor we have $1,403.30 net remaining. The Schools' dining halls crediting the Dairy Department at the rate of 9c and 10c per quart for all milk used.

Although the primary object of our dairy is to supply the pupils with pure, nutritious milk (ours averaging 44.2 butter fat) it is proving an important educational factor and leaves a profit besides.

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To summarize and add a passing thought: The past and present years have been prosperous ones for the cattle raiser here and elsewhere, due to his own advancement as much as to external causes. He need not fear the slump of a prime article,

I should prefer to withhold a definite statement until our conclusions have been thoroughly verified.

I can think of no more fitting conclusion to my paper than to pray that your organization, with its large and peculiar influence, give earnest thought and energetic support to the Government's efforts in forest preservation.

The live-stock interests of Hawaii, as well as elsewhere, cannot but be benefited by proper restriction. The policy of the United States is to use the forest products of the reserve, and they have been so used wherever conditions will permit. This may seem news to some, but during the past season more than a million sheep and half a million cattle and horses were grazed on forest reserves under regulations, and with benefit to all concerned.

List of Officers and Members.

JANUARY 1, 1904.

PRESIDENT ..... JULIAN MONSARRAT
VICE-PRESIDENT ..... A. W. CARTER
SECRETARY ..... ALBERT F. JUDD
TREASURER ..... R. W. SHINGLE

EXECUTIVE COMMITTEE.

HAWAII ..... ROBERT HORNER
MAUI ..... L. VON TEMPSKY
MOLOKAI ..... A. M. BROWN.
OAHU ..... H. M. VON HOLT
KAUAI ..... E. A. KNUDSEN

MEMBERS.

	Address.
Bolte, C	Honolulu.
Brown, J. F.	Honolulu.
Brown, A. M.	Honolulu.
Carter, A. W.	Honolulu.
Cullen, John	Honolulu.
Conradt, C. C.	Honolulu.
Damon, S. M.	Honolulu.
Dowsett Co., Ltd.	Honolulu.
Gay, Francis	Makaweli, Kauai.
Greenwell, Mrs. E. C.	Kealakekua, Hawaii.
Haleakala Ranch	Makawao, Maui.
Hawaiian Agricultural Co....	Care C. Brewer & Co., Hon.
Hitchcock, H. R.	Pukoo, Molokai.
Horner's Ranch	Paauilo, Hawaii.

Ii Estate ,John, Ltd..... Honolulu.
Isenberg, Paul R. ..... Honolulu.
Irwin & Co., W. G. ..... Honolulu.
Kamehameha Schools ..... Honolulu.
Knudsen, E. A. ..... Kekaha, Kauai.
Lihue Plantation Co., Ltd.... Lihue, Kauai.
Low, Eben P. ..... Honolulu.
McCandless, L. L. ..... Honolulu.
Mendonca, J. P. ..... Honolulu.
Molokai Ranch ..... Kaunakakai, Molokai.
Monsarrat, J. ..... Pahala, Hawaii.
Maguire, J. A. ..... Kawaiahae, Hawaii.
Oahu Railway & Land Co., Honolulu.
Parker, Samuel ..... Honolulu.
Raymond, J. H. ..... Makena, Maui.
Robinson, Aubrey ..... Makaweli, Kauai.
Robinson, M. P. ..... Honolulu.
Robinson, W. T. ..... Wailuku, Maui.
Rice, W. H. ..... Lihue, Kauai.
Searle, R. C. ..... Lahaina, Maui.
Smith, Jared G. * ..... Honolulu.
Swanzy, F. M. ..... Honolulu.
Shipman, W. H. ..... Hilo, Hawaii.
Waller, G. J. ..... Honolulu.
Henry Waterhouse Trust
Company, Ltd. ..... Honolulu.
Wight, Dr. Jas. ..... Kohala, Hawaii.
Wilcox, A. S. ..... Lihue, Kauai.
Wilcox, G. N. ..... Lihue, Kauai.
Wilcox, S. W. ..... Lihue, Kauai.
Woods, J. F. ..... Mahukona, Hawaii.
Woods, Palmer P. ..... Mahukona, Hawaii.

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*Honorary member.

STATISTICAL TABLE SHOWING LIVE STOCK DELIVERED TO THE METROPOLITAN MEAT COMPANY'S SLAUGHTER HOUSE FROM JULY 1, 1902, TO JUNE 30, 1903, WITH WEIGHTS AND VALUES OF SAME.

OWNER	CATTLE			CALVES		SHEEP			CATTLE		SHEEP	
	No.	Weight	Amount	No.	Amount	No.	Weight	Amount	Average Weight per Head	Average Price per Head	Average Weight per Head	Average Price per Head
American Sugar Co., Ltd.	599	227,890	$ 20,950 13	.....	.....	3858	123,724	$ 11,753 74	380	$34 97	32	$3 40
Achi, W. C.	119	45,947	4,053 25	.....	.....	.....	.....	.....	386	34 06	.....	.....
Brown, J. F.	.....	.....	.....	15	$ 252 58	143	3,718	353 21	.....	.....	26	2 47
Broad, John	26	9,584	895 00	.....	.....	.....	.....	.....	368	34 42	.....	.....
Bolte, C.	11	6,774	578 93	.....	.....	.....	.....	.....	615	52 63	.....	.....
Glark, Capt	12	5,356	504 26	16	393 46	.....	.....	.....	446	42 02	.....	.....
Clark, Geo.	30	10,986	1,035 34	1	5 10	.....	.....	.....	366	34 51	.....	.....
Cornwell, W. H.	288	105,973	9,857 21	.....	.....	.....	.....	.....	367	34 22	.....	.....
Dowsett Co., Ltd.	405	159,760	14,213 37	157	2,897 00	.....	.....	.....	394	35 09	.....	.....
Dimond, W. W.	37	15,452	1,442 50	8	133 20	.....	.....	.....	417	38 90	.....	.....
Damon, S. M.	200	90,823	8 726 81	23	526 16	.....	.....	.....	454	43 63	.....	.....
Gay & Robinson	205	128,936	12,356 50	.....	.....	1599	65,378	5,596 50	628	60 27	40	3 50
Greenwell, Mrs. E. C.	497	259,201	25,485 33	29	549 29	.....	.....	.....	521	51 27	.....	.....
Gomes, M.	31	14,188	1,368 81	.....	.....	.....	.....	.....	457	44 15	.....	.....
Hitchcock, H. R.	1	340	30 60	58	1,053 08	.....	.....	.....	340	30 60	.....	.....
Hackfeld & Co.	7	1,846	129 65	.....	.....	.....	.....	.....	263	18 52	.....	.....
Humuula Sheep Station	.....	.....	.....	.....	.....	2100	74,035	7,033 31	.....	.....	35	3 33
Holt, Geo.	14	4,374	365 88	.....	.....	.....	.....	.....	312	26 13	.....	.....
Haleakala Ranch	105	59,054	5,837 57	.....	.....	.....	.....	.....	562	56 54	.....	.....
Isenberg, D. P. R.	25	9,766	906 61	49	367 61	.....	.....	.....	390	36 26	.....	.....
Irwin, W. G. & Co.	101	50,660	4,894 06	4	41 70	.....	.....	.....	501	48 45	.....	.....
Ii, John, Estate	.....	.....	.....	147	1,592 20	.....	.....	.....	.....	.....	.....	.....
Kamalo Plantation	.....	.....	.....	29	535 20	.....	.....	.....	.....	.....	.....	.....
Kaneohe Ranch	169	77,218	7,529 93	135	2,040 85	257	8,953	868 70	458	44 54	34	3 38
Kahoolawe Ranch	.....	.....	.....	.....	.....	550	20,531	1,950 44	.....	.....	37	3 54
Low, E. P.	274	153,313	15,187 15	.....	.....	.....	.....	.....	559	55 42	.....	.....
Lanai Ranch	.....	.....	.....	.....	.....	1308	28,956	3,656 92	.....	.....	22	2 79
Lindsay, T.	29	18,642	1,818 82	.....	.....	.....	.....	.....	642	62 71	.....	.....
Mauliola, J.	10	3,702	314 41	15	306 42	.....	.....	.....	370	31 44	.....	.....
Maguire, J. A.	294	139,045	13,706 39	.....	.....	.....	.....	.....	472	46 62	.....	.....
McCandless, L. L.	29	11,954	1,109 95	10	184 64	.....	.....	.....	412	37 92	.....	.....
Meyer, Otto & Bro.	25	7,488	629 23	29	611 95	.....	.....	.....	299	25 16	.....	.....
Mano	30	12,034	906 87	11	178 46	.....	.....	.....	401	30 20	.....	.....
Nakuina, Mrs. E.	13	4,262	339 80	24	367 99	.....	.....	.....	327	26 13	.....	.....
Oahu Railway & Land Co.	726	313,148	30,143 18	173	2,672 56	.....	.....	.....	431	41 51	.....	.....
Parker Ranch	1586	852,619	85,085 12	.....	.....	.....	.....	.....	537	53 01	.....	.....
Perry, A.	22	10,328	1,006 45	11	196 80	.....	.....	.....	469	45 74	.....	.....
Paris, J. D	215	91,350	8,860 27	.....	.....	.....	.....	.....	424	41 21	.....	.....
Puuloa Ranch	.....	.....	.....	.....	.....	353	11,106	1,055 07	.....	.....	31	2 98
Robinson, M. P.	210	73,766	5,907 27	142	2,071 50	.....	.....	.....	351	28 13	.....	.....
Star Dairy	27	8,136	635 76	34	219 38	.....	.....	.....	301	23 54	.....	.....
Swanzy, F. M.	23	9,408	900 35	.....	.....	.....	.....	.....	409	39 14	.....	.....
Sundries	56	21,496	1,717 94	49	446 55	13	579	57 90	401	30 67	44	4 43
Tollifsen, O	4	1,384	120 86	28	431 02	.....	.....	.....	346	30 21	.....	.....
Woods, P. P.	40	21,298	2,061 25	.....	.....	.....	.....	.....	532	51 53	.....	.....
Woods, J. F.	400	179,058	17,560 93	.....	.....	.....	.....	.....	447	43 90	.....	.....
Cattle totals	6895	3,216,509	$ 309,173 74	.....	.....	....	.....	.....				
Calves "	.....	.....	.....	1197	$ 18,074 70	....	.....	.....				
Sheep "	.....	.....	.....	.....	.....	10181	336,980	$ 32,325 79				

ANIMALS SLAUGHTERED.

6,878 Cattle	$308,077 59
1,186 Calves	17,822 42
10,030 Sheep	31,910 83
	$357,810 84

MEATS IMPORTED.

45 Beef, 25,824 lbs.	$ 2,355 10
3,807 Mutton, 180,708 lbs.	17,743 42
980 Pork	12,387 53
	$32,486 05

1904

33210-500

Cost SONG
Chg 140 for pp 95.00

THE PROCEEDINGS

OF THE

HAWAIIAN

Live Stock Breeders' Association

THIRD ANNUAL MEETING

HONOLULU, HAWAII

NOVEMBER 14, 1904

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1904

HONOLULU:
HAWAIIAN GAZETTE CO., LTD.
1905.

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MEETING

OF THE

Hawaiian Live Stock Breeders' Association

IN THE JUDD BUILDING, HONOLULU.

MONDAY, NOVEMBER 14, 1904.

Meeting called to order at 11 o'clock a. m., Mr. Julian Monsarrat, President, presiding.

The Secretary, Mr. A. F. Judd, being unavoidably absent, on motion of Mr. A. W. Carter, duly seconded and carried, Mr. Geo. P. Thielen was appointed to act as temporary Secretary until Mr. Judd's arrival.

The following members of the Association were present, either in person or by proxy:

Bolte, C., by J. P. Mendonca, proxy.
Brown, J. F.
Brown, A. M.
Carter, A. W.
Callen, John, by A. F. Judd, proxy.
Cornwell, Estate of W. H., by W. H. Cornwell, Jr., proxy.
Damon, S. M., by R. R. Redford, proxy.
Dowsett Co., Ltd., by David Dowsett, proxy.
Greenwell, Mrs. E. C., by Henry Greenwell.
Haleakala Ranch, by L. von Tempsky, Manager.
Hawaiian Agricultural Co., by J. Monsarrat.
Hitchcock, H. R., by A. M. Brown, proxy.
Horner's Ranch, by Robt. Horner.
Ii Estate, John, Ltd., by J. A. Magoon.
Irwin & Co., W. G., by W. M. Giffard, proxy.
Kamehameha Schools, by A. W. Carter, proxy.
Low, Eben P., by F. Wundenburg, proxy.

McCandless, L. L.
Mendonca, J. P.
Molokai Ranch, by A. F. Judd, proxy.
Monsarrat, J.
Maguire, J. A.
Oahu Railway & Land Co., by H. M. von Holt, proxy.
Parker, Samuel, by F. Wundenburg, proxy.
Raymond, Dr. J. H.
Robinson, Aubrey, by R. W. Shingle, proxy.
Robinson, W. R., by L. von Tempsky, proxy.
Searle, R. C., by H. P. Baldwin, proxy.
Smith, Jared G.
Swanzy, F. M.
Shipman, W. H., by J. Monsarrat, proxy.
Wight, Dr. James.
Wilcox, A. S., by A. F. Judd, proxy.
Woods, J. F., by F. Wundenburg, proxy.
Woods, Palmer P., by J. S. Low, proxy.
Mokuleia Ranch, by W. F. Dillingham.
Gay, Charles.
Baldwin, H. P., by A. W. Carter, proxy.
Horner, Robert.
Judd, A. F.
Von Tempsky, L.
Low, J. S.
Shingle, R. W.

On motion of Mr. von Tempsky, duly seconded by Mr. McCandless, and carried, the reading of the minutes of the previous meeting was dispensed with, in view of the fact that the same had been fully printed and distributed among the members.

The President having stated that he was not prepared to make any report or deliver any address to the Association, the regular order of business was taken up as follows:

REPORT OF THE SECRETARY.

Owing to the unavoidable absence of Secretary Judd, on motion of Mr. McCandless, duly seconded and carried, the hearing of

the Secretary's report was deferred until such time as he might be able to be present for the presentation thereof.

REPORT OF THE TREASURER.

The next order of business was the hearing of the Treasurer's report, which, being read by Mr. Shingle, on motion of Mr. von Holt, seconded by Mr. A. M. Brown, was adopted and ordered placed on file. The report reads as follows:

REPORT OF THE TREASURER.

1904,				
Jan.	2—By bal. from ℄ A. B. Wood, Treas.			$ 498 05
	5—To A. F. Judd, Saly. Dec.	$	33 33	
	12— " Postage Stamps		3 00	
	29— " Haw'n Gazette Co., ℄		7 45	
Feb.	4— " S. M. O. favor in Mottie Metcalf $30.—Fee 15c.		30 15	
	9—To A. F. Judd, Saly. Jan.		33 33	
	16— " Exch. on Chicago Draft, favor Mottie Metcalf		25	
	19—To Postage Stamps		2 00	
	29— " Postage Stamps		3 00	
Mar.	2— " A. F. Judd, Saly. Feb.		33 35	
	3— " Haw'n Gazette Co., ℄		120 00	
	3— " G. P. Thielen		21 00	
	23—By Cash ℄, Registration fees			41 00
	29—To Haw'n News Co., rubber stamps		75	
Apr.	4—To A. F. Judd, Saly. Mar.		33 35	
	8—By ℄ amt. rented, Mottie Metcalf			23 59
	12— " Haw'n Agril., dues to 12-31, '04			12 00
	12—To draft J. G. Smith, Sydney, Australia, £13 10s.		66 10	
	12—To draft J. G. Smith, London, England, £12 16s.		62 67	
	12—To draft J. G. Smith, New York, 43.50 Exch. 18c.		43 68	
	13—By E. P. Low, dues to 12-31, '03			10 00
	13— " E. P. Low, dues to 12-31, '04			12 00

	13— " W. G. Irwin, dues to 12-31, '04		12 00
	15—By P. R. Isenberg, dues to 12-31, '04		10 00 12 00
	18—By J. Wight, dues to 12-31, '04.		12 00
	18— " J. H. Raymond, dues to 12-31, '04		12 00
	18—By A. S. Wilcox, dues to 12-31, '04		12 00
	18—By Haleakala Ranch, dues to 12-31, '04		12 00
	18—By G. N. Wilcox, dues to 12-31, '04		12 00
	19—By Ii Estate, dues to 12-31, '04		12 00
	21—By Tr. Gay, dues to 12-31, '04..		12 00
	22— " A. W. Carter, dues to 12-31, '04		12 00
	22—By Molokai Ranch, dues to 12-31, '04		12 00
	25—By E. C. Greenwell, dues to 12-31, '04		12 00
	25—By Horner Ranch, dues to 12-31, '04		12 00
	26—By C. Bolte, dues to 12-31, '04..		12 00
	26— " J. I. Mendonca, dues to 12-31, '04		12 00
	30—By John Cullen, dues to 12-31, '04		12 00
May	2—By W. H. Rice, dues to 12-31, '04		12 00
	2— " H. W. T. Co., Ltd., dues to 12-31, '04		12 00
	2—To A. F. Judd, Saly. Apr.....	33 30	
	4—By A. Robinson, dues to 12-31, '04		12 00
	5—To return dues to E. P. Lon of 12-31, '03, pd twice.....	10 00	

	9—By S. W. Wilcox, dues to 12-31, '04		12 00
	10—By Dowsett Co., dues to 12-31, '03		10 00
	10—By Dowsett Co., dues to 12-31, '04		12 00
	14—By G. J. Waller, dues to 12-31, '04		12 00
	27—By O. R. & Land Co., dues to 12-31, '04		12 00
June	4—To Saly. A. F. Judd	33 35	
	10—To S. de Frust Co., ⅞	7 25	
	25—By W. H. Shipman, dues to 12-31, '04		12 00
	28—By J. Monsarrat, dues to 12-31, '04		12 00
July	5—To Saly. A. F. Judd	33 35	
	5— " Stp. $3.—Frgt on Seed per Alameda, 6.35 Cartage 50c	9 85	
	5—To Draft New York for J. G. Smith $7.10x08c. London dft., Velmonia Augerux $2.37	9 55	
	8—To Neipers' Express ⅞	1 00	
Aug.	12— " Exchg. 1 Bag Seed from France $2.—Drayage 25c	2 25	
	12—To Freight on same	1 56	
	18— " Sang Chan ⅞	2 50	
	20— " Sang Chan ⅞	1 70	
	22— " 5 M. Bags 18x24 at 25c	1 25	
	23—By O. R. & Land Co., for Seed		6 85
Sept.	2—To Saly. A. F. Judd	33 35	
	22—To Saly. A. F. Judd	33 30	
	23—By Sund. payments, ⅞ seeds delivered, A. F. Judd		121 75
	24—By E. A. Knudsen, ⅞ Seed		9 30
	24—To 4 Rice Bags	75	

	27—By J. H. Raymond, ⅞ Seed.....		12 52
	30—to Saly. A. F. Judd.....	33 30	
Oct.	1—By W. H. Shipman, ⅞ Seeds....		10 76
	8—To Postage	3 00	
	17—By F. M. Swanzy, dues to 12-31, '04		12 00
	17—By A. S. Wilcox, ⅞ Seeds.....		10 05
	25—By Dowsett Co., ⅞ Seeds.....		8 14
	31—To Saly. A. F. Judd.....	33 35	
	" Balance	320 64	
		$1,098 01	$1,098 01

Oct.	31—By Balance	$320 64
Nov.	12—R. C. Searle, dues to 12-31, '04.....	12 00
		$332 64

STATEMENT.

HAWAIIAN LIVE STOCK BREEDERS' ASSOCIATION IN ACCOUNT CURRENT WITH HENRY WATERHOUSE TRUST COMPANY, LTD.

Receipts.

Balance from A. B. Wood, Treas.	$ 498 05
Dues year ending 12-31, '03	10 00
Dues year ending 12-31, '04	348 00
Sale of Seed delivered	179 37
Acct. Registration fees	41 00
Amt. returned by Miss Mollie Metcalf, Chicago	23 59

Disbursements.

A. F. Judd Salary		$ 366 66	
Dft. on Chicago and Exch., Miss Mollie Metcalf	$30 40		
Dft. on Sydney £13 10s., J. G. Smith	66 10		
Dft. on London £12 16s., J. G. Smith	62 67		
Dft. on N. Y. and Exch., J. G. Smith	43 68		
Dft. on N. Y. and Exch., J. G. Smith	7 18		
Dft. on London 10s., Vetmosia Augerus	2 37		
Exch. 1 bay seed from France, cartage and freight	3 81		
S. De Freest Co.—Entry charges, seed	7 25		
Fgt. charges, seed, "Alameda"	7 85		
Sundry bags for seed	6 20		
		237 51	
Haw'n Gazette Co. %		127 45	
Haw'n News Co. % for rubber stamp		75	
G. P. Thielen % services rend.		21 00	
Postage stamps		13 00	
Cash on hand		332 64	
		$1,100 01	$1,100 01

Cash on hand as of Nov. 14, 1904	$332 64
Dues remaining unpaid from 15 members—$12 each	180 00
	$512 64

On motion of Mr. A. W. Carter, seconded by Dr. J. H. Raymond, a recess was here taken until 11 o'clock a. m., to await the return of the Secretary and the presentation of his report before proceeding with further business.

Upon reconvening at the hour above stated, a quorum being present, the meeting was called to order, and the first order of business was the presentation of the

SECRETARY'S REPORT.

Upon the completion of the reading of the said report, on motion of Mr. McCandless, seconded by Mr. von Tempsky, the same was received and ordered placed on file, the same reading as follows:

SECRETARY'S REPORT.

Honolulu, November 14th, 1904.

To the President and Members of the Hawaiian Live Stock Breeders' Association, Honolulu.

Gentlemen:—

In presenting the third annual report of the Secretary of your Association I desire to touch upon the following subjects:

GRASSES.

The chief work of the Secretary during the past year has been in conjunction with Mr. Jared G. Smith, Special Agent in Charge of the Hawaii Experiment Station, importing and distributing among the members of the Association applying therefor, grass and fodder plants seeds from various parts of the world. Some of these seeds were not available through the regular seed dealers; others were not known to us here. It has been Mr. Smith's efforts entirely which have made it possible for us to get the rarer seeds and to call our attention to the fodder plants with which you were not familiar. Our local conditions vary, so that it was a matter of some study as to how to distribute the seeds to the best advantage. Mr. Smith and your Secretary had to use their best judgment as to the suitability of each ranch for the seeds allotted. It is hoped that each rancher will watch these grasses carefully so that the Association as a whole may later on have the benefit of his experience with them.

A short description of these plants and grasses may not be out of place here.

1. Fenugreek (*Trigonella foenum-graecum*) is *the* annual leguminous forage plant of Algeria. It is sown like alfalfa and irrigated, is cut and fed in a partially wilted condition either alone or with Indian fig (our prickly pear). Upwards of 100,000

acres of Fenugreek are cultivated in Algeria. It is said to be of great value for fattening cattle and sheep. A large portion of the cattle for the Paris market is fattened on this plant.

2. Sand Lucerne (*Medicago media*). This is a relative of alfalfa that thrives on sand hills or barren sandy lands. It probably will do well on sand hills like those of Kahoolawe and West Molokai.

3. Spanish Sulla (*Hedysarum coronarium*). This is a leguminous plant from 3 to 5 feet high. It should be sown like alfalfa, and irrigated. It is grown in Sicily, Southern Italy and Algeria.

4. *Paspalum dilatatum.* This is a grass belonging to the same genus as Hilo grass (*Paspalum conjugatum*). It is essentially a pasture grass, but when irrigated it grows sufficiently tall to be cut for fodder. It is a prolific seeder and stands drought especially well. Under local conditions it has kept green when the manienie around it, has been yellow. The roots are easily separated for planting out and if the weather is moist the roots will take such firm hold in a week's time that animals cannot pull them out. The grass stands heavy pasturing. When heavily pastured the seed stalks come out almost horizontal and fruit even when the grass itself is eaten right down. It is said that the grass does not get hard and sour and that it is suited to all kinds of soil. The stock papers of the mainland have much to say now-a-days about the value of this grass. Apparently, it is second to none for ranch purposes. It may be obtained in quantity from the leading seed dealers.

5. Mitchell Grass (*Astrebla pectinata*). This grass made a name for itself in Australia, which is its home, during the long drought there. It is said that it is the only grass which came through that distressing time with any credit to itself. It is a range grass and it is hoped will find itself suited to our dry, hot lowlands.

6. Florida Beggar Weed (*Desmodium tortuosum*). This fodder plant is related to Spanish clover and being a self seeder ought to do well on our lower ranges.

"An annual leguminous plant, indigenous to Florida and the Gulf States, extending into the West Indies and tropical America.

This is undoubtedly one of the very best forage plants for those portions of the United States where it grows. The stems are tall, and, if grown at considerable intervals, are woody, but where seed is scattered thickly over the ground the entire plant can be converted into hay or ensilage. Florida beggar weed springs up naturally in fields wherever the ground has been disturbed, about the middle of June, and matures a crop in seventy-two to eighty days. On sterile clay soils in the vicinity of Washington, D. C., beggar weed grows 3 to 4 feet high. In the rich, moist, sandy fields along the Gulf of Mexico it grows from 6 to 10 feet high. Horses, cattle, and mules are very fond of it. Beggar weed hay contains about 21 per cent of crude protein. At a yield of 10 tons, the amount of fertilizers contained in a crop yielded by one acre has been estimated at: Potash, 80 pounds; phosphoric acid, 160 pounds, and ammonia, 400 pounds. It will be seen from this that as a renovator of worn soils, or as a green manure, no better or cheaper fertilizer can be added to a field than to turn under a rank growth of beggar weed. The tap roots descend deeply into the soil, bringing up mineral fertilizers from the subsoil which can be utilized by other crops. Beggar weed can be sown after a crop of oats has been harvested or it can be scattered between corn rows after the crop has been laid by. Six to ten pounds of clean seed are enough for an acre. If beggar weed is tried as a crop in the North, it should not be planted until midsummer. If planted early, the seed will lie in the ground and will fail to germinate until the ground has become warm. Beggar weed makes an excellent quality of ensilage, either alone or mixed with corn fodder."

7. White Branching Sorghum. This new variety of sorghum has two things to its credit, it ratoons prolificly and will not thus have to be replanted as frequently as the older variety. It also does well on a smaller amount of water than the ordinary sorghum. It is one of the leafy non-saccharine sorts.

8. A large order has been placed for seeds of dry-land range grasses from the Southwestern United States, to include White gramma, Red gramma, Wooley top ,Side-oats gramma, Panicum bulbosum and many others.

HORN FLY.

Previous to the departure of Professors Koebele and Perkins in May of this year to Australia to search for insects predatory on the cane leaf hopper, Professor Perkins, at your Secretary's suggestion, took up the question of the horn fly pest. Various ranchers, by request, sent in samples of flies, together with notes of their observations concerning the fly. This investigation satisfied Professor Perkins that the horn fly bothered horses as well as cattle.

The flies are found in England and in other countries, but not in such quantities as to be a pest. Predatory insects keep down the surplus.

It was Professor Perkins' hope that he and Professor Koebele would come across such an insect on their explorations in Australia, in which event the beneficial insects would be forwarded to the local entomologists for propagation and distribution. The last steamer from the Colonies brought the first shipment of these beneficial insects, and the few which were alive were librated at the Isenberg Ranch at Waialae. These manure bugs came from Queensland and it is hoped that they will thrive under our local conditions which are more or less similar to that part of Australia. Other shipments of bugs will come from time to time. It is deemed best not to distribute them generally until they become well established in one place. From Waialae they can easily be sent all over the Islands as needed. Transportation from Australia is simple after the insects reach Sydney, but the difficulty is in getting the insects to Sydney in good condition. When this is overcome, the shipments will no doubt come in better condition and the insects will have a greater chance of being successfully propagated. It is to be hoped that science will thus find a way of removing from our ranches this our great insect pest.

LIBRARY.

The collection of reports, pamphlets, papers and books which had begun to accumulate in the Secretary's office, in January last was turned over by vote of the Executive Committee to the

Board of Agriculture and Forestry of the Territory. It is now in their library at the old Government nursery on King Street, Honolulu, where it has been properly indexed and is available at all times. The only provision named at the time of the donation was that the title to the library should remain in the Association so that if at any time in the future we should have headquarters of our own, the collection would be a nucleus for our own library.

TEXAS TICKS.

On August 5th, 1904, the Army Transport "Dix" en route from San Francisco to Manila called at the Port of Honolulu with cattle aboard for the Philippine Government. Considerable excitement resulted from the rumor that the animals had the "Texas fever." Because the vessel was a government boat the matter was taken up with Acting Governor Atkinson, who personally brought the situation to the attention of the U. S. Army Quartermaster. It developed that the cattle did not have the fever, but were affected with the Texas ticks which is the medium for spreading the fever and also that every precaution had been taken by the Quartermaster's Department to disnfect the cattle and their droppings. None of the cattle were landed and nothing has come of the scare except a firm conviction on the part of some of our members of the necessity for a closer and more careful inspection of animals coming to or through the Port of Honolulu.

GLANDERS.

This disease has prevailed off and on in the city of Honolulu during the last year but without being epidemic. I have a memorandum from J. R. Shaw, D. V. S., to the effect that he destroyed between January and March 6th of this year 12 glanded horses and 4 glanded mules. Six of these were among imported animals.

Dr. Rowat reports that since May, 1904, he has slaughtered eighteen animals for glanders and two for tuberculosis.

Dr. Monsarrat has killed seven animals for glanders since January 1st, 1904.

It is my belief, however, that more than 31 animals have been killed for glanders since the first of the year, the above data not being a complete record.

Rumors have come to the Secretary of an epidemic of glanders in North Kohala District, in the Island of Hawaii. Investigation by correspondence has been unsatisfactory. If these rumors are true those whose animals have been afflicted have tried to conceal the fact.

The Territory is without funds to meet the emergency of any epidemic among animals.

INSPECTORS.

Dr. Shaw reports that importations of animals into the Port of Honolulu between January 1st and December 31st, 1903, have been as follows:

Horses	42
Mules	171
Bulls	3
Swine	2208
Goats	14
Cows	15

From Mr. Clark of the Board of Inspectors I have the following list of importations at the Port of Honolulu since January 1st, 1904.

Horses	22
Mules	87
Bulls	49
Swine	3348
Goats	00
Cows	40
Calves	2
Sheep	78

The incident of the Transport "Dix" brings forcibly to attention the necessity of careful and expert inspection at the Port of Honolulu.

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You may remember the report made at our last meeting by Mr. Jared G. Smith of his efforts last fall in Washington to have

an Inspector of the U. S. Bureau of Agriculture stationed in this Territory. Under date of October 14th Dr. Salmon, Chief of the Bureau of Animal Industry, writes to Mr. Smith as follows:

"About a year ago I believe we had a conversation concerning the appointment of an inspector to be stationed at Honolulu in which you offered to coöperate with us in making the salary sufficient for the maintenance of a man providing he coöperated with you in the Experiment Station work. I did not for some time think of any one who would be a suitable man, but I learn that Dr. V. A. Norgaard, who was a few years ago Chief of the Pathological Division of this Bureau, desires such a position, and I think he is fully competent to do the work which you desire and also to attend to the inspection and supervision of the transportation of animals on behalf of the United States.

If you still think it desirable to have such a man to conduct experiments in animal husbandry for your station, and have not already secured one, I will recommend the appointment of Dr. Norgaard at $1,400, and you can add $1,100 to his salary which would bring it up to $2,500 and make it sufficient."

Here is an opportunity to get the services of one of the best men in the United States, who can besides supervising the inspection at Honolulu, direct experiments on the various ranches and study the diseases of cattle, sheep and horses which we now have and let us have the benefit of his experience. The federal government will provide $1,400 of his salary, if we can locally find $1,100 for him.

This matter should be acted on at this meeting if we are to avail ourselves of Dr. Norgaard's services.

Before leaving this subject of inspection, it is well to note that since April of this year ome importers of stock have refused to pay the inspection fees prescribed by statute.

On April 25th, 1904, the Metropolitan Meat Company, Limited, notified the Superintendent of Public Works that they would no longer pay these fees, basing their refusal upon the ground that the statute under which it was sought to collect the fees was unconstitutional, "being in violation of Clause 3, Section 8, Article 1,

of the Constitution of the United States which authorizes Congress to regulate commerce between different parts of the Union."

The Meat Company owes now for fees $521.40. Some other importers of live stock have followed the lead of the Meat Company in its refusal to pay. They are indebted to the Board of Inspectors as follows:

Wm. Norton	$ 56.00
C. H. Bellina	68.00
Gus Schuman	211.00

The ranches which have imported stock directly for themselves have paid the fees without question.

I state the facts as I have been able to get them, leaving you to draw your own conclusions and make your own comments.

PAMAKANI.

This pest hitherto confined to the Island of Maui nas appeared on the uplands of Molokai. It is probable that the light, fluffy seeds have been carried across the channel by the strong winds. If this be so it is not unreasonable to expect that the pest in time may spread further and find lodgement on all of the Islands.

GOVERNOR'S REPORT.

In August last by the request of the Territorial Executive your Secretary prepared a statement of the progress in and present condition of the animal industry of this Territory for incorporation in the Governor's report to the Secretary of the Interior for this year. This statement was carefully revised by the Vice President of the Association.

"OVER PRODUCTION" OF BEEF.

No program of papers has been prepared for this meeting such as we have enjoyed in the past. Circumstances have chosen our subject for us as given above.

Ten raisers of beef associated together by an agency in this city proposed to the Metropolitan Meat Company that something be done to dispose of the surplus of cattle which they saw on

their ranches would await marketing during the coming year. It was proposed that the Meat Company call a graziers' convention in Honolulu in the latter part of October to discuss the whole question of the marketing of beef in Honolulu. Such a step would have made it impossible for having a successful annual meeting of the Association in November. The suggestion was made to devote the entire time of our meeting to the discussion of these questions. This suggestion was adopted by the Executive Committee and the notice for the meeting issued.

ORGANIZATION.

Several of the topics touched on in this report would point to the necessity of a closer organization, at least among those members of the Association engaged in the raising and selling of beef. I believe that most, if not all, of the ten ranchers above referred to are members of this Association. The agency in question is represented on our Executive Committee. And yet these gentlemen did not see fit to use the Association as a means of advancing their interests on a matter which concerns the whole Association. It is well to call attention to this to show that the Association as now organized does not *fulfill* as completely as the charter members contemplated the objects for which they associated themselves together.

The Association has fully justified its existence by its work in the introduction of lantana destroying insects alone, without reference to the many other activities in which it has been engaged. A live institution grows, and we must grow or become stagnant. Our work as an Association is now hampered by the looseness of our organization and by lack of funds.

Is it not worth our while to assist in this matter of animal inspection? What members of our Association would not be glad to have a visit from Dr. Norgaard and to pay his expenses for the trip to and from Honolulu, if in return we could receive the kindly advice of such an expert in animal husbandry? The best of us have much yet to learn.

The legislature is about to meet. The laws concerning animal inspection and quarantine are of little value without appropria-

tions to make them workable. These laws themselves would bear careful revision., It is questionable whether the present system of fees for inspection meets our changed condition, as has been referred to.

The cattle-landing in Honolulu sadly needs repairs. This is owned by the Territory and the Territory should make the repairs.

Your Secretary has been paid at the rate of $400 a year. There is enough work which should be done to make three times that amount not an excessive salary.

Perhaps it is possible to have another class of members in the Association composed of shippers of beef and mutton to Honolulu, who would submit to a voluntary tax of so many mills per pound or cents per head.

I have no definite plan to suggest, but it seems to me that we have come to the time when a closer organization would make for the advantage of all concerned. I do not see how this closer organization can be effected without touching in a way the pockets of our members.

NEW OFFICERS.

The work of Secretary which you have confided to me since the Association's organization has been full of interest and pleasure. I ask you now to relieve me from it because of the pressure of my professional duties. In closing I desire to call to your attention that at least five members of the Executive Committee should be residents of Honolulu.

Respectfully submitted,

ALBERT F. JUDD,
Secretary.

Thereupon, the President announced the next order of business to be the election of officers for the succeeding year, and declared nominations to be in order for the

ELECTION OF PRESIDENT.

Mr. R. W. Shingle placed in nomination for the office of President Mr. L. von Tempsky, the nomination being seconded by Mr. A. W. Carter; and, on motion of Mr. von Holt, the nominations being closed, the President instructed the Secretary to cast the ballot for Mr. von Tempsky for President, whereupon, the ballot being cast, Mr. von Tempsky was declared to be the duly elected President of the Association for the ensuing year.

ELECTION OF VICE PRESIDENT.

Nominations for the office of Vice President being declared in order, Mr. A. W. Carter moved the name of R. W. Shingle, Esq., for the office, seconded by Mr. von Holt; and, on motion of Mr. von Holt, duly seconded and carried, the nominations being closed, the Secretary was instructed to cast the ballot for R. W. Shingle, Vice President, and the same being cast Mr. Shingle was declared to be the duly elected Vice President of the Association for the ensuing year.

ELECTION OF TREASURER.

Proceeding to the election of a Treasurer for the ensuing year, the following names were placed in nomination for the office, to-wit: H. M. von Holt, A. W. Carter, The Henry Waterhouse Trust Co., Ltd., David Dowsett, W. F. Dillingham, A. F. Judd, the names of A. F. Judd and the Henry Waterhouse Trust Co., Ltd., being the only nominations seconded, no action being taken, however, at this time in the matter of election of a Treasurer, Mr. W. M. Giffard moving a recess until 1:30 p. m., which motion was duly seconded and carried.

AFTERNOON SESSION.

There being a quorum present, at the hour of 1:30 o'clock, the meeting reconvened, President Monsarrat presiding.

RESIGNATION OF R. W. SHINGLE AS VICE PRESIDENT.

Mr. Shingle tendered his resignation as Vice President and stated his willingness to accept the office of Treasurer. There being no objection offered, the President put the motion and the same was duly carried.

ELECTION OF A. F. JUDD AS VICE PRESIDENT.

Thereupon the President declared the office of Vice President vacant and stated that nominations for that office would be in order. Whereupon Mr. Shingle placed in nomination the name of A. F. Judd for the office, duly seconded by Mr. von Tempsky, and, there being no further nominations, the ballot was cast and Mr. Judd was declared to be the duly elected Vice President of the Association for the ensuing year.

ELECTION OF TREASURER.

Nominations for Treasurer being declared in order, Mr. Judd placed in nomination the name of R. W. Shingle for the office, seconded by Mr. von Tempsky; and, there being no further nominations, the ballot was cast and Mr. Shingle was declared to be the duly elected Treasurer of the Association for the ensuing year.

ELECTION OF SECRETARY.

The election of a Secretary being declared to be the next order of business, nominations were declared to be in order. Whereupon, Mr. Judd moved the name of Mr. A. M. Brown for the office, duly seconded by Mr. A. W. Carter. There being no other nominations, the ballot was cast by the Secretary, and

Mr. Brown was declared to be the duly elected Secretary of the Association for the ensuing year.

ELECTION OF EXECUTIVE COMMITTEE.

Proceeding to the next order of business, the President declared nominations in order for the election of members of the Executive Committee and the following members were duly elected thereon.

KAUAI REPRESENTATIVE.

Mr. Judd placed in nomination the name of E. A. Knudsen, to succeed himself as the representative for the Island of Kauai upon the Executive Committee. Mr. A. M. Brown seconded the motion, and, there being no further nominations, the ballot was cast and Mr. Knudsen was declared to be the duly elected member of such Committee for the Island of Kauai.

OAHU REPRESENTATIVE.

Mr. von Holt placed in nomination the name of Mr. L. L. McCandless as the representative for the Island of Oahu upon such committee, which motion was duly seconded by Mr. A. M. Brown, and, there being no further nominations, the ballot was cast and Mr. McCandless was declared to be the duly elected representative on such Committee for the Island of Oahu.

MOLOKAI REPRESENTATIVE.

Mr. Dowsett placed in nomination the name of Mr. A. W. Carter, and Mr. A. W. Carter placed in nomination the name of Mr. J. F. Brown for representative of the Island of Molokai upon the said Committee. Mr. Judd seconded the latter nomination, and upon Mr. Carter's request his own nomination was withdrawn by Mr. Dowsett. Thereupon, there being but one name in nomination, the ballot was cast, and Mr. J. F. Brown was declared to be the duly elected member of said Committee to represent the Island of Molokai.

MAUI REPRESENTATIVE.

Mr. McCandless placed in nomination the name of Mr. H. P. Baldwin as the Maui representative upon the Executive Committee. The motion being duly seconded by Mr. Dowsett, and there being no other nominations, the ballot was cast and Mr. Baldwin was declared to be the duly elected member of the Executive Committee to represent the Island of Maui.

HAWAII REPRESENTATIVE.

Mr. Carter moved that Mr. Robert Horner be elected to succeed himself as the representative of the Island of Hawaii upon such Committee, which said motion was seconded by Mr. Judd. Mr. F. Wundenberg placed in nomination the name of Mr. Eben P. Low for the said office, seconded by Dr. J. H. Raymond. There being no further nominations, a ballot was taken with the following result:

For Mr. Eben P. Low	19 votes
For Mr. Robert Horner	18 votes
Total ballots cast	37

Mr. Low having received the greatest number of votes cast, he was thereupon declared to be the duly elected representative upon said Executive Committee for the Island of Hawaii.

MISCELLANEOUS BUSINESS.

Mr. Judd: The Committee of the Planters' Asociation on the Utilization of By-Products has made a report, which will be presented at the end of this week to the Planters' Association, and there are parts of it which I would like to have permission to reprint in our report. It is that part which concerns the experiments on sugar plantations—re feeding molasses to animals, particularly work animals. There is much in the report which would not interest the ranchers, but there is a part of it which is of considerable interest and which is more or less technical. It is a subject which would bear study. I do not believe it would

be well to take up the time of the Association in reading this now, but you can all have it if you wish to have it reprinted in the report of this Association.

Mr. A. M. Brown: I move that the Secretary be instructed to incorporate it in the annual report.

Mr. A. W. Carter: I second that motion.

REPORT OF COMMITTEE ON UTILIZATION OF BY-PRODUCTS.

"As a feed for mules or stock there is no longer any question about its being a valuable and harmless feed. There is already considerable literature from different reliable sources within the United States and foreign countries proving that it is a valuable food and without bad effects when fed properly. Feeding properly means to protect the molasses from an excess of water diluting it to a point where fermentation might develop were the mixture allowed to stand some time during hot weather. One of the most recent articles upon molasses as a food for animals is the one which appeared in the "Louisiana Planter," April 19th, 1904, entitled "Results of Scientific Feeding of Plantation Mules," by Walter Godchaux. Those who are still doubtful of the value or safety in feeding molasses to their live stock should read this article.

Assuming that a ten thousand ton plantation requires 150 head of mules or horses, and that each mule will eat a gallon of molasses a day, then during the year 54,750 gallons of waste molasses will be used as feed.

Ordinarily not less than 25 U. S. gallons of molasses are produced for each ton of sugar made in a well equipped factory, or 250,000 gallons per year from a 10,000 ton factory; of this hardly a fourth would be consumed as feed by the working stock. If it is not practicable to feed all of the molasses, (and it is most valuable as a feed as we will show later on), the next best scheme is to burn it in the furnaces, and we believe the best results are obtained when the molasses is finely atomized and combustion takes place before the potash in the molasses can combine with the silica in the trash and form a mass of clinker and glass that will clog the grate bars.

We will now consider the value of waste molasses as a food for stock. On the Makee Sugar Co.'s plantation for the last

20 years molasses has been fed to mules at the rate of 3 to 5 pounds per head per day. Tanks of molasses have been kept in the paddocks where not only the working oxen could drink it at will, but also fine racing stock. When the molasses was fed to milking cows it was found that the milk from them tasted of molasses which, while being bad for household use, might be advantageous for young sucking calves whose mothers were feeding on poor pastures.

Since the first of this year they have fed their working stock at the rate of from ten to fifteen pounds of molasses per day and have reduced the amount of grain from 16 and 18 pounds to 6 and 8 pounds.

For years they had fed the following ration:

5 pounds bran at say .01 4-5 cents a pound	.09 cents
12 pounds barley at say .01 1-2 cents a pound	.16 cents
3 pounds molasses.	
35 to 50 pounds of chopped cane tops.	
Cost of grain per day	.25 cents

Since the first of the year they have fed the following ration:

6 to 8 pounds barley at .01 1-2 cents pound	.12 cents
35 to 50 pounds of cane tops mixed with 10 to 15 pounds of molasses.	
Cost of grain	.12 cents

From the foregoing figures it is evident that a gallon of molasses is worth at least ten cents when used as a feed for stock, and as the manure from the animals is properly preserved, cured and applied to the soil there is an additional value as all of the potash contained in the molasses is recovered in the manure.

Assuming that a ten thousand ton plantation making 250,000 gallons of molasses per year could feed all of that molasses to the stock and utilize the manure on their fields then the value would be as follows:

250,000 gallons at .10	$25,000
51 tons of potash recovered in the manure	5,000
	$30,000

Bran is not necessary as a food for working animals when molasses is fed at the rate of from 10 to 15 gallons per day, but an occasional "bran mash" when required is very good for the animals.

In changing from a strict grain to a molasses diet, where animals have never been accustomed to molasses, it is best to withdraw the grain gradually and substitute the molasses. It is also best to give as much "dry matter" such as grass, cane tops, etc., as the animal will eat and mix the molasses thoroughly with it.

Keeping the animal's hair short is another advantage both in hot and cold weather. A long coat of hair hold rain and perspiration to the detriment of the health and spirit of a working animal.

Mr. C. C. Kennedy on Hawaii reports on molasses as a food as follows, which corroborates the above results of the Makee Sugar Co.

The figures given below are for the month of July, 1903, when no molasses was used, and for the month of July, 1904, when molasses had become a regular part of the ration:

One gallon molasses assumed to weigh 13 pounds.

AVERAGE DAILY RATION PER ANIMAL.

	July, 1903. (No molasses)	Value at wharf.	July, 1904. (Using mola'es)	Value at wharf.
Lbs. hay	14.	.18	5.75	.075
Lbs. bran	8.5	.106	4.	.5
Lbs. barley	8.5	.11	5.5	.07
Lbs. molasses	nil	....	11.83	nil
	31	.40	27.08	.20

Saving in landed cot, 20c.

Saving in hauling weight, 4 lbs.

It can readily be seen that in landed cost this means a saving throughout the year of $7,300 for 100 mules.

The mules at Waiakea have now been on this regular ration of molasses for some time, and are in as good condition as before.

At Laupahoehoe, where the lands are steeper, it is found

necessary to increase the ration of barley to keep the mules in condition for heavy plowing, etc.

The following is an extract from Farmers Bulletin No. 170, U. S. Department of Agriculture, Principles of Horse Feeding by C. W. Langworthy, Ph. D., May, 1903: "Molasses, which consists almost entirely of carbohydrates (sugars), was used as early as 1830 as a feed for horses, and has recently attracted considerable attention in this connection. When used for this purpose it is usually sprinkled on dry feed, being first diluted with water, or it is mixed with some material which absorbs it and renders it easy to handle, such as peat dust, or with some material rich in nitrogen, as dried blood. In the latter case the mixture more nearly represents a concentrated feed than the molasses alone, or molasses mixed with an absorbent material. Cane-sugar molasses is also used as a feeding stuff. It differs from beet molasses, in that it contains glucose in addition to cane sugar, and has a much smaller percentage of salts.

"The number of experiments which have been reported in the last few years on the feeding value of molasses is fairly large. According to the Louisiana Station, cane-sugar molasses has been extensively used for some time locally as a feed for horses and mules, many feeders keeping mules exclusively on rice bran and molasses in addition to cowpea hay. The general custom is to feed the molasses from a large trough allowing the mules to eat it ad libitum. It is said they will consume, with apparent relish, from 8 to 12 pounds per head daily. The mules at the Louisiana Station have been fed molasses daily ad libitum for eight or ten years, and it is stated, show its good effects 'in their splendid condition, lively action, and endurance of work.'

"When molasses, diluted wth water and sprinkled over chopped hay, was fed to some army horses in Porto Rico for about five months the condition of the horses improved. Apparently, a daily ration of 35 pounds of grass and 13 to 15 pounds of molasses per 1,000 pounds live weight was sufficient to maintain a horse in good condition. It was noted that molasses possessed some disadvantages, namely, it attracted insects, notably flies and ants, stuck to the animal's coat, smearing his face and breast, halter

strap, etc., and caused some trouble and delay in mixing it with the other feeds.

"Other tests in the United States, France, Holland, and elsewhere have been favorable to the use of molasses as a feeding stuff, and from the results of all these, it seems fair to conclude that it can be safely fed to horses when its cost in comparison with other feeding stuffs warrants its use, a quart night and morning, diluted with water, being apparently a reasonable amount. Apart from the nutritive material molasses supplies it has a value as an appetizer and frequently renders poor hay or other feed more palatable."

If the feeding of molasses will result in a saving of $3.00 per head per month for the 7,000 mules employed upon Hawaiian plantations we can see a gain of $200,000.00 a year.

If we could sell it all to live stock ranches, etc., at only five cents a gallon (its value in Louisiana as a food for stock) it would be worth $500,000.00 as food, and its potash saved in the manure or compost heap another $160,000.00.

Mr. F. M. Swanzy: I would like to draw your attention to the fact that this report has not been presented to the Planters' Association yet. The Committee which made the report has not presented it and it may never be presented.

Mr. Judd: It has been handed to me by Mr. Mead to present to this Association, and that is the ony reason I have done so.

Mr. M Candless: I don't see that any harm will be done. If they allo ed it to be given to our Secretary I don't see why it shouldn't go into the report.

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At this juncture of the proceedings, it was moved by Dr. J. H. Raymond, seconded by Mr. Magoon and carried, that the Association go into

EXECUTIVE SESSION.

for the purpose of the consideration and discussion of the subject of

THE OVER-PRODUCTION OF BEEF.

The following report was submitted by Mr. L. von Tempsky, giving a history of the cattle industry on the Island of Maui for a number of years past, giving statistics on the production, consumption, marketing, and present supplies of beef for that Island.

Haleakala Ranch,
Makawao, Maui, November 11, 1904.

MAUI CATTLE.

Cattle ranching on Maui, from 1879, when I first took hold of it at Ulupalakua, to the present date, has been to me a very interesting study. My only regret is that I cannot lay my hands on the records kept by me prior to my taking charge of the Haleakala Ranch Co.

In 1879 there were not very many cattle on the Island. I should judge about 10,000 head, if that number; the principal herds being Louzadas' at Waikapu, Captain Makee's herd at Ulupalakua, the Haleakala School herd, Grove Ranch, the Mission herd on the Waikapu Commons, and that of a Portuguese named Andrew at Kaanapali.

Kahikinui was leased at that time to Manuel Pico and had on it only about four or five hundred head of cattle and horses.

Beef was very cheap in those days, being sold mostly by the head; and one could at that time purchase a very fine fat steer for from $18 to $20.

I started butcher shops for the Ulupalakua Ranch at Waihee and Waiuku in November, 1879, and the ranch supplied the shops at a fixed rate of 5c. per lb. dressed weight; the retail price being 8c. I cannot, at this distance of time, recall the number of cattle killed per month on the Island, but it was not nearly equal to the number reached in from 1898 to 1900. At any rate the consumption did not equal the increase, as the herds steadily grew

all over the Island, reaching the maximum about 1896 or 1897, at which date there must have been close on to 25,000 head of cattle on the Island.

Beef was selling at this date (1896-7) to the butchers at from 4 1-2c. to 5c. per lb. dressed carcasses, and the consumption was very large. Added to this, the drought in Kula of 1897 cleared out a very large number of cattle; many of the Kula natives moving their stock into Ulumalu and Halehaku, and this change being from the rich Kula feed to Hilo grass, added to the depletion of the herds. One native alone, Kahoonouna by name, losing close on to three hundred head that year. From that time to 1900, the stock on the Island of Maui steadily decreased, and the price rose accordingly, till, in April, 1901, it reached its maximum, viz: 11c. per lb. dressed weight. This price was sustained for two years, when the stockmen following the lead of Mr. H. P. Baldwin, voluntarily lowered the price to 10c., which is now the price all over the Island. This brings us down to the question now being asked regarding the future of the cattle raising industry.

In 1900 there were on the Island of Maui, as near as I could find out, about 20,000 head of cattle. Beef was selling to the butchers at 8c. per lb., and the consumption on the Island was over 3000 head per annum. This number, and allowing for deaths from causes other than butchering, about used up the natural increase of the flocks.

At the present date there are about the same number of cattle on the Island (20,000, the price is 10c. per lb. and the sales *on* the Island have fallen to ebout 2000 per annum; to make up for this depreciation, there were shipped from the Island to Honolulu and Molokai in 1902, 1304 head; and in 1903, 1373 head; so that on the Island of Maui, if conditions remain the same, there should be no over-production of cattle.

With particular reference to the probable output of marketable cattle from Maui during 1905, although the past four years has shown an average of about 3000, it is my opinion that the number for 1905 will not exceed 2500.

In considering the future of the cattle industry in Hawaii and

the probability of a surplus, certain facts must be considered that do not appear on the face of the cattle records. I suggest the following as some of these:

By reference to the rainfall statistics it will be noticed that the average rainfall for the past four years has been more than double that of the average of the previous ten years, i. e. 78.94 inches as against 34.63 inches for the previous term.

This excessive rainfall has produced an abnormal increase of feed all over the Islands, and an increase not only in fat cattle, but in the actual number.

This period of heavy rainfall cannot continue indefinitely,—in fact, a drier period has already begun. With the return of normal weather and feed conditions, the number of cattle, more particularly of fat cattle, will be necessarily reduced. These facts are vital in a consideration of the probable supply during 1905 and following years.

As against these facts, however, are the following which directly tend to increase the supply, viz:

1. During the past few years a radical improvement in quality of cattle has taken place through importation of improved stock and more careful breeding, resulting in increased weight and earlier marketing; so that hereafter a given number of cattle will probably produce considerably more beef than in the past.

2. Paddocking and consequent resting and increase of pasturage has greatly increased during the past four years, and will continue so to do.

3. The importation and planting of foreign grasses and forage plants during the past few years has revolutionized feed conditions upon many ranches. Certain localities are capable of carrying from 25 to 50 per cent. more cattle than they were a few years ago from this cause alone. The good results obtained will cause the propagation of these grasses and plants to increase materially.

4. Much is being done in the way of piping water to feeding grounds, rendering fattening lands available throughout the year which heretofore have been available during the winter months only.

5. The diminished number of white, beef-eating employes on the sugar plantations, and the substitution therefor of Asiatics,

who are largely non-beef eaters, has materially decreased the beef-eating population and consequent consumption. A change in this policy would be of great benefit to the stock industry.

6. The systematic and persistent fishing which the Japanese practice, is another very material factor in reducing the consumption of beef. In Lahaina, Wailuku, Paia and Hana, this is very noticeable. Mr. Decoto, of Lahaina, tells me that some months it makes a difference in slaughtering, of 5 head of cattle; which means about fifteen hundred pounds of beef.

Mr. McCandless: I was asked by the Secretary to get an estimate of how many cattle there were on the Island of Oahu. I would say that my report is based on the tax books. I got this data this morning from the Tax Office, with the exceptions of two or three I was not able to get from the Tax Office because the returns were not given of the amount of cattle, but I made a guess.

The Secretary here read the report as submitted by Mr. McCandless, which reads as follows:

Honolulu, H. T., November 14, 1904.

To the President of the Breeders' and Stockmen's Association,
Honolulu, H. T.

In response to a request from the Secretary of the Breeders' and Stockmen's Association that I estimate as near as possible the number of cattle on the Island of Oahu, I beg herewith to submit the following:

Maunaweli (W. G. Irwin)	100
Kaneohe Ranch	1,500
Ahuimanu Ranch	40
Kuoloa Ranch	60
Laie	325
Kahuku Ranch	2,150
Waialua (O. R. & L. Co.) Halemano	665
Kawailoa	186
Mokuleia	700
Gay Estate	300
Antone Lopez	27

O. R. & L. Co. (Ewa District)	4,515
Dowsett Estate	3,700
Mark Robinson	365
John Ii Estate	500
L. L. McCandless (Ewa and Makua)	525
Waianae Plantation	250
Holt's (Makaha)	100
S. M. Damon	1,000
P. Isenberg (herd cattle and 340 cows)	504
Chas. Lucas	100
Star Dairy	109
Mrs. Perry	240
Woodlawn Dairy	150
C. Bolte	200
Sundry Owners (estimated)	1,000
Total	19,311

The above figures are taken from the Tax Returns for the year 1904, excepting Maunaweli, 100; Kaneohe Ranch, 1500; and C. Bolte, 200; which are merely estimates of the number of cattle owned by them.

In conversation with Mr. von Tempsky, who is making the estimates for the Island of Maui, he has informed me that he is going to add 25 per cent. over and above the number returned for taxation purposes. If this is done with the number returned for the Island of Oahu the total would be 24,139

Respectfully submitted,

L. L. McCANDLESS.

Mr. Dowsett: I would like to ask Mr. McCandless if he has included in his report the cattle on the land of Moapalua.

Mr. McCandless: They have made a tax return of 1,000 head of cattle. I estimate some of the returns—on all the dairies. There are a number of people who own a few head and I estimate 1,000 head of such cattle. I think that is an under-estimate, but I thought I would be conservative and put it down 1,000 head, although I think it would go over that figure.

Mr. Monsarrat: I have the data of the Kapapala Ranch giving the brand, herd and total count. If you care I will read it off. It also gives the sale of all cattle from the ranch for 17 years. I think it goes to prove, so far as Kapapala Ranch is concerned, that there is no overproduction. I took the ranch in 1884. At that time there were 3750 head. Then from that time to 1888 unfortunately I cannot find the book that gives the amount of the brands.

(Mr. Monsarrat here read the figures showing the total brand, herd and total count from the year 1888 to and including the year 1904, showing an average brand per year for 17 years of 1229. For particulars, see the report which follows:)

KAPAPALA RANCH DRIVES, BRANDS AND COUNTS, JUNE, 1888, TO JULY, 1904.

Year.	Males.	Females.	Total Brand.	Herd.	Total Count.
1888	473	499	972	5278	6250
1889	809	684	1493	4967	6400
1890	639	578	1217	5383	6600
1891	654	676	1330	5413	6743
1892	651	609	1260	5250	6510
1893	633	592	1225	5455	6680
1894	775	779	1554	5474	7028
1895, 1896	805	763	1568	4814	6382
1897, 1898	1326	1320	2646	3997	6643
1899	700	747	1447	4696	6143
1900, 1901	540	594	1134	4402	5536
1902	959	919	1878	4163	6041
1903	802	801	1603	4872	6475
1904	781	772	1553	5431	6984
	10,547	10,333	20,880		

Average brand per year, 1229, for 17 years.

Mr. Shingle: I would like to inquire of the Secretary if Mr. Knudsen has reported for the Island of Kauai. Some one was delegated to report for the Island of Kauai.

Mr. Judd: The Executive Committee asked Mr. Knudsen to get up the statistics for the Island of Kauai. He stated to us that the Island of Kauai raised just about enough beef for its own consumption; that the election was coming on and he would not have time to take it up. I then asked Paul Isenberg to do the work for us. Mr. Isenberg was too busily engaged in other matters. I then wrote to Mr. Knudsen and asked as a last resort to take it up or get some one to do it and I expected he would be here at this meeting. I have had no letter from him; consequently there is nothing to report concerning the Island of Kauai.

Mr. McCandless: Can the Secretary give us any report for Hawaii in general?

Mr. Judd. The Executive Committee wrote to Mr. Monsarrat to get that data and I believe I sent him such a letter.

Mr. Monsarrat: He wrote, I understand, to each ranch, and I understood each ranch should get the data or statistics as far back as they could and present it at the meeting. That was the idea I got. I did not get the idea that I was to get up the data for the whole island. I thought each one, the Parker Ranch —by the way, we have not seen anything about it yet—and Hind and others would have their statistics here showing what their herd was and what the brand has been.

Mr. Shingle: In the absence of figures from the various Islands showing the surplus of cattle, and in view of the fact that the manager of the Metropolitan Meat Co. was able to take only about sixty per cent of the cattle offered for the last quarter, and in order to bring the matter up for discussion I would like to make this motion, in the form of a resolution or motion:

"The Hawaiian Live Stock Breeders' Association respectfully recommend to the management of the Metropolitan Meat Co., that the cattle received by it for the Honolulu Market be purchased from the graziers on a pro rata basis as far as practicable, and further suggests, in arriving at the number of cattle contained in the various herds, that the tax returns made by the different graziers be used as a basis to work upon."

Dr. Raymond: I do not support the motion of Mr. Shingle on these grounds: While it is no doubt true that the Metropolitan

Meat Co. has at this time of the year offers of more cattle than the market can consume, it is not at all certain that these are permanent conditions. It is unquestionably true that the cattlemen in some cases do not return the full amount of cattle on their ranges, for perfectly sound reasons, and the tax returns would not be accurate guides in arriving at just pro ratas. The entire subject is one which needs thorough investigation, and I renew my motion made this morning that a Committee be appointed to thoroughly investigate the matter and report its findings and conclusions. This present over-supply is the result of many conditions which are of a fluctuating, rather than a permanent nature. The conditions of weather, water supply and abundance of feed are all factors in this result, and if the graziers, acting upon data which is erroneous, determine upon a pro rata apportionment, no rancher who might be justly dissatisfied with that apportionment can be excluded from bringing in his cattle on the open market. We have as yet taken no steps for a proper determination of the causes leading to an over-production, nor are such figures as are now before this meeting for consideration accurate or complete enough to justify this Association in arriving at a proper apportionment.

Mr. McCandless: The figures for cattle offered to the Metropolitan Meat Co. for the months of October, November and December, 1904, as compared with the estimated consumption for the same period shows an estimated surplus of 2483 head at the end of that period. The question is: What shall be done with this over-plus? Should shipments be made to San Francisco, or should an attempt be made to increase the consumption of beef in the local market by reducing the price? I offered the suggestion that the price of beef to the Metropolitan Meat Co. be reduced to eight cents per lb. and that the retail price be accordingly reduced.

Mr. Greenwell: If the price be reduced to eight cents for beef delivered to the Metropolitan Meat Co., I think, by reason of the expense of freights and long drives incurred by Hawaii cattlemen, they should receive some additional compensation as against a price of eight cents to the Oahu grazier.

Mr. McCandless: In reply to Mr. Greenwell's argument, I

would state that such differences are fully offset by reason of the heavier rents charged on the leaseholds of the Oahu graziers as against charges on leasehold interests on the Island of Hawaii, the leases in many instances being double. The Oahu ranges are incapable of producing as fat cattle as the richer ranges of the latter island.

Mr. Wundenberg: The aim of the Metropolitan Meat Co., of which I am a director, is to keep up the price of beef for the benefit of the grazier. I do not believe in throwing beef on the open market. Independent action would invite competition from foreign sources. Previous attempts to introduce cold storage beef from the Coast in the local market have been thwarted only by the concerted action of combination between the Metropolitan Meat Co. and the local graziers. I do not believe that by reducing the price the consumption will be increased one bit. I have made inquiries regarding shipments of beef into the Philippine market and I find that beef is being delivered in the Philippines at six cents per lb. I favor the motion as made by Dr. Raymond, that a committee, consisting, say, of the members of the Executive Committee be authorized to investigate the matter and determine upon a just and proper pro rata apportionment. Such a policy would meet with favor by the Metropolitan Meat Co. I do not believe that, as stated by Mr. McCandless, there is today 6,000 head of prime marketable beef in these Islands; I do not believe that if orders were given for such beef today that one-half of such amount would be forthcoming.

Mr. J. Low: Mr. Hind has about 5,000 head of cattle, 1,000 head of which are marketable. About 750 head annually is the production of prime beef on that ranch. The Kohala Ranch Co., Ltd. (Wood's Estate) has 3,500 head of cattle.

Mr. Carter. I believe very strongly that there is not a permanent over-plus of prime cattle, of fat cattle, in the country at this time. There may be a temporary one. We have had on certain ranges, which are usually dry ranges, exceptionally good weather and it has resulted in those particular ranches having more cattle than they have in ordinary times. I believe the trouble could be largely avoided if the Metropolitan Meat Co. would insist on getting only fat stock and that if a grazier returned

a number of cattle, the minute he began putting inferior stock on the market it should be stopped and that a man with prime cattle should be given the opportunity to market his superior article. If we act upon that principle there will be less trouble and friction between the various interests in getting the cattle in. So far as the appointing of a representative is concerned, I do not think that would work at all, because it assumes that the grazier is not going to tell the truth. I defy any man to go onto the ranches and say how many cattle they have and how many fat cattle. I don't think it would work out. It seems to me that the Executive Committee, acting in conjunction perhaps with the Metropolitan Meat Co., insisting that only fat cattle should come in, would relieve the situation at any rate.

Dr. Raymond: We want to get at the truth. We don't want to accept anybody's say-so. Another thing—I don't believe the Metropolitan Meat Co. is properly organized. Mr. Waller admitted to me that if they closed up their retail department and confined themselves solely to the wholesale business, the slaughtering of cattle, the expenses of preparing cattle for market could be reduced to such an extent that they could pay 10 1-2 cts. per lb. for every bullock brought into this market. Contracts could then be made with the retail butchers and they could be required to make weekly payments and no losses would occur from bad accounts. This committee could take up that proposition.

Mr. McCandless: The only thing that saved the graziers in 1900 from outside competition was the fact that the Metropolitan Meat Co. had the retail trade of Honolulu back of it and the new market was unable to get a foothold because the Metropolitan Meat Co. held the trade. You can land foreign beef today in Honolulu for six cents per lb.; as good beef as the first class beef killed today in this market. The Metropolitan Meat Co. can show you reports verifying this statement. Today the Metropolitan Meat Co. is selling loins at from 20 to 22 cts. per lb., while the Chinese butchers are selling the best cuts at from 15 to 17 cents. Still the people go to the Metropolitan Meat Co.

Dr. Raymond: Even if foreign beef could be landed here at five cents per lb., the cattlemen would, in self protection, meet the competition and lower the price so that foreign beef would

be driven from the market. It is hardly probable that a second shipment would be attempted when they were faced by such conditions.

Mr. von Tempsky: I would like to say that I keep in touch with the San Francisco prices and my last week's report showed the S. F. price of beef to be 6 and 6 1-2 cts. per lb. I do not believe that California beef could be brought down here and marketed for less than 8 or 9 cts. and you get no hides, no tallow, no offal.

Dr. Raymond: I wish to state further concerning the importation of beef that I believe it is impossible for any one—I don't care how wealthy he is—to bring foreign beef into this market and continue it unless he wishes to throw his coin away by the wholesale, because the cattlemen are in the business not for their health, but for making money, and they must protect their interests and they will face that emergency as they would another. In a conversation six or eight months ago with Mr. Waller, we figured it out that if the cattle-men confined themselves to slaughtering their own cattle and did away with the retail business that the Metropolitan Meat Co. could pay ten cents per lb. for cattle and pay a dividend of approximately $40,000.00 per year. Mr. Waller agreed with me that one man is not competent to run both branches of the business. I don't mean for a minute to reflect upon Mr. Waller, or his honesty or integrity, and I believe that the only thing for the cattle-men to do is to form a slaughtering company, go out of the retail business, and sell the beef to Chinese and White butchers for cash, and you will get your ten cents per lb. and the beef will be retailed much cheaper than it is today. That will increase the consumption, because you will get the price down to about 14 or 15 cts. per lb. It will do away with the expensive delivery system, the credit system, and the company will sell its beef to responsible Chinese or White men who will pay every week for their meat and they will do a cash business. The cattle could be butchered for about 25 per cent. (?) of the total value of the hides, tallow and offal and the balance will go into the dividend account. Today the Chinese are paying all the way from 7 1-2 to 11 cts. for their meat, selling No. 2 beef for No. 1 and driving people away from the stands

to the fish stalls. I believe that the Metropolitan Meat Co. should limit its operations to the slaughtering of cattle and the supplying of a uniform article to the retail market, and I believe that the business could be conducted in such a manner that the people of Honolulu could get their beef at from 12 to 14 cts. per lb.

Mr. Judd: The Executive Committee had in mind two things concerning this meeting. One object was the collection of facts. It is very easy to talk and go into lengthy discussions of lots of subjects; but the Executive Committee thought the proper thing to do was to collect facts. Certain facts have come out here. One fact which has not been clearly expressed is this: We cannot, by any artificial arrangement, alter the universal law of supply and demand. It seems to me that that should be taken as axiomatic. Another fact is that there is not the confidence among the gentlemen in this room which I think should exist. When we talk about the tax returns a smile was to be seen on the faces of about half the gentlemen in this room. In other words, the impression which that conveyed to my mind was this—that certain men make accurate returns and pay taxes commensurate with their holdings and that others do not. The same thing has come out through Mr. McCandless's remarks, speaking for the Metropolitan Meat Co., that certain men make requisitions to the Metropolitan Meat Co. based on truth, on the basis of the actual observations of the number of cattle which they have in their paddocks; others do not. I do not know who have made requisitions on the Metropolitan Meat Co. for this quarter. Apparently there has been a great deal of padding. These two facts have come prominently into my mind.

The second thought the Executive Committee had in mind in calling this meeting was that the result of the meeting would be something constructive. It is now four o'clock and I do not think we have gotten very far in considering any sort of solution of the problem.

The President: There are two motions before you, but neither of them has been seconded.

Mr. Wundenberg: The question to be considered by us is how

to deal with the over-supply of cattle. One suggestion is to lower the price. I don't think that would increase the consumption. I think Mr. Waller should answer this question, but that he should not be asked to take up the time of this meeting by discussing whether or not the Metropolitan Meat Co. should retail or not. I think a committee should be appointed to consider the question of pro rating cattle.

Mr. Waller: With regard to reducing the price of beef, that matter has been talked over by the directors of the Metropolitan Meat Co. and with several graziers. I believe it would make some difference if the price of beef were reduced from 10 cts. per lb., but I don't think it would make that amount of difference that would justify the graziers in making the reduction, so far as the local consumption is concerned. It might make a difference of 25 head a month, that is, so far as the City of Honolulu is concerned. What I have advocated is that the graziers should put the Metropolitan Meat Co. in a position where they could enter into contracts with the steamship companies who call here and who do not at the present time buy any meat. That would give an outlet for beef which we are now unable to sell. I think that might make a difference of from 50 to 75 head per month. We have already entered into a contract with the Oceanic S. S. Co. at seven cts. per lb. Some have agreed to stand in with that. The American-Hawaiian S. S. Co. is considering that proposition and also the Pacific Mail Co.; and then there is the question of transports. They do not buy one pound of beef here, unless they are compelled to by some accident happening to their cold storage plants. I think they could be induced to buy here if the price were reduced. In San Francisco they pay from six to seven cts. per lb. That is all I have to say with regard to the question of price. That, it seems to me, is the only outlet we can figure on for our surplus.

The President. You have been confronted with this same proposition of over-supply before, have you not?

Mr. Waller. I have never been confronted with such an overplus as at the present time. We have never had a surplus of 4,000 cattle in three months that I remember of, and especially at this time of the year, when cattle are generally scarce and the

supply short. 6,000 head are offering and we can only take seventeen or eighteen hundred head.

Mr. Thurston: Have you any reason to believe that that is a correct estimate of the surplus at present; or do you think it is the result of a doubling-up in order to make sure that each grazier will get his cattle in?

Mr. Waller: I doubt if it represents a surplus of prime cattle, as a number of them are not up to the scratch. We need a certain proportion of poor cattle to mix with the fat beef. If we don't supply fat Island beef to the good families of Honolulu it would invite competition from the Mainland, where fat beef could be had. Sometimes we have kicks about the grading of the cattle and the prices that are returned. A question that should be considered by the graziers is this: There have been a large number of men stationed here by the Army. They are kicking about the price we now charge them, and the other day the Captain of the Marines told me that he would pay ten cts. for beef and if he didn't get it at that price that they would import their beef from the Coast and erect their own cold storage plant. The Metropolitan Meat Co. can't pay ten cts. for beef, put it into cold storage, and then sell it again for ten cts. a lb.

The President: Now, if you had a contract with the transports to supply them with cattle and the contract was seven cts. per lb.—say a herd of cattle came in from the Parker Ranch that were all ten cent beef, you might say, or the majority of them were over the seven cts. that you would supply the transports with, and you would supply them that beef. Would the Parker Ranch stand the loss between the ten cent, and seven, or nine and seven cents?

Mr. Waller: We have not devised any scheme, but I think all the graziers should stand their proportion of the price. The transports would not take anything but fat beef.

Mr. Wundenberg: This Association might co-operate with the Planters' Association, or the agents of the sugar companies and see that we get a chance to supply some of the beef to the mail steamers calling at this port. A committee could sum up the total amount of cattle and let the various ranches stand their proportion of the cattle put into such a market. I make a motion

that the matter of regulating the supply of cattle for the Honolulu market be left to the Executive Committee, provided the price of cattle shall not be reduced below say eight cents per lb. I would make that as a motion coming from the floor, to put into the hands of the Executive Committee, and I would like to restrict that to the extent that I would like this Association to discuss the matter of the price to be fixed. I should certainly think that some method should be devised whereby this Association can agree with Mr. Waller, the manager of the Metropolitan Meat Co., upon the pro rata. I don't agree with some of the speakers that it would be impossible to go up to the various ranches and say approximately how many cattle they could put on the market. I think any experienced rancher can do that.

Mr. Thurston: It seems to me, as Mr. Judd said, that we are here for the consideration of two matters. First, we want to learn what are the facts. We have not got the facts before us yet, or anything like the facts. We have an estimate from Mr. von Tempsky of the cattle on Maui, which I think is very close. I think there are approximately 20,000 head of cattle on Maui, and a variation of one or two thousand head don't cut much figure. On Oahu the tax returns indicate about 19,000 head and the chances are there are three or four thousand head more—say 23,000. We don't know how many there are on Hawaii. We don't know what there are on Kauai, and we have not the number on Molokai. We have not the foundation of facts on which to estimate whether there is a surplus or whether, because this has been a rainy spring and summer, there are a lot of cattle ready for market. I believe that a committee of three should be appointed to follow up and get the facts; then, having gotten the facts, if they find, as a matter of fact that there is a considerable increase in the number of cattle over what there was a few years ago, naturally there is going to be an increased output that must be taken care of. If not, there is no necessity for taking any radical steps to get rid of a surplus that does not exist. I remember 10 or 12 years ago Mr. Waller advocated that the Metropolitan Meat Co. go out of the retail business and he demonstrated the reasons to my mind very clearly. I never have been able to understand why the company has persisted

in running a retail business, which, according to the statistics I have seen, is netting a very small loss or very narrow margin, while the wholesale business renders a large profit. I think a reduction of the price from 10 to 9 or 8 cents would make very little difference in the consumption unless the retail price is brought down very radically. As Mr. McCandless stated, loins are bringing in the Metropolitan Meat Company's shops from 20 to 22 cts. and the Chinamen are selling for about 15 cts., from 15 cts. down to 12 cts. Now, if you cut the price of all beef down so as to retail at from 15 to 20 cts, that would radically increase the consumption. Reducing the wholesale price is not going to affect the consumption at all unless the retail price is reduced. It seems to me that as the graziers are very largely interested in the Metropolitan Meat Co. it is for the graziers to take the matter up and study it carefully among themselves and decide whether it is not going to pay them better in the long run to have the Metropolitan Meat Co. go out of the retail business and have all the beef sold at such rates to outside butchers that they can retail it at from 15 or 16 cts. per lb. for the best cuts down to 12 and 14 cts. for the poorer cuts, and then we have hit the consumer in his pocket. It seems to me that we are not in a condition today to say what is the best thing to be done. We want more facts, by inquiring around, checking up the tax books and getting the facts from the graziers, and wherever they think it is the sound thing to go on the ranches and make inspections to do so, and I don't think there would be much attempt to hide information. Then we will get at the facts and if there is a surplus the committee could devise ways and means and later a special meeting of the graziers could be called and schemes could be formulated, criticized and some action could be decided upon.

Mr. Wundenberg: It might be of some interest to the members of the Association to know approximately what the number of cattle on the Island of Hawaii are. I have put down some figures.

Horner's Ranch	5,000
Dr. Wood	4,000

Puuhue	4,000
Kawaihae	4,000
Robert Hind	4,000
Maguire	5,000
J. D. Paris	3,500
Greenwell	6,000
Kapapala	6,500
Waiohino	4,500
Kahuku	5,000
Shipman	3,000
That totals up	54,000
Parker Ranch	25,000
Those are the approximate figures, making about	80,000

Mr. Maguire: I have come here unprepared with any figures, but the figures given by Mr. Wundenberg are swoolen up a little. I think my herd is in the neighborhood of 4,000 head.

Mr. Greenwell: We have in our herd, I should say, between 5,000 and 6,000 head. Nalehu has about 2,400 head.

Mr. Wundenberg: There seems to be a general belief that the Metropolitan Meat Co. is doing a large retail business. This is not so. The retail business we do in the matter of beef is a mere bagatelle. A large proportion of the meat retailed is retailed by outsiders. So far as the Metropolitan Meat Co. is doing the business, taking the meat away into their coolers and hauling it out again is a mistake. The Chinese make the best selection and if a few white families prefer to deal with the Metropolitan Meat Co. because of its cleanliness, etc., I don't think it affects the consumption one single bit.

Dr. Raymond: You have the report of the Metropolitan Meat Co. I think it is possible to find out what it costs to slaughter cattle and what the Metropolitan Meat Co. is doing in a retail way. There is no use arguing it here. All the information would be considered by this committee. I move that a special committee of five members, consisting either of the Executive Committee or five members of this Association be appointed to thoroughly canvass the situation, the supply of cattle, in fact

everything appertaining to the raising of cattle and marketing of them, either here or elsewhere; that all the data be collected by this committee; and, in short, to follow out the suggestion made by Mr. Thurston; and, that after they have made an exhaustive study and report of the subject that at the pleasure of the Chair a special meeting be called for the consideration of the over-supply of meat in this market.

Mr. Judd: I second Dr. Raymond's motion and amend it to the extent that the appointment of the committee be left with the Executive Committee, as it is a matter which demands considerable time.

Mr. Gay: The only objection I have to that is to the going upon each ranch on the Islands to make the investigations, the expense and time. How long is it going to take? If it is going to be necessary to drive each ranch the expense will be too great.

Dr. Raymond: It will be unnecessary to drive the ranches. Any competent man can give a pretty accurate estimate of his cattle by going into the fattening paddocks, spotting his cattle here and there, and estimating the number of head upon his observations.

Mr. Magoon: I think an independent outside man should be employed by the committee. The committee can make all the arrangements with Mr. Waller so that beef can be supplied to the slaughter-house or wherever it is, at eight cents per lb., and the pro rata can be determined and if there is any dissatisfaction this outside man, who would not favor any one man, could be sent up to visit each one of the ranches and the matter could be adjusted. The ranchers ought to have the right to demand that such a man be sent up to investigate the number of cattle he has there. In this way I think the question could be solved very easily. If that man does not do his duty we will know it very quickly.

Mr. Carter: I move to amend the motion of Dr. Raymond that the whole matter be referred to the Executive Committee for the purpose of compiling statistics and data necessary and to make a recommendation to the Association as soon as they have made their investigation. I will follow that up later with a

motion that the Metropolitan Meat Co. take fat cattle in preference to cattle that are not fat.

Dr. Raymond: I accept the amendment. The motion as amended is, that the Executive Committee act in the matter in place of a special committee, and report back to the Association as early as possible. I will withdraw my motion and will second the motion as amended by Mr. Carter.

Mr. Magoon: I move that the Executive Committee be authorized to employ one person, independent of this Association, to visit the different ranches and make an estimate of the fat cattle that each ranch can supply and to report to the Association.

Dr. Raymond: I amend that motion to the effect that the ranch to which this representative goes shall pay the expenses of that man from the time he leaves Honolulu until the day he returns.

Mr. Carter: It seems to me that the Executive Committee has full power to act in that regard if it sees fit. If they believe they cannot get the statistics, then they can employ such a man if they want to, but I think they should exhaust every other means before sending out a man on another's property.

Mr. Wundenberg: I move it be the sense of this meeting that that be done, if necessary.

Dr. Raymond: I move that the committee be authorized to employ a man, if they see fit, and levy an assessment on the ranch for the pay of this man.

Mr. Mendonca: How is the expense going to act where the cattle average say 300 lbs. on one ranch and 600 lbs. on another. My neighborhood may have cattle that will average 500 or 600 lbs. Am I to pay by the head or by the weight of the bullock?

Mr. Magoon: I will amend that—Make it on the weight of the cattle coming from each ranch.

Mr. von Tempsky: It would be better to make it on the amount of gross sales for the year.

Mr. Magoon: I will make it on the amount of gross sales for the year.

Mr. von Tempsky: I second that.

Mr. Judd: It seems to me that the easiest way is for the ranch to pay the costs of each inspection.

Mr. Magoon: My motion is that the committee be authorized to employ an independent outside man to investigate the different ranches and ascertain the number of fat cattle that are marketable, and that his salary be assessed according to the amount of gross sales from each ranch, based on the preceding year's sales.

Dr. Raymond: I think the easiest way out of that is, as Mr. Carter suggests. In nine cases out of ten it may not be necessary to send a man, but I think the solution is that the man owning the ranch should pay the expense.

Mr. Carter's motion (being the motion of Dr. Raymond as amended by Mr. Carter), as amended by Mr. Magoon, was then put and unanimously passed.

Here a recess was taken until 7:30 o'clock p. m.

EVENING SESSION.

At the hour of 7:30 o'clock p. m., there being a quorum present, the meeting was called to order, President Monsarrat occupying the chair.

The President: The Secretary has a few things in his report that he says he wishes to bring before the meeting.

Mr. Judd: There is one thing in my report that was perhaps passed over this morning rather hurriedly, and that is about new grasses. The ordinary grass seeds are available through almost any dealer, but they are not really the kinds of grasses we need on our ranges. By placing an order in early through Mr. Jared Smith grasses can be secured which are now being grown in the Southwestern part of the United States which cannot be had at any seed dealer's store. From Mr. Smith's experience there he believes they will do very well on our ranges. One work that the Association will do this year will be to receive those seeds and allot them among the ranches and reimburse itself for the expense. The numbers of the seed sent out by me correspond with the seed mentioned in the report.

Mr. McCandless: I consider this beggar weed (if that is beg-

gar weed which has a seed that sticks to your clothes), a very bad weed. It grows up faster than things which are cultivated.

The President: That is good feed for cattle.

Mr. Judd: The other two subjects in my report which I think should be considered this evening are the topics of "Glanders" and "Inspectors." The question of Inspectors naturally divides itself into two branches. The question which has been raised by Dr. Salomon's letter to Mr. Smith concerning the stationing here of a Federal expert in animal husbandry, to whose salary the Government will contribute $1400 if we contribute another $1100. This is purely a Federal matter. We know now that the Federal Experiment Station up in Makiki has no barns or stables or facilities for conducting experiments in animal husbandry right there on the ground; but I believe there are very few of the ranchers who would not willingly pay the expense of a man like Dr. Nogard (?) from Honolulu to their ranches for studying the problems furnished him on the ground. I understand there is "redwater" up on Hawaii, up Mr. Maguire's way. I understand there is fluke everywhere. There is hardly a ranch that has not some problem confronting it. If we provide $1100 some man will be sent here and we would have some one who would be able to make the rounds of the ranches.

The other question of "Inspectors" is the inspection done by the Territory. Heretofore we have acted under the law commonly known as Chapter 101 of the Penal Laws, enacted a great many years ago and some of the provisions of which are perhaps not entirely applicable to our present changed conditions, and yet the statute provides for a system of inspection of animals coming here, fees to be paid by the importer or consignee. As I have stated in my report, it has come to a deadlock between some importers and the Board of Inspectors. The Governor finds out that the Board of Inspectors has not been properly appointed. They being a board of a public nature it provides that they shall be appointed by and with the advice and consent of the Senate. That has not been done. I look at it this way: No matter what the legal aspect of the situation may be, even granting for a moment that the stand of the Metropolitan Meat Co. is correct legally, that the fees are illegal because the statute

is unconstitutional, yet it seems to me that everyone should, as a matter of policy, support the inspection of every animal that comes here, either into the Territory or which passes through the Territory, as on the Transport "Dix," because there is no telling when we may have the neighborhood of Honolulu affected by diseases which may be very virulent. I would say right here that I was told the other day that all the importers of animals now were waiving any claim on their part that the fees were illegal and were paying them and voluntarily submitting to the inspection. I understood from somebody—I can't tell you now who—somebody spoke to me this morning saying that he had just seen the Governor, who said that the Governor was ready to act and appoint a Board of Inspectors.

Mr. von Tempsky: I told you. He said there were actually no inspectors of stock here and there was a ship outside with stock aboard. I think he said he would be willing to appoint anybody whom this Association recommended. That is to the best of my memory what he said.

Mr. Magoon: It seems to me that it is incumbent upon this Association to have a law drafted that will stand the test of constitutionality and to see that there is an inspector appointed. You can't rely upon the voluntary submission of one individual to the assessment of fees. Some will submit and some won't. It must be a matter of law, a compulsion of law, and a very heavy fine for the violation of the law. You ought to have a law passed as soon as possible and have the inspector appointed.

The President: I think it is a very important matter. I believe this is a serious matter and the Association should take it up, and, as Mr. Magoon says, try and pass some law by which everything will be inspected.

Mr. von Tempsky: I think it is one of the most important things we have to deal with. We should have an inspector here and at Kahului.

The President: On all the Islands.

Mr. von Tempsky: That is one of the things that should be looked into particularly. Out of 80 mules shipped to Kihei there were a number with glanders.

The President: We have imported quite a lot in Hilo and the inspection is simply farcical.

Mr. Magoon: I make a motion to have a committee appointed —but I don't want to be on the committee—a judicial committee of three members, to provide a draft of such legislation as may be necessary.

Mr. McCandless: I second that motion.

Motion put up and carried unanimously.

Mr. Carter: I think we had better leave it to the Executive Committee.

Mr. von Tempsky: I would like to state, while on this subject of a judicial committee, that there is another matter that ought to be brought before the legislature. At the last session there was a bill passed reducing the fine for cattle stealing, reducing the penalty from two years to one year. I think there ought to be a very strenuous kick made about that. It is hard to convict a cattle thief, and the cattle-men who were in the House seemed to lose sight of the fact and they reduced the penalty as I have stated. I make this merely as a suggestion.

Mr. Carter: It seems to me the most important thing to consider tonight is the offer of the Department in Washington to procure for us a man and pay $1400 of his salary, leaving $1100 to be raised here. Not only is the matter of inspection a very important question, but it may be important at any time to have a man available for sending up to the ranches to look after diseases that may be developed after the animals arrive here. So far we have been pretty fortunate, but there is no telling at what time we may have a fatal disease that will result in tremendous losses, and I think we should endeavor to take advantage of the offer made by the Federal Secretary. It is a question of raising $1100. It seems to me that if we revise the law we could have a Commission of veterinaries appointed and Dr. Nogard could be on that Commission, and I was thinking that possibly all fees he got through that work could be applied towards his salary for making up the difference.

Dr. Raymond: I move that the Executive Committee take up the matter, canvassing each ranch immediately and getting a guarantee from the various ranches of the $1100. We shall

be satisfied to pay in our share, so much per month, payable every month, so that this man's salary is assured. Then, if there is any possible way of charging fees to those who are not in the organization, why some disposition can be made of that money to reimburse those ranches for the amount of money they put in. I think that would be the best way.

Mr. Carter: A charge might be made according to the number of cattle on each ranch. I don't think any rancher would be opposed to that.

Mr. Judd: Isn't the situation somewhat similar to the situation which confronted us during the lantana bug experiment, when an offer came to Mr. Perkins to go to London, Mr. Koebele being in Mexico and sending bugs to Mr. Perkins here. The $1100 would make it a little over $90 a month. The Legislature meets in February. Could we guarantee his $1100 until the Legislature could meet and make an appropriation for the man's salary? I make that as a suggestion.

Dr. Raymond: I don't believe in that at all. I think the best way is for the ranchers to pay that amount, even give him more than $90 a month, to have his services for the benefit of the Association, and not to go outside, not even to the Government, but to have him the authorized officer of this Association, so that his energies will be directed in that direction and that direction only. I don't believe in being small about matters of that kind.

Mr. von Tempsky: I might state that the question is mooted on Maui of employing the services of a veterinary for that Island alone. I took it upon myself to go around to the ranches for subscriptions and raised $900 inside of a day, $900 a year for that purpose alone.

The President: I don't think there is any doubt at all that the salary can be raised. I believe an assessment on each head of cattle would bring it out fairly. As far as Kapapala Ranch goes we will stand by anything of that kind.

Mr. Carter: I move, as an Association, we guarantee this gentleman his salary for one year and that his salary we are responsible for be raised by taxing the ranches pro rata according to the number of cattle they have.

Mr. McCandless: I second that motion.

Mr. Dowsett: I don't see how this Association can bind the ranchers to pay this amount.

Mr. Carter: The Association is binding itself, and if the ranchers do not pay it the Association will.

Motion put and carried unanimously.

Mr. Wundenberg: I understand there is a ship outside the harbor now with diseased cattle aboard. I understand the Governor is ready to take action, provided this Association recommend somebody. I think this inspection has been a perfect farce. When we do make a recommendation I hope it will be somebody who will do the work thoroughly. There are two veterinary surgeons in town now and I think they should be appointed.

Mr. Carter: I think it should be restricted to veterinaries.

Mr. Judd: As I understand it, I think there are only two veterinaries in the City of Honolulu, and the Board is composed of three men.

Dr. Monsarrat: There is a veterinary employed in the Immigration Department, a perfectly qualified man.

Mr. Wundenberg: Even two would be all right.

Mr. Magoon: I move that we leave the recommendation of these inspectors to the Executive Committee.

Mr. von Tempsky: I second that motion.

Motion put and carried unanimously.

The President: There is one matter I would like to speak of—the matter of glanders. I am told that North Kohala is suffering very badly from them. Mr. Loebenstein says his mule died with glanders and that the disease was contracted in the stables at Niulii. He says he is willing to make affidavit to that effect and that he knows glanders when he sees them. Mr. Palmer Woods will not allow horses from there to be put into his paddocks.

Dr. Wight: I am from Kohala and know that glanders have been very bad in the past, but I have heard of no cases this year.

The President: I heard of this in June. I saw the mule about the 26th of April. He died somewhere near the end of May.

Mr. Judd: I wrote to Dr. Fitzgerals and asked for suggestions. He evidently did not get the letter. If he did he hasn't answered it.

Mr. Jared Smith: I would like to make a suggestion. Congress some years ago appropriated a sum of one million dollars to be used for stamping out the foot-and-mouth disease in the New England States and a good deal of money was expended in Massachusetts and other New England States, but they neglected to spend the entire appropriation. That appropriation was made to be used until used up—Congress makes most appropriations to be expended within a certain fiscal year, but this million dollars, I believe it was that was appropriated—was made until used. That appropriation was set aside two years ago. Last year a very considerable portion of the unexpended balance was used in stamping out a new disease of cattle which arose in South Dakota, a scab of cattle introduced with cattle imported from Russia into Canada, and which spread across the line into North and South Dakota. There is, I believe, still quite a sum of that original appropriation left, and, while I do not know what the prospects would be of getting any of it for use in the Islands, there would be no harm in asking the chief of the Bureau of Animal Industry to expend a portion of it, or expend a portion of the unexpended balance, in stamping out glanders here in the Islands. You would have to show a good motive and put up a strong case. I don't know whether it could be cooked up strongly enough or not, but I believe that it would do no harm to apply to the Chief of the Bureau of Animal Industry for aid. There is certainly no harm in asking, even though the aid should not be extended. If the animal industry in these Islands is in danger of extinction, if its raising of horses and mules is in danger it seems to me that it would be a sufficiently serious matter to ask Congressional aid in the extermination of the disease. As I understand, there is no local law which promises payment for stock which is killed by an inspector. Is that so?

Mr. Judd: That is right.

Mr. Smith: If glanders is to be stamped out among horses and mules or if any other infectious disease is to be stamped out there must be some arrangement for the payment by the State

to the individual who loses his stock; otherwise glanders is liable to continue here almost indefinitely. It might not be possible to secure the passage of a law by the Territorial Legislature making such reimbursement to owners of such stock, but it might be possible to get aid from the Federal Government to attain the same end.

The President: I don't believe there is a man that has or knows of any glanders that would not be perfectly willing—that is, among the ranchmen—to have any animals killed. I believe every plantation would not hesitate a moment if they had it from good authority, a duly qualified veterinary surgeon to tell him that a mule or horse was affected with glanders—I don't think they would hesitate a minute to have him put away.

Mr. Smith: But the Portuguese and Japanese would be very likely to conceal the fact.

Dr. Raymond: At Ulupalakua, when I first went up there, they had a large number of animals killed. You all remember that, I think, that epidemic they had there. They say there were in the neighborhood of some 400 horses that died and many of them were killed. There is no question but that a large number of horses, of very fine horses, too, were killed through mistaken diagnosis. There is no question in my mind at all about that. I was not familiar with glanders at first when I went up there, although in the human subject we have glanders and I have seen one or two cases in the human subject. But I am satisfied it all depends very largely, and should depend largely, upon the man who condemns the animal. This action we have taken tonight in appointing Dr. Nogard will be a step in the right direction, that will be greatly appreciated, particularly by those people on Hawaii. I know of cases of ten different horses, more than that, that were reported to me as having glanders. The boys brought them out and said "That horse has glanders." I am satisfied in my mind they were not glanders. They simply had a little running at the nose, but I noticed one symptom in every case of real glanders. I suppose we have had in the past four years perhaps six or seven cases of death in which the diagnosis was made before hand. That is, I made the diagnosis and in every one of those cases I noticed a certain paresis and some

partial paresis of certain muscles. These muscles were in the flank and I got so that I would make a distinction between the glandered horse—that is, the horse that did and the horse that did not have it by the muscle symptom, and I will say that in every case where the animal was brought to me that had that symptom that sooner or later glanders developed and the horse died. I have never yet killed an animal, but we have a paddock, a place we put them in, and periodically we sterilize the troughs. We drain the troughs and we paint them over, put kerosene, saturate them with kerosene oil all over and burn them out, charring the entire surface and then paint them, and since I began to do that we have had no cases at all, that is, no new cases, as we have not had a case of glanders now in a year and no deaths on the ranch. All horses that died we burned. The ground for a space of 100 or 200 feet square was covered over, sprinkled with kerosene oil and that was especially so if on the range. The troughs out on the range, every one of them, was treated in the same way. I think those protections will do a great deal toward mitigating the disease. As far as certain symptoms are concerned, the characteristic symptom is, I believe, necrosis of the ends of the nasal bone, the membrane. I do not know of a single case where that symptom has appeared. The nasal cavities have been affected somewhat, but nothing more than in a horse with an ordinary cold.

Mr. Judd: At the suggestion of the President, I desire to move that the Executive Committee be instructed to take up this suggestion of the unexpended balance with the Governor, the Special Agent in charge of the Hawaiian Experiment Station, the Delegate to Congress and his Secretary.

Mr. Carter: I second that motion.

Motion put and carried unanimously.

Mr. Judd: There is one fact I would like to bring to your attention. In Mr. McCandless's estimate of the number of stock on this island we might be led to believe it represents stock simply for the raising of beef. You will notice in that list a great many dairies are included, dairies that supply the City of Honolulu with milk, and I imagine the proportion of beef cattle from those dairy herds is very small. I want to mention that

in connection with the fact that during the last year, that is June, 1903, to June, 1904, the Metropolitan Meat Co. imported nearly 40,000 dollars worth of butter from California. We are concerned, as an Association, not only with the raising of beef, but with products of animal husbandry. It seems to me that if the fact is gone into we might keep that $40,000 here inside the Territory instead of sending it out to enrich the people up there. There are a great many difficulties that confront the raising of butter in this Territory, perhaps not the smallest of which is the question of transportation to Honolulu. I throw this out as a suggestion. I think perhaps if somebody would take it up we might at the next annual meeting have some paper read on the subject and some work done this next year. It seems to me we should try to keep that $40,000 from going to California.

Mr. Smith: Mr. President, if I may have the indulgence of the Association for a moment. The Hawaiian Experiment Station has commenced to make analyses of Hawaiian feed stuffs, grasses and forage plants, and I would be very pleased to get samples in sufficient quantity for analyses from any of the members of the Association, not only the native forage plants but the introduced forage plants as well. I would be very glad to get a wide range of samples from all over the Islands. I think we have about 35 or 40 annuals or forage plants grown in the vicinity of Honolulu, but I would like to get other things as well.

Mr. Judd: What do you call sufficient quantities?

Mr. Smith: Well, it does not take a very large amount of the dried material. But the water content of the forage is an item which is interesting and valuable and if the man who collects the sample will weigh out say four or five lbs. of the green material and dry it carefully on a newspaper and then weigh it again and send the remainder, well, one pound say, that would be sufficient for an analysis. But we would like to have the loss of weight in drying as indicating the amount of water in the plant. A very small sample is sufficient for analysis, a few ounces, four ounces I should say, of the dried material, but not the green.

Mr. Magoon: It seems to me that the Association won't accomplish as much as if it appointed a committee for the purpose

of investigating the conditions of the Metropolitan Market and see what relations should be established between it and this Association. It seems to me that should be considered before we separate. I say a committee, but leave it to the Execuitve Committee to try to make some arrangement with this Association and that Company whereby the work can be done harmoniously between that Company and this Association.

The President: Before I entertain any motion to adjourn, I think there is due from this Association a vote of thanks to our retiring Secretary, Mr. A. F. Judd, who has done a tremendous amount of work, good, hard, earnest work, and a great deal is due to him for the building up of this Association. He has done a great amount of earnest work and has done more than we have ever been able to pay him for, and I think it is due to this Association to give him a vote of thanks on retiring.

Mr. Carter: I wish to heartily second that motion. He has done all the work; he has taken the initiative in every step we have taken and I think it is quite proper that we should recognize it. I will make that motion.

Mr. McCandless: I heartily second that motion. I think as Mr. Carter, that the Executive Committee has not done anything nearly as much as the Secretary. In every case he has taken the initiative. In fact it was he who had the bugs brought here to try to eradicate this fly, the horn-fly, and I think he had a great deal to do with the keeping of Mr. Perkins here and to get the flies here that have destroyed the lantana blight, which has been worth thousands of dollars to the graziers in this matter alone. The ranches that are clear of lantana today, with the new bugs we are having will keep a man from expending any new money for clearing his land. I have noticed all around the country that the seeds have disappeared now altogether from the lantana. There are no seeds anywhere and I give to our Secretary the greatest credit for all this work.

Mr. Shingle: I want to join heartily in that recommendation. No one knows better than I do that our Secretary has been overworked and under-paid and I am very sorry he has jumped his job when the Association is getting in a better way financially.

Mr. Judd: Now that Mr. Brown is to succeed me, I want to

in connection with the fact that during the last year, that is June, 1903, to June, 1904, the Metropolitan Meat Co. imported nearly 40,000 dollars worth of butter from California. We are concerned, as an Association, not only with the raising of beef, but with products of animal husbandry. It seems to me that if the fact is gone into we might keep that $40,000 here inside the Territory instead of sending it out to enrich the people up there. There are a great many difficulties that confront the raising of butter in this Territory, perhaps not the smallest of which is the question of transportation to Honolulu. I throw this out as a suggestion. I think perhaps if somebody would take it up we might at the next annual meeting have some paper read on the subject and some work done this next year. It seems to me we should try to keep that $40,000 from going to California.

Mr. Smith: Mr. President, if I may have the indulgence of the Association for a moment. The Hawaiian Experiment Station has commenced to make analyses of Hawaiian feed stuffs, grasses and forage plants, and I would be very pleased to get samples in sufficient quantity for analyses from any of the members of the Association, not only the native forage plants but the introduced forage plants as well. I would be very glad to get a wide range of samples from all over the Islands. I think we have about 35 or 40 annuals or forage plants grown in the vicinity of Honolulu, but I would like to get other things as well.

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Mr. Judd: Now that Mr. Brown is to succeed me, I want to

ask if it was the intention of the Executive Committee to recommend an increase in the salary? Was there anything said about that matter?

Mr. Carter: The Executive Committee has the power to fix the salary.

Motion put and unanimously carried that a vote of thanks be given Mr. Judd for his services to the Association.

The President: I move a vote of thanks to the Planters' Association for the use of this room.

Mr. Shingle: I second the motion.

Motion put and carried unanimously.

Mr. Judd: Before we adjourn, I move that the powers of the Executive Committee with reference to the investigation of the cattle industry be increased to cover the question of the mutton industry and that they be empowered to get together data on that industry, for this reason: Sheep increase very much more rapidly than cattle. There is an under-production now. The various sheep ranchers do not know what the fellow on the next sheep ranch is doing. Perhaps the plans as now outlined might be changed in two or three years and then there might be an over-production of mutton. If every reserver of mutton knows what is in the air he can lay his plans accordingly and it seems to me that without much trouble the Executive Committee can get this data together. So I make that motion.

Mr. Carter: I will second that motion.

Motion put and carried unanimously.

Mr. Judd: Just one more word. There is nothing like patting ourselves on the back. It seems to me that this is the first meeting, the first good meeting, we have had. If we could get together twice a year it means we are going to extend much. I believe it will put an end to false requisitions, if such have been made. I think it will mean accurate tax returns and a better feeling all through. That is one of the purposes for which we are brought together.

Mr. Carter: I move we adjourn.

Mr. von Tempsky: I second the motion.

Motion put and carried unanimously.

LIST OF OFFICERS AND MEMBERS.

JANUARY 1, 1905.

PRESIDENT.....L. VON TEMPSKY
VICE-PRESIDENT.....ALBERT F. JUDD
SECRETARY.....A. M. BROWN
TREASURER.....R. W. SHINGLE

EXECUTIVE COMMITTEE.

HAWAII.....E. P. LOW
MAUI.....H. P. BALDWIN
MOLOKAI.....J. F. BROWN
OAHU.....H. M. VON HOLT
KAUAI.....E. A. KNUDSEN

MEMBERS.

	Address.
Baldwin, H. P.	Puunene, Maui.
Bolte, C.	Honolulu.
Brown, J. F.	Honolulu.
Brown, A. M.	Honolulu.
Carter, A. W.	Honolulu.
Cullen, John	Honolulu.
Conradt, C. C.	Honolulu.
Damon, S. M.	Honolulu.
Dillingham, W. F.	Honolulu.
Dowsett Co., Ltd.	Honolulu.
Gay, Francis	Makaweli, Kauai.
Greenwell, Mrs. E. C.	Kealakekua, Hawaii.
Haleakala Ranch	Makawao, Maui.
Hawaiian Agricultural Co.	Care C. Brewer & Co., Hon.
Hitchcock, H. R.	Pukoo, Molokai.
Horner's Ranch	Paauilo, Hawaii.
Horner, Robert	Paauilo, Hawaii.
Ii Estate, John, Ltd.	Honolulu.

	Address.
Isenberg, Paul R	Honolulu.
Irwin & Co., W. G	Honolulu.
Judd, A. F	Honolulu.
Kamehameha Schools	Honolulu.
Knudsen, E. A	Kekaha, Kauai.
Lihue Plantation Co., Ltd	Lihue, Kauai.
Low, Eben P	Honolulu.
Low, J. S	Honolulu.
McCandless, L. L	Honolulu.
Mendonca, J. P	Honolulu.
Molokai Ranch	Kaunakakai, Molokai.
Monsarrat, J	Pahala, Hawaii.
Maguire, J. A	Kawaiahae, Hawaii.
Oahu Railway & Land Co	Honolulu.
Parker, Samuel	Honolulu.
Raymond, J. H	Makena, Maui.
Robinson, Aubrey	Makaweli, Kauai.
Robinson, M. P	Honolulu.
Robinson, W. T	Wailuku, Maui.
Rice, W. H	Lihue, Kauai.
Searle, R. C	Lahaina, Maui.
Shing, C. Q. W	Honolulu.
Smith, Jared G.*	Honolulu.
Swanzy, F. M	Honolulu.
Shipman, W. H	Hilo, Hawaii.
Waller, G. J	Honolulu.
Henry Waterhouse Trust Company, Ltd	Honolulu.
Von Tempsky, Louis	Makawao, Maui.
Wight, Dr. Jas	Kohala, Hawaii.
Wilcox, A. S	Lihue, Kauai.
Wilcox, G. N	Lihue, Kauai.
Wilcox, S. W	Lihue, Kauai.
Woods, J. F	Mahukona, Hawaii.
Woods, Palmer P	Mahukona, Hawaii.

*Honorary member.

STATISTICAL TABLE SHOWING LIVE STOCK DELIVERED TO THE METROPOLITAN MEAT COMPANY'S SLAUGHTER HOUSE FROM JULY 1, 1903, TO JUNE 30, 1904, WITH WEIGHTS AND VALUES OF SAME.

OWNERS	CATTLE			CALVES		SHEEP			CATTLE		SHEEP	
	No.	Weight	Amount	No.	Amount	No.	Weight	Amount	Average Weight per Head	Average Price per Head	Average Weight per Head	Average Price per Head
Dowsett Co., Ltd.	255	98,084	$ 8,512 02	160	$ 2,643 30			$	384	33 38		
Oahu Railway & Land Co.	733	258,959	22,108 36	287	4,309 60				353	30 16		
Parker Ranch	2745	1,348,233	136,358 62						504	49 67		
Damon, S. M.	85	35,018	3,256 18	56	1,104 95				412	39 48		
Haleakala Ranch	165	79,820	7,218 51	51	843 17				483	38 30		
McCandless, L. L.	47	18,264	1,519 41	51	873 79				388	32 33		
Greenwell, Mrs. E. C.	634	320,774	31,224 36						505	49 39		
Kaneohe Ranch	168	75,558	7,265 92	85	1,381 33	83	3,045	289 27	449	43 25	36	3 48
Maguire, J. A.	330	148,258	14,271 93	9	156 20				449	43 25		
Isenberg, D. P. R.	41	15,024	1,337 00	33	267 32				366	32 63		
Paris, J. D.	256	114,826	11,181 06						448	43 67		
Holt, Geo	25	10,540	986 00	11	246 31				421	39 44		
Puuloa Sheep Ranch						583	19,652	1,856 07			34	3 18
Gay & Robinson						1676	66,429	5,866 00			39	3 50
American Sugar Co.	809	309,140	28,838 69			5857	175,913	16,815 26	382	35 87	30	2 87
" " "						156	4,090	490 80			26	3 14
Humuula Sheep Station	5	3,378	337 80			2192	72,964	6,686 84	675	67 50	33	3 05
Hitchcock, H. R.	31	9,544	624 77	20	321 28				308	20 15		
Star Dairy	9	3,140	226 22	40	177 66				349	25 13		
Irwin, & Co. W. G.	140	59,606	5,033 65						425	35 95		
Brown, J. F.				39	535 75							
Woods, P. P.	100	52,846	5,031 67						528	50 32		
Mendonca, J. P	27	11,430	1,094 33						423	40 53		
Kamalo Sugar Co.	2	822	73 98	25	497 97				411	36 99		
Woods, J. F.	299	120,911	11,473 15						404	38 37		
Lanai Ranch						1407	38,832	4,133 91			27	2 93
Nakuina, Mrs. E. M.	22	7,282	622 33	1	19 01				331	28 29		
Cornwell, W. H., Est.	313	108,090	9,162 51	213	3,418 13				345	29 27		
Makee Sugar Co.						150	4,619	431 29			30	2 87
Holt, R. W.	19	6,954	623 05						366	32 79		
Meyer, Otto & Bro				32	542 13							
Kahoolawe Ranch	6	2,354	186 43			750	24,199	2,368 44	392	31 07	32	3 15
Dimond, W. W., Est.	11	4,278	416 81	3	57 80				389	37 89		
Hind, Robert.	264	127,277	12,655 24						482	47 94		
Kahikinui Ranch	198	79,078	7,119 28	15	212 52				399	35 95		
Gomes, A.	67	29,366	2,850 91	1	7 80				438	42 55		
Robinson, K. P.	32	11,690	1,023 54	4	69 20				365	31 98		
Horner, Robert	49	30,912	3,091 20						631	63 08		
McDougall	55	20,014	1,891 09						364	34 38		
Swanzy, F. M.	41	14,978	1,351 72						365	32 97		
Ii, John, Estate				22	292 89							
Achi, W. C.	26	7,663	517 32						295	19 89		
McBryde Sugar Co.	60	20,086	1,577 31						344	26 29		
Gay, Estate	20	7,256	555 82						363	27 79		
Broad, John	30	11,896	1,154 61						396	38 48		
Perry, A.	32	14,366	1,374 57	33	536 80				449	42 95		
Bolte, C.	16	7,718	746 06						482	46 63		
Puakea	10	3,322	272 73	46	633 45				332	27 27		
Sundries,	65	22,650	2,012 19	80	1,013 49	2	56	5 32	348	30 09	28	2 66
Cattle totals.	8242	3,667,405	$ 347,178 25									
Calves "				1317	$ 20,161 85							
Sheep "						12700	405,709	38,452 40				
Lambs "						156	4,090	490 80				

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THE PROCEEDINGS

OF THE

Hawaiian Live Stock Breeders' Association

FOURTH ANNUAL MEETING,
HONOLULU, HAWAII,
DECEMBER 18, 1905

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HONOLULU:
HAWAIIAN GAZETTE CO., LTD.
1906

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Meeting of the Hawaiian Live Stock Breeders' Association

HELD IN JUDD BUILDING, HONOLULU.

MONDAY, DECEMBER 18, 1905.

Meeting called to order at 10 o'clock a. m., by Mr. A. F. Judd, Vice-President, the President, Mr. L. von Tempsky, not being present.

Mr. Judd stated that professional engagements would necessitate his absence from the meeting, and upon motion of Mr. C. Bolte, seconded by E. H. Wodhouse, A. W. Carter was elected to act as temporary Chairman.

The following members of the Association were present, either in person or by proxy:

E. P. Low.
John Ii Estate (by C. A. Brown, proxy).
J. F. Woods.
Samuel Parker (by F. Wundenburg, proxy).
G. J. Waller.
Jared Smith.
A. W. Carter.
A. M. Brown.
R. W. Shingle.
H. P. Beckley.
R. R. Hind.
American Sugar Co., (by E. H. Wodhouse, proxy).
J. P. Mendonca (by Geo. Campbell, proxy).
Haleakala Ranch Co. (by L. A. Thurston proxy).
E. E. Conant (by A. M. Brown, proxy).
Mrs. E. C. Greenwell (by R. W. Shingle, proxy).
Julian Monsarrat (by A. M. Brown, proxy).

Henry Waterhouse Trust Co., Ltd., (by R. W. Shingle, proxy).
A. S. Wilcox (by E. P. Low, proxy).
L. von Tempsky (by L. A. Thurston, proxy).

The Chairman announced that twenty members were present or represented by proxy, thus constituting a quorum; the total membership of the Association numbering sixty-one.

Moved by F. Wundenburg, and second by C. A. Brown, that the reading of the minutes of the last annual meeting be dispensed with, in view of the fact that the same had been published and distributed among the members of the Association.

No report was presented from the President of the Association.

The report of the Secretary of the Association was read, and upon motion placed on file.

The Treasurer's report was read and accepted and ordered placed on file.

The report of Mr. Paul Jarrett, as Animal Inspector for the Association, was read by the Secretary and placed on file.

The election of officers was the next order of business.

ELECTION OF PRESIDENT.

Mr. Bolte suggested that the President of the Association should be a resident of Honolulu, and suggested the name of A. F. Judd for President, which was seconded by R. R. Hind.

It was moved by C. A. Brown, and second by F. Wundenburg, that the nominations close.

Motion carried.

Moved and seconded that the Secretary cast a ballot for Mr. A. F. Judd as President of the Association, which being done, Mr. Judd was declared President for the ensuing year.

ELECTION OF VICE-PRESIDENT.

Moved by Mr. Geo. Campbell that Mr. A. W. Carter be elected as Vice-President for the ensuing year.

Moved by Mr. Wundenburg, and second by R. W. Shingle, that the nominations close.

Motion carried.

Moved and carried that the Secretary cast a ballot for Mr. A. W. Carter, as Vice-President of the Association, which being done, Mr. A. W. Carter was declared Vice-President for the ensuing year.

Moved by Mr. C. Bolte, and seconded by Mr. Wundenburg, that all the remaining officers with the exception that L. von Tempsky be substituted for H. P. Baldwin as representing the Island of Maui, be re-elected.

Motion carried and the remaining officers were declared re-elected:

A. M. Brown, Secretary.

R. W. Shingle, Treasurer.

Executive Committee—Hawaii, E. P. Low; Maui, L. von Tempsky; Molokai, J. F. Brown; Oahu, H. M. von Holt; Kauai, E. A. Knudsen.

A letter was read from Mr. Olding resigning as a member of the Association on account of his intended departure from the country, and suggesting that the Kohala Sugar Co. be substituted in his place as a member of the Association.

Moved by R. W. Shingle, and seconded by C. A. Brown, that the Kohala Sugar Co. in place of Mr. Olding, and the Puakea Ranch in place of Dr. White, deceased, be made members of the Association.

Motion carried.

A letter from Mr. L. L. McCandless resigning as a member of the Association was read and accepted.

A report from Dr. Norgaard concerning animal diseases as he has found the same in this Territory, and their treatment, was read.

Upon motion of Frank Wood, second by Fred Wundenburg, the same was ordered placed on file.

Mr. Jacob Kotinsky made a report on lantana bugs and horn-fly parasites, which report he agreed to put in writing for publication in the annual report of this Association.

At 12 o'clock the meeting adjourned until 2 o'clock p. m.

Upon the coming to order of the meeting at 2 o'clock p. m., the application of Mr. Geo. Duggal was presented for membership, and upon a vote being taken, he was duly elected a member of the Association.

Mr. Jared Smith, who had undertaken to make a report on grass seeds imported and distributed among the graziers of this Association, stated that such report would be ready for publication in the annual report of the Association.

Mr. R. W. Shingle stated that the funds of the Association were running short and that the receipts for the ensuing year would probably be much smaller than they had been in the past.

Mr. E. P. Low suggested that an annual carnival be arranged and participated in by all the members of the Association for the purpose of meeting the expenses of the Association.

Mr. C. Bolte urged the necessity of retaining Mr. Paul Jarrett in the position now occupied by him, believing, however, that Mr. Jarrett should devote more of his time visiting the ranches throughout the Territory to ascertain the true condition of affairs on the ranches reported to have fat cattle.

The Chair suggested that the matter might be left to the Executive Committee with power to act.

Mr. R. R. Hind stated that he did not think an inspector was necessary. Most of the ranches had their representatives in Honolulu, who could attend to the details now being taken care of by such animal inspector.

Mr. E. H. Wodhouse suggested dispening with the services of Mr. Jarrett as suggested by Mr. R. R. Hind, and have the Honolulu agents attend to his work.

It was moved by E. H. Wodhouse, and seconded by R. W. Shingle that the services of Mr. Paul Jarrett, as Animal Inspector for this Association, be dispensed with. That the salary of the Secretary be reduced from 50 to $20 per month, and that the tax on cattle be reduced from 25 cents to 10 cents per head; that sheep be taxed 2½ cents per head and salves at 25 cents per head. Such arrangement to take effect January 1, 1906.

Moved and carried that the Secretary be authorized to cause to be printed a report for distribution among the members of the Association.

Moved and carried that Mr. E. H. Woodhouse and A. M. Brown act in conjunction with Mr. L. A. Thurston, in endeavoring to secure assistance from the Hawaiian Planters' Association to the extent of defraying one-half of the salary now paid to Dr. Norgaard by this Association.

The meeting then adjourned.

A. M. BROWN,
Secretary.

Secretary's Report.

To the President and Members of the Hawaiian Live Stock Breeders' Association.

Gentlemen:

The fourth annual report of your Secretary would call your attention briefly to the following facts of interest occuring during the past year:

Acting upon the vote of the Association to employ a person to represent the grazers and to be known as the Animal Inspector of the Association, your Executive Committee met and unanimously voted to employ Mr. Paul Jarrett, he to assume the duties of such office on the first day of March, 1905.

The report of such Animal Inspector is hereto attached.

Mr. Jarrett, together with myself, acting in conjunction with Mr. Waller, of the Metropolitan Meat Company, secured the construction by the O. R. & L. Co., of new up-to-date cattle pens at the Railroad wharf in place of the old cattle pen at the Ewa side of the harbor, which for so many years had been used for that purpose.

Another matter of importance was the preparation and the securing the passage of an animal industry bill by the last legislature. This bill provided for the appointment of a Territorial Veterinarian, and Dr. Norgaard was by the Board of Agriculture on the first day of July, 1905, appointed to such position.

A report prepared by him will be presented to you.

During the last year a large quantity of dry range grass imported by Mr. Jared Smith for this Association have been distributed and most satisfactory reports received concerning them. These reports I have referred to Mr. Jared Smith, and will present to you and report upon the same.

A report will also be presented by Mr. Kotinsky upon lantana blight and horn-fly parasites.

Very respectfully,

A. M. Brown,
Secretary.

Meat Cannery.

On the subject of a meat cannery, I beg to report as follows:

The cost of the machinery necessary to cure and handle twenty cattle per day would cost $5,000, and a building properly equipped for the purpose would cost about the same amount. This does not include the place for the manufacturing of cans, but it would probably be practicable to buy these already made.

Cost of Meat: Meat to be used for the purpose must be stripped from bone and free from tissue, and put into the can on a basis of not over 2½c per pound, so as to compete with American canned meat.

Experienced Man Needed: In order to make a success of this business it would be necessary to engage a man of experience who could tell definitely as to the construction and handling of the plant. Such a man would have to be gotten from one of the large canneries in the East, from Chicago, Kansas City or Omaha. The success of the enterprise would depend upon the man obtained for the position, as the quality of the pack would depend upon the stock curing and venting of can, which would have to be handled by some one with a large experience in this line. It would not be easy to obtain a man of this kind, as the matter would possibly have to be referred to some of the superintendents of the canneries in the East, for if taken up with the packers themselves, they would probably hesitate about lending assistance to a firm to start in competition with their own products.

A man might be gotten more easily from Brisbane, Australia, where there are large canning factories in existence.

As to the advisability of starting such an enterprise there is no question but if a suitable man could be obtained that a success could be made of the business; provided, however, the Hawaiian grazers would furnish the fresh meat at the figure named above, namely, 2½c per pound, which would mean by the carcass 1½c to 1¾c per pound.

A. M. Brown,
Secretary.

Treasurer's Report.

HAWAIIAN LIVE STOCK AND BREEDERS' ASSOCIATION.

TREASURER'S REPORT, NOV. 30, 1905.

RECEIPTS.

Cash carried over from last year	$ 332.64	
From dues during 1905	1,212.00	
From Metropolitan Meat Co. (stock tax)	1,417.43	
From Secretary, account sales of seed	184.40	
		$ 3,146.47

DISBURSEMENTS.

Salary paid to Paul Jarrett		$ 1,350.00	
" " " Dr. Norgaard		700.30	
" " " A. M. Brown, Secretary		416.65	
" " " A. F. Judd, former Secretary		16.50	
Paid for seed		327.48	
" " expenses, as follows:			
Cables and wireless messages	$ 20.91		
Stenography	82.05		
Postage stamps	14.00		
Books, stationery and printing	143.80		
Charges on seed	11.85		
Expenses of Dr. Norgaard from Washington to Honolulu	66.40		
Chairs	2.00		
Miscellaneous	7.40		
		345.81	
			$ 3,156.74
Deficit			$ 10.27

We have owing to us:

For dues (J. F. Brown, $24; R. H. Hitchcock, $24)	$ 48.00	
From sales of seed	100.00	
Due from seed account	25.00	
Due from Metropolitan Meat Co. for stock tax for December (estimated)	159.00	
		$ 332.00

We owe:

Henry Waterhouse Trust Co. account deficit	$ 10.27	
A. M. Brown, salary as Secretary for Sept., Oct., Nov. and Dec.	200.00	
Dr. Norgaard, salary for Nov. and Dec.	150.00	
Paul Jarrett, salary for Dec.	150.00	
Hawaiian Star Newspaper Association	18.00	
		$ 518.27
Estimated deficiency at the close of the year, December 31, 1905		$ 186.27

Honolulu, December 15th, 1905.

Inspector's Report.

HAWAIIAN LIVE STOCK AND BREEDERS' ASSOCIATION.

I beg to make report of work done since taking office as Inspector for the Hawaiian Live Stock Breeders' Association and append herewith, memorandum showing number of cattle, calves and sheep received and slaughtered during my incumbency. You will note that there has been a gradual decrease in the number of cattle slaughtered at the Metropolitan Meat Company's abattoir during the last few months, partly due to less consumption, assisted also by the trade diverted through the opening up of Yee Hop Company's abattoir.

Since taking office, I have made but one trip of inspection to the other Islands; viz., to the American Sugar Company Ranch on Molokai. I find that with my present duties which require my constant attendance at the abattoir, it is impossible to be absent for any length of time.

With regard to recommendations and improvements, would say that at my suggestion, we have subdivided some of the larger pens, making the handling of the stock easier. Extra water troughs have also been put in at convenient places.

I would suggest as an improvement and a benefit to the graziers that stock in the pens be fed twice a day and not once as hitherto has been the rule; if possible some green feed be at times mixed with the hay, and also that foreign hay be fed instead of rice straw, which is often the class of fodder given to the stock.

I would also call the attention of the members of the Association to the over-crowding of the pens which has happened many times since I took office, and would suggest that Mr. Waller be advised that when such overcrowding is imminent, he use his best endeavors to postpone shipments to immediately arrive, or else that he so curtail his orders that the overcrowding will not occur. The loss to the grazer from cattle standing and fretting in the pens for a number of days is very great ,as there is a double loss from the shrinkage in weight and the falling off in

quality of meat, causing, necessarily, a reduction in price obtainable.

Respectfully submitted,

PAUL JARRETT,
Inspector.

1905.

Stock received.	Cattle.	Calves.	Sheep.
March	620	109	736
April	613	148	880
May	645	100	898
June	584	97	886
July	523	53	700
August	595	116	845
September	506	57	1778
October	372	37	676
November	559	120	469
	5017	881	7868

Stock slaughtered.	Cattle	Calves.	Sheep.
March	614	143	177
April	595	112	525
May	633	110	958
June	578	108	767
July	563	72	795
August	519	102	725
September	500	88	110
October	479	100	698
November	524	94	641
	5005	929	5396

Slaughtered during 9 months:

Average per month	(Cattle)	556
" " "	(Calves)	103
" " "	(Sheep)	598

Reports on Trials of Grass Seed

DISTRIBUTED BY THE HAWAIIAN LIVE STOCK BREEDERS' ASSOCIATION.

MOLOKAI RANCH.

October 13th, 1905.

The grass seed received by this ranch from the above Association early this year, arrived too late in the wet season to warrant sowing, at that time; two kinds, viz: black grama and winter fat, however, were tried in the grass garden, the other having been tried before from former consignments.

No. 1.—Side oats grama has been tried and has done well in prepared ground, having seeded and lived through the dry season; it is also one of the very few grasses that can be found growing on the ranch from scattered seed. It will, I think, be a serviceable grass for the dry country.

No. 2.—White grama was one of the first grasses tried and made an indifferent showing; it grew and seeded, but declined afterwards. Last year's seed did better and looks more promising.

No. 3.—Black grama is new and the seed sown in the garden furnished a few plants which, for their age, showed great drought-resisting qualities; it promises to be a good grass for the dry lands.

No. 4.—Fuzzy top. This or a closely allied sort was also one of the first lots furnished by the Experiment Station and about the only one that did really well, the original planting seeding well now and probably spreading a little. The variety sowed late last year did, if anything, better; it is a great drought-resisting grass and seems to grow in the driest weather.

No. 5.—Winterfat, tried before and did not grow. The garden trials of this lot grew and a few plants are still alive.

The following is a list of other grasses that have shown well for dry conditions:

Rhodes Grass.—A remarkable grower and drought-resister.

Paspalum Dilatatum.—Invaluable grass for wet or dry lands.

These two are grasses of much value and easily established.

Sporabolus Wrighti.—A strong rooted, drought-resister, grown from first seed from Experiment Station; good for salty land.

Sporabolus Crputoul.—From seed from above station last year has done well and seeded in garden.

Panicum Bulbosum and Mehlybergia Petrei.—Same remarks apply to these as to the last named.

Arizona Saltbush, Atriplix Lentiformis.—This did finely in one place of salty land; takes a strong root, grows several feet high and stands cropping to the ground; well worth further trials.

Mitchell Grass.—From Australia, has done well and is worth establishing. Sand Lucerne has done better than other lucernes.

J. C. MUNRO,
Manager of Molokai Ranch.

KAPAPALA RANCH.

Kapapala Ranch, Sept. 30th, 1905.

Mr. A. M. Brown, Secretary H. L. S. B. A., Honolulu, Oahu.

Dear Sir: I acknowledge receipt of yours of the 21st inst. in reference to dry land grasses.

Owing to the drought we have experienced for the past year on this place, was not able to plant the seed until a month or so ago. All the seed has come up and seems to be doing well, but it is rather early in the day to make any report on them.

I find the Mosquito grass does exceedingly well with us here, at any elevation above 2500 feet, growing best at 4000 feet elevation.

Red-Top and Orchard grass sown nearly two years ago, has only come up within the past three or four months. I cannot account for this.

Other grasses sown about the same time are only just now making their appearance.

If any grass will grow, and do well, on this rain-forsaken land, it can well be considered a dry range grass.

I hope to be able to make a report on these grasses in time for the meeting next year.

Yours truly,

J. MONSARRAT.

KAMUELA.

Kamuela, Hawaii, October 10th, 1906.

A. M. Brown, Esq., Secretary Hawaiian Live Stock Breeders' Association, Honolulu.

Dear Sir: I am in receipt of your favor of September 21st, requesting information in regard to dry range grasses distributed by the Association during this year.

In reply I beg to say that I am afraid I will not be able to give you much information, as we have had such a long dry spell on the leeward side of the ranch that it was impossible to sow any of the seed on the range.

I did, however, sow a portion of the seed in small plots in the garden at Puuopelu.

Seed received was as follows:

No. 1—Side Oats Grama.
No. 2—White Grama.
No. 3—Black Grama.
No. 4—Fuzzy Top.
No. 5—Winter Fat.

From general observation, of growth and seed producing qualities of these different varieties, I think that Fuzzy Top is about the best of the lot. This grass seems to be a rapid grower, and the seed being of a feathery nature, and very light, is easily scattered by the winds. This grass grew to a height of about four feet. I have recently cut the plot, and the second growth has started rapidly.

Side Oats Grama is also a fast grower, but the second growth seemed to seed very short.

White and Black Grama grew well. Similar to Side Oats Grama.

Just what these grasses will do on a dry range, I cannot tell you. They have been grown by me under very favorable conditions, in a garden plot. Conditions on a dry and open range may prove entirely different results.

We are having some success with Paspalum Dilatatum. This is undoubtedly a most excellent grass, after it once gets established. It seems to do best where there is considerable moisture, but grows fairly well in dry sections. I have found that the best way to establish this grass on the range, is to plant portions of the roots. Seed that I have sown shows poor results; not over 25 per cent. of it has shown at all.

I am now experimenting with Rhodes grass, seed of which I received through Mr. A. W. Carter, from the American Sugar Co. of Molokai. This grass promises well, and I believe will be one of the best grasses we have. I am not familiar enough with it as yet to write you a description of growth, etc.

We have several other varieties of grasses growing on the ranch, such as Orchard, Rye, Red Top, Blue Grass, etc., all of which grow well at different elevations.

As written above, this information is of little value to you, but I willingly give it for what it is worth.

I remain,

Yours truly,

E. E. CONANT.

HALEAKALA RANCH.

Makawao, Maui, September 26th, 1905.

To the Secretary, Hawaiian Live Stock Breeders' Association, Honolulu.

Alfilaria. Sown in nursery January 23, 1905, came up and did very well. "Peeluas" cleared off the greater part of the bed; what survived, matured and seeded inside of seven weeks. Tried on the mountain at elevations up to 6000 feet, did not do well.

I should not recommend this for a sheep run, as it has a seed resembling Pili, and bores its way into the flesh of the animal.

Bromus Mermis. Sown in nursery, January, 1905. Came up quickly, but did not mature and seed till September 15th, and then only reaching a height of about twelve inches. Tried on the mountain up to 6000 feet, not a success so far.

Blue or White Grama. Sown in nursery October, 1904, and did well. I also sowed some in Kula at an elevation of 2500 feet, in the driest section; this seed had practically no rain on it at all; yet it grew along, and is now seeding profusely. I consider this a most valuable grass for dry ranges.

Black Grama. Sown in nursery and came up within thirteen days. "Peeluas" eat it up with the exception of one or two stools which did well and matured quickly.

Buffalo Grass. I got this seed from the Kansas Experiment Station, but it did not germinate.

Blue Grass, Kentucky. Grows well on the mountain from 4000 to 6000 feet elevation; does best under moist conditions; on dry, loamy soils does not do so well.

Coxfoot. Does very well on the mountain from 2000 to 6000 feet elevation in either wet or dry soils.

Clover, Red. Grew well on the mountain, but disappeared after a couple of years.

Clover, White. Grows best at from 4000 to 6000 feet elevation; likes some moisture.

Cenchous Montanus. I got a few seeds of this species (from Mr. Jared Smith) which came up in the nursery; it matured and seeded inside of three months; I consider this a very promising grass.

Fenny Greek. Came up in the nursery, matured and seeded inside of seven weeks. A most valuable weed, I should say, for makai lands.

Florida Beggar Weed. Came up and matured in the nursery inside of two months. Grows to a height of three feet and looks as if it would make a valuable addition to our makai pas-

tures. I sowed some broadcast on a burnt Manienie patch as an experiment; it came up well and strongly. This weed is spoken very highly of in the Western States as a stock fattener.

Fuzzy Top. Sprouted in nursery in eleven days, matured and seeded in three months. Looks like a good grass for elevations ranging from 2000 to 4000 feet.

Meadow Fescue. Came up in nursery in nine days, all eaten by "Peeluas."

Mezquite or *Soft Meadow Grass* or *Yorkshire Fog.* As for from 2500 to 7000 feet; prefers moist lands.

Paspalum Dilitatum. Seems to be one of the best grasses introduced to the country. It comes up readily amongst Manienie, and I believe by judicious stocking, it will more than hold its own with this grass. I have tried it on the mountain up to an elevation of 6500 feet, but it is too soon yet to form an opinion as to its merits at that elevation.

Panicum Bulbosum. Grows well and stands drought at an elevation of 2000 feet; reaches a height of about two feet and seeds freely.

Panicum Lachnanthum. Seed did not germinate.

Panicum Spectabile. Grows very well at 2000 feet elevation; also does well in Hilo grass lands. Very good feed.

Rat's Tail or *New Zealand Timothy.* This is an A1 grass, having a range in altitude of from 1000 to 6000 feet, growing equally well anywhere between these points. tI grows right up amongst a thick bed of Manienie, and the stock eat it readily.

Red Top. Came up in nursery in twelve days; "Peeluas" eat it all up.

Rye Grass. Perennial. Does well from three to fourhoW"fi;

Rye Grass. Perennial. Does well from 3000 to 4000 feet elevation; prefers moist conditions.

Rescue Grass. Grows well from 2000 to 6000 feet. Does best in bottom lands and is A1 feed.

Shepherds Purslain. Seed did not germinate.

Side Oats Grama. Came up in nursery inside of two weeks, matured and seed in three months; looks like a very promising pasture grass. Have tried it at elevations ranging from 2000 to 6000 feet, but cannot yet give a definite report.

Spanish Sulla. Sown in nursery January, 1905. Came up very quickly, grown well, but has not seeded to date. Resembles somewhat our native Papapa.

Timothy. Came up in the nursery in five days, grew well, but "Peeluas" cleaned it all up except one stool, which grew and seeded in four months.

Turkestan Alfalfa. Came up well in nursery, but was all eaten by "Peeluas."

Winter Fat. Seed did not germinate.

White Branching Sorghum. Of all the seeds sent me by the Association only six germinated; these, however, did well, growing without any artificial irrigation and now stand six feet high and are covered with seed.

From the foregoing it will be observed that the most likely grasses for our makai lands, that is, land that produce grasses like Kakonokono, Papapa, etc., etc., after a heavy kona, should be, Fenny Greek, Spanish Sulla, Florida Beggar Weed, Alfilaria and Cenchous Montanus.

For our middle lands, that is Manienie land, Fuzzy Top, Bromus Mermis, Paspalum Dil., Rat's Tail, Timothy, and perhaps Side Oats Grama would thrive. I think also Florida Beggar Weed would do well.

For the mauka lands, say from 4000 feet up, Black Grama, Blue Grass, Ky.; Coxfoot, Clovers, red and white; Mesquite, Red Top, Rye Grass (perennial), Rescue Grass and Rat's Tail.

In Hilo Grass land I should recommend the Panicums, and perhaps Fuzzy Top, and for dry ranges, Blue Grama without doubt.

L. von Tempsky,
Manager Haleakala Ranch Co.

Introduction of Grass Seeds.

REPORT OF JARED G. SMITH.

Seed was imported from New Mexico a year ago, of five varieties of dry land grasses and forage plants, as follows:

Side Oats Grama,
White Grama,
Black Grama,
Fuzzy Top,
Winter Fat.

While these seeds have received wide distribution throughout Hawaii, I regret to say that I have received reports in regard to them from only five members of the Stock Breeders' Association. It is important, if a report on these introduced grasses is to be published, that all members who have received seeds should let us know what their success has been. I submit herewith reports from the Haleakala, Molokai, Parker and Kapapala ranches. In addition to these reports, Huehue Ranch has sent in a few notes in regard to Fuzzy Top and the Gramas.

I have received several offers of seed from Mr. James K. Metcalfe of Silver City, New Mexico, from whom I purchased the dry land seeds a year ago. He offers for sale now, the following:

Metcalfe Bean, a tuberous root bean, which remains green during long periods of drought.

Apache Plume, a shrub, the leaves and twigs of which are browsed by sheep and cattle at all seasons of the year. This is a mountain species and would probably not thrive here in Hawaii at elevations below 2000 feet, but might be of some value above that.

Orchard Rye Grass, a native Southwestern species, not identical with either the cultivated orchard grass or the rye grasses.

Gray Weed, a perennial weedy plant, which makes fine feed, suitable for growth in very dry land.

White Grama, concerning which Mr. von Tempsky makes a very favorable report. It is one of the Buffalo grasses of the prairie country.

I would like to have the Association take some action in regard to whether a continuance of the work with grasses and forage plants, especially the introduction of seeds of dry land species, is desirable.

During the first four years of my service in the U. S. Department of Agriculture, I was engaged in grass and forage plant work, especially the investigation of grasses and forage plants, suited for, or native to, arid regions. I spent a portion of each year in the field, collecting grasses and making notes in regard not only the value of the native forage plants, but various phases of the forage question as affecting the cattle and sheep industry of the Southwest.

Grant County, New Mexico, where Mr. Metcalfe lives, is an extremely dry and barren country. When there are abundant rains feed is abundant, but in the dry seasons which prevail a great deal of the time, feed is very scarce. The characteristics of the country resemble very much the rainless districts of the leeward side of these Islands.

The grasses and forage plants, which I have already procured from New Mexico, are not suited for "cultivation," in a strict sense. A good use of this seed, in my opinion, would be to scatter it broadcast from horseback, somewhat sparsely over the range during, or immediately before, or after, a rain storm.

Desert species of plants have this common characteristic, that while they will remain dormant in the soil for an extraordinarily long period, they are capable of germinating almost at once when the rains come. Many of these desert plants are capable of completing their period of growth in a few weeks, or months. Growth when it takes place is extremely rapid. I would not advocate sowing seed of any of these species on plowed land or in garden plots. While it may seem like throwing money to the winds to sow broadcast seeds that may not show any results for a number of years, yet I believe that this would be the best possible use to make of dry land grass and forage plant seeds. As I have previ-

ously stated to this Association, a large variety of forage plants is very desirable in any range or pasture here in Hawaii. Our ranges are very deficient in this regard.

The majority of desert or dry land plants have seeds capable of distribution by the wind or by adherence to the hair or feathers of passing animals. If it is desired to establish new dry land species of plants on dry ranges, a practicable method and one not involving too great expense, would be to fence in a small square of land, say 50 to 100 feet, on a side and sow the seeds inside of this inclosure. Such seeds as mature will be scattered by the wind, in all directions over the range, or by running water in case the paddock is located somewhere at the head of a gulch. Small paddocks of this character would require no care other than to keep up the fences to keep stock out.

I would strongly recommend to the Association that they continue officially the importation of seeds of forage plants from the United States and from foreign countries and I would respectfully request an appropriation for this purpose. Under the old arrangement the seeds would be distributed to members at a slight advance over cost to cover the expenses of putting them up ready for distribution.

I do not anticipate marked results in improvement on the range following immediately. It will take time to establish any of these new grasses in sufficient quantity to reimburse you for the expense, but these plants, if once established, will undoubtedly, in the course of time spread over a large area of land. As we all know, thousands of bushels of seed of the cultivated grasses have been scattered broadcast on some of the ranches. Expenditures of this sort, made fifteen or twenty years ago, are only now bearing abundant fruit.

The list of cultivated grasses introduced by the old managers and now growing abundantly in localities where it is difficult to say who was responsible for their introduction is a very large one. In my rather hurried visits to different parts of the Islands I have observed Kentucky Blue Grass, White Clover, Yellow Sweet Clover, Rhode Island Bent, Red Fescue, Bromus Inermis, Natal Red Top, Italian Rye, Perennial Rye, Alfalfa, Rescue Grass, Tall

Oat Grass, Mesquite, Johnson Grass, Wild Oats, Black Medick, Filaree, Orchard Grass and many other species of European or foreign origin. Some of these species now cover thousands of acres of land. All were introduced intentionally, to improve forage conditions, but it is doubtful whether many of those who sowed have themselves lived to see the benefit.

By continuing introduction of this character our grazing lands are bound to improve from year to year, not only in the ratio of stock to acres that the land is capable of supporting, but a general improvement in the feed conditions throughout the year.

There is another matter that I would like to bring to the attention of this Association. The Station Chemist, Dr. E. C. Shorey, has prepared a manuscript embodying the results of his analysis of about sixty species of grasses and forage plants growing here in Hawaii. It contains material for which there is considerable demand and which will be of immediate interest and value to every one engaged in any branch of animal husbandry in Hawaii.

In conclusion I would again remind the members of this Association that the Hawaii Experiment Station wishes samples of grasses and forage plants growing on each of the ranches, together with notes as to their value. If any one will agree to supply samples, I shall take pleasure in sending franks so that the plants can be sent free of charge, by mail.

Report of the Territorial Veterinarian

AT THE

ANNUAL MEETING OF THE HAWAIIAN LIVE STOCK BREEDERS' ASSOCIATION, HELD IN HONOLULU, DEC. 18, 1905.*

By Victor A. Norgaard, *V. S.* (Copenhagen), *Inspector, U. S. Bureau of Animal Industry, Territorial Veterinarian.*

Mr. President and Members of the Association:

In accordance with an agreement between your Association and the U. S. Department of Agriculture I was directed to proceed to Honolulu as Inspector for the U. S. Bureau of Animal Industry and was, upon arrival here, March 1, 1905, offered the position of Consulting Veterinarian to this Association. I beg herewith to submit my first report to you on the observations which I have made during the past year regarding the general condition of the live stock industry in these Islands as well as upon the prevalence of various diseases among the live stock and the measures which have been taken to suppress the same.

As far as the live stock industry in general is concerned a fairly good idea may be formed by observing the cattle and sheep which are shipped from the various islands to Honolulu, for slaughter. It is at once noticed that all the cattle are grass fed and their condition varying to a great extent, owing to the great variety of climatic and other conditions prevailing on the different islands where cattle are raised. It is further observed that the greater majority of the animals show no breeding but are unimproved native stock. There are, how-

* Since this report was delivered it has been supplemented by additional observations and conclusions made during the following four months.

ever, exceptions. From two ranches at least have I seen consignments of steers arrive in which nearly every animal showed a decided strain of either Shorthorn or Hereford, and it is simply a question of time when the continued importations of registered breeding stock will make its impress on all of the herds in the Islands. Furthermore, there is little encouragement at the present time in shipping high grade steers to the market. They bring no higher price than common steers in the same condition, and the fact that they carry more beef and of a better quality on the high priced cuts (ribs and loin) is entirely lost sight of. A Jersey steer, a common steer and a high grade Shorthorn or Hereford steer, all fat, and which on the Chicago market would bring respectively 3½ cents, 4½ cents and 6 cents per pound live weight, would on the Honolulu market all fetch the top price of the day, unless the common steer had long horns in which case he would be called a stag and sold accordingly. The top price of the day as established by the purchasers and based upon the average available supply of common steers at a given season is never exceeded, and the owner of high grade steers is at a decided disadvantage This condition, however, will undoubtedly regulate itself when the high grade steer becomes the rule and not the exception.

The majority of the steers which come to the Honolulu market are four years old or over, and vary, according to their condition and the locality where they have been raised, from 700 pounds to 1000 pounds live weight. When in prime condition they dress out well, some bunches averaging fifty-five to fifty-eight per cent.

The sheep killed for consumption in Honolulu are small and seldom more than half fat. Like the cattle they are only grass fed, but owing to the limited supply they fetch comparatively good prices.

During the past year I have visited the principal islands in the Territory, but as there are many sections where I have not yet had opportunity to make any observations it should be borne in mind that the conclusions set forth in this report in

some cases are of local interest, while in others they cover a wider scope. My general impression, however, is that all classes of live stock in the islands fail, in a more or less pronounced degree, to attain the size and quality which the apparently perfect climatic conditions would warrant, and that the young stock matures slowly.

I was at first inclined to ascribe this to inbreeding, but soon found that even where fresh blood had been introduced regularly the offspring frequently failed to attain the size and development which characterizes similar breeds on the mainland and in other countries. Still there seemed nearly always to be an abundance of feed, and such conditions as in other countries are considered detrimental to the development of stock, a more or less prolonged winter for instance were unknown here. When one has seen the great plains in the Southwestern part of the United States, where each cow or steer requires from 16 to 20 acres for its support, but where, in spite of the scarcity of grass, they attain the required size, and has compared them to pastures in these Islands, often covered with an abundance of grasses, which elsewhere are considered nutritious, then it becomes evident that something is lacking in the soil and consequently in the food, the absence of which prevents growth and development. I do not mean to imply that this is the case everywhere in these Islands; there are no doubt places on certain Islands and pastures on certain ranches where the grasses contain everything required for the development of young animals, but most frequently such localities are utilized for other purposes and such pastures are generally used as fattening paddocks and not as breeding paddocks, and in neither case do the young animals obtain what they require.

It was, however, not until quite recently that this deficiency in the food was brought so forcibly to notice that it became evident that the losses resulting therefrom were very great, and that measures should be taken to check the same. On the Island of Hawaii for instance a number of animals, especially calves, yearlings and heifers with their first or second calf,

have been dying, especially on Hilo grass ranges, and even though these are covered with green succulent grass and the animals eat an abundance thereof, they have the appearance of starving. They become weaker and weaker and finally lie down and die, the death struggle often lasting twenty-four hours or more. On postmortem examination it appears that all of the internal organs are in apparently normal condition, though the tissues are rather pale and the blood thin. But the stomachs and intestines are full of partly or completely digested grass and there are no flukes or other intestinal worms. In fact we only find a more or less pronounced anemic condition, in every respect bearing out the ante-mortem appearance and symptoms. However, if we look a little further, remove the unpliable hide, and cut away the pale flaccid muscles from the bones we come to the seat of the trouble. In removing the muscles from the shoulder blade, for instance, it will be noticed that the periosteum—the white tough membrane which covers all bones directly—which in the healthy animal is very firmly attached to the bones, strips off easily and that the exposed bone is of a bluish, half transparent color. A tap with the heel of the boot will shatter the bone and the pieces may be sliced with a butcher knife like a shingle. This condition, known as *osteomalacia* or softening of the bones, is due simply to an insufficiency or total absence of lime salts in the food.

The observations of this disease in certain sections of Hawaii and Maui at once threw light on a number of conditions throughout the Islands which hitherto had been more or less mysterious, and when I was informed by Mr. Jared Smith of the U. S. Experiment Station that a number of chemical analyses of grasses from various parts of the Islands had revealed a deficiency in lime salts, I felt convinced of having reached the root of many evils and began to realize that much could be done to remedy them. For instance I had noticed that fractures of bones in grown animals—cows, steers, bulls, and especially bullock horses—were more common here than in most other places. During the past year I have seen or

heard of at least twenty cases of broken legs, not counting any which may have occurred on lava flows, and I feel convinced that even though the surface of the Islands for the greater part is rough and stony, so many fractures would not occur unless there was something materially wrong with the bones of the animals.

Another disease of the bony system which prevails here to a great extent is *osteoporosis* or big head in horses and mules. The true nature of this disease is not known, but it seems probable that it is due to some form of malnutrition of the bony system. I have seen this disease on all of the Islands I have visited, though it seems to cause the greatest loss on Maui. A description of this disease as well as of osteomalacia in cattle will be given under separate heads.

It is, however, not the actual loss by death which results in certain sections of the Territory from this deficiency in mineral matters in the grasses, which is of most economic importance, but the incalculable waste of time and material resulting from an "unbalanced ration." By a "balanced ration" we understand a given amount of food which contains all of the ingredients necessary for the maintenance, growth and development of each and every tissue of the animal economy and for the production of heat and energy.

If any one of the required ingredients is missing or deficient the tissues or functions which remain unsupplied will, as a rule, not suffer alone, for the economy will endeavor to equalize the ration by giving off spare or surplus products from one tissue to another, converting the same to meet the demands of the neglected tissue or organ. It will therefore be seen that when the ration becomes unbalanced by a deficiency of mineral matters it will not alone affect the bony system, even though this is first to suffer, requiring as it does the major part of the mineral matters assimilated with the food, but every other tissue or organ containing or requiring mineral matters, all of which do to a greater or less extent, will suffer in proportion. When we further consider that the young and growing animal requires an excess of lime salts to build up its bony system,

upon which all other tissues and organs depend for support, then it can be realized what an immense influence a general deficiency in lime salts will have upon the live stock industry of a country.

Excepting this one deficiency we find that every other requirement for making this Territory an ideal place for live stock raising is present. It is a well established fact that a pregnant animal will supply the fetus with everything required for its development even though the mother must convent its own substance for that purpose, and will continue to do so after the young one is born, dissolving its own bones to provide the lime salts in the milk, unless an abundance thereof is available in the food.

This is well illustrated in certain sections, where the said deficiency is not very pronounced. On Molokai for instance all lambs are born strong and well developed, and so long as they receive plenty of lime salts through the mothers' milk, they gain rapidly in size and weight. When about four months old they are generally weaned, at which time many of the best lambs weigh from 55 to 60 pounds, while the majority average 50 pounds. This would indicate that the conditions up to that point have been as favorable as could be desired. But no sooner are the lambs weaned before an almost complete standstill in the development takes place, and further growth is resumed but slowly. When 12 months old they only weigh from 60 to 70 pounds, the best lambs of the following season being heavier than the less good yearlings. There is certainly a discrepancy here, which can only be accounted for in the way indicated. From the time of their weaning the lambs have subsisted on grass, but even though they have had an abundance thereof, they have only developed in direct proportion to the actual amount of lime salts which they have assimilated with the food. The deficiency in lime salts has unbalanced the ration and the resulting excess of proteids and carbohydrates which have been consumed by them have simply been wasted, and for either breeding or marketing purposes, the young animals have received a set back from half a year to a year.

When the yearlings finally are bred and have to provide lime salts for the formation of the skeleton of the fetus, their retarded development again comes to a standstill, and so on, until they reach the age where no further growth takes place, without ever having attained the size which, under more favorable circumstances, would have been realized.

Where the deficiency in lime salts is more pronounced, as on certain parts of Hawaii, the conditions are as stated more serious. In the first place the young and undeveloped animals are often bred too young, with the result, for instance, that heifers become runts and the calves are born small and weak. If the mother is a good provider she will sacrifice herself for the calf, which will soon become strong and gain rapidly, until, as is often the case, the mother dies. If the calf survives it will, as a two-year old, be the size of a yearling, but with a large stomach and an old look. If the mother lives the calf will develop normally, so long as it receives milk, and the heifer will get in calf again. She has then to maintain her own bony system, provide a new skeleton for the fetus and supply the required amount of lime salts in the milk to the calf at the foot. This, as a general rule, proves too much of a strain on her system and it is therefor principally this class of animals which develop typical osteomalacia and succumb to it.

What has been said here about cattle and sheep applies, though to a less extent, to most horses and mules raised in the Islands. They lack bone, develop slowly and mature late, and unless grain-fed, or supplied with food containing lime salts fail to attain size. There is an abundance of horses in the Islands, but they are of little value for the reasons mentioned, and both mules and horses are constantly imported in considerable numbers. During the past year there has, for instance, been imported over $60,000 worth of mules. As far as I am able to judge I do not see why these mules could not equally well have been raised here and I shall shortly describe the method by which I believe it possible, to a great extent, to relieve the condition which, in my opinion, is the only serious

obstacle to this Territory producing live stock of all classes, in sufficient numbers to supply the local demand.

From slaughter-house and other statistics it would appear that the Islands are well able to supply the local demand for beef, and the price at which it is retailed in Honolulu is reasonable. All beef consumed in the Islands is purely grass fed and the general condition of the cattle shipped to market is therefore, to a great extent, dependent upon the more or less favorable climatic conditions, the season of the year and the available supply of feed in the paddocks on the various Islands.

As grass fed cattle on short feed lose flesh a good deal quicker than they can put it on under more favorable conditions, and as the warm and cold, dry and wet seasons coincide to a certain extent on all of the Islands, it will be seen that fat cattle cannot, as a rule, be supplied at all times of the year. For this reason about fifty per cent. of the cattle, which come to the Honolulu market, are only half fat, some of them not even that, but as the demand must be supplied cattle are constantly shipped to market which, if they could have been held a little longer, would have brought their owners a better price. This condition can only be remedied when feed stuffs, other than grass, are grown and harvested in the Territory in sufficient quantities to insure against a shortage at any time, and make the present stock raiser and the future stock feeder independent of climatic conditions.

As far as sheep are concerned the supply does, in no way, satisfy the demand. There are approximately 100,000 sheep in the Islands, but nevertheless there were imported for the Honolulu market, during 1905, 3,013 carcasses of mutton from California of a net value of $13,341.00.

All Island grown mutton and lamb is, like the beef, purely grass fed. Practically no attempt has been made, so far, to fatten either lambs or sheep before shipping them to market, as is being done in every other country. On the mainland a comparatively small number of fat weanling lambs are sent to market and sold at fancy prices. All other classes of sheep

are prepared for market in either selected pastures, cultivated fields or in the feed yards.

Both lambs and wethers respond so willingly to feed given them, however small the amount, that it has been found unprofitable to market them half finished, as is being done here. For instance, a ration of ½ pound of grain per head in addition to good pasture will increase the gain in weight 60 per cent. If such ration could be made to contain an abundance of lime salts the speedy development and growth of the young animals would be increased. Both corn and alfalfa, the feeds most commonly used for lamb feeding, can be raised cheaply in certain sections of several of the Islands, and in some cases close to the sheep ranges.

To illustrate what can be gained by feeding lambs under circumstances and conditions which can easily be duplicated in this Territory, I shall quote the following from Bulletain No. 64 of the Wyoming Experiment Station, entitled "Feeding Experiments with Lambs," "Sixty lambs fed for one hundred days on eleven and six-tenths acres of field pease which were raised on sod land without irrigation. These lambs harvested the crop, made better gains and went to market in better condition than the lambs from the feed pens, which were fed alfalfa and corn." It is further stated that it is impossible to tell what portion of the crop was wasted, but by comparison with the foods consumed in other rations, it is probable that not more than sixty or seventy per cent. of the total crop was consumed. Four varieties of pease were used—White Canadian, Green Canadian, Golden Vine and Mexican. The lambs gained an average of 24.9 pounds per head, and were remarkably well and thrifty throughout the experiment. They were made up of twenty-two Shropshire crosses on Merino ewes, averaging a little over forty-eight pounds per head, and thirty-eight small Merino crosses (mostly runts) averaging 35.5 pounds per head. The large lambs did much better than the smaller ones, in fact they gained an average of 29.91 pounds during the first 90 days, while the smaller ones only gained 23.14 pounds during the same period. This would mean that

the larger lambs, when shorn, could have been marketed between six and seven months old, weighing about 75 pounds each, and dressing out 56 per cent. of the live weight, or 42 pounds each.

With the prices now prevailing here such lambs should bring at least 11 cents per pound or $4.62 per head, a price which is rarely realized here for wethers at 10 cents per pound. If a similar experiment were to be made here, starting in with strong lambs weighing 50 to 60 pounds, the result would undoubtedly be much better.

As far as hogs are concerned there is annually imported between $35,000 and $40,000 worth of them.* The high price paid here for hogs, about 10 cents per pound live weight, would seem an incentive for investigations as to the conversion of waste products into pork. The principal waste product of the Islands is molasses, which contains a high percentage of carbohydrates in their most easily digested form, that is, sugar. The proteids could, in my opinion, be obtained from the abundance of otherwise worthless live stock which is now consuming a large proportion of the grasses of the Islands, for which their hides and carcasses will never pay. There are thousands of such animals in the Territory--wild cattle and goats, old cows, worthless horses and donkeys, and ranged out ewes—which could be killed, boiled down and converted into pork, when fed with molasses and roughage. Besides there is the algaroba bean, the supply of which is constantly increasing and which forms an excellent feed for hogs.

This is a suggestion only, the practical value of which must be demonstrated through experiments, but the success of hog raising in connection with slaughter houses is so well demonstrated as to leave little doubt as to the final result if undertaken in places where the suggested material can be obtained in abundance. The importers of hogs now pay 2¼ cents per pound, live weight, in freight from San Francisco to

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* The Metropolitan Meat Co. alone imported 2510 head of the value of $26,294.00.

Honolulu, so it would appear that there is a bounty on hog raising in this Territory unequaled in any other country.

RECOMMENDATIONS.

As already stated I ascribe the failure of the live stock breeders to supply the local demand for all classes of live stock and their products to a more or less pronounced deficiency in mineral matter, especially phosphate of lime, in the soil and subsequently in the grasses of this Territory. I further hold that if this deficiency is remedied all classes of young stock, lambs as well as calves and colts, will continue to develop without interruption after they are weaned; they will mature earlier and be able to bear strong and well developed offspring without detriment to themselves, and to supply this offspring with an abundance of milk containing the requisite amount of lime without having to draw on their own economy for it.

There are two ways in which this can be accomplished, either by liming the soil or by giving the lime salts to the animals direct. As the first way is out of the question, owing to the large acreage which would have to be treated, the administration of lime salts, in the form of licks, must be resorted to.

Wherever animals are observed to have developed a depraved appetite, eating manure, decayed wood or dirt, and especially where they are seen chewing bones, it may safely be concluded that their system is craving something which is missing in their food, and treatment should be begun at once.

The safest and cheapest method is to place an abundance of bone meal, mixed either with salt or with molasses, where the animals can have constant access to it. Bone meal contains fifty per cent. of phosphate of lime and, when ground sufficiently fine, the greater part of it will be digested and reach those parts of the system where it is needed.

There are other forms in which the bone building material

may be supplied, for instance as superphosphate of lime, which is slightly cheaper than bone meal, but it is an acid salt and cattle will not eat it when mixed with common salt. It contains more available phosphoric acid than bone meal, but when given in molasses there is always the danger of some animals eating too much of it.

In many places, especially where the drinking water is brackish, cattle will eat little or no salt, and the best results, particularly where it is desired to get the animals to take the lick quickly, have been obtained by mixing the bone meal with molasses. In the first place the molasses contains carbohydrates in the form of sugar, and in the second place there is a certain amount of lime in it. (Lime is used in the manufacture of sugar to clarify the cane juice.)

Furthermore, the cattle, as soon as they get used to it, will eat any amount of molasses, while they will only take a limited amount of salt. Hence in using molasses the treatment with bone meal is more easily regulated.

On a ranch on Hawaii, where, in certain sections the deficiency in lime salts is very great and where the mortality from osteomalacia has been considerable, an experiment was begun in the beginning of January this year, in which 85 cows and some large calves, all in very poor condition, were submitted to this treatment. The animals were taken from Hilo grass range and were placed in a small paddock close by and which also contained nothing but Hilo grass. These animals were therefore kept under exactly the same conditions as those on the adjoining plains, where many deaths occurred.

The mixture was prepared by adding 10 pounds of superphosphate of lime to 70 pounds of bone meal, and then mixing with 250 pounds of molasses. The whole was worked together till it formed a homogeneous mass. A twenty-four-foot V-shaped trough, made of two twelve-inch planks with end pieces and braces, was placed in the paddock and the mixture transferred to it. For one week the cattle were herded around the trough for an hour each day, efforts being made to get as many to taste the mixture as possible. After that the animals

were left alone, but it was easily noticed that a number of them, if not all, returned regularly to taste the mixture. On January 12th, ten days after the beginning of the experiment, there was a noticeable improvement in a majority of the animals. On February 3rd, the manager of the ranch, where the experiment was being made, wrote as follows: "Just a line or two about the cattle-bone-meal experiment that you started some time ago.

"On January 19th I put ¾ bbl. of molasses, one bag of bone-meal, and 15 lbs. of superphosphate in the paddock where this experiment is being carried on.

"This amount was all eaten by Wednesday, the 31st, or in 11 days. There are 85 cows and some large calves in this paddock, say 100 head altogether. They therefore consumed about 400 lbs. of molasses, 130 lbs. of bone-meal and 15 lbs. of the superphosphate, which would make about 5 lbs. per animal, or 4 lbs. of molasses, and 1.3 lbs. of bone-meal in 11 days.

"I did not herd the animals at all, and they consumed this amount at their own free will. The cattle are much improved, and I feel justified in putting in several feeding boxes on different parts of the range."

In reply to this letter the following was sent:

"In order to more definitely decide the lack of lime salts in the grasses on the ranch, I would ask you to send samples of the grasses from all pastures where you suspect that this deficiency obtains, in order that I may have them chemically analyzed. The grass should be cut green, each sample to consist of ten pounds. After weighing, the grass should be allowed to dry then wrapped into bundles and numbered. A description of the locality and general condition of the pasture together with observations as to how the cattle thrive in said pasture should be furnished with each sample. The samples should be sent to Dr. E. C. Shorey of the U. S. Experiment Station, Honolulu, who has kindly agreed to analyze them and to report the results to me.

"I would suggest that one of the samples be cut from the paddock where we have been feeding bone meal and molasses.

"I would also ask you to send Dr. Shorey a sample of bones from animals which you suspect to have died from osteomalacia. I believe it will be safe to take any of the bones from heifers which you may find on the Hilo grass plains. The samples should contain the shoulder blade and one or two of the heavy bones, and should comprise about five pounds all told."

Again on February 23rd the manager wrote as follows:

"I am in receipt of your favor of the 14th inst., and in reply beg to say that I will attend to the matter of grass and bone samples as soon as I can give them my personal attention.

"I can report good results from the paddock experiment with bone and molasses, but the range cattle have not as yet 'caught on.' They probably will later, though."

One month later, on March 23rd, the following letter was received:

"I beg to acknowledge receipt of your favor of the 20th inst., and in reply would say that it is impossible at the present time to note any improvement in the range cattle that have been eating the molasses mixture. I do not believe the range experiment will prove a success from the fact that the cows that really need the stuff are constantly fought off by the stronger ones. Again I find that the horses are very fond of it, and I figure they get away with about half that we put out. My present idea is to build a paddock specially for the weak cows, and feed them the mixture in the paddock.

"I am continuing the paddock experiment. This bone meal feeding is no longer an experiment, as I am thoroughly convinced it is just what the animals need. The cattle that have been eating it are looking 50 per cent. better."

Again on April 27th the manager writes:

"I have not put out any of the molasses mixture on the plains as we have been having so much rain, and the troughs being uncovered I find that the mixture sours on top to a depth of about two inches, and the cattle refuse to eat it. Just as soon as I can get around to it I intend to build sheds over the troughs.

"If the rain lets up I will again send out the stuff."

From the above correspondence it will be seen that 200 pounds of bone meal and 650 pounds of molasses, besides a slight amount of superphosphate of lime, fed to 100 animals in the course of one month, caused a decided improvement in their condition and appearance.

The same treatment was continued until I again visited the ranch during the month of April. The one hundred experiment animals had then consumed about 14 bags of bone meal and 7 barrels of molasses. It would simply have been impossible to recognize the animals in question as the same bunch of hides and bones with which the experiment was begun some three and one-half months earlier.

With the exception of three old cows, which from the appearance of their rough coats had never touched the molasses mixture, every animal, whether cow, heifer or calf, was in splendid condition. Their hides were soft and sleek and rolled freely over the well rounded bodies, in fact the entire herd, with the noted exceptions, gave the impressions of perfect health.

The calves, which had been born since the beginning of the experiment, showed a contrastingly strong development of bone and a complete absence of the bloated pendant stomach which had characterized the calves on the Hilo grass plains.

Bone meal costs according to its fineness, $28.00 to $30.00 per ton, and the superphosphate $26.00 per ton. The molasses can be obtained at many plantations for a reasonable charge, as quantities of it are allowed to run into the sea. Consequently only the cost of transportation from the nearest mill needs to be considered. This, however, in connection with the distribution of the mixture in various paddocks or on open ranges will, on large ranches, undoubtedly be an item of importance. I expect, however, through continued experiments to be able to reduce the bulk of the mixture considerably by adding a greater amount of bone meal to a correspondingly smaller amount of molasses.

I am of the opinion that where the deficiency of lime salts is greatest, one ounce of bone meal per day is sufficient for all young stock and for breeding stock, and much less for steer cattle. Consequently one ton of bone meal will furnish 32,000 doses or be sufficient for one thousand head of such stock for about one month, if properly administered and waste avoided.

That the decided improvement in the experiment animals under consideration was due to the bone meal and not to the molasses is evident when we consider that each animal received but six pounds of molasses during a period of one month. This amount of molasses containing perhaps two to two and a half pounds of digestible carbohydrates would not constitute one single ration for a grown animal, unless the requisite amount of proteids was furnished to balance it. And the very fact that the animals began to improve almost from the very start plainly indicates that the hitherto missing lime salts accomplished what was expected of them, that is, to balance the daily rations of grass. In doing so the animals received the full benefit of what they eat and immediately began to show the effects therefor.

In regard to the bone meal and salt mixture I herewith give a letter from the manager of the American Sugar Co.'s ranch on Molokai:

"The bone meal and salt were mixed and put in two pastures, one with the young Devon bulls, the other with the young lambs for market; neither have eaten it to any appreciable extent, and I will order molasses to see if that will induce them to take it. The Devon cow herd is at present on a large pasture and watering at a brackish well, so I will defer trying it on them till I have them on a smaller pasture."

It will be noticed that this treatment up to date has not been a success, but I believe that in places where the deficiency in lime salts is but slight and where the cattle or other animals eat salt regularly a mixture of half and half bone meal and salt will prove beneficial.

Where live stock is watered from troughs a further supply of lime may be administered by placing a sack of lime, say ten

pounds, in each trough. The lime should be slaked before being placed in the sack. Lime requires 750 times its own weight of water for solution, but by leaving it enclosed in a sack and undisturbed at the bottom of the trough a much smaller amount will be dissolved. If constantly stirred a saturated solution (1 to 750) would form and an animal drinking ten gallons of water in a day would receive 1.7 ounces of lime, which would be far in excess of what the system could take care of.

Lime administered in the drinking water does, however, not benefit an animal to the same extent as bone meal, as it is in the form of calcium oxide, which must be combined with phosphoric acid before it can be utilized by the animal economy. This manner of treatment should therefore be adopted only where chemical analysis has demonstrated that the grasses or other feeds contain a relatively higher proportion of phosphoric acid than of lime or else where superphosphate of lime is fed with molasses instead of bone meal.

For the comparison of the percentage of lime and phosphoric acid in grasses grown in foreign countries and in this Territory, the following figures are hereby given:

	Lime.	Phosph. acid.
Rich pasture grass	0.26	0.19
Orchard grass	0.11	0.13
Rye grass	0.15	0.22
Timothy	0.17	0.24
Alfalfa	0.85	0.16

The above are all German analyses, taken from Prof. E. von Wolff's tables.

	Lime.	Phos. acid.
Alfalfa, Waialae	0.45	0.30
Hilo grass, U. S. Experiment Station	0.08	0.26
Manienie, U. S. Experiment Station	0.14	0.40
Pili grass, Punchbowl	0.26	0.40
Paspalum dilatatum, Kamehameha Sch.	0.12	0.11
Panicum crus-galli, Kamehameha Sch.	0.02	0.21

The last analysis, panicum grass, shows a very high percentage of phosphoric acid and an extremely low percentage of lime. It would therefore be advantageous to give lime in the drinking water where this grass forms part of the daily ration. The analyses of these native grasses and fodder plants have been made by Dr. E. C. Shorey of the U. S. Experiment Station, Honolulu, but, as will be seen, they are all from Honolulu or vicinity, where the soil is known to contain one per cent. or more of lime. It is therefore not given that Pili grass from Molokai or Hilo grass from Hawaii will contain the same amounts of either lime or phosphoric acid, and Dr. Shorey is now at work analyzing a number of samples of grasses from various Islands, and has kindly offered to do the same with any samples which are sent to him from places where conditions would indicate that mineral substances are lacking in soil and plants. Such samples should be gathered and prepared according to the direction contained in the letter printed on page —, and as soon as the results of the analyses reach me I shall suggest such treatment as would in each case seem indicated.

In the mean time it would be safe for all live stock breeders who are not satisfied with the development of their animals to begin experimenting with molasses and bone meal. In ordering the latter it must be insisted on that only Hawaiian bones be used in making the meal. Fatal infectious diseases, as black leg and anthrax, have been introduced into New Zealand and Australia with importations of bone fertilizers, and as these diseases do not occur in this Territory it is only safe to use the bones grown here.

The finer the bone is ground the more of it will be utilized by the animals and the more economically it may be fed. The formula now used on the ranch on Hawaii can be recommended for such experiments in a general way, the principal point being to get the animals to eat it. When first they get acquainted with the taste and smell of the molasses the composition can easily be changed to suit various localities. The lick trough should always be located near the watering places

or else, during warm weather for instance, in shady places where the animals herd together at certain times of the day.

If the stock raisers who undertake such experiments will report to me their observations, together with such suggestions as may lead to improvements in the method of administering the treatment, I have no doubt that valuable information will speedily accumulate and conclusions be reached which, when published, would benefit all interested parties.

Where the rainfall is high it is advisable to place the troughs under sheds to avoid the fermentation, which will take place when water is mixed with molasses and then exposed to the rays of the sun.

When breeding stock and steers are running in the same pasture or on open range it is advisable to segregate the heifers and calves to be sure that they get the required amount of bone meal. Horses, as has been seen, are very fond of the mixture and eat excessive quantities of it. It should therefore be an easy matter to raise both horses and mules big enough for the heaviest plantation work and with a bony system immune to osteoporosis and fractures. Simply keep an excess of bone meal and molasses before them and the native grasses and the climate will do the rest.

That this Territory is not the only place where deficiency in lime salts has proven a severe obstacle to the development to the live stock industry would appear from a number of articles in a copy of the Agricultural Journal of the Cape of Good Hope, February, 1906, and which has just reached this office. Under the heading "Feeding Broken or Crushed Bones to Cattle," Dr. Hutcheon, Acting Director of Agriculture, reports on a number of experiments which have been made for the purpose of ascertaining how far the herbivora (plant eating animals) are able to digest bones. It is a well known fact that the *carnivora* (meat eating animals) are well able to digest bones; the same remain in the stomach until they have been completely dissolved by the gastric juices. In the herbivora, however, only the fourth or true stomach contains secretions which are able to digest bones, and when the food reaches this

stomach it is so well prepared for digestion that it remains there but a comparatively short time. It is, therefore, necessary that bone should be given in as small particles as possible in order to be acted upon to the fullest extent in the fourth stomach. Dr. Hutcheon fed coarse crushed bone varying in size from 1-6 to ½ an inch in diameter. These pieces of bone were passed by the animal without showing the slightest traces of action by the digestive juices. The sharp edges were not even rounded nor was the spongy part of the bone acted upon. In another experiment a two-year-old steer was given 1 pound of coarse bone meal per day for seven days and it was found that this excessively large amount was completely digested, none of it being passed by the steer. The piece of bone, as well as the bone meal, had been dyed blue with fast color, in order to be more easily recognized when passed.

The government of the Cape Colony has realized the absolute necessity for the artificial feeding of mineral matters to the live stock in various districts of South Africa, and has even gone to the extent of establishing depot agencies for supplying bone meal at cost. From these agencies guaranteed sterilized bone meal is sold to bona fide farmers at terms published in an official regulation dated December 15, 1905.

In the same number of the Agricultural Journal of the Cape of Good Hope appears a note headed, "Bone Meal and Lamziekte" (Osteomalacia), and which reads as follows:

"Mr. John T. Smith, Secretary of the Langeberg Farmers' Association, writing to the Acting Director of Agriculture and offering the sincere thanks of his Association for the establishment of the bone meal depot at Oliphants Hoek, incidentally gives his experiences in the use of that article as a preventive of lamziekte, osteomalacia. He says, 'I have a herd of cattle, some 200 in number; I have been using bone meal for two years and have not lost one head during that time from lamziekte, osteomalacia, though my neighbors lost heavily. Before using bone meal I lost between 90 to 100 head of breeding stock in 12 months.' He concludes by stating that he is

quite convinced of the efficacy of bone meal and so are many of his neighbors, though they will not all own it. Now that this commodity is obtainable at a reasonable cost close at hand, the work of conversion should proceed faster."

I am also in receipt of a German circular which highly recommends prepared food-bone-meal for all young stock and dairy cattle. This preparation, however, retails at one hundred dollars per ton and contains only thirty-three per cent. of phosphate of lime, while ordinary bone meal contains from fifty to sixty per cent.; and as observations made in South Africa have fully demonstrated that the plant eating animals are well able to digest the ordinary bone meal, there would be no reason for using a more expensive preparation simply because it is more soluble.

Osteomalacia also prevails to a more or less pronounced extent in various European countries, the treatment adopted being practically the same as that recommended here, that is, the regular feeding of bone meal. In conclusion I must reiterate that I believe that the rational feeding of bone meal to all classes of stock, but especially to young animals, and female breeding stock, will prove of incalculable value to the entire live stock industry of the Territory.

DISEASES AMONG LIVE STOCK IN THE TERRITORY.

In accepting the office of Territorial Veterinarian in July last year I made the following statement to the Directors of the Board of Agriculture and Forestry: "Although my observations have been limited they nevertheless indicate that this Territory is singularly free from most of the infectious and contagious diseases which cause such heavy losses annually on the mainland and in other countries, as for instance Texas fever, blackleg, foot and mouth disease, anthrax, rabies, contagious pleuro-pneumonia and others." This statement still holds good as far as these diseases are concerned, though the past year has made it apparent that there are diseases and conditions here which require undivided attention and careful

investigation unless they are to become serious obstacles to the development of the local live stock industry or cause heavy losses among the work animals in the Islands. I especially refer to osteomalacia, osteoporosis (big head in horses), true glanders and farcy, and a disease which in many respects closely resembles glanders, although less malignant, and which is very widespread on several of the Islands, if not on all. Three out of these four diseases have been given but scant attention by modern investigators and veterinary text books refer to them briefly, if they mention them at all. In combating them we are therefore left to our own resources, and, the last legislature having failed to provide funds for such work, it would seem that the present conditions must either be allowed to continue as hitherto or private enterprise must provide the means for investigation. Without a thorough knowledge of the nature and cause of a disease, preventive measures can only be guessed at, and where such sums are involved, as for instance those invested in work animals on the sugar plantations, it is obvious that uncertainty should be eliminated as far as possible and that all sanitary as well as preventive measures should be based upon thorough scientific research. To accomplish this a pathological and bacteriological laboratory, together with a reference library containing the principal books, magazines and periodicals on the subject of veterinary science, would be required and until that is forthcoming no real headway can be made in our knowledge of the animal diseases of these Islands. Especially in reference to the horse disease above referred to I have felt badly handicapped in making a diagnosis for want of the requisite instruments and reference books, and as thousands of animals appear to be affected it would seem that an early investigation would be desirable.

OSTEOMALACIA OR BONE BRITTLENESS.

The nature and cause of this disease as well as its treatment have already been discussed, so it will only be necessary here to give a short summary of the principal symptoms by means of which owners or caretakers of live stock may be able

to decide for themselves whether their stock is affected and to what degree.

Symptoms.—In the first stages of the disease it is impossible clinically to diagnose osteomalacia. The animals, especially heifers with first or second calf, may appear unthrifty; there is depraved appetite, the animals eating decaying wood, dirt or manure, or may be seen standing for hours chewing an old bone. Gradually the unthriftiness becomes emanciation, the coat becomes staring and symptoms of gastro-intestinal catarrh (indigestion) and anemia appear. The animal moves with a slow, painful and stiff gait often accompanied by crackling of the joints, and evinces pain in lying down and getting up. The visible mucous membranes become pale, often white, and there may be swelling and soreness of the joints. The appetite, which at first may be voracious gradually becomes more and more precarious. There is a decided disposition to fractures of various bones, especially ribs and shoulder blades, but also of the limbs and hip bone, and such fractures show little or no tendency to heal. The animals finally become too weak to seek food or water and lie down never to get up again, or, if near a water hole frequently mire down and drown. For the post-mortem appearances see page —

Treatment.—This should consist principally in the artificial feeding of lime salts as described on pages ——. As far as dairy cows and other animals, fed in stables, are concerned, foods containing mineral salts may be given, such as beans, cowpeas, oats and cotton-seed meal. Algaroba beans are very high in lime, especially if the seeds have been ground up. Alfalfa is also high in lime, the contents of mineral matters depending to a great extent upon the soil on which it is grown. Alfalfa will, however, not thrive on a soil poor in lime salts, so it may always be depended upon to contain sufficient lime to supply the demand of the animal economy. The same is the case with field peas and other legumes.

OSTEOPOROSIS OR BIG HEAD IN HORSES.

Osteoporosis or big head is a disease which presents itself under a variety of symptoms. It may be very mild in nature or be very acute and rapidly fatal. The symptom which, as a rule, is first observed is an enlargement of the bones of the face or lower jaw, or more rarely of the shoulder. Other bones may show thickening and excessive roughness. The ribs gradually change so that a round barreled horse becomes flat sided, the back becomes straight, and there is a noticeable dropping of the croup. In young animals there is a tendency for the back to become elevated or arched.

Simultaneously with these bone changes there appears a peculiar lameness which comes on very suddenly and is difficult to locate. There is no heat, swelling or pain, over any part to locate it by. We simply know that the animal is lame. The lameness is of a migratory character, being in one limb one day and in another the next. It ceases as quickly as it comes. The animal assumes a peculiar gait. There is little shoulder movement, the steps are short and executed as if there was stiffness in all the joints. The hind legs are carried further under the body than natural, thus giving every appearance of chronic founders.

In the milder forms the appetite remains about normal and the animal is capable of doing a fair amount of work. In other cases the appetite persists but the animal is incapacitated for work. The general condition remains fair until after the disease has made severe inroads in the bony system. Decline then begins and is rapid. There is a slight elevation of temperature, but the pulse and respiration remain normal. The animal is easily exhausted on work that ordinarily would be considered light.

The disease often abates, for several days, weeks or even a couple of months or more, but almost invariably recurs in a more aggravated form. We then see soreness and often swelling of the joints and inability to get up or lie down. The temperature rises to 103° or 104° F. Loss of appetite and

emaciation follow, and there is a great tendency to fracture of the bones. The animal succumbs sooner or later from emaciation and complications such as bed sores.

One attack does not confer immunity from the second.

Big head attacks horses and mules of any breed and at any age. Young animals are more susceptible than old ones. Mules are less susceptible to the disease than horses and the termination is more favorable. The disease is very widely distributed, occurring in nearly all parts of the United States, as well as in many foreign countries. It is found under all climatic, soil and food conditions, and therefore cannot be due to any one local cause. It is not uniformly distributed, being of very rare occurrence in some places and altogether too common in others. In this Territory it is prevalent among the work horses and mules in certain localities on Maui, while a milder form, manifesting itself principally by a more or less pronounced swelling of the branches of the lower jaw is common among the ranch horses on Hawaii. The disease also occurs in a more severe form on the island of Oahu.

Pathologically, the disease is due to the development of the vascular and fibrous structure of the bones without a corresponding growth of the true osseous and cartilaginous elements, but whether it is due to some specific micro-organism, or is due to a malassimilation of the food, has not yet been decided.

Whether the disease is contagious or not is also unknown. There are cases on record where the disease has persisted for years in one stable, but where, nevertheless, numbers of new horses have been kept for varying lengths of time without contracing the disease. Colts and adult animals may become affected even though they have always been isolated from other animals of their own species. On the other hand there are many cases on record which would indicate that the disease is contagious. For instance, on a farm in Florida, the disease was introduced in 1888 and has remained there ever since. Nine horses and mules have died, and new horses become affected soon after being taken there. No difference can

be detected between this farm and others in the vicinity except that perhaps everything is in a better condition. The disease had never been known prior to 1888. In another case four horses died successively in one barn. It burned and a new one was built some distance from where the old one stood. No animals have died since.

Whether the disease may be transmitted by heredity is equally unknown, even though there seems to be a tendency for the offspring of affected animals to develop the disease.

So far as the treatment is concerned it may as well be stated unequivocally that no remedy is known which has proved beneficial in a considerable number of cases, and if any sure cures or specifics are offered for sale, as I have seen it done here, I would suggest that the owner of affected animals save his money.

It should be kept in mind that the disease is not local, even when it manifests itself by local swellings of the bones, and any treatment which aims at a local effect, will not be sufficient. To bore holes in the side of the face or jaw filling them with arsenic, iodine, caustic potash, or applying a hot iron or blister can have but a local effect, besides producing intense pain and suffering, but the intermittent character of the disease has caused a number of such remedies to be reported as infallible cures. A change of feed, better care, and rest are more potent factors in bringing about the desired results. Big head will probably make most improvement by turning out on good pasture and allowing rest for five or six months. This should be supplemented with a liberal supply of lime or lime water, but the most important point is to change the feed, regardless of what is being fed at the time when the disease manifests itself. Animals which are fed in a stable may be given one tablespoonful of bone meal in each feed. It has been suggested that animals which are fed on bran regularly will recover when no more bran is given, but on the other hand, when the disease appears in a stable where no bran has been fed for years, equally good results have been obtained by feeding bran. Other foods containing mineral salts may be given

such as beans, cowpeas, oats, or cotton-seed meal. Lime may be administered in the form of lime water by dissolving a few lumps in a barrel. The water, if not stirred, will only contain a certain amount and may be used without doing any harm.

The treatments here enumerated are now being tested on Maui, and if good results are observed, the same will be published in a circular for the benefit of horse owners in other parts of the Islands, where the disease occurs.

SHEEP SCAB.

Sheep scab has been one of the greatest obstacles to successful sheep raising in the United States and great difficulty has been experienced in fighting it. It is estimated by the United States Department of Agriculture that, with the possible exception of hog cholera, sheep scab causes greater annual loss than any other disease. It is not the actual mortality resulting therefrom, but the deterioration in value of the affected animals as producers of wool and mutton, which is of the most importance. In the United States a strict quarantine of all States and Territories, or sections thereof, where this disease prevails, has been established and no sheep are allowed to be moved from the quarantined area except in accordance with the regulations of the Bureau of Animal Industry providing for their inspection and treatment. The magnitude and cost of this work may be imagined when it is mentioned that in 1905 nearly 17,000,000 sheep were dipped under the supervision of inspectors of the said Bureau, and several times that number were examined and passed as sound. As a result of this work sheep scab has almost entirely disappeared from several States that were badly infected and is much less prevalent in most others. The Secretary of Agriculture in his annual report for the year 1905 states "that by continuing the work for a few years the disease can undoubtedly be eradicated." In coöperation with the National Government each individual State and Territory has endeavored to enforce the Federal regulations and in every way possible to support the work of eradicating sheep scab, and I am pleased to state that the same

spirit has prevailed in this Territory. I have during the past year supervised the dipping of many thousands of sheep, the total number of dippings amounting to more than 40,000, with the result that the disease has been practically exterminated on one of the islands, where formerly it prevailed to considerable extent. The island of Hawaii seems to be free from this disease and the same may be the case with Kauai and Niihau, neither of which islands I have so far had an opportunity to visit, and if the sheep owners on the islands where sheep scab is known t oexist continue the treatment now inaugurated, there is no reason why this disease should not be completely eradicated in the course of a few years.

It is not known at what period sheep scab was first introduced into this Territory, but it no doubt occurred with one of the earliest importations of breeding stock. The conditions in the islands are not favorable for the spread of the disease. The even climate and the open ranges on which the sheep are allowed to run at will without being herded in flocks—as is done on most of the western ranges on the mainland—all tend to prevent the spread of the disease; and when sheep scab nevertheless became quite prevalent on certain islands it was simply due to a lack of the ordinary precautions which were being taken in all sheep raising countries and which now have been established here.

There is available a number of excellent publications on the subject of this disease, issued either by the United States Department of Agriculture or by the experiment station of the various sheep raising States in both this and foreign countries, so it would seem unnecessary here to give a description of the nature, cause and symptoms of this disease. Of these publications I shall only mention Bulletin No. 21 of the Bureau of Animal Industry, United States Department of Agriculture, entitled "Sheep Scab. Its Nature and Treatment," copies of which may be obtained upon application addressed to the Secretary of Agriculture, Washington, D. C. The Bureau of Animal Industry recommends tobacco-sulphur and lime-sulphur dips as the most effective and economic remedies for this dis-

ease, and the lime-sulphur dip has been employed by me in the treatment and prevention of sheep scab during the past year.

It may be well to state here that I am prepared at any time to assist sheep raisers in the Territory with the installation of dipping tanks, the preparation of the dip as well as with the application of the treatment for preventive or curative purposes. The present high price of both mutton and wool should prove an inducement to all sheep raisers to improve their flocks in every way possible and the first step in this direction is to rid them of diseases which tend to diminish their yield of either commodity.

HORN FLIES ON SHEEP.

On the mainland sheep are rarely known to be attacked by the horn fly, but it seems that on some of these islands where sheep and cattle graze in close proximity to each other the horn flies frequently leave the cattle to attack the sheep whenever there are denuded spots on them due to the sheep scab parasite or the screw worm fly. It is also possible that horn flies which hatch after the cattle have left the range, to be followed by sheep, attack the latter simply because there are no cattle in the neighborhood or else they are blown by strong winds from the cattle to the sheep. I have carefully observed the action of the horn fly on sheep and I do not believe that they are able to penetrate the wool and reach the skin of the unshorn sheep so long as there are no bare patches present, but wherever sheep scab prevails, or has prevailed, the horn fly has proved a complication of a very serious nature. Even when scabby sheep have been completely cured of this disease through repeated treatments the horn fly will continue to attack the bare spots causing the sheep to lick the wounds and prevent their healing, and I see at the present time no remedy for this condition except the complete elimination of sheep with bare spots from the herds. Treatment is of little avail, for even though the sores heal up the skin continues to be exposed to the attacks until the wool has grown long

enough to protect it. The horn fly must, therefore, be considered a serious menace to the wool and mutton industry and would no doubt be so to a far greater extent if it were not for the natural and introduced parasites which attack the pupae of the flies. I would, therefore, suggest that the horn fly question be made a subject of an appeal to the Board of Agriculture by the individual live stock raisers, or the Live Stock Raisers' Association, for the purpose of ascertaining and recording all investigations made in the United States and other countries in regard to the life history, habits, control and eradication of this pest, and that exhaustive experiments be conducted here in the study of the life history, habits and propagation of the already known parasite of the horn fly.

THE SCREW-WORM-FLY

The screw worm is unquestionably one of the most important parasites attacking the domestic animals on the mainland, and as I have had opportunity to observe it here a few times it would seem advisable to sound a note of warning now, in order that its limited prevalence in this Territory may not develop into the scourge which it has proved in other countries. I have, as stated, only seen a few cases of sheep attacked by screw worm, but I am informed by Mr. Francis Gay of Kauai that this parasite is comparatively common on Niihau. As the fly has been known frequently to attack man by gaining entrance to the openings of the face, often with fatal results, it would appear that every effort should be made to eradicate this pest from the islands. The screw-worm-fly (*Compsomyia macellaria*, Fab.) is common on the American Continent from Canada to Patagonia, but the territory within which the greatest damage occurs is within the tropical and sub-tropical belt. In the United States the fly is most common in Texas, where it principally attacks cattle and more rarely horses and mules. The eggs are deposited in any wound or scratch, and the larvae, which develop shortly afterwards, bore into the flesh causing severe loss of tissue with inflamation and suppuration, and if treatment is not applied the wound will

become infested rapidly with fresh deposits of eggs and the animal, as a rule, dies.

The fly which causes all this trouble is less than half an inch in length, of a bluish green color, with metallic reflections. It is easily distinguished from other flies by the presence of three longitudinal black stripes on the thorax (chest). The head is reddish or yellow and the body is covered with stiff black hairs. In order that stock raisers may recognize this fly by its action I shall describe a couple of cases which came under my personal observation here. In the first case the fly had evidently deposited its egg in the wool on the side of the rump where no abrasions of the skin existed. The maggots, or screw worms, which develop from the eggs within a few hours after being deposited, had attacked the skin, into which they bored holes, causing a severe inflammation which gradually made the wool fall off. At first, however, nothing was noticed except a dark moist spot on the wool about the size of the palm of a hand. In parting the wool at this place it was found that the skin underneath was covered by a wriggling mass of maggots, many of them with their heads deeply buried in the inflamed skin while the protruding part of the body underwent the characteristic contortions from which the parasite derives the name of Screw Worm.

The maggots mature in from five to six days when they fall to the ground, where they bury themselves, and in the course of ten days to two weeks are transformed into flies.

The severity of the attack depends upon the number of eggs which have been deposited; (at least three to four hundred eggs may be deposited by a single female in a very few moments, and the same fly may at various times and places deposit thousands of eggs). If all the eggs develop at the same time and the larvae find equal opportunity for development, then they should all have left the host in the course of a week to ten days and the affection of the skin would have a chance to heal up. But it seems probable that the same fly or other flies are attracted to the already affected place and that they continue to infect the wound by fresh deposits of

eggs. That such was the condition in the case here referred to was evident from the appearance of the wound. On the side of the rump was a large bare spot denuded of wool and of a shiny dry appearance. Here and there were seen deep round holes varying in size from a pin's head to a small pea with sharply defined edges and some of them filled with green pus. In only a few of these holes screw worms were seen, and the whole appearance of this area indicated that the healing process was progressing favorably. Surrounding this area, and also denuded of wool, was a highly inflamed zone where every hole in the skin was filled with a rotating screw worm, and surrounding this again was another zone two to three inches wide, covered with wet, discolored wool under which could be seen a solid mass of wriggling, newly hatched maggots, which had not yet begun to bore into the skin. The whole process and manner of operation of the screw worm in attacking the uninjured skin was, therefore, fully illustrated in this one case.

Where the skin is already broken the parasite meets with less difficulty and the damage done is much greater. Here they attack the fleshy parts at once and burrow deeply under the skin following the course of least resistance; the putrid emanations from such a wound greatly attract other flies and unless treatment is begun in time the animal dies of blood poisoning or as the direct result of the injuries to vital organs by the maggots. The second cases I observed was of this nature. A large abscess or tumor on the right side of the jaw of a sheep had broken open and become infested with screw worms. The entire mass of the tumor, which must have been the size of a clinched fist, had been eaten away by the maggots, leaving a wound five inches in diameter with ragged, undermined edges and reaching clear through the cheek to the jaw bone.

Where the screw worm attacks the uninjured skin spontaneous recovery may take place, unless the same wound is constantly reinfested by new deposits of eggs, but in a case like

the last one described speedy treatment is required or the animal must die.

In Texas the screw worm season begins in June or July and reaches its climax in September and October, after which it gradually declines until cool weather puts a stop to it. The adult fly survives the winter in protected places and makes its appearance again the next summer. As stated, sheep are rarely attacked on the mainland except when injured, nor have I seen attacks upon the uninjured skin reported except from one place. Dr. M. Francis (Bulletin No. 12, Texas Expt. Station) states, "Of all our domesticated animals cattle suffer the most from its ravages. Sheep are comparatively free from the attacks unless injured by dogs."

Prof H. E. Weed (Bulletin No. 14, Mississippi Experiment Station) states:

"Sheep are attacked when injured by dogs, or, when the sheep are in poor condition the eggs are laid upon the wool, and when the larvae hatch they immediately bore into the skin."

He adds that in many cases sheep are attacked within the nasal cavaties and the worms eat into the head, but no such cases have been observed here.

In an article in the Peoria Medical Monthly for February, 1883, Dr Joshua Richardson writes under the heading of "The Screw Fly and its Ravages" as follows:

"While travelling in Kansas in the latter part of last August, a citizen of this place had the misfortune to receive, while asleep, a deposit of eggs from this fly. He had been troubled for years with catarrh, hence the attraction to the fly. He returned home a few days after the accident and shortly after began complaining of a bad cold. His nose seemed greatly swollen and he complained of a smarting, uneasy feeling in it, and general misery through the head. I found on examination a mass of the larvae of this fly (or 'screw-worms,' as they are commonly called in the South) completely blocking up one nostril. On touching them they would instantly retreat en masse up the nostril. Making a 20 per cent. solution of

chloroform in sweet milk I made a few injections up both nostrils, which immediately brought away a large number, so that in a few hours I had taken away some 125 of them. His speech becoming suddenly worse, I examined the interior of his mouth and found that a clear-cut opening had been made entirely through the soft palate into his mouth and large enough to insert the end of a common lead pencil. Saturday the few remaining larvae began changing color and one by one dropped away. On Sunday, for the first time, hemorrhage from both nostrils took place, which continued at intervals for three days, but was not at any time severe. On this day the patient began to improve, the delirium and erysipelas having subsided, leaving but little or no annoyance in his head. In a few days he became able to go about home, and even to walk a distance of half a mile to visit a friend and return. But while there he began complaining of a pain in the neighborhood of his left ear, apparently where the eustachian tube connects with the middle ear. It proved to be an abscess. Being already so reduced by the first attack, he was unable to withstand the second, and died after an illness of nearly three weeks, completely exhausted by his prolonged sufferings. Three days before his death the abscess discharged its contents by the left nostril. The quantity of pus was about 2½ ounces (78 grams).

"In all about 250 larvae were taken away from him during the first attack, and, as the visible results, not only had they cut the hole through the soft palate, but had also eaten the cartilage of the sepium of the nose so nearly through as to give him the appearance of having a broken nose. The case occupied, from the first invasion of the fly to its final result nearly two months. He doubtless would have recovered but for the formation of the abscess, which, from all the symptoms, was caused by one or more of the larvae having found their way up the left eustachian tube."

Dr. Richardson also quotes the Rev. William Dixon, of Green Clay County, Kansas, as giving the following account of his own experience:

"While riding in his buggy a few years ago in Texas a screw

fly attacked him, flying up one nostril. He blew it out, when it dashed up the other and deposited its eggs before he was able to expel it. Not realizing the danger, he did nothing for about three days, when the pain became so great that he hastened to Austin to consult a physician. His soft palate was almost destroyed before the larvae, over 200 in number, were expelled."

This was the only one of twelve cases known to Dr. Richardson in which the patient recovered.

While I do not believe that the screw-worm-fly is of a recent introduction in these Islands, I feel convinced that powerful agents must be at work here keeping it in check. Nevertheless, there is every reason for taking such precautions for its suppression as circumstances will permit. In the southern part of the United States this pest has become a perennial nuisance, causing a great economic loss, and when it is taken into consideration that each female fly lays several thousand eggs and that a number of generations are developed each season, and no doubt would continue to develop uninterruptedly in this Territory, where the winter is not severe enough to check it, except for the destructive agents above referred to, then it will be seen that the destruction of each grown fly and each single maggot will prevent the development of succeeding generations. The object should, therefore, be to destroy by fire the carcasses of all dead animals (the maggots develop in these as well as in the living animals) and to submit to speedy treatment all affected animals which come under observation. These should be caught and treated on the spot, or if possible, brought home and dipped. When treated in the pasture care should be taken to do it in a spot which can easily be disinfected by fire, as the maggots leave the sores immediately and fall to the ground when medicine is applied to them. The repeated application of a 10 per cent. solution of carbolic sheep dip or the dipping for five minutes in a 3 per cent. solution of the same, and repeated after ten minutes, is very effective. Lime and sulphur dip has no effect on the maggots.

Dr. Francis of Texas recommends the use of creolin or any of the carbolic sheep dips, to be carried in a machinist's oiler, by means of which it may be injected into deep holes without any waste or squirted on affected surfaces. Such an oiler, holding about four ounces, is carried by nearly every cowboy in Texas during the screw worm season.

GLANDERS.

This disease is quite prevalent among the horse stock in Honolulu and vicinity. During the past year about forty cases have come under my personal observation or been reported to me by the practicing veterinarians. It is said that glanders was very common some years ago both in Honolulu and on the other islands, but whether all the animals which have been destroyed here, for this disease, were really affected with glanders can, of course, not be ascertained now. That new cases have been repeatedly introduced with importations from the mainland is a well established fact and I have personally seen two cases of acute glanders in a shipment of mules from San Francisco which arrived a year ago, and quite recently another case, also in a mule from California, which developed the disease shortly after arrival here, and before the animal had come in contact with other horse stock. In order to minimize the danger of introducing new centers of infection with imported horse stock, the mallein test, which is recognized the world over as the best, though not infallable means of diagnosing glanders, was made compulsory for all horse stock before admission to the Territory. The enforcement of this rule has no doubt proved beneficial in causing greater care to be exercised in the selection of horses and mules for shipment to these Islands and will tend to discourage unscrupulous dealers from disposing of suspicious animals, in the hope that the disease will not become manifest until after arrival and admission to the Territory, as undoubtedly has been common practice before. With this check on the original and continued source of infection there is some hope for the ultimate eradica-

tion of this most dangerous of animal diseases, though the prospects of gaining this end in the near future are anything but encouraging. With the many Orientals and foreign inhabitants, a large number of whom are horse owners or employed by horse owners—whose ignorance in general and lack of knowledge of the American language prove almost insurmountable obstacles to the imparting of information regarding the nature of the disease in question and the danger in handling affected animals, and whose inherent cupidity is supported by actual or simulated ignorance of the rules and regulations promulgated for the suppression of this disease—the odds seem to be overwhelmingly against a successful issue. There is a disinclination on the part of this class of people to voluntarily surrender an animal as long as there is a breath of life left in it, even though the disease has progressed to the point where the living animal is little better than a fetid carcass. When every known remedy has been applied and when finally the presence of the animal becomes unbearable, there is generally a friend or relative who is willing to try a new series of experiments. When these have proven futile, in either killing or curing, a change of air and surroundings is deemed beneficial, and the victim goes into the country where it may be found, sooner or later, wandering by the road side or temporarily recuperating in somebody else's pasture and scattering the infection broadcast.

Under these circumstances it is obvious that the individual efforts of a single official count for little, and only the coöperation of every citizen, whether horse owner or not, in reporting suspicious cases, can at all lead to the desired results. The practicing veterinarians of Honolulu have been intrumental in the apprehension of a majority of the cases which have been destroyed during the past year, and which, without their assistance might never have come to notice, but a thorough campaign against this disease cannot be undertaken until the required funds are forthcoming, wherewith to indemnify the owner who promptly reports the first suspicion of glanders and whose animal is destroyed for the benefit of the public in gen-

eral, as is now being done in many of the States and most foreign countries.

From observations made during the past year I have come to the conclusion that the climatic conditions in these Islands are not favorable to the malignant form of glanders. Rather the opposite seems to be the case. While a considerable number of very bad cases have been seen and disposed of, many of them were undoubtedly old or chronic cases which, under unfavorable circumstances, would have developed into acute cases and as such, would have transmitted the disease to a much greater number of animals. It frequently occurs that only one or two cases of glanders appear in large stables where there would seem to be every facility for the spread of the disease, but where, nevertheless, no more cases occur after the diseased ones have been disposed of and ordinary precautions have been taken to check the disease. Several small outbreaks among plantation stock on Hawaii and Maui have been reported, but none of them have assumed the proportions which would have been the invariable consequence in other localities with more strongly differentiated seasons. Under such conditions glanders would undoubtedly have become epidemic here long ago, and the result would have been the early adoption of those sanitary and preventive measures, which are in vogue elsewhere, but which seemed to be practically unknown here.

For those who may wish to acquaint themselves with the nature, cause and symptoms of the disease under consideration a circular entitled "Glanders and Farcy" has been issued by the United States Bureau of Animal Industry and may be had by application to the Territorial Veterinarian, Honolulu.

CHRONIC NASAL CATARRH IN HORSES AND MULES.
(Pseudo-glanders, Japanese farcy.)

There prevails on all of the islands, which I have visited, a chronic nasal disease affecting, to a considerable extent, both horses and mules.

This disease in its aggrvated form resembles chronic glanders and may indeed be a mild form thereof, though until definitely diagnosed it has been considered advisable to refer to it as chronic nasal catarrh.

Symptoms. There is more or less abundant discharge from one or both nostrils. This may be either thin and watery, syrupy and sticky or in advanced cases thick and strawcolored, and forming crusts around the nostrils. It is frequently mixed with blood, assuming the appearance of typical glanders discharge. It may persist for months or even years and by its constant irritation of the mucous membrane causes the appearance of erosions or superficial ulcerations, which, however, lack the thick indurated edges of the typical glanders ulcerations. These erosions form principally on the lower part of the partition which separates the nasal chambers (the septum nasi) and in order to observe them it is necessary to turn the head of the animal toward the sun, raise the head and open the nostrils as far as possible to admit the light.

When the discharge is scant the erosions may be absent, but we observe in their place round or irregular thickened patches of a greyish or brown color with granulated surface and protruding slightly above the level of the mucous membrane. Or we may find white stellate cicatrices greatly resembling the scars resulting from glanders ulcerations.

The submaxillary lymph glands (glands the size of beans or hazelnuts, located just beneath the skin and between the branches of the lower jaw) may be swollen or not, but are rarely attached to the bone as is almost always the case in glanders.

Another condition which frequently accompanies this disease is conjunctivitis of either one or both eye. The mucous membrane of the eye is red and swollen. There is more or less discharge of tears and the swollen eyelids are kept half closed giving the animal a sleepy appearance. This condition is not always present, but is most frequently seen when the discharge from the nose is abundant. It is more common in young than older animals.

The affected animals seem to suffer very little inconvenience from the disease in its mild form, which is by far the most prevalent. If food is abundant they remain in good condition and are able to perform their work satisfactorily. A large number of cases recover spontaneously under favorable conditions, exhibiting only the white scars in the nose, but whether the cure is permanent or only temporary has not yet been ascertained. Animals are known to have suffered from a rather aggravated form of the disease for years, and still remained in good flesh. One saddle horse for instance, came under observation, which the owner disliked to ride because it invariably snorted blood stained mucous over him when ridden against the wind. This condition was known to have persisted for six years. Otherwise the symptoms, principally the nasal discharge, seem to abate or increase in accordance with the prevailing climatic and food conditions. With plenty of feed and little work there is a strong tendency to recovery, while a drouth and consequent scarcity of food aggravates the symptoms.

Whether the disease may be transmitted from animal to animal has not been definitely decided, though everything points toward the infectious nature of it, and it is to be hoped that means will soon be provided for the study of this very important point. So far experiments have shown that the disease is not easily transmitted to donkeys, but it is possible that these animals may be immune.

On post-mortem examination it is found that the lesions in the nose, whether fresh erosions or old scars, are principally confined to the lower one-third of the septum nasi, while in typical glanders the ulcerations appear to be more common on the upper part and to spread from there downwards.

In the lungs there are invariably found a greater or less number of calcareous nodules, possibly due to parasites, but also fresh nodules with a yellow center surrounded by a purplish hemorrhagic zone and very much resembling the nodules observed in true glanders.

Mallein test. When to the above description is added that twenty per cent. of all of the affected animals I have tested with mallein have given more or less pronounced reactions, (twenty-seven reacted out of one hundred and thirty-four head tested), it will be seen that the parallelism between the symptoms and post-mortem lesions of the disease in question and those of a mild form of chronic glanders is so pronounced that a diagnosis cannot be made without a thorough pathological and bacteriological examination, the facilities for which, as stated, are not, at the present time, at my disposition.

Distribution and Economic Importance. At the request of Messrs. C. Brewer & Company I undertook during October and November of last year an investigation to determine the prevalence of glanders on the island of Hawaii. In this work I was assisted by Mr. Julian Monsarrat, manager of the Kapapala Ranch, who accompanied me on the entire trip around the island and to whose knowledge of the language and local conditions is principally due the important results of the investigation. I am also indebted to the Volcano Stables and Transportation Company of Hilo for furnishing free transportation for Mr. Monsarrat and myself during the entire tour, occupying more than a month's time, also to the various plantation and ranch managers, and to the local police authorities for rendering every assistance possible in furthering the investigation.

It is not my intention here to give a detailed description of this work, but simply to state that a total of nearly 4000 animals were examined, 137 head were tested with mallein and 27 head were destroyed, with the owners' consent, and for post-mortem examination. Of the total number examined 727 belonged to plantations. (It should be stated that in the case of the plantations only such animals were clinically examined, as either the managers or lunas requested to have examined or which they suspected to have been exposed to the infection.) Of these only thirty-eight showed more or less pronounced symptoms and those which reacted to the mallein test were destroyed. This comparatively small percentage of plantation

animals affected would seem to indicate that stabling, feed and care, as afforded this class of animals, have a decided effect in keeping the disease in check, especially when considered in connection with the following statement:

On the same plantations a large number of the foreign laborers keep a horse or two for their private use, the employers generally providing pastures for these animals. Nearly 1700 head of horses and mules of this class, generally undersized and cheap ponies of island breeding, were examined, and of these 458 head were found to be affected, or more than twenty-five per cent.

The principal number of the affected animals had the disease in a very mild form, which may be accounted for by the fact that they were, with few exceptions, in good condition as to flesh, had little or no work to do and an abundance of food. Of most interest, however, was the distribution of the disease. On some plantations not a single case was found either among the plantation stock or among the animals belonging to the laborers, while on a neighboring plantation twenty-five to fifty per cent. of the latter class would be affected, with scattering cases among the plantation stock. These cases would most frequently be among horses or mules which came much in contact with the laborers' animals, as for instance store wagon horses, or such as were used on the public highways and which came in contact with Japanese stage horses, many of which were affected. In the same way it was found that where a laborer owned more than one animal, the rule was, that either all of them were affected or else none of them.

These circumstances all point toward the infectious nature of the disease.

The horse stock on the ranches which were visited also appeared to be affected to a considerable extent. As it was out of the question to gather and inspect all horses on the ranches, only a few head from each pasture or range were submitted to examination. Out of a total of 443 head thus examined 102 were found to be affected, or twenty-three per cent. In certain sections where a drouth had prevailed for many months

practically every animal was affected while on other ranches under more favorable conditions only scattering cases were found. On one ranch in the southern part of the island where about one hundred head were examined not a single case was found. This is so much more remarkable as the disease was quite prevalent on the neighboring ranches on both sides, with identically the same climatic conditions.

As a considerable number of horses are shipped from Hawaii to the other islands, principally to Maui, it became of interest to know if this nasal disease was found on the other islands, and if so, to what extent. The island of Maui was therefore visited and several hundred horses were rounded up and examined. It was found that the disease prevailed to practically the same extent among the animals belonging to the plantation laborers there, while not a single case was found on the Haleakala Ranch, where every animal was examined. Since then I have observed the disease on Molokai, Oahu and Kauai, on all of which islands it is quite common, though to a less extent than on Hawaii and Maui.

Conclusions. The disease in question, whether simply a chronic nasal catarrh or whether due to a specific cause (infection) cannot, at the present time, be considered of great economic importance, except in so far as it diminishes the value and prevents the sale of affected animals. The constant snorting and emission of the discharge makes it a nuisance to either ride or drive the affected animals, but no case of transmission of the disease to man has come under observation. The working capacity of the affected animals is but slightly impaired and no death as the direct result of the disease has been known to occur. Whether under continued unfavorable conditions the disease might develop into a more virulent type has not been fully demonstrated, though observations made on certain ranches on Hawaii indicate that such might be the case; but until the true nature of the disease has been ascertained no definite conclusions can be made as to measures to be adopted in dealing with it.

In the meantime it would seem advisable to separate the affected animals,—that is to deal with the disease as if it were known to be infectious. Plantation managers should, as far as possible, prevent all intercourse or contact between the animals belonging to the laborers—a large percentage of which are affected—and the plantation stock, and if any of the latter are affected their noses should be washed regularly with a disinfecting solution, and they should be placed in the stables where they cannot blow the discharge on other horses, and should be watered from separate troughs. If aged and affected with chronic blood-stained discharge, should be destroyed, and it should constantly be borne in mind that animals suffering from this disease are highly susceptible to any infection, through the inflamed nasal mucous membrane, and that cases of true glanders may easily be obscured or pass unnoticed for a long period, where many animals are suffering from chronic discharge from the nose. All such animals should therefore be examined regularly for deep or eating ulcers in the nose, which, as a rule, are easily distinguished from the more superficial erosions which characterize the disease under consideration, at least when they occur on the lower part of the septum.

TUBERCULOSIS.

I am pleased to report that my observations during the past year justify me in stating that tuberculosis is a comparatively rare disease in these islands. A few cases are known to have occurred among range stock on Kauai, no doubt introduced and transmitted by imported breeding stock, but beyond these I believe the disease to be very rare among island-bred stock. In former years animals brought here for dairy purposes were frequently affected with tuberculosis and the disease undoubtedly lingers in a number of dairy herds as a result thereof. With the precautions which now have been taken to prevent the further introduction of affected animals it should not be difficult to eradicate the disease entirely from the dairy herds of the Territory, and I feel convinced that the climate

and the manner of keeping stock in open stables, when they are not in pasture, all tend to retard or prevent the spread of the disease.

It is expected during the coming year that measures will be adopted for the testing with tuberculin of all dairy herds from which milk is sold for human consumption, and that all such dairies and animals be submitted to regular inspection by competent men, under regulations promulgated by the Board of Agriculture in cooperation with the Territorial Board of Health.

Preliminary Notes on Lantana Insects in Hawaii.

By Jacob Kotinsky.

Assistant Entomologist, Board of Commissioners of Agriculture and Forestry of Hawaii.

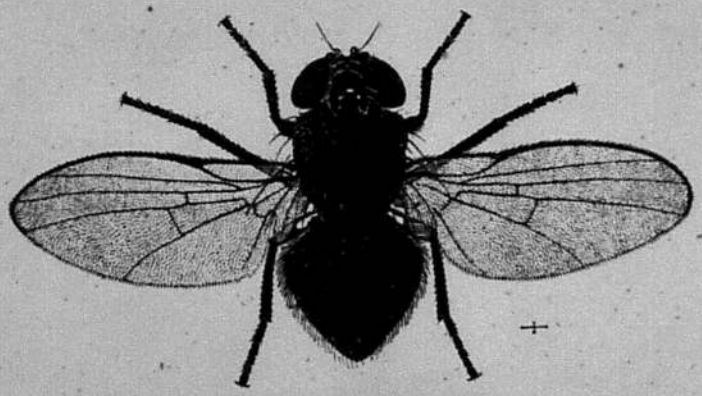


Fig. 3.—Lantana seed fly (Agromyzid). Hair line shows natural sized. (Author's illustrarion).

LANTANA SEED FLY.

Of the lantana insects introduced into Hawaii by Mr. Albert Koebele several years ago, those that were established are now the most common lantana insects throughout these Islands. By far the most important of them, as it is also the most active and abundant, is the small black fly (Agromyzid) (Fig. 3), the maggots of which live in and destroy the seed. Favored by climatic conditions and abundance of food, and unchecked by its natural enemies, this fly has increased enormously since its introduction. In course of the past year it was difficult to find a lantana seed that was not either entirely destroyed or seriously damaged by this fly. Such complete destruction of

lantana seed means that the plant can no longer be sown broadcast as was done formerly by mynah birds and doves. While in Makawao, Maui, last May, I was told by a farmer that owing to the absence of lantana seed the mynah birds have deserted the locality, as a result of which the Army-worm (*Heliophila unipuncta*, Haw.) was more destructive than spring than it had been for the previous twenty years. It may possibly be, however, that the drought was the principal cause of the migration. The fact remains that a stage has been reached in the fight with lantana when a field once thoroughly cleared of it may be depended upon to remain so indefinitely. We must hope now that fields cleared of lantana are not overrun by guava, which I was assured by growers of Kona, is far more difficult and expensive to eradicate. We must bear in mind, however, that there will always be times and places, when and where, after a complete extermination of lantana seed, the flies will die out for want of food, and then the seed is likely to get the start of the fly and some germinable seed will be produced before the fly has again increased sufficiently to check it. These ups and downs of host and parasite are a common phenomenon in nature and are to be expected.

But even should the lantana fly diminish in numbers for reasons just given we need have little fear of a large production of lantana seed, for we have at least three * other insects, moths and butterflies (*Lepidoptera*), which so mutilate the flower head and flowers that very little, if any seed is formed. These accomplish their task in the caterpillar stage.

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* These may actually represent four or more species. Thus far the Tingid (*Teleonemia subfasciata*) is the only species of the introduced lantana insects that has been definitely identified.

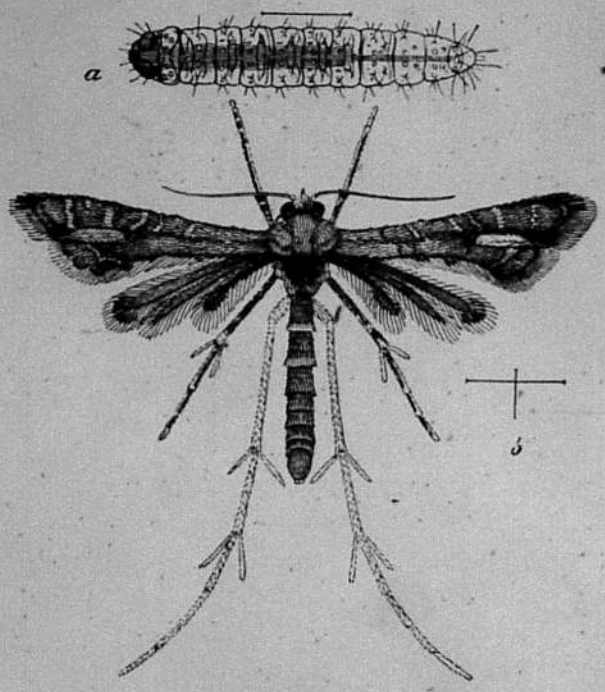


FIG. 4.—Lantana Plume-moth (*Pteropon'd*: *a*, larva: *b*, adult. Hair line shows natural sized. (Author's illustration).

Lantana Plume-moth (*Pterophorid*).

This is the dark brown moth (Fig. 4, *b*) about half an inch in expanse and one-half as long. It seems to lay its egg either at the base of the individual flower or slightly above. Upon hatching, in the former case, the young caterpillar excavates a tunnel under the flower; in the latter it gnaws a hole through the corrolla, attacks and destroys the pistil, then descends beneath the flower and continues to feed in the torus (flower-bearing head). By the time it is full grown many of the flowers are destroyed and the torus is an empty shell. Preparatory to pupation it weaves together by means of silken threads the remnants of the dead flowers and closes the entrance with the bundle thus made. It then pupates in which state it remains about two weeks, after which it emerges as a perfect moth.

The larva (Fig. 4, *a*) is opaque, greyish white, with the exception of the head, thoracic shield and true legs which are shiny brownish black. In life the head is retractile into thoracic shield; pro-legs on abdominal segments 3-6 and 9.

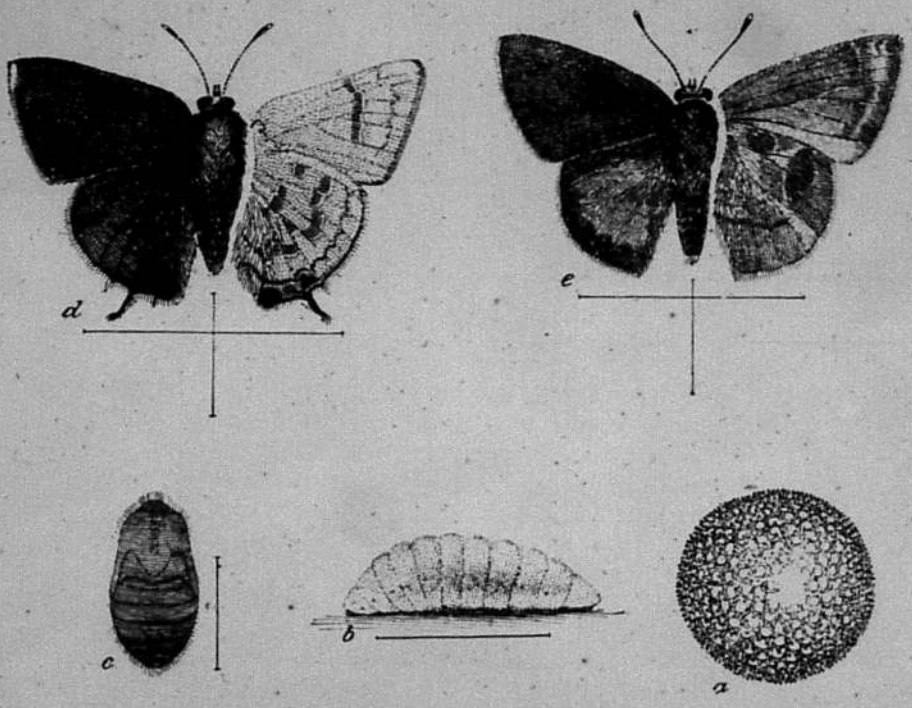


FIG. 5.—Lanatana Butterflies: *a*, egg; *b*, larva; *c*, pupa; *d*, adult (bred from *a*, *b*, *c*); *e* another butterfly. Adults show marking of upper and under sides of wings. Hair lines show natural size of all, but egg which is x30. (Author's illustration.)

Lantana Butterflies (*Lycaenidae*).

One of these is a pretty, small, butterfly, with upper side of hind wings metallic blue, the rest of the insect being mottled brownish grap (Fig. 5, *e*). It lays its egg (Fig. 5, *a*) upon the young lantana flower and the subsequent caterpillar feeds upon the flowers and young seeed. The other differs somewhat in color, but its work is identical with the first. The caterpillars of both are variably green in color, fuzzy, short and stubby, varying in length from ¼ to ½ an inch when full grown, and about ½ as wide (Fig. 3, *b*).

As stated above these may actually represent four species,

but their identity has not been ascertained, and their work is so similar in appearance that for our purpose this meagre description will answer, at least for the present. These three caterpillars are so abundant at present that no flower is without one or both of them, and more frequently several specimens of each infest a single flower head. Especially is this true of flowers at lower elevations, so that there the chances for the production of seed are very poor indeed.

LANTANA LEAF INSECTS.

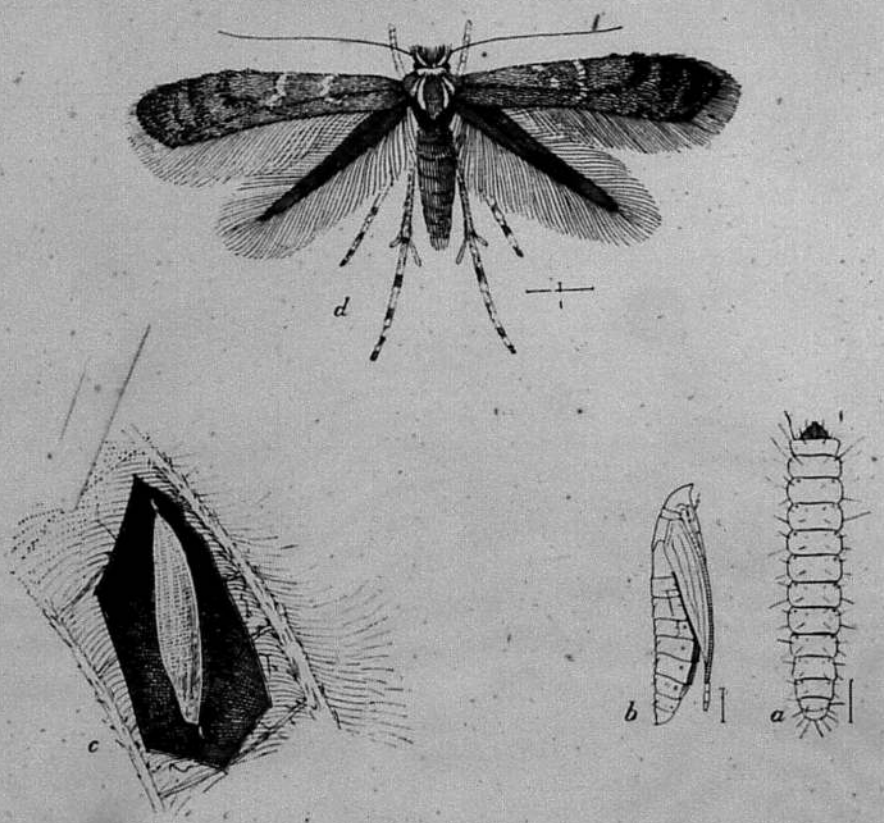


FIG. 6.—Lantana leaf miner: *a*, larva; *b*, pupa; *c*, cocoon, containing pupa, in situ; *d*, adult. Hair lines show natural size. (Author's illustration).

"Lantana Leaf-Miner."

This caterpillar (Fig. 6, *a*) when full grown is pale yellowish-white, with a yellow streak through the middle, representing some internal organ, doubtless the silk glands which produce

the cocoon; the entire insect with the exception of the mouth parts and legs, which are brownish, is translucent and tapers slightly posteriorly; the segments are very distinct; occasionally the darker pellets of excreta are seen through the body wall. This caterpillar attains full growth within the mine and there transforms into a pupa (Fig. 6, *b*). The pupa is enclosed within a very pretty, white, longitudinally ribbed sack (Fig. 6, *c*). It seems that before commencing to build this sack the caterpillar gathers all its frass into a small space and covers it with a net-work of silk, evidently to protect itself from the effects of decay. The sack contains the inactive stage of the insect and is usually found in older, somewhat dried mines and is so conspicuous that it is not overlooked even by the layman. The tiny gilt colored, striped legged moth (Fig. 6, *d*) is the outcome of this useful miner. One of these mines (Fig. 6, *c*) is not sufficient to destroy a leaf, but as they usually occur in large numbers, up to six or more in some cases, it is inevitable that the vitality of the leaf should be materially reduced.



FIG. 7.—Lanta leaf bug (*Teleonemia subfasciata* Champ.) Hair line shows natural size. (Author's illustration.)

"Lantana Leaf Bug" (*Teleonemia subfasciata*, Champ.).

Another insect that his inflicted terrible injury upon lantana is a small Tingid bug (Fig. 7) which should be properly known

as the "lantana leaf bug." It is a true bug belonging to an order of insects (*Hemiptera-Heteroptera*) supplied with jointed beaks, capable of taking up liquid food only. Although introduced at the same time that the others were, it has not, until the past year I believe, increased to such large numbers as have the others. It may possibly be that the unusual drought of the year has been particularly favorable for this enormous increase. Large numbers of it, particularly the younger stages, occur on the under surface of leaves, and together with the leaf miner referred to above, and the drought, they have defoliated lantana two or three times in course of the year. To all appearances, particularly on the leeward side of hills and Islands, lantana was dead. This was only an illusion, however, which was quickly removed either by careful examination of the stem or by the reappearance of foliage after heavy rains. The younger shoots of lantanas were usually found dead. There is no doubt that during the last year lantana received severe injury and a quite serious set-back.

These "leaf bugs" were so abundant everywhere that it was inevitable that some of them should stray to other plants, either of their own accord, or blown by the wind. Their leisurely, deliberate mode of locomotion makes them an object of easy study. As a result of these facts many people have repeatedly observed the insect on plants other than lantana and, warned by previous experiences, have repeatedly attempted to raise the alarm of a new pest. The fact is, however, that although it does occur on plants other than lantana, it has never been observed to breed upon them or in sufficient numbers to do injury; neither has it been observed in the actual process of feeding on plants other than lantana.* So that no apprehension on the score of these insects need be entertained. Close watching, however, does no harm.

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* See my note in the Hawaiian Forester and Agriculturist, Vol. II, pp. 401-2.

While the leaf insects kill the young shoots of lantana they are also, though indirectly, responsible for the periodical heavy crop of lantana flowers. It is a well known fact that plants and animals are most prolific when their chances for life are reduced. This phenomenon is accounted for by the law of perpetuation of the species, i. e., every living being feels the instinctive impulse of helping to perpetuate its kind and, when disease or want of nourishment threatens its existence it turns all of its available vitality toward reproduction. Fruit trees upon a deserted farm where they are neither fed nor otherwise attended to are known to produce heavier crops of fruit than their neighbors, upon an adjoining lot perhaps, living in opulence. In order to hasten the flowering of a plant horticulturists take advantage of this indomitable law and either root-trim those plants severely or plant them in small receptacles. To return to lantana we see that no sooner is a crop of leaves produced than it is immediately stripped. The repeated defoliation evidently so shocks the plant that it feels in danger of extermination. To save itself from such a calamity it concentrates all its available vitality upon reproduction. The plant, of course, does not reason but it does follow out the course laid down for it by nature. This overproduction of flowers is in itself therefore, an indication that the plant is suffering. As to the seed crop, I believe that our flower and seed insects will permit but little of it to mature. To all appearances lantana looks now practically doomed. Very few lantana plants are as healthy and vigorous today as they used to be.

The introduction of insects to check the spread of a plant has, to my knowledge, never before been tried anywhere in the world. Mr. Koebele is the pioneer worker in this line and judging by the marvelous results already attained, the credit to which he is entitled for what he has accomplished cannot be given him in more adequate form than by pointing out the difference between lantana on Hawaii as it was and as it is at present. He is moreover to be congratulated on the strict

business-like manner in which these insects confine their work to lantana.

Lantana Scale or "Maui Blight"

(*Orthezia insignis*, Dougl.)

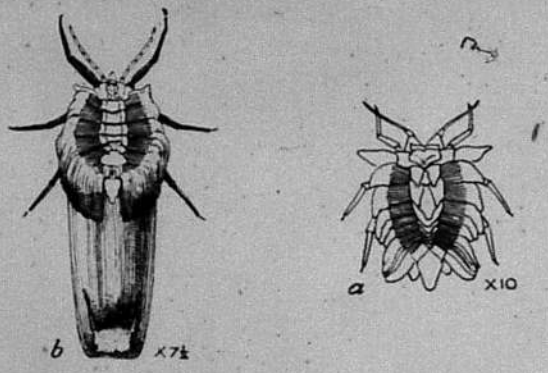


FIG. 8.—Lantana scale or "Maui Blight" (*Orthezia insignis*, Dougl.): *a*, young; *b*, adult female. Magnification indicated by figures. (Author's illustration).

This lantana enemy (Fig. 8) was introduced by Mr. Koebele. In fact in an exhaustive paper published in the "1902 Reports of The Commissioner of Agriculture," he warned the people most emphatically against its distribution. Despite this warning ranchmen have been scattering lantana infested with this scale all over the Islands. Only in a few localities does it seem to spread rapidly, but, wherever it exists, it surely assists in reducing the vitality of the lantana giant. Fortunately this insect has not yet been observed in injurious numbers on any plant of economic importance, if we disregard the ornamental plants. At Wailuku, Maui, it has been observed by the writer to have practically destroyed a Gardenia, and at Ulupalakua, Maui, Mr. Eli Snyder called attention to serious infestation of *Alternanthera*, *Coleus* and *Achyranthes* by this scale bug. Where the insect will stop it is impossible to say. Its adaptability to plants other than lantana on these Islands it has shown. "A hint to the wise is sufficient."

A similar study of the horn fly and its parasites was made. The following notes on the subject were presented to the same Association.

Horn Fly and its Parasites in Hawaii.

By Jacob Kotinsky.

Assistant Entomologist, Board of Commissioners of Agriculture and Forestry of Hawaii.

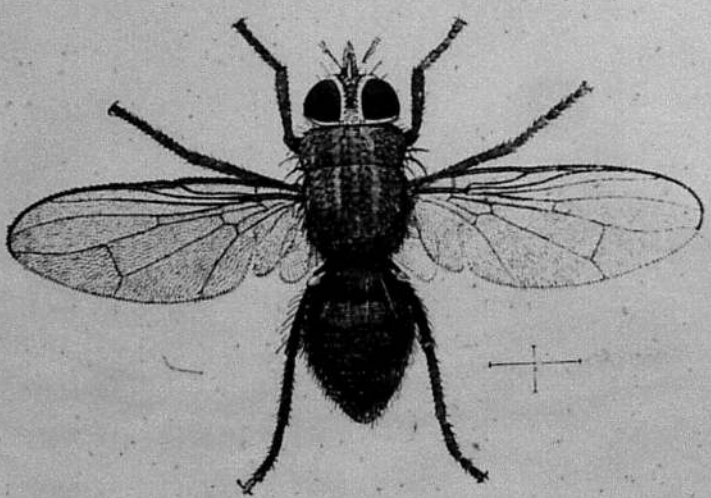


Fig. 9.—Horn fly (*Hæmatobia serrata* R. D.). Hair lines show natura size. (Author's illustration.)

From Dipterous (two-wing flies) pupae collected in horse dung at Volcano House, Hawaii, about June, 1905, Mr. F. W. Terry, of the Planters' Experiment Station Staff, bred parasites which upon subsequent examination proved to represent two species of Spalangia (*S. hirta*, Haliday, and *S. lanaiensis*, Ashm.), both recorded in the Fauna Hawaiiensis. The first of

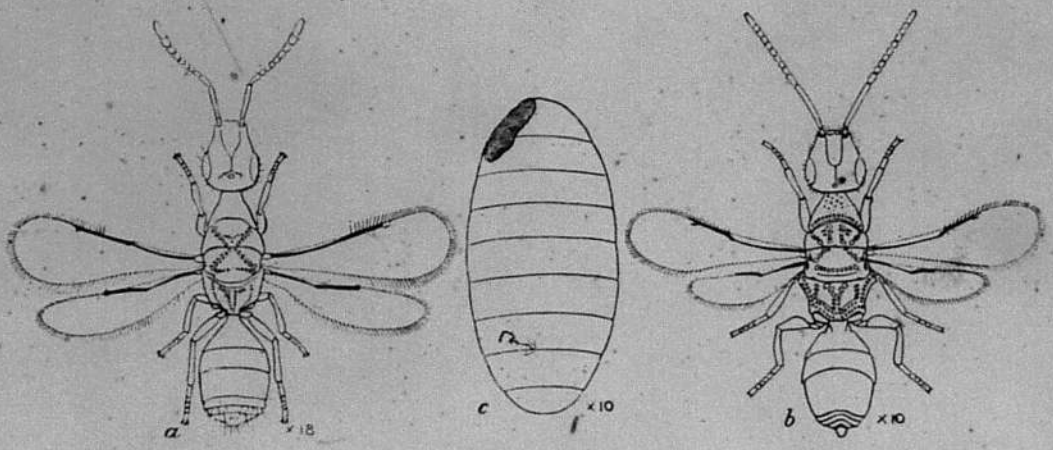


FIG. 10.—Horn fly parasites: *a*, *Spalangia lanaiensio* Ashm.; *b*, *S. hirta*, Haliday; *c*, horn fly pupa showing exit hole of parasite, x figures indicate magnification. (Author's illustration.)

these (Fig. 10, *b*) was collected years ago in Honolulu by Rev. T. Blackburn, while the latter (Fig. 10, *a*) was found by Mr. R. C. L. Perkins on Lanai, and described in the Fauna as new. Mr. Terry kindly brought my attention to these parasites and offered to coöperate with me in whatever experiments I might choose to undertake, and my thanks are due him for assistance in this work. The two questions that presented themselves at this stage of the work, were (1) whether either of these parasites attacks horn fly (*Haematobia serrata*, R. D.) pupae, and if so (2), whether they occur on all these Islands; if not, they should be bred and distributed.

To determine the first point horn fly pupae were collected and placed in tubes containing active fecundated females of *S. hirta* (the other species had died out) and watched carefully. The horn fly pupae were attacked promptly and stung repeatedly, although the parasites were originally bred from pupae of the stable fly (*Stomoxys calcitrans*, Linn.). In about three or four weeks the parasites issued successfully from these pupae, thus demonstrating the possible usefulness of the parasite. Subsequent field study corroborated the laboratory work. While searching for horn fly pupae at a Palolo dairy one of the parasitic flies was observed walking about within the dung heap. It was captured and its identity with the survivors from the Volcano House established. It was also bred from

pupae collected in that dairy. Horn fly pupae collected at Leilehua, Oahu, on August 1, 1905, were also found to be inhabited by *S. hirta*. Further examination disclosed that *S. lanaiensis*, the supposed native species, was bred from Dipterous pupae collected in Honolulu sometime last April. These facts demonstrated conclusively that these parasitic flies attack horn fly. Their distribution and effectiveness of the parasites remained to be determined. In order to gain this information it was necessary to enlist the assistance of the ranch managers. After consulting the Secretary of the Stock Breeders' Association, a circular was sent out to all the ranch managers. Following is a copy of that letter:

LETTER TO RANCH MANAGERS.

Honolulu, October 22, 1905.

Dear Sir:—In our studies of the horn fly we have bred a parasite from its pupae collected on four ranches upon these Islands. We are now anxious to determine the extent of distribution that useful parasite has attained. You can assist us in the determination of this important fact by collecting and mailing to us a lot of the horn fly pupae. These should be collected upon portions of the ranch differing in climate and altitude, kept separate and each parcel labeled indicating these conditions. This pupa, which is about one-twelfth of an inch wide and about twice as long, and dark brown in color, is usually to be found on the inside of the crust of droppings about three or four days old.

At the conclusion of breeding we shall be glad to report results.

Yours truly,

JACOB KOTINSKY,
Assistant Entomologist.

In response to this appeal for assistance but one man, Mr. D. T. Fleming, of the Maui Agricultural Company, sent specimens. It is true that correspondents on Kauai and Molokai also sent material, but those were replies to special requests. My thanks are due these gentlemen for the assistance rendered. Notwithstanding the meagre coöperation on the part of ranch managers, it was ascertained that at least the European horn fly parasite (*S. hirta*) exists on the five larger Islands, and that the native (?) species (*S. lanaiensis*) occurs on Hawaii, Lanai and Oahu. Moreover, about 75% of the pupae received from Molokai were parasitized. In conversation, Dr. V. A. Nörgaard, the Territorial Veterinarian, informs me that the parasite is responsible for considerable reduction of the pest at some seasons of the year, and it is evident that it is some check upon the horn fly at all times.

While on a visit to Kona last November the ranchmen there complained bitterly of the horn fly, yet when search was made for the pupae only three were found in the course of two hours This may be explained either by the particular locality or the season, or both.

Any ranch manager might determine for himself whether or not the parasite exists on his ranch. It is presumed that he is familiar with the appearance of the fly and its pupae. If he is not, it is to his interest to make their acquaintance. Collect pupae and place in a glass jar covered with a bit of cloth held fast by string or rubber band. At the end of a week or two flies will begin to issue, and if these are small, black, *four-winged*, he may rest assured that he has the parasite. The Entomological Division of the Board of Agriculture and Forestry is at any time ready to breed, determine, and report upon any material submitted for examination.

About February, 1905, a collection of dung fly larvae and pupae were received from Mr. Albert Koebele, who collected them near Sydney, New South Wales, and about March para-

sites began to issue from them. Two strong colonies of these were released; one near Honolulu and the other on Leilehua. Subsequent examination of horn fly material collected at both places failed to show the presence of the parasite. The same is true of a number of dung beetles or tumble bugs sent by Mr. Albert Koebele. None have been seen since the day of their release.



STATISTICAL TABLE SHOWING LIVE STOCK DELIVERED TO SLAUGHTERHOUSE,

FROM JULY 1, 1904 TO JUNE 30, 1905 WITH WEIGHTS AND VALUES OF SAME.

	CATTLE			CALVES		SHEEP			CATTLE		SHEEP	
	No.	Weight	Amount	No.	Amount	No.	Weight	Amount	Average Weight per Head	Average Price per Head	Average Weight per Head	Average Price per Head
American Sugar Co.	779	353,634	$ 33,179.60		$	2359	76,641	$ 7,373.00	454	$ 42.58	32	$ 3.12
Bolte, C.	11	4,534	438.51						412	39.86		
Broad, John	27	10,726	889.55						397	32.95		
Brown, J. F.				27	35.96	149	338	224.67			23	1.51
Brown, Cecil	2	844	50.64						422	25.32		
Cornwell, W. H., Estate	49	19,320	1,516.84	424	6,0[illegible].38				394	30.95		
Damon, S. M.	140	66,694	6,196.08	68	1,[illegible]3.69				376	44.25		
Dimond, W. W.	31	11,110	953.14	21	35.63				358	30.74		
Dowsett Co., Ltd	344	148,296	13,250.24	45	83.39				431	38.52		
Dowsett, A. C.	2	966	64.57						483	32.26		
Gay & Robinson	200	126,764	12,281.90			1049	37,786	3,750.20	636	61.41	36	3.57
Gay & Cornwell	40	13,464	1,105.02						336	27.64		
Greenwell, Mrs. E. C.	395	198,340	18,707.49						503	47.36		
Gomes, A.	62	29,178	2,738.85						470	44.17		
Haleakala Ranch	51	23,646	2,106.16	103	1,[illegible]4.55				464	41.30		
Heeia Agricultural Co.	34	15,922	1,416.57	3	14.10				468	41.66		
Hitchcock, H. R.				9	134.08							
Hind, Robert	339	168,992	16,684.84	21	319.53				498	49.22		
Holt, Geo.	10	3,198	276.06	13	212.58				319	27.60		
Horner, Robert	306	174,863	16,858.12	12	303.92				571	55.09		
Humuula Sheep Station	3	1,924	188.95			1691	64,979	6,153.26	641	62.98	38	3.64
Isenberg, D. P. R.	5	1,762	167.05	6	16.80				352	33.40		
Irwin & Co., W. G.	211	89,938	7,173.68						426	34.00		
Ii Estate	15	3,976	285.91						265	19.06		
Kahikinui Ranch	184	77,940	6,537.35	166	2,[illegible]4.31				423	35.53		
Kaneohe Ranch	144	81,058	7,905.02	31	5[illegible]6.85				563	54.90		
Kapapala Ranch	387	230,334	20,901.39						595	54.01		
Kohala Ranch Co	140	78,038	7,465.38						567	63.25		
Lanai Ranch	29	12,602	1,001.76	20	360.39	963	24,221	2,252.18	434	34.54	25	2.34
Lucas, Chas.	27	9,014	880.92						334	24.48		
Maguire, J. A.	191	88,880	8,138.79	31	4[illegible]1.51				455	42.61		
Mendonca, J. P.	26	10,414	909.54						400	34.98		
Meyer, Otto				41	[illegible]5.06							
McCandless, L. L.	82	35,366	3,086.85	24	[illegible]2.71				431	37.64		
Nakuina, Mrs. E. M.	19	5,542	365.49	6	[illegible]1.14				292	19.23		
Oahu R. & L. Co.	326	138,486	12,457.71	98	1,4[illegible]6.06				424	38.21		
Parker Ranch	1704	901,858	86,543.96	103	1,[illegible]1.12				529	50.79		
Paris, J. D.	198	87,674	8,054.38						443	40.68		
Perry, Antone	25	10,448	949.07	31	4[illegible]7.80				418	37.96		
Princeville Plantation	7	4,808	326.27						687	46.61		
Puakea	50	18,896	1,228.07	30	[illegible]8.20				378	24.56		
Puuloa Sheep Ranch						424	13,067	1,232.76			31	2.91
Robinson, M. P.	67	26,498	2,113.47	15	[illegible]8.87				395	31.54		
Star Dairy	3	1,046	63.05	16	[illegible]2.12				348	21.02		
Swanzy, F. M.				6	[illegible]3.48							
Shipman, W. H.	50	33,330	2,987.27						666	59.74		
Sundries	48	12,428	995.44	83	[illegible]3.57	3	112	10.64	259	20.74	37	3.55
Woods, Frank	160	67,786	5,995.82						424	37.47		
CATTLE Total	6923	3,398,831	$ 315,206.77									
CALVES "				1453	$ 21,[illegible]1.80							
SHEEP "						6638	220.194	$ 20,996.71				

1907

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THE PROCEEDINGS

HAWAIIAN LIVE STOCK BREEDERS' ASSOCIATION

FIFTH ANNUAL MEETING

HONOLULU, HAWAII

NOVEMBER 18, 1907

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1907

HONOLULU:
HAWAIIAN GAZETTE CO., LTD.
1908

THE PROCEEDINGS

HAWAIIAN LIVE STOCK BREEDERS' ASSOCIATION

FIFTH ANNUAL MEETING

HONOLULU, HAWAII

NOVEMBER 18, 1907

HONOLULU:
HAWAIIAN GAZETTE CO., LTD.
1908

MEETING

of the

Hawaiian Live Stock Breeders' Association

in the

JUDD BUILDING, HONOLULU.

MONDAY, NOVEMBER 18, 1907, 11 A. M.

Held in the rooms of the Stock Exchange, third floor of the Judd Building, in the City of Honolulu, Territory of Hawaii, on Monday, the eighteenth day of November, A. D. 1907, at 11 o'clock a. m.

The meeting was called to order by A. F. Judd, President, presiding.

The following members of the Association were present either in person or by proxy:

A. M. Brown.
H. P. Beckley.
Albert Horner.
A. F. Judd.
R. W. Shingle.
L. M. von Tempsky.
E. P. Low.
Frank Woods.
H. M. von Holt.
A. Mason.
Dowsett Co., Ltd., by Zeno K. Myers, Secretary and Treasurer.
G. N. Wilcox (by A. M. Brown, proxy).
G. J. Waller (by A. M. Brown, proxy).
A. S. Wilcox (by A. M. Brown, proxy).
E. E. Conant (by A. M. Brown, proxy).
William H. Rice (by A. M. Brown, proxy).

William T. Robinson (by A. M. Brown, proxy).
A. W. Carter (by A. M. Brown, proxy).
H. P. Baldwin (by L. M. von Tempsky).
Aubrey Robinson (by R. W. Shingle, proxy).
Mrs. E. C. Greenwell (by W. A. Greenwell, proxy).
W. H. Shipman (by Albert Horner, proxy).
Samuel Parker (by E. H. Wodehouse, proxy).

By invitation:

Geo. R. Carter.
A. L. C. Atkinson.
Dr. Victor A. Nörgaard.
D. L. Van Dine.

MINUTES OF THE LAST MEETING.

It was moved by L. von Tempsky, seconded by R. W. Shingle, and unanimously carried, that the reading of the minutes of the last meeting be dispensed with, in view of the fact that the same had been published and distributed among the members of the Association.

ADDRESS OF PRESIDENT.

The President said that the Executive Committee considered it vital to the live stock interests that the annual meeting determine whether to dissolve the Association or to wake it up; that there had been no annual meeting for the year 1906, and that the President was absent from the Territory during the months of October and November when, by the By-Laws, the annual meeting should have been held; that the lack of interest on the part of the members of the Association was due in part to the fact that the Association as such had done very little during the past two years, and partly to the suit for an injunction brought against most of the members of the Association by the United States, (the so-called Beef-Trust Case), and that finally as the result of the lack of interest that various members who had been contributing to the funds of the Association by means of a tax on

beef and mutton slaughtered by the Metropolitan Meat Company, Ltd., had refused to continue their contributions to the funds of the Association. The President urged that this matter be thoroughly discussed and a final decision made.

DISCUSSION AS TO CONTINUING THE ORGANIZATION.

An informal discussion ensued, led by L. von Tempsky and E. P. Low, to the effect that the Association had a place to fill and that it ought not to be allowed to go out of existence; that it should be continued even though the form be a skeleton one, because no one could tell when an emergency would make organization necessary, such an emergency as a severe animal epidemic, for instance. Mr. von Tempksy also spoke of the necessity of influencing legislation, and in this connection spoke of the reduction by the last Legislature of the penalty for cattle stealing from two years to one, and of his belief that in the interests of the cattle raisers the penalty should be increased to five or ten years.

AMENDMENT TO BY-LAWS, REDUCING DUES OF THE ASSOCIATION.

Mr. von Tempsky then moved that the annual dues of the Association be reduced from twelve to five dollars, and that the By-Laws of the Association be amended in Article 2 thereof to accomplish this purpose, and that the Association until its financial position changed, reduce its expenses to the lowest possible point. This motion was seconded by E. P. Low and unanimously carried.

RESIGNATION OF DR. VICTOR A. NORGAARD.

Dr. Victor A. Nörgaard, the Territorial Veterinarian, being present was asked by the President how the above resolution would affect him; whereupon Dr. Nörgaard stated that while he had come to the Territory originally on a guaranty from the Association, that at the present time he was receiving compensation from both the Federal and Territorial Governments, and he, therefore, desired leave to tender his resignation as the veter-

inarian of the Association, in order that the Association might be relieved of the expense of his salary. At the suggestion of Mr. von Holt, seconded by Mr. von Tempsky, a resolution of thanks to Dr. Nörgaard for his courteous and efficient services was ordered spread upon the minutes.

REPORT OF THE TREASURER.

R. W. Shingle, the Treasurer, then presented the following reports:

Honolulu, Hawaii, September 30, 1907.

To the President and Members of the
Hawaiian Live Stock Breeders' Association,
Honolulu.

Dear Sir and Gentlemen:—

I herewith beg to hand you my report as Treasurer of the Association, showing a gross income in the last two years of $3,174.97, expenditure $2,715.90, leaving a balance on hand of $459.07. This income has been derived principally from the stock tax. The revenue from dues, owing to the resignation of many members, and the failure to pay of others, has become very small. Interest in the Association and its workings appears to have diminished so materially, that the only revenue for 1907 has been from the tax levied on shippers of cattle into the Honolulu market, and the collection of this has been objected to by some of the graziers. This fund has been utilized to pay Dr. Nörgaard's salary, but I understand he is willing to forego this as it is his intention, if possible, provided the plantations and ranches will guarantee a sufficient sum, to install a new system here; that is, the appointment on the Islands of resident veterinaries,—two for Hawaii, one for Maui and one for Kauai, Oahu coming under his immediate jurisdiction. He requires a guaranty of $400 a month, of which he figures the plantations should pay 75% and the ranches 25%. If this scheme of his is successful, the stock tax as now called, or some other form of tax, could be so rated amongst the ranches that the required amount would be forth-

coming. The amount as rated would not be so heavy as the present tax, as we would expect all raisers of stock to participate in raising this subsidy. Let it be understood that these subsidized veterinarians are at all times at the service of their supporters for treatment of contagious and infectious diseases, which will be treated free of any charge. For other animal diseases coming under their professional treatment, they would be entitled to charge a fee.

Respectfully submitted,

ROBERT W. SHINGLE,
Treasurer.

RECEIPTS AND DISBURSEMENTS.

Receipts.

1905.					
Oct.	1	From	Stock Tax, September	$144.95	
	—	"	Dues	12.00	
Nov.	—	"	Stock Tax, October	111.55	
	—	"	Stock Tax, November	157.59	
Dec.	—	"	Dues	24.00	$ 450.08
1906.					
Jan.	—	"	Stock Tax, December	114.79	
	—	"	Dues	168.00	
	—	"	Dues	36.00	
Feb.	—	"	Dues	96.00	
	—	"	Stock Tax	93.60	
Mch.	—	"	Dues	12.00	
	—	"	Stock Tax	79.95	600 34
April	—	"	Stock Tax	97.55	
	—	"	Dues	84.00	
May	—	"	Stock Tax	114.15	
	—	"	Dues	12.00	
June	—	"	Stock Tax	74.05	
	—	"	Dues	12.00	
	—	"	Hawaiian Planters' Assn.	450.00	843.75

July	—From	Stock Tax, June.....	96.45	
Aug.	— "	Stock Tax, July.....	102.55	
Sept.	— "	Stock Tax, August.....	76.05	275.05
Oct.	— "	Dues	60.00	
	— "	Stock Tax, September.....	61.75	
Nov.	— "	Dues	24.00	
	— "	Stock Tax, October.....	96.50	
Dec.	— "	Dues	12.00	
	— "	Stock Tax, November.....	68.30	322.55
1907.				
Jan.	— "	Stock Tax	89.45	
Feb.	— "	Stock Tax	60.95	
Mch.	— "	Stock Tax	61.55	220.95
April	— "	Stock Tax, March.....	97.20	
May	— "	" " April	76.15	
June	— "	" " May	62.10	235.45
July	— "	" " June	78.35	
Aug.	— "	" " July	78.90	
Sept.	— "	" " August	69.55	226.80
				$3,174.97

Disbursements.

1905.			Draft.		
Oct.	14—P. Jarret on %		No.	35..	$ 50.00
	31— "	Balance	"	36..	100.00
Nov.	14— "	Salary	"	37..	75.00
	14— "	%.....	"	38..	50.00
	Paid Wirless		"	39..	2.70
	" Expenses, stamps, etc.....		"	40..	10.00
	" P. Jarret, Nov. Salary.....		"	41..	100.00
	" " % Dec. Salary....		"	42..	50.00

Dec. 30—Paid	V. A. Nörgaard, Salary.....	"	43..		75.00
"	Miss Achucj, ½ day, steong..	"	44..		5.00
"	P. Jarret, Bal. Salary.....	"	45..		100.00
"	Exp. % bill heads.....	"	46..		2.50
1906.					
Jan. 15— "	V. A. Nörgaard, Dec. Salary..	"	47..		75.00
"	A. M. Brown, Bal. Salary....	"	49..		68.30
"	V. A. Nörgaard, Salary.....	"	50..		20.00
Feb. 1— "	" " "	"	51..		55.00
20— "	Charges on Seeds.....	"	52..		7.48
Mch. 6— "	V. A. Nörgaard, Salary.....	"	53..		75.00
31— "	" " "	"	54..		75.00
"	Exp. Cattle Record Book and Blanks	"	55..		18.00
April 4— "	Bags and Twine for Seeds....	"	56..		2.55
17— "	V. A. Nörgaard, Salary.....	"	57..		20.00
May 1— "	" " "	"	58..		55.00
21— "	Letter heads, etc.....	"	59..		7.00
June 1— "	Grass Seeds	"	60..		194.70
13— "	V. A. Nörgaard, Salary.....	"	61..		75.00
July 2— "	" " "	"	62..		75.00
30— "	" " "	"	63..		75.00
Aug. 31— "	" " "	"	64..		75.00
Sept. 25— "	" " "	"	65..		75.00
Oct. 13— "	Printing 150 Reports.....	"	66..		75.00
20— "	V. A. Nörgaard, Salary.....	"	67..		25.00
24— "	" " "	"	68..		25.00
Nov. 1— "	" " "	"	69..		30.00
23— "	" " "	"	70..		20.00
30— "	" " "	"	71..		50.00
1907.					
Jan. 2— "	" " "	"	72..		75.00
Feb. 11— "	" " "	"	73..		75.00
21— "	" " Feb. Salary..	"	74..		25.00
28— "	" " Bal. " ..	"	75..		50.00
Mar. 28— "	" " Mar. " ..	"	76..		75.00
April 30— "	" " April " ..	"	77..		75.00

May	31—Paid	V. A. Nörgaard, May	" .. "	78..	75.00
June	21— "	Exp. % Subscription toward defraying expenses obtaining parasites to destroy Horn Fly	"	79..	50.00
	29— "	V. A. Nörgaard, June Salary.	"	80..	75.00
	"	Exp. % additional sub. toward parasites to destroy Horn Fly	"	81..	25.00
July	30— "	V. A. Nörgaard, July Salary..	"	82..	75.00
Aug.	31— "	" " Aug. " ..	"	83..	75.00
					$2,643.23

INCOME AND EXPENDITURE ACCOUNT.

From Oct. 1, 1905, to Aug. 31, 1907.

From Stock Tax	$2,172.97	
" Dues	552.00	
" Hawaiian Planters' Association.....	450.00	$3,174.97
Paid Salaries	$2,243.30	
" Expenses	195.20	
" Seeds and Grasses	204.73	
" H. W. Trust Co., overdraft as of Sept. 30, 1905	72.67	2,715.90
Balance on Hand.....		$ 459.07

Honolulu, Hawaii, November 18, 1907.

To the President and Members of the
Hawaiian Live Stock Breeders' Association,
Honolulu.

Dear Sir and Gentlemen:—

I herewith beg to submit my report as Treasurer of the Association, showing a cash balance on hand of $440.29. Since my last report of September 30th, 1907, the receipts to date have been only $134.67, while the expenditures have been $153.45.

The interest in the Association has decreased to such an extent that I have been unable to collect the Stock Tax from many of the ranches; they refusing to pay as they have understood the Association was to be disorganized; otherwise, there would have been approximately $700.00 on hand as per the Secretary's report of October 21st, 1907.

The partial cessation of this revenue will render it impossible to carry on the business and purposes of the Association and it seems that unless some steps are taken toward a change in the purposes of the Association or a revival of the interest therein, there is little left but disorganization.

Respectfully submitted,

(Signed) ROBERT W. SHINGLE,
Treasurer.

FINANCIAL STATEMENT.

Receipts.

1907.		
Aug. 31—Cash Balance on Hand	$459.07	
Sept. 30—From Stock Tax, September	87.95	
Oct. 31— " " " October	46.72	

Disbursements.

Sept. 30—Paid Dr. Nörgaard, Salary		$ 75.00
Oct. 22— " Stamps to A. M. Brown		1.20
Nov. 12— " Hawaiian Star		2.25
" 14— " Dr. Nörgaard, Salary		75.00
Balance Cash on Hand		440.29
	$593.74	$593.74
Nov. 14—Cash Balance on Hand	$440.29	

SUGGESTION FOR RESIDENT VETERINARIANS ON THE OTHER ISLANDS.

R. W. Shingle called the attention of the Association to a plan suggested by Dr. Nörgaard to have a resident veterinarian on the Island of Kauai, the Island of Maui, and two on the Island of Hawaii, in order that stock importations might be made directly to those Islands and properly inspected upon landing. Dr. Nörgaard, being called upon, explained that the necessity for this no longer existed, as, through his efforts the Federal Department of Agriculture will now inspect all animals on the Pacific Coast which are to be shipped to this Territory, and will certify to their being free from disease without cost to the owners.

REPORT OF SECRETARY.

A. M. Brown, the Secretary, being then called upon by the President for his report, stated that he had no report to offer.

APPOINTMENT OF COMMITTEE TO PREPARE NOMINATIONS.

The hour of noon approaching, the President suggested that he be authorized by resolution to appoint a committee to prepare nominations. A motion to this effect having been made, seconded and carried, the President appointed Messrs. R. W. Shingle, L. von Tempsky and Albert Horner.

The meeting then adjourned until 2 p. m.

AFTERNOON SESSION.

There being a quorum present, at the hour of 2:00 o'clock, the meeting reconvened.

REPORT OF COMMITTEE ON NOMINATIONS.

The Committee on Nominations then presented the following report:

To the President of the
Hawaiian Live Stock Breeders' Association,
Honolulu.

Dear Sir:—

The special committee appointed this day for the purpose of selecting officers and directors to serve for the ensuing year, respectfully begs to submit the following report:

H. M. von Holt, for President;
Albert Horner, for Vice-President;
J. O. Young, for Treasurer;
Zeno K. Myers, for Secretary.

Directors:

Francis Gay, for Kauai;
L. A. Thurston, for Oahu;
J. H. Mackenzie, for Maui;
J. Frank Woods, for Hawaii;
Chas. A. Hartwell, for Molokai.

Respectfully submitted,

L. von Tempsky,
Robert W. Shingle,
A. Horner.

ELECTION OF OFFICERS.

It was moved by L. von Tempsky, seconded by H. M. von Holt, and carried unanimously, that the Secretary be instructed to cast the ballot of the members present for the officers named in the committee's report. This having been done, the President declared the following to be the officers of the Association for the ensuing year:

H. M. von Holt, President;
Albert Horner, Vice-President;
J. O. Young, Treasurer;
Zeno K. Myers, Secretary.

Directors:

Francis Gay, for Kauai;
L. A. Thurston, for Oahu;
J. H. Mackenzie, for Maui;
J. Frank Woods, for Hawaii;
Chas. A. Hartwell, for Molokai.

PRESIDENT-ELECT TAKES THE CHAIR.

President von Holt, being called to the chair, in a few appropriate words expressed his appreciation of the honor conferred upon him, and his hope that the next year would be a profitable one to the Association.

ADDRESS OF D. L. VAN DINE.

D. L. Van Dine, entomologist of the United States Agricultural Experiment Station, then presented his report. Mr. Van Dine exhibited at the meeting a set of insects discussed in his paper. (See page 25.)

A. F. Judd referred to the fact that Mr. Francis Gay on Kauai was experimenting with a fly trap at Makaweli, Kauai, which was arranged in a chute through which the cattle passed, the chute being darkened except in the middle where the trap was superimposed upon the chute, the trap having a glass cover so arranged that the flies would be attracted to the light.

REPORT OF DR. VICTOR A. NORGAARD.

A. M. Brown suggested that owing to the inability of Dr. Nörgaard to be present and submit his report personally, Dr. Nörgaard's paper be not read, but be published with the minutes of the meeting. (See page 25.)

NEW GRASSES.

Both L. von Tempsky and A. F. Judd recounted their observations on the Islands of Maui and Molokai concerning the Rhodes grass. It seemed to be the opinion that paspalum dilatatum bid fair to compete with, if not run out the Manienie grass, and that the best way to distribute it was broadcast sowing in preference to plowing and planting.

Mr. vonTempsky stated that in his opinion the Haleakala Ranch, of which he was manager, owing to the foreign grasses which had been recently sown, was in a condition to carry twenty five per cent. more stock than formerly; that in his opinion paspalum did best at an elevation not less than 1500 feet.

A. F. Judd spoke of the making of Rhodes grass hay in the months of June and July on the Molokai Ranch, at an elevation of 800 feet.

Geo. R. Carter, a member of the Territorial Board of Agriculture, stated that as a member of the Board, he took great interest in the proceedings of the Association, and that he believed that much could be accomplished by maintaining the organization, and eventually, if possible, putting it on as sound a basis as the Sugar Planters' Association; and that he was particularly interested in the interchange of ranching experiences which he had listened to at the meeting. Commenting on a recent trip to the Island of Molokai where he had noticed the weed Pamakani, he asked the members if it had been reported from any other Islands except Maui and Molokai. No one present had heard of its reaching any other Island. E. P. Low stated that the Scotch Thistle, in his opinion, threatened much damage to the grazing land of this Territory, and that in Kona, on the Island of Hawaii, it had already taken possession of large areas of grazing land. It seemed

worse than pamakani and as bad as lantana. Albert Horner stated that on the Horner Ranch in Hamakua men are constantly employed in eradicating Scotch Thistle and raspberry.

L. M. von Tempsky said that on the Island of Maui a certain Scotch Thistle (evidently not the variety spoken of by E. P. Low) was not considered a pest, but, on the contrary, a good fertilizer for the ground preparatory to the planting of grass seeds.

VOTE OF THANKS.

It was moved and carried that a vote of thanks be extended to the members of the Stock Exchange for the use of their room in the Judd Building for the purpose of this meeting, and that the Secretary so notify the Stock Exchange.

ADJOURNMENT.

There being no further business before the meeting, the President, H. M. von Holt, declared the same adjourned.

A. M. Brown,
Secretary.

Abstract of a Preliminary Report on

Insects Affecting Live Stock in Hawaii.

BY

D. L. VAN DINE,

Entomologist, Hawaii Agricultural Experiment Station, United States Department of Agriculture,

AND

VICTOR A. NÖRGAARD,

Territorial Veterinarian, Territory of Hawaii, Veterinary Inspector, Bureau of Animal Industry, United States Department of Agriculture.

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LETTER OF TRANSMITTAL.

Honolulu, Hawaii, April 10, 1908.

Dear Sir:—

The undersigned beg to transmit herewith the manuscript of an article on Insects Affecting Live Stock in Hawaii and to recommend that the same be published in the next report of the Hawaiian Live Stock Breeders' Association.

The two principal subjects discussed in this article pertain to The Horn-Fly and The Sheep-Maggot Fly, either of which insect-pests causes a greater direct loss to the live stock industry of the Territory than all of the remaining ones combined.

The writers are of the opinion that conservatively estimated the losses, direct or indirect, due to insect-pests aggregated between $60,000 to $75,000 during the year of 1907.

The subject under discussion is, therefore, of the greatest importance and the present article is intended to take the place of the papers presented by the writers at the last annual meeting of the Hawaiian Live Stock Breeders' Association.

In view of the fact that the annual report of the Territorial Veterinarian will be ready for publication in the course of two weeks and as this report will treat *in extenso* the same subjects which his paper to your Association only touched on, it seemed expedient from an economic, as well as a practical standpoint, to withdraw this paper and in its place provide each member of your Association with a separate copy of the said annual report.

In the case of injurious insects which the writers have not yet had opportunity to investigate, but the presence of which in the Territory we have observed or verified, it has been deemed advisable to quote extensively from the most reliable sources, credit being given in each case to the original writer.

That the prevalence of insect-pests in the Territory is due to a great extent to the almost total absence of insectivorous birds cannot be doubted. Of equal importance is the absence of scavenger birds such as the buzzard. The introduction of various species of these two classes of birds has been discussed *pro et con* in this article, and the writers herewith request that opinions and suggestions pertaining to this subject be forwarded to them by the members of the Association.

Respectfully,

D. L. Van Dine,
Victor A. Norgaard.

Z. K. Myers, Esq.,
Secretary, Hawaiian Live Stock Breeders' Association.

INTRODUCTION.

The insects affecting live stock in Hawaii are second only in economic importance to those injurious to sugar-cane.

Some of the species of this group of pests are known to the stockmen and the status of one especially, the horn-fly, is well understood. There are several pests recorded from Hawaii whose local status and occurrence have not been worked out in reference to their injury to live stock, as for example, the horse bot-fly, the stable fly, the sheep head-maggot fly, and the screw-worm fly, and there are still others that are not even recorded, as the two recently determined species of blow-flies or maggot flies affecting sheep. Still another group of pests of direct interest to those engaged in the live stock industry, but indirectly affecting live stock, are the cutworms that injure or destroy the feed in the pastures.

Of minor importance are incidental injuries or death of live stock, especially horses, as a result of bee stings.

All of these insect depredators demand consideration, for on their control rests to a great extent, the success of stock raising in Hawaii. An effort is being made on the natural enemy phase of the control of one species, the horn-fly, and relief is hoped for from this effort, but the general statement can be made that, as a group, the insects affecting live stock in Hawaii exact their heavy annual tax unhindered and in some instances, unrecognized.

This report is a brief consideration of the insects injurious to live stock in Hawaii and a summary of the preliminary investigations made on the subject by the writers to acquaint the stockmen with the purposes and scope of the investigations we propose to make. These investigations are in direct coöperation with Doctor L. O. Howard, Chief of the Bureau of Entomology, United States Department of Agriculture.[1]

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[1] Since the above was written an effort has been made by the Hawaiian Sugar Planters' Association and the Board of Agriculture and Forestry to send Prof. Koebele to Europe in search of natural enemies of the horn-fly. The realization of this project will depend upon the support it receives from the stock-raisers of the Territory.

INSECTS AFFECTING CATTLE.

THE HORN-FLY.

(*Haematobia serrata,* Desvoidy.)

The horn-fly was introduced into Hawaii with shipments of cattle from the western coast of the United States to the Island of Oahu during 1897, and within the following year spread to all the other islands.[2] For ten years this pest has bred uninterruptedly and the worry and irritation from its blood sucking habit has been felt during this time by the thousands of cattle on Hawaiian ranches. The smaller dairy herds likewise have suffered injury. Horses are bothered to some extent by the horn-fly, the irritation being especially noticed on cow-ponies when working cattle. Recently Nörgaard has pointed out the complication of sheep-scab and horn-fly injury on sheep.[3] To this complication has later been added that of the maggot flies, which in many cases take up the work of destruction in connection with or subsequent to the injuries caused by the scab and horn-fly parasites.

HISTORY OF INTRODUCTION.

This insect, of European origin, was introduced into the eastern United States on imported cattle not earlier than 1885 and possibly as late as the spring of 1887. By 1889 the pest had spread throughout the eastern United States, and in 1891 it is recorded from Canada to Texas and from Massachusetts to the Rocky Mountains.

General Characteristics and Habits. The following summary of the horn-fly is taken from Bulletin No. 5, U. S. Bureau of Entomology:

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[2] A. Koebele. Rept. of the Entomologist, Rept. of the Minister of the Interior, Republic of Hawaii, 1898, Honolulu, 1899, pp. 84-87.

[3] Rept. of the Div. of Animal Industry, Rept. Bd. Comms. Agr. & Forestry, Hawaii, 2 (1905), pp. 171, 211, 212.

That the loss from their presence is very considerable is recognized by most practical stock breeders who have every day association with the affected animals, the loss showing in reduced vitality, lack of growth, or in loss of milk.

Mr. Fletcher, the entomologist of the Dominion of Canada, estimated the loss in Ontario and Quebec at one-half the product.

The loss is the direct result of the irritation to cattle, which keeps them in a perpetual worry and interferes with their feeding and with the normal digestion of food, and to some extent, from the loss of blood which, when the flies occur by the thousands on a single animal, is an item not to be ignored.

Injury to other animals than cattle seems to be very slight, and while a number of records have been given of the insect occurring upon horses, these seem to be exceptional.

The flies are observed in greatest numbers in July, but appear as early as May, and remain till cold weather, the full time depending upon the season or latitude.

The characteristic habit of clustering about the base of the horn seems to exist only when the flies are quite abundant. When they average only a hundred or so to a single animal, comparatively few will be found on the horns. Moreover, as a general thing the horn-clustering habit seems to be more predominant earlier in the season than later, although the flies may seem to be nearly as numerous. Careful study of the insects in the field shows that they assume two characteristic positions, one while feeding and the other while resting. It is the resting position in which they are always found when upon the horns. In this position the wings are held nearly flat down the back, over-lapping at base and diverging only moderately at tip. The beak is held in a nearly horizontal position and the legs are not widely spread. In the active sucking position, however, the wings are

slightly elevated and are held out from the body, not at right angles, but approaching it, approximately an angle of 60° from the abdomen. The legs are spread out widely; and the beak, inserted beneath the skin of the animal is held in nearly a perpendicular position.

The fly before inserting its beak has worked its way through close to the skin. While feeding, however, the hairs which can be seen over its body do not seem to interfere with its speedy flight when alarmed, for at a fling of the tail or an impatient turn of the head the flies instantly rise in a cloud of a foot or two, returning again as quickly and resuming their former positions.

The horns are not their only resting places, for with the horns black for two inches above their base, we have seen the flies toward nightfall, settle in vast numbers upon the back and between the head and foreshoulders, where they can be reached by neither tail or head. When feeding, they are found over the back and flanks and on the legs. During a rain storm they flock beneath the belly. When the animal is lying down a favorite place of attack seems to be under the thigh and back belly, around the bag. With certain animals the dewlap seems to be badly attacked, while with others this portion of the body is about exempt. Certain cattle, again, will be covered with flies and will lose condition rapidly, while others are troubled but slightly.

On the horns the flies settle thickly near the base, often forming a complete band for a distance of two inches or more. They seem to prefer the concave side to the convex side of the curve of the horn, probably for the reason that the cow can not scrape them off so readily, and one cow was noticed in which they reached nearly to the tip of the horn on the concave side of the curve only.

The time and method of the deposition of the eggs were for sometime a puzzle, but it was clearly shown in the investigations of the Division of Entomology that the eggs are placed in fresh cow manure in daytime, mostly

between 9 a. m. and 4 p. m., and that in laying them the female darts only for an instant from the cattle, immediately after the dung is passed, and that within a little more than a minute afterward all had returned to the animal. They are laid singly, and never in clusters, and usually on their sides on the surface of the wet dung; seldom inserted in cracks.

After the eggs hatch, the larvae descend into the dung, remaining, however, rather near the surface.

The larval stages are passed in from four to six days.

When ready to transform, the larvae evidently descend from the dung into the ground below from a half to three-quarters of an inch. Actual observations were made on larvae in dung in breeding cages where the soil was fine sand, affording ready entrance to the larvae. Where the dung has been dropped upon hard ground, the probabilities are that they will not enter so deeply, and may indeed transform upon the surface of the ground at the bottom of the dung.

The pupa stage may last from five to eight or ten days, so that the full time from egg deposition varies from ten to seventeen days, estimated from the average, as about two weeks. As the flies doubtless begin egg laying soon after issuing from the pupa stage, there is room for a number of generations during even a northern summer, probably from six to eight being common.[4]

THE HORN-FLY IN HAWAII.

From the above and from subsequent remarks it will be seen, that while the horn-fly in the United States and Canada causes more or less loss to the live stock and dairy industries, these places are favored by two distinct seasons, a cold and wet and a hot and dry season. As it requires warm and wet weather for the continual development of generations of horn-flies, it would seem

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[4] Osborn. Insects Affecting Domestic Animals, U. S. Dept. of Agr., Bureau of Entomology, Bul. No. 5, 1896, pp. 116-120.

that the Hawaiian Islands offer an especially favorable breeding ground for this pest. Being solely dependent upon the rainfall, and requiring but little of that, the horn-fly finds here an equable temperature, varying but slightly with the seasons and at no time detrimental to its propagation. Prolonged drouths will check it and ordinary dry weather simply retard it, but climatic conditions which might be called destructive to it rarely occur here.

It is therefore little wonder that, once introduced here, it required but a short time to spread all over the Territory and to multiply to such an extent as to compare favorably in abundance with the worst infested sections of the Mainland.

There is therefore every reason why the scientists of this Territory should give their time and energies to the problem of measures for the suppression of this menace to the only animal food product, beef, which is now supplied by the Territory without importation from the outside.

PREVENTIVE AND CURATIVE MEASURES.

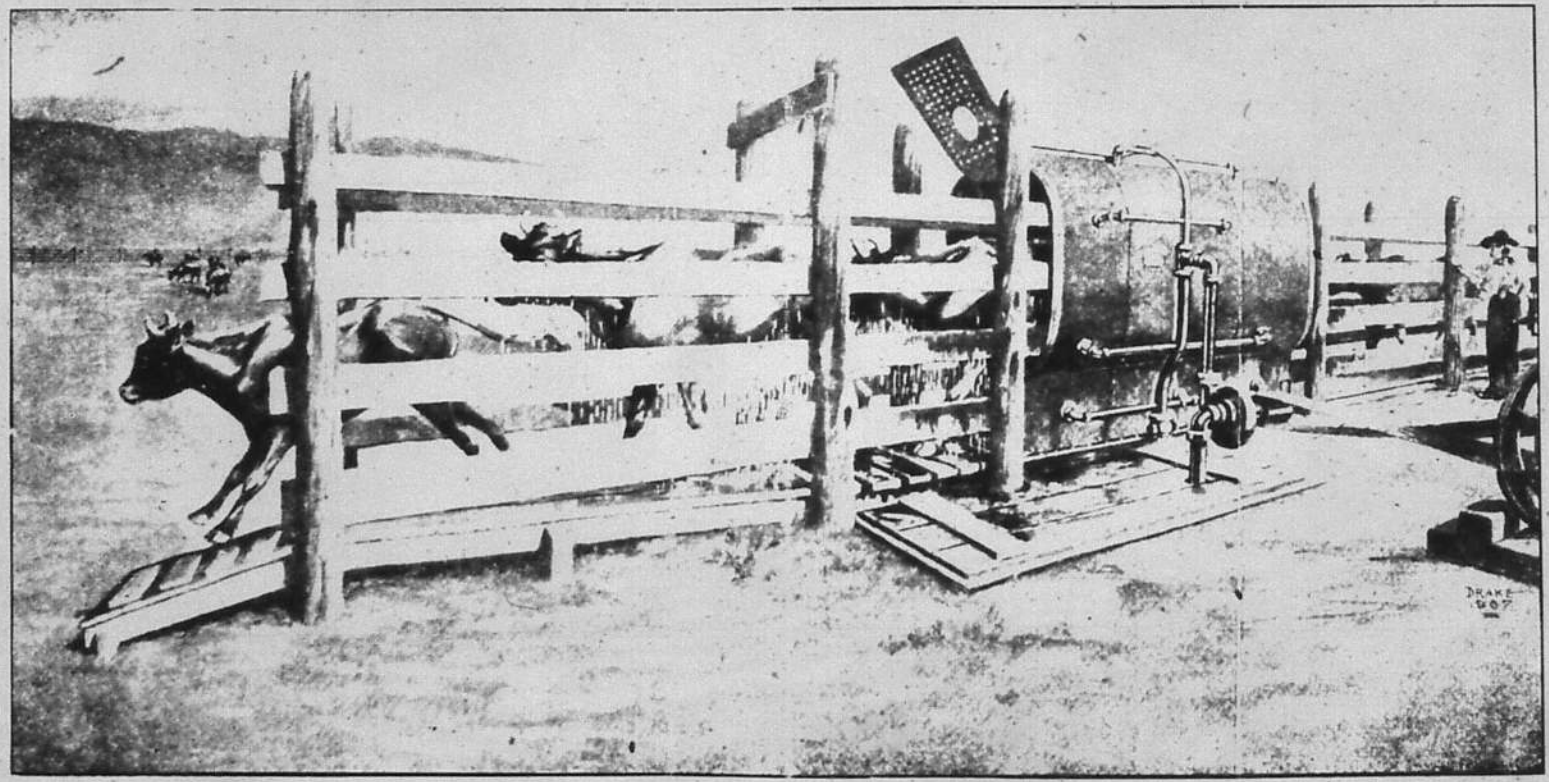
The two lines of control that are offered for the horn-fly are, as with all insect pests, preventive and curative measures. Prevention implies the destruction of the larvae in the cattle dung by direct measures or by the introduction of natural enemies that will feed upon them. Curative measures imply protection to the cattle from the attack of the fly or the wholesale destruction of the adult flies. All of these methods of control have received serious consideration as is testified by the many reports dealing with the treatment of cow-dung to destroy the breeding place of the larvae, the introductions of natural enemies from one country to another, the spraying of cattle with repellant mixtures and the trapping and dipping experiments to destroy the adult fly. These various methods and a discussion of their application to Hawaiian conditions cannot be treated in a report of a general character. The use of repellants, however, does not appear feasible in Hawaii except in the case of our dairy herds, and even here they should be used only in conjunction with preventive measures for the destruction of the larvae in the dung. Prevention, therefore, is the keynote to the control of the horn-fly.

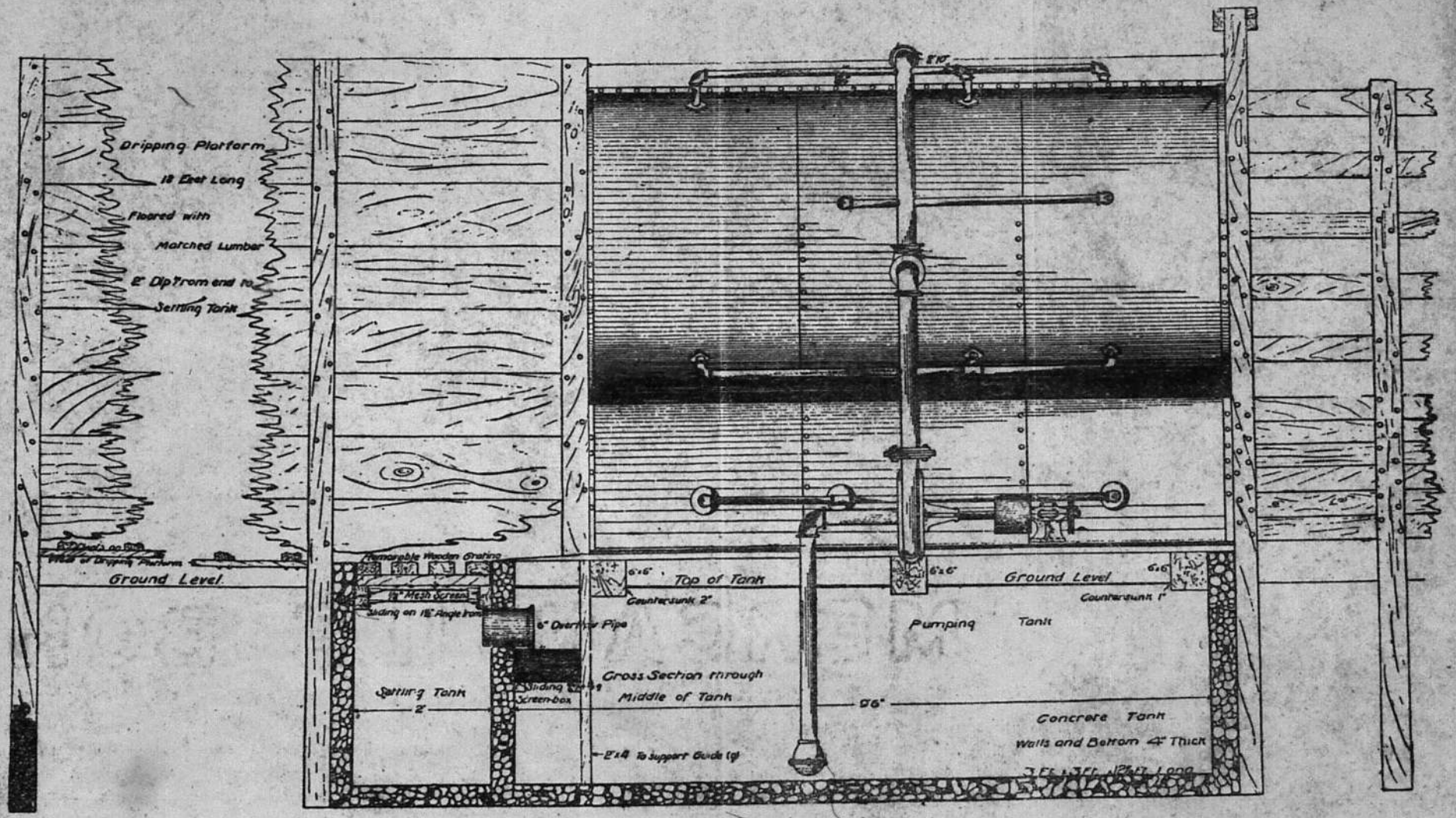
Natural Enemies. The immense areas comprising our cattle ranges and the semi-wild condition of our herds give emphasis to the idea that the only hope of permanent relief for the beef cattle lies in procuring effective natural enemies. The serious menace that faces cattle raising so long as the horn-fly ravages remain unchecked, justifies the continuation of efforts to procure such enemies from abroad and to establish and encourage the development of promising species already within the Territory. This phase of the control work should, however, not detract the stockmen from doing their share towards the suppression of the pest, as the natural enemy side of the control work does not become a factor until the enemy is obtained and established and its value demonstrated. In other words, while supporting morally and financially the investigations relating to this work, the ranchers should not allow the possibility of direct measures of control to pass from their mind. A discussion of the possible introduction of effective natural enemies arouses hope that relief will be obtained from that source, but this hope should not lead the ranchers to discontinue their own individual efforts.

Cooperation by Federal Authorities. While in Washington it was the privilege of one of us (Van Dine) to bring to the attention of Dr. Howrd, the details of our ranch conditions and to emphasize the importance to our live stock industry of gaining relief from the horn-fly. At the time of this conference (last April) Dr. Howard was about to sail for Europe on the work of the importation of parasites for the Gypsy and Brown-Tail moths of New England, but took the time to outline at once a program to aid the Hawaiian stockmen. Field Agents of the Bureau in the West and South were instructed to begin breeding experiments to determine what special enemies of the horn-fly, if any, exist in the United States. These experiments have continued since that time and Dr. Howard says in a recent letter that "I am having extensive breeding work carried on in different sections of the country with the view of securing horn-fly parasites to send to you for possible introduction into Hawaii. I recently visited our laboratory at Dallas, Texas, where Mr. Pratt, of this

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DRAKE
'07


Dripping Platform
18 Feet Long
Floored with
Matched Lumber
2" Dip from end to
Settling Tank
Ground Level.
Removable Wooden Grating
Top of Tank
Countersunk 2"
6" Overflow Pipe
Sliding Screen-box
Settling Tank
2'
Gross Section through
Middle of Tank
2"x4" to support Guide (g)
Ground Level
Countersunk 1"
Pumping Tank
96"
Concrete Tank
Walls and Bottom 4" Thick

Bureau, is carrying on large rearing experiments, and was much interested in his results."

Observations Made in Texas. During the latter part of May, on the way home, Van Dine visited Southern Texas and at Victoria, Mr. J. D. Mitchell, a Special Agent of the Bureau, had already begun breeding experiments relating to the horn-fly. At that season the horn-fly had reached the spring maximum and was generally abundant. Important natural checks in that section are low temperature and lack of moisture. In Texas the horn-fly begins to increase as the weather becomes warmer, which is about the first of March. What is termed the first maximum is reached in May. From May on, dryness prevails and the fly decreases until the fall rains begin and then increases towards the second maximum which is checked when frost appears in the latter part of October. From October to March there is a decrease due to low temperature.

In a recent letter, Mr. Mitchell says that "The past summer has been so long, so hot, and so dry that all flies that breed in cow dung are reduced about 95 per cent. to what they were in May last. The manure dries before the larvae can pupate and where the manure is thin, the intense heat cooks the larvae outright. We have had rain recently (during October) and the weather is cooler, and I can see quite an increase in horn-flies. I have kept several breeding cages going all summer." One point obtained from the tick eradication work in Texas of interest in relation to the horn-fly is that in dipping cattle fully 80 per cent. of the adult horn-flies are killed. This is brought about by their habit of hovering close to cattle even when dipping operations are being carried out. This relief is, of course, only temporary.

Spraying for Horn-Flies. Quite recently a new process of destroying skin parasites on live stock on a large scale, by means of spraying, has been invented by Dr. Geo. T. Seabury, former State Veterinarian of Wyoming. The two accompanying cuts show the spraying machine and the manner of operation. The process, which is endorsed by the U. S. Bureau of Animal Industry, has proved very efficient and at the same time humane,

as compared to the old method of dipping in a vat. The preparation used in the machine and which has proved absolutely satisfactory not alone in protecting the animals from the attack of flies for a certain period, but also for the destruction of flies, ticks, lice, warbles and mange parasites, is very cheap and consists of an emulsion of crude oil in water in the proportion of 20 gallons of oil to 80 gallons of water, with the addition of five pounds of soap. It is claimed that the oil remains on the cattle from six to eight weeks after application and prevents the reinfection with skin parasites, but in the writers' opinion a single spraying will not protect the animals from attacks by flies for any such lengths of time. We believe, however, that great benefit can be obtained from the use of this machine in the wholesale destruction of the adult flies, especially so far as cattle in fattening paddocks are concerned.

It is a well known fact that cattle in a fattening paddock cannot be finished for market while the flies are bad even when the feed is excellent and abundant. It would therefore seem a paying investment if such cattle could be submitted to one or two sprayings thereby affording them perfect rest for at least a month or six weeks before going to market.

The spraying machine in question is portable, that is, the entire outfit, including the gasoline engine, can be hauled on a common farm wagon with a light pair of horses over any kind of road. To install it for use will, however, require pens and chutes, as well as a portable tank to contain the oil emulsion. This tank or trough is set in the ground under the machine and serves at the same time as a receptacle for the waste emulsion.

Freeing a Pasture of Horn-Flies. The habits of the horn-flies are such that they never leave the cattle for any great distance or for any length of time. Whether they rest on foliage or grass is not known, but it is safe to conclude from the observations of many investigators, and from our own experience, that when all of the animals in a pasture are rounded up nearly one hundred per cent. of the adult flies are around or in the neighborhood of the animals, including the cow ponies. As the flies are very light

and so far as is known are not in the habit of traveling or migrating, they are easily carried by the wind. To free a pasture from adult flies would, therefore, simply require that all animals be rounded up and driven with the wind out of the pasture and then put through the spraying machine and back into the same pasture against the wind. To prevent any of the flies returning with the cattle it might be well to build a funnel-shaped canvas-covered guard at the entrance to the machine and a long brush-covered chute at the exit. Two weeks after the first spraying the operation should be repeated in order to destroy the horn-flies which had developed since the first treatment. It is a safe conclusion that all of the flies which are left behind and which are not destroyed in the spraying will assemble on or around the horses of the cowboys and annoy them greatly and if any cowboy returns to the presumably clean pasture thousands of them will follow him.

Still better results might be obtained if the pasture to be freed from flies could be left empty for from two to four weeks after the cattle and flies have been removed, but until something definite is known as to what becomes of horn-flies which are hatched in the pasture where there are no animals to feed on, how long they can live without food and what distances they will travel in search of food, nothing certain can be said in regard to the length of time the pasture should be allowed to rest to completely free it from the flies. From deductions made from observations of other species it is, however, safe to conclude that the above mentionel period, two to four weeks, would be sufficient for the greater majority of them to die.

The Spraying Machine. The spraying machine in question, which is manufactured in Denver, is patented and the price quoted is $600, exclusive of the required eight-horse power gasoline engine. Negotiations have been entered into with the company for the right to manufacture the machine here as the freight from Denver would add to the cost considerably. When a definite proposition has been received the same will be submitted to the members of the Stock Breeders' Association for their consideration. In the mean time an effort will be made to obtain funds

for the purchase of at least one machine for experimental purposes as the writers feel convinced that the horn-fly pest could be checked to a very great extent while efforts are being made in finding and testing natural enemies.

Testimonials furnished by prominent and well-known stock raisers in Texas, Wyoming and Montana are all to the effect that the animals begin to put on flesh immediately after spraying, that no animal has ever been known to be injured during the process and that where sprayed and unsprayed cattle are grazing together the former can be recognized at a distance by the way it feeds without fighting flies with head and tail.

It may finally be added that with a good round-up crew the machine cane take care of three to four thousand head of cattle in a day.

Trapping the Adult Flies. Another manner of destroying the adult flies on a smaller scale and without any considerable outlay is by trapping them. The writers have no personal experience along this line, but quote the following from the Denver Field and Farm of April 25th, 1896:

> "The flycatcher is a kind of covered pen or passageway through which the animal must walk to secure relief. A few feet from the entrance there is a cupalo or dome in the roof of the passageway, made of glass, and arranged as a flytrap. Beyond this the passageway is in darkness. The animal walks through the machine, and just as it passes the dome and enters the darkened part a set of brushes sweeps off the flies, which naturally rise into the lighted dome, and the steer passes out at the other side free from flies. The flies are retained in the dome trap. The inventor has experimented with his machine, and finds that animals soon learn the value of the machine, and know enough to walk through it when the flies begin to bite. The device is said to be patented, but a plan involving the same principles has been in use among farmers for the destruction of horn-flies for a year or two past."

This plan would seem to be especially well adapted for dairies, if it could be so aranged as to compel the animals to pass through the passageway every time they are brought home for milking.

Destruction of Larvae in the Dung. To attend to the individual droppings of animals, however small the number and however easy the method is practically out of the question. It is only where the application of remedies can be done on a scale promising actual returns in proportion to the time and labor expended that this method of control can be at all considered.

It has been estimated that perhaps fifty per cent. of the developing flies can be found in the dung in the vicinity of watering places, pens and shady retreats. The cakes are found in greater numbers and more eggs are probably deposited in them than in those which are dropped in feeding over the range. The same applies to cattle yards near dairies or farms where the animals are being held at milking time. Appropriate treatment of the dung in these places would, therefore, destroy a proportionately large number of larvae. For the benefit of cattle owners and especially dairy men who might wish to attempt this method of eradication, we quote the following:

> "For the destruction of the larvae, which is probably the more effective way of preventing damage, two principles have been established. The first involves the killing of the maggots by introduction of some destructive agent; the other, the prevention of their maturity by the rapid drying of the mass of dung which supplies their food. The use of lime, as originally suggested in Insect Life, is a very effective plan, and where not prohibited by expense should be generally adopted. Professor Smith's suggestion to spread out the droppings of manure so that they may dry rapidly is applicable during dry weather and in some localities is accomplished by drawing brush across the fields, a method which must necessarily fail to be complete in its operation, but much less expensive than the use of a shovel by hand." [5]

[5] Osborn. Insects Affecting Domestic Animals. U. S. Dept. of Agr., Bureau of Ent., Bul. No. 5, 1906, p. 121.

A still more inexpensive method of scattering the dung in yards and pens is to allow a number of pigs to run with the cattle. In their efforts to obtain undigested particles of food they will effectively destroy the cakes as breeding places for the fly larvae, at least during the dry season. This is especially noticeable in cattle feed yards on the Mainland where hogs always follow the cattle, and to a certain extent in the algaroba belts of these Islands.

BIRDS AS ENEMIES OF THE HORN-FLY.

Last year one of the writers (Van Dine) was sent to Washington to look after the interests of the bee-keepers of the Territory. As the bee industry and the live stock industry in many cases are closely allied the opportunity was taken advantage of to confer with the Bureau of Biological Survey of the Department of Agriculture in regard to the possibility of introducing insectivorous birds that would aid in checking the development of flies on our ranches. Prof. Henshaw, the Acting Chief of the Bureau, was consulted along these lines, as well as in regard to the introduction of the turkey buzzard to feed on dead bodies of cattle and sheep and thus destroy the breeding places of various flies. The latter subject will be discussed under the heading of "The Sheep-Maggot Fly," and extracts of the correspondence pertaining to insectivorous birds are submitted herewith:

(Van Dine to Prof. Henshaw, July 20, 1907.)

> "I have read your Circular No. 56 and believe a lasting benefit could be conferred upon Hawaii by the introduction of certain birds. Bryan's idea in establishing an observational aviary in Honolulu is undoubtedly the way to go at the project, and I think that if the people here could be made to see the economic value of such an affair it could be brought about. Of course my interest is confined to the insectivorous birds, and I wish particularly that we could get some birds that would feed upon insects in dung. An old-time Californian informed me that Brewer's black-bird feeds exclusively upon in-

sects and will scatter cow-dung completely about in its effort to obtain the insects developing therein. If true, this would be a fine thing in our horn-fly problem here. Will you give me any information you can on this or other dung feeding birds?"

(Prof. Henshaw to Van Dine, August 5, 1907.)

"I have always believed that it was advisable to introduce certain insectivorous birds into Hawaii, but one cannot be too cautious in their selection of the particular birds. We regard Brewer's blackbird in the United States as a valuable species. It feeds about corrals and is particularly fond of feeding around cattle, nevertheless, it destroys considerable corn in certain localities. With us it does more good than harm, but the question is how the bird would affect the rice plantations in the Islands. The corn crop is not extensive enough to be much damaged, but if the birds should increase and acquire the rice-eating habit, which is by no means impossible, the results can hardly fail to be disastrous.

"So far as the horn-fly is concerned, the cowbird would undoubtedly be one of the very best species to introduce, but the cowbird is open to the same objection that Brewers' blackbird is, namely, the danger that it would attack rice or grain. It is to be remembered that it would while both these birds would unquestionably attack the larvae of the horn-fly successfully, they would also eat all the useful Carabidae.

"There is one bird which may be introduced into the Islands with absolute safety and, although its habit of feeding on dung insects is not so pronounced as in the case of either of the above blackbirds, it would yet render good service in that way. This is the meadow lark. The only trouble that I know of with this lark is that it would be subject to attack by the mongoose as it invariably breeds on the ground. Otherwise, I should recommend it unhesitatingly.

"Why not try some of the fly-catchers? Almost any of the true fly-catchers that are found on the West Coast would be serviceable and I do not see that they can do any harm. It would be difficult to transport the swallows to the Islands from the States, but once there, their value cannot be doubted. Unquestionably they would attack the horn-fly with vigor.

"I will close by simply stating that if you can guarantee the Brewer blackbird will not attack rice, that is your bird so far as the horn-fly is concerned."

(Van Dine to Prof. Henshaw, Sept. 13, 1907.)

"Brewer's blackbird would indeed be a bad acquisition if it destroyed rice to any extent. I think from what you say in your letter, that the meadow lark and some of the fly-catchers would be the only birds we had best undertake to import without very careful observations on their habits. This kind of work we are not in a position to undertake, and it simply emphasizes the importance of establishing here an aviary for such investigations. This, you know, has long been recommended by Bryan at Bishop Museum, and I would like to see him receive the necessary financial support to carry out his ideas. I wish you would tell me in detail what our part of the work would be in getting the meadow lark and some of the fly-catchers here."

(Prof. Henshaw to Van Dine, Nov. 2, 1907.)

"When it comes to the practical business of getting suitable birds from California to the Islands the problem begins to assume a rather serious aspect. I do not believe that an application to import birds for purposes of propagation will meet with any opposition from the State Game Commissioners of California, but I confess that I am at a loss to suggest means of obtaining the birds, even assuming that you had abundant means. Take the short list of birds I give below:—meadowlark, ground towhee (Pipilo crissalis), lark finch (Chondestes

grammacus), horned lark, bluebird, and black phoebe. All these birds are abundant in California, most of them are right hardy, and I think all of them would thrive under island conditions. The black phoebe as an insect eating bird would be particularly valuable as it is a good breeder, somewhat domestic in its habits, and a very active fly catcher. The other species are all adapted to life in the more or less open island districts, and would thrive particularly well in such regions as the Puna region of Hawaii. But how are you to obtain the necessary number of individuals? In order to experiment properly you should have not fewer than 25 birds, and I do not see how these are to be trapped. It is possible that Mr. Leverett M. Loomis, Director of the California Academy of Sciences, would be able to suggest the names of parties from whom some, at least, of these birds might be obtained in numbers, and it might be a good idea for you to address a letter to him on the subject. Perhaps the better way would be to try the experiment on a small scale at first, and the introduction of the meadow lark would probably be the easiest species to obtain and transport. The horned lark, the pipilo and the lark finch are all seed eaters, but when they cannot obtain seeds they live largely on insects, and all of them are lowland birds. It seems to me that it is much more important to procure species that will live in the lower districts now practically unoccupied by bird life than to try to import species that will resort to the woods where practically nobody will see them.

"I may add that I do not consider the importation of a wholly insectivorous species, like the black phoebe, to be practicable, for I do not know of any way in which such birds can be fed, unless possibly they could be induced to take meal worms, and so far as I know, this experiment has not been tried."

The writers have taken up the possibility of the introduction of certain fly-eating birds with Mr. Wm. A. Bryan, of the newly

organized Scientific Institute of the Pacific, and Mr. Bryan offers every encouragement that desirable birds for the purpose in view can be secured and successfully introduced, but emphasizes the necessity of careful local observations on their habits and feeding tendencies before liberation. We are assured by Mr. Bryan that the introductions will be undertaken as soon as provisions are made for the establishment and equipment of an aviary.

THE WARBLE-FLY AND THE HEEL-FLY.

(*Hypoderma bovis*, Deg. and *H. lineata*, Villers.)

One, and possibly both of the bot-flies attacking cattle, have been brought to Hawaii with imported cattle. So far neither of them seem to have become established here.

These flies produce a condition known as bots or warbles or "grub in the back" of cattle."

General Characteristics and Habits. Bots, or Warbles.

Two kinds of bots (Hypoderma bovis and H. lineata) infest American cattle. They represent the larval stages of the heel fly. The adult flies are about half an inch long and resemble bees somewhat in appearance. They appear in warm weather and lay their eggs, especially in the open, upon cattle, often freightening the stock, making them nervous, and even causing them to stampede. It is maintained by some authors that the flies puncture the skin in laying the eggs; other authors deny this, maintaining that the cattle lick the eggs from the skin, so that the infection is through the mouth. Young bots are found in the wall of the esophagus; older bots appear under the skin at various parts of the body. They are also occasionally found in other places, such as deeper in the back, in the spinal canal, etc. The bots are in the body by October or before, and they appear under the skin along the back by January; here they grow until March, April, or May, forming the well-known lumps. When mature, the bots work their way

out, fall from the cattle, burrow into the ground and remain there as pupae for about a month, when the adult fly issues. The adult fly does not bite.

Bots weaken animals, cause a decrease of milk and flesh, and reduce the value of the hide. It is estimated that ox warbles result in a loss to this country of $35,000,000 to $60,000,000 a year.[6]

Preventive and Curative Measures. From the above description it would seem that every effort should be made to prevent the introduction of these flies into Hawaii, but owing to the fact that the larval stage occupies more than six months and that for the greater part of this time the presence of the larvae in the body of the animals is not discernable, it has been found impossible to make regulations for the prevention of their introduction. It is not until the larvae appear in the hide of the back that measures can be taken for their destruction and importers of stock are, therefore, urged to examine their imported animals regularly every two or three weeks for at least six months after arrival.

When the larvae appear in the back they are easily destroyed either by injecting a few drops of kerosene oil through the opening in the swelling, which can be done by using a machinist's oil-can, or by placing a daub of Stockholm tar over the opening. When the warbles are nearly mature and have begun to extend part of their bodies through the openings they may be pressed out by placing the mouth of an empty bottle on top of the swelling and by steady pressure force the larvae out.

Economic Importance. During the year of 1904 this Territory exported to the Mainland of the United States $73,000 worth of hides and skins,[7] besides what was manufactured into leather and sold to the local trade. There is, therefore, as stated, every reason why this parasite should be kept out of the Territory and it will depend entirely upon the importers of breeding and dairy

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[6] Special Report on Diseases of Cattle. Dept. of Agr., 1904, p. 478.

[7] Ann. Rept. Bureau of Animal Industry, U. S. Dept. of Agr., 1904, p. 503.

cattle to see to it that none of the larvae mature and escape from the animals before they are destroyed.

Though no regulation has been promulgated to that effect, the office of the Territorial Veterinarian has made it a rule to thoroughly disinfect the hide of all imported cattle immediately after arrival and to destroy all warbles which at that time have made their appearance under or in the hide.

The fact that the adult fly has not been observed here would seem to indicate that natural enemies are present, as the climatic conditions would be favorable for the development of the fly throughout the year. The following account of the manner and extent of injury from these flies is here included to emphasize the necessity for local inspection and subsequent coöperation on the part of the importers. While we congratulate ourselves on immunity it is well to keep in mind the necessity for continual vigilance.

> The losses from warble flies must be considered from three distinct points, only one of which can be estimated with any great accuracy. They are (1) the loss incurred on the hides perforated by the maggots, subjecting them to discount or rejection in the markets; (2) the loss in milk and beef supply caused by the fretting and stampeding due to the presence of the flies when laying eggs, and (3) the loss to the vitality of the animal, its weakened condition, and consequent loss in milk or beef due to the presence of the warbles, with accompanying ulcers in the back, sometimes, it is asserted, resulting in the death of the animal.
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> The loss on hides will vary in different countries, both from the actual differences in abundance of warbles and consequent perforations of the hides and from the different rates of discount applied by different dealers.[8]

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[8] Osborn. Insects Affecting Domestic Animals. U. S. Dept. of Agr., Bureau of Ent., Bul. No. 5, 1896, pp. 88, 89.

INSECTS AFFECTING SHEEP.

THE HAWAIIAN SHEEP-MAGGOT FLY.

(*Calliphora dux*, Eschscholtz.)

A number of flies have the habit of depositing their eggs in either flesh or decaying meat when the same is left exposed to their attack. Some of these flies deposit their eggs in wounds of living animals when the same are left unattended and become foul.

During the War of the Rebellion wounded soldiers left on the battle fields over night frequently had their wounds blown and suffered greatly in consequence. Epidemics of blow-fly have, however, been practically unknown until recently. On the Mainland of the United States the only fly of this class which causes trouble of any consequence is the screw-worm fly (*Compsomyia macellaria*) and this species very rarely attacks sheep. In his report to the Stock Breeders' Association Nörgaard described a few cases of screw-worm in sheep which had come under his personal observation in this Territory, and warned against the danger of this fly gaining a foothold here. Since that time only one case has been observed, but the screw-worm fly has been supplanted by a new species, *Calliphora dux*, which has worked great havoc among the sheep and lambs on various islands of this group.

Similar epidemics, though less severe, have been reported from Australia. The Hawaiian and the Australian flies in question, though different species but closely related, have in neither case been known before to attack uninjured living animals. The English blue-bottle fly (*Lucilia sericata*) has on the other hand been known for years as a troublesome insect to sheep at certain times of the year and under certain conditions, as will be referred to later.

A New Parasitic Fly. The Hawaiian sheep-maggot fly was first collected by us on Molokai and was forwarded to Washington for determination. Mr. D. W. Coquillett of the Bureau of Entomology of the Department of Agriculture, determined it as above. The species has never been recorded from the Terri-

tory of Hawaii and is here treated for the first time as an animal parasite. No reference can be found in the literature of animal parasites, where a practically obscure species, supposedly infesting only dead animal tissues, has so suddenly adapted itself to living animals with such serious results. The outbreaks that have thus far come to our notice are sufficient to place the species in the front rank as the most serious pest that stockmen in Hawaii will have to deal with where sheep raising is of importance.

The fly is probably of comparatively long standing in this Territory, and while details are not at present worked out, enough information is at hand to show that sporadic cases of "blown" sheep have occurred in past years without epidemics resulting from them. Our understanding of our own species has been extended by references to similar injury to sheep from different, though related, species in the British Isles and Australia. The problem is far from solved and calls for extended and detailed study before definite conclusions can be given.

Characteristics and Habits. The fly itself can be recognized as the bluish green metallic species that breeds wherever decaying flesh is left exposed. On the ranches where it occurs, it is always attracted in numbers when slaughtering an animal. The fly will "blow," that is, deposit its eggs, on any exposed meat or in any wound, but preferably when the same has become foul. Its development as a parasite of sheep in this Territory began by the fly blowing the scars from sheep-scab that had been irritated to bleeding by the horn-fly. The attack of the fly, combined with the sheep-scab and horn-fly injury resulted in some instances in the death of the animal and from the carcasses of the dead sheep innumerable flies developed. From this source, the dead bodies, the fly became epidemic and began to blow not only the sheep-scab wounds, but dead wool and wool fouled in any manner, especially that about the crutch of sheep and lambs suffering with the scoures.

When the eggs are deposited on wool the resulting maggots, which appear within twenty-four hours, work down through the wool to the body. They do not attempt to penetrate the unbroken

skin, as do the screw-worm maggots, but work in a constantly moving intermingled mass over the surface, causing irritation which brings about inflammation, suppuration and ulcertation, on the products of which the larvae feed. Then the wool drops off leaving a festering ulcer that is being constantly reblown, while masses of eggs are also being deposited in the filthy wool surrounding the sore. Such an infestation of one week's standing will contain maggots in all stages of development as well as unhatched eggs. When the skin is completely destroyed the maggots penetrate with ease in all directions under the skin, forming pockets, fistulas and sinuses and the animal dies from septicemia or exhaustion.

As the maggots mature they drop to the ground and pupate in the soil. Observations to obtain the length of time for development of larvae and pupae and to obtain other facts concerning the life-cycle are now in progress. The life-cycle does not extend over three weeks and the larvae or maggots develop in less than ten days.

CURATIVE AND PREVENTIVE MEASURES.

Local Treatment. Without going into the details of our efforts to eradicate the blow-fly from infested local herds, the measures employed at the present time are here presented. We have so far failed to find a remedy that in one application will kill the maggots, disinfect the wound and prevent reinfection. The present treatment is a dual one. All loose and foul wool is removed and destroyed and the wound and surrounding skin treated with a mixture of chloroform and kerosene oil in the proportion of 1-10. This dislodges and kills all the maggots. An application is then made with a brush of a mixture of flowers of sulphur and Stockholm tar in equal proportions by measure, to which has been added a small amount of sperm oil (1 quart to 5 gallons of the mixture) to give elasticity to the resulting crust. The wound heals well under the crust, which not alone protects it from being reblown, but also from attacks by the horn-fly. With the exception of very aggravated cases one treatment is as a rule sufficient, but the treated animals must be watched closely as they are

likely to bite at the crust on account of the itching which accompanies the healing process.

Disposal of Affected or Dead Animals. By far the most important measure in dealing with an empidemic of maggot-flies is to locate the affected animals, and this is, to say the least, extremely difficult when the animals are on the open range or in large paddocks, and with sheep which are not used to being herded it is impossible to get near enough to them without rounding up the entire bunch and examine them in a corral. On the open range or in paddocks containing perhaps 10,000 acres only the very worst cases can be seen when they lag behind the bunch from weakness. Such animals may just as well be killed and buried on the spot, and care should be taken to bury them deep enough to exclude the possibility of newly hatched maggots working down to them, as the stench which rises to the surface from a carcass in a shallow grave will cause numerous flies to deposit their eggs on top of it. The writers have seen such a grave, from which the egg masses could be scooped up in double handfuls. This fully illustrates the necessity for disposing effectively of all dead animals, and especially during an epidemic.

Destruction of Eggs and Maggots. Equal care must be taken in destroying all eggs and maggots in pens where affected animals are being dagged or treated. We have seen in such a pen the ground completely covered with newly hatched flies, sitting so close together as to lend a greenish sheen to the surface. Two or three weeks before this observation was made a number of sheep had been treated there for maggots.

The affected animals should be doctered and sheared on a piece of canvas or a wagon sheet and the rubbish collected and burned.

THE TURKEY-BUZZARD AS AN ENEMY OF MAGGOT-FLIES.

The fact that neither mammalian nor avian scavengers exist in these Islands led us to make inquiries in regard to the introduction of the turkey-buzzard. While in Washington one of us (Van Dine) conferred with Prof. Henshaw on the subject, who was

then in favor of its introduction here. Since that time the following correspondence has taken place:

(Van Dine to Prof. Henshaw, July 29, 1907.)

"I had a very interesting trip in Southern Texas and I want to write you particularly in regard to certain information concerning the turkey-buzzard given me by cattlemen in that country. You remember I mentioned introducing this bird into Hawaii to feed upon the carcasses of sheep and cattle on our ranges. The cattlemen tell me that the bird is a great nuisance for the reason that it fouls the drinking water. There will be a good supply of grass and water but they will visit the range and find the cattle not feeding but collected about the drinking places and will not drink until the troughs or tanks are cleaned and fresh water supplied. They also say that the buzzard picks the eyes out of young pigs and will take off their tails and ears. Mr. J. D. Mitchell of Victoria, Texas, could give you more detailed information on the behavior of the buzzard on the range if you desire it."

(Prof. Henshaw to Van Dine, Aug. 5, 1907.)

"Since seeing you I have learned one or two facts about the turkey-buzzard which would require careful consideration before its introduction into Hawaii.

"There is no doubt that the bird fouls drinking water in the State of Texas, and perhaps elsewhere, although until recently I was not aware of the fact. My acquaintance with the bird has been long, and the same may be said of most of the members of our Survey, none of whom appear to have any knowledge of attacks by the bird upon living animals. Nevertheless, it is possible that in the case of newly born young, or of sick or helpless animals, the bird occasionally may attack them. I believe such cases are so rare, however, that they should be allowed little weight in considering the advisability of introducing it abroad.

"There is, however, another and very important reason for exercising caution in introducing the bird into Hawaii, which has only very recently come to my knowledge. It is thought in Texas that the buzzard is instrumental in spreading disease by feeding upon dead cattle and then distributing bacteria among forage grass by means of its excrement. I am not aware that this has actually been proven as yet, but it has at least been suggested as a reason why the birds should be exterminated over the cattle ranges of Texas; and if there is even a fair degree of probability that the bird spreads cattle disease it should make us very cautious about recommending its introduction in any region or country where the cattle business is important."

This ended further consideration of the subject for the time being. Nörgaard is, however, of the opinion that there would be little or no risk connected with the introduction of these birds as long as proper precautions were taken to see to it that no diseases were introduced with them.

In his opinion the buzzard undoubtedly scatters blackleg and anthrax over the Southern States by feeding on the carcasses of animals which have died from these diseases, both of which are caused by spore-bearing bacilli. But neither of these diseases exist here, nor so far as is known any other transmissible disease which could be carried by the buzzards. On the other hand the question arises, what would have become of the live stock industry in Texas and other stock-raising southern and western States if it had not been for the scavenger work done by the buzzards and the coyotes.

The loss of sheep in this Territory during the past year alone, and which to a great extent could have been kept in check by buzzards, was so great that further consideration must be given the question of their introduction, especially if the fly pests should continue unabated during the coming season.

MAGGOT-FLIES IN AUSTRALIA.

The sheep maggot-fly or blow-fly of Australia is *Calliphora oceanicae*, Derc., which similar to the Hawaiian species, has become parasitic only of recent years. As Prof. Froggatt of the Department of Agriculture of New South Wales has given considerable study to this pest, it is deemed of interest to our readers to know his conclusions. We therefore quote him as follows:

> *"History and Life Habits.* In the case of 'blown sheep' which have recently come under notice, the fly or flies, for there may be more than one species in Australia, (two are said to affect sheep in the same way in England), lays its eggs in the soiled wool on the rump or crutch of the sheep, chiefly ewes and lambs, though sometimes wethers are attacked, from which the maggots issue and work their way down to the skin, burrowing about in the roots of the wool, and very soon, through their presence, turning the wool above into a corrupt, evil-smelling felted mass, the skin beneath becoming heated and inflamed with red and blackened blotches. At first, there is little evidence from the outward appearance of the wool, particularly in that of a heavy fleeced sheep, of the swarming maggots beneath. If neglected, the wool sloughs off in masses as the maggots extend their ravages and spread round the crutch, flanks and back, the sheep making matters worse by rubbing herself against tree stumps or biting the wool, so that in the final stage she is covered with ulcerated, festering wounds. The maggots sometimes enter the vagina, and the wretched beast wanders away from the flock into the scrub, where she is literally eaten alive.
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> "When full grown, these maggots crawl out of the wool and drop to the ground, where they change into the pupal form, becoming incased in a close-fitting, hard brown pupal shell, oval in form, which may be buried in the ground or hidden among the rubbish. The perfect fly emerges a week or fortnight later, the length of the

pupal stage being very variable and regulated by the warmth or otherwise of the weather and the season of the year.

"Warm showery weather is the worst for fly, and if rains continue late in the season, when the wool is thick, the worse they become. They are first noticed towards the end of April or May (in some districts as early as March), and continue right through the winter up to shearing, which does not commence in some parts of the north-west till October. The sheep are seldom badly blown in the open plains, those depastured in the hills, scrub, and open forest, on the more sheltered places, suffering most.

"The experienced sheepmen when mustering can very soon spot a blown sheep in the mob, from her restless movements, the constant shaking of her head, and flirting of her tail. It is said that in the Highlands of Scotland the shepherd's dogs sometimes become just as expert in detecting blown sheep, and will pick them out without direction. The sheep maggot, according to Carpenter, was first noticed by William Ellis in a curious old work published by him in Dublin in 1749, and one of the preventive measures then in use in Buckinghamshire was to strew brimstone (sulphur) over the backs of the sheep as soon as the flies appeared. A Sydney gentleman recently told the writer than some forty years ago he looked after his father's sheep in Oxfordshire, which he examined in the summer twice a day (they were hurdled upon fallow land every night), and whenever he saw the eggs of maggots on the wool he spat on a lump of arsenic which he carried in a bag, and rubbed it over the spot. Blown sheep are common in all the pastoral districts of England and Ireland, and the Highlands of Scotland; and the pest has been recorded by Ritzema Bos from France and Holland, but in the latter instance the infestation is said to have occurred among sheep that had been imported from England. There is no record of

their doing any damage in America or the Eastern countries.

"In the course of my investigations I have, besides personal observations, received a great deal of valuable information from squatters and station managers, which I condense in this report. As far as I can learn, 'blown sheep' were unknown in the Riverina districts until about the year 1897. Of course, there were maggoty sheep, when the animals had been worried by dogs, staked in the bush, or, as among the rams, had damaged their heads in fighting; but the blowing of soiled wool, if not unknown, was comparatively rare.

"When the question was first brought under my notice, I thought that it was probably the introduced English blue-bottle fly *Lucilia sericata* that had made its appearance, or failing that, one of our own bush flies that had developed a new habit. In either case we have a very difficult problem to solve, as the conditions of sheep raising in Australia are so different from those in Great Britain, with our immense paddocks containing many square miles of country, in which large mobs of sheep wander, and are only cursorily examined by the boundary rider as he passes on his rounds, unless at shearing time, and up to the present, on the larger leaseholds, most of the stock has been practically untended for months at a time, so that the losses from fly will be very considerable, unless the cost of supervision is greatly increased. One of the reasons that our sheep will be more subject to blowflies is that the old type of ewe, particularly out West, had little or no wool on her legs or crutch; a large percentage were 'bare bellies,' and the wool itself was of lighter texture. Now the ambition of every sheepman is to breed animals with a heavy close fleece extending all over the legs and crutch, so that when the wool gets any length it is very liable to be soiled with the urine. Lambing ewes often have ulcerated sores on the

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woolly portion of the udder simply from local irritation. Daggy sheep of either sex are free from flies, wethers are not often attacked, and weaners until recent years were comparatively free, the ewes and lambs, particularly after marketing, being the chief sufferers. On all hands comes the information that in nearly every district in the State sheep and lambs have been killed by the pest, while the loss in wool shorn from blown sheep is a very serious matter."[9]

As to the *Causes for the Flies Becoming Parasitic*, Froggatt says:

"One of the reasons that these flies have appeared in such numbers during the last few years, in places once more or less free, is on account of the numbers of dead sheep that have covered the land in the drought, and in blowing these they may have even developed a keener sense of smell for foul wool on the backs of the living sheep, just as the New Zealand kaka (Nestor notabilis) is said to have first taken a liking for mutton fat by coming to the freshly flayed sheep skins on the shepherd's fence, which afterwards led to them actually attacking the living sheep to tear out their kidney fat.

"Another factor has been the wholesale poisoning of rabbits, the festering remains of which, hidden in the burrows, afforded suitable food for swarms of maggots to develop in safety from outside enemies. The rabbit poisoning has had a very appreciable effect upon the bird life of the West, and at the present rate of things, there will be hardly any of our insectivorous birds left in the course of a few years. This may bring forth quite as serious a plague as it has suppressed. Locusts, cutworms and many other pests are chiefly kept in check by insectivorous birds; and when they have been all civilized off the face of the land, we may look out for fresh de-

[9] The Sheep Maggot Fly. Misc'l. Publications, Dept. of Agr., N. S. Wales, No. 809, 1905, pp. 1-3.

velopments in insect life, of which the increase of blow-flies in the bush is an example."[10]

Under *Remedies* and *Suggestions* the writers quote the following from Mr. Froggatt's paper:

> "The important question to sheep-breeders is how to combat or check the spread of maggots, in wool, for at the present rate of increase, the sheep-fly may become as serious a pest to the sheepmen as the tick has proved to the Queensland cattlemen. The dipping of sheep is extensively carried out in this State to destroy sheep tick (Melophagus ovinus) and other skin parasites, and in the ideal sheep-dip improves the texture and lustre of the wool. Dipping at one time was done off the shear, but since the advent of the fly-pest many squatters do not dip until six weeks or two months after shearing time, so that there is sufficient wool upon the skin to hold a certain amount of the composition to keep the fly from 'striking.' Most of the advertised dips seem to have a more or less lasting effect, but for fly-maggot those containing sulphur will be found most effective. If fine weather prevails after dipping, the sheep may remain safe from fly for a considerable time, but sooner or later the growth of the wool and the weather reduces its value, and the fly is liable to strike any sheep with soiled wool.
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> "Then we come to the most suitable dressing for blown sheep, and the number of mixtures used by my correspondents seem to suggest that there is much guess-work in their formulae; for while most of them will drive out and kill all the maggots, for the delicate fly-larvae are very easily destroyed by contact poisons, many of them have no lasting effect, and I have seen blown sheep dressed with a carbolic mixture and blown again in three days. When the sheep is well fleeced, the wool has to be first shorn off the infested portion of the

[10] The Sheep Maggot Fly. Misc'l. Publications, Dept. of Agr., N. S. Wales, No. 809, 1905, p. 4.

skin before the maggots can be reached, or the extent of the infestation determined, as soon as the mixture is applied the maggots begin to fall out as the sheep runs away. A mixture of sulphur and oil is not only one of the best as a lotion to the wounds, but also has the most lasting effect in keeping the fly from striking while the wool is still soiled,, as when once blown a sheep is naturally more subject to the fly than a perfectly clean healthy sheep. Though arsenic in small quantities is used in the composition of many advertised sheep dips, it is not advisable to use it in a dressing lotion, particularly when the skin is broken and the sores open and ulcerated, as is so often the case when the sheep has been badly infested. The sheep man wants something handy to carry and safe to use with his hands to rub into the wool. Now, constantly handling arsenic, in any form, will sooner or later affect the user. Taxidermists, in old times, used arsenical soap for preserving birds' skins, and it was quite common for them to have ulcerated fingers, and even lose all their teeth through the use of this compound. In the Monaro country some of the squatters use turpentine 1 part and castor oil 5 parts.

"A mixture of oil and sulphur makes a very good dressing for all kinds of wounds, and both ingredients are deadly to fly larvae, the oil smothering them and the sulphur acting as a contact poison, while the smell drives the adult fly away. Enough sulphur should be added to the oil to bring it to the consistency of thin honey, giving it sufficient density to stick on but not spoiling its penetrative powers. Besides being effective ,this mixture is cheap, sulphur being quoted at 2d. per lb., or 12s. per cwt., and whale oil at 2s. 4d. per gallon. In mixing, if the sulphur is first damped with methylated spirits, it will blend with the oil very much better and more quickly than when used dry.

"Mr. Blyth, manager of Gunnee Station, informs me that he has found sulphur and fish oil of very little value

for treating lambs, after tailing, and has gone back to Stockholm tar and sulphur alone. Of course, the tailed lambs are very different from sheep with blown wool, and the old dressing of tar is probably best in the cutting yard for lambs. I have had a number of sheep dips examined, and find the active properties of them consist either of sulphur and arsenic, or mineral oils containing some form of carbolic in combination. We are at present in the experimental stage as regards the best material for dressing blown sheep, and it can only be settled by experiments. I shall therefore be very glad to get any hints or suggestions that may be made by sheepmen who are interested in the matter, and have opportunities to make their own tests.

"*Preventive Measures.* I have noticed, that when the men are dressing the sheep, a number of well-developed maggots usually wriggle out and fall on to the soil before the dressing is applied. Now, as these creatures pupate in the soil, changing into the chrysalid state, from which the fully developed fly will emerge a few weeks later, where practicable, it would tend to the checking of the next crop of blow-flies if the stockmen carried a bag or sheet around with him, upon which the sheep could be trimmed, and all the maggots and soiled wool, as it is shorn off, could be collected and burnt or destroyed later on; it does not much matter about those that drop from the wool on the sheep after she has been dressed, as the contact with the mixture used would affect them so that they could not pupate.

"As all blow-flies must have some decaying matter in which to breed, it would pay squatters to see that, where practicable, all dead sheep, offal, and such like, instead of being left festering in the sun, should be burnt or otherwise destroyed, for the less matter of this kind lying about the fewer blow-flies will be found about the station."[11]

[11] Sheep Maggot Fly. Misc'l. Publications, Dept. of Agr., N. S. Wales, No. 809, 1905, pp. 4, 5 and 12.

THE ENGLISH BLUE-BOTTLE FLY.

(*Lucilia sericata,* Meigen.)

This species has been taken in company with the blow-fly, *Calliphora dux,* on the Island of Molokai. Of the two flies, *Lucilia sericata* would have been suspected of being responsible for the injury to sheep previous to the determination that revealed the real culprit. Only three specimens have been collected thus far and its presence is interesting only because of the fact that the species is recorded as the common blow-fly of sheep in England and Holland. It is recorded also from France and Australia as an animal parasite. While occurring in the Mainland of the United States it has never been considered injurious there.

Prof. Cecil Warburton, Zoölogist of the Royal Agricultural Society of England, has the following to say concerning maggots in sheep in his report to the Society for 1902:

> "*History and Habits.* Several inquiries have been received with regards to the maggots which are frequently found on the backs of sheep and lambs, and which cause very severe annual loss to the owners of flocks. One correspondent expresses surprise that, while notes are frequently given concerning warble-fly and the sheep nostril-fly, the much more common infestation is passed over in silence by writers on injurious insects. The reason is doubtless this, that the flies which give rise to the maggots on the sheeps' backs are not, in any true sense, sheep-flies at all.
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> "The nostril-fly (or sheep bot-fly, *Oestrus ovis*) requires the sheep in order to complete its life-cycle, and cannot develop without the aid of that animal. It is otherwise with the 'flesh-flies,' whose maggots feed on any sort of offensive or decaying animal matter. The cure of all maggoty sheep at any moment would do little to diminish the supply of these flies, which have no lack of suitable material on which to deposit their eggs. To put it briefly, it is not the sheep as a sheep which the flesh-fly seeks, but it is attracted by the dirty and of-

fensive state in which the fleece happens to be, or by neglected sores on the back of the animal at the time when the eggs are deposited. The question is one of the condition of the animal, and the only plan which seems at all likely to meet the case is to keep the sheep in such a condition of cleanliness and health that they offer no attraction to the fly.

"The particular insect concerned is not so easy of identification as might be imagined, for the maggots, when removed from the sheeps' backs are bred with difficulty. Where the attempts to rear them have succeeded, the insect obtained has not been the common blow-fly, or 'blue-bottle,' but a fly belonging to the genus Sarcophaga or to the genus Lucilia. Sarcophaga magnifica is a large flesh-fly half an inch in length, and vivparours, depositing maggots—not eggs—in the festering wounds of many animals. It has been bred out from maggots in the case of man, horses, cattle, sheep, pigs, dogs, and even geese. Lucilia has several species, but one, Lucilia sericata, has been identified as the cause of severe injury to sheep—or rather lambs—in Holland, the attack being usually associated with diarrhoea and general bad condition. The maggots appeared in the first instance near the vent, the fly being apparently attracted by the presence of faecal matter due to the diarrhoea; but adjacent parts were often infested. Medical recods abound with cases of similar maggot attacks on man, always associated with a filthy condition and the presence of untended wounds.

"The important point to bear in mind is that the clean sound sheep is not in the least attractive to the fly, but that a dirty and matted fleece, accompanied by neglected sores, is an irresistable attraction, and the farmer's attention should be directed, not to the impossible task of extermination of the flies, but to keeping the sheep, and especially the lambs, in a clean and sound condition. Even slight sores should receive prompt attention, and

an antiseptic lotion should be applied, especial vigilance being required in dirty weather.

"It is possible that something might be done, by the application of some ill-smelling preparation such as tar-water, to prevent the flies visiting sheep known to be suffering from sores on the back."[12]

Prof. Sir George T. Brown, another English authority, says:

"Maggots in dead and putrifying substances are repulsive enough to most people, but the disgust becomes something like horror when they are seen or even heard of living in wounds of the skin of man and beast. Sheep, of all animals, seem to be most subject to this kind of invasion, probably because they are more patient than most animals under the infliction, and their thick woolly coats enable the parasites to conceal themselves from observation until it becomes obvious from the demeanor of the stricken sheep that they are suffering. As the mischief that is done by the temporary ravages of larvae is not fatal, very little attention appears to have been given to the subject by agricultural and veterinary writers. Several species of flies according to the different authors, are concerned in the attacks upon the sheep ,among them the large blow-flies (Calliphora vomitoria, Lucilia caesar); also Sarcophaga carnaria, Lucilia macellaria, and others.

"The effects of an attack of the fly are well known to the shepherd. A small wound, which would naturally have healed in a very short time, is soon converted into a large cavity, filled with decomposing material and the larval parasites, unless molested, continue to burrow in pursuit of their food until they arrive at the stage when they fall off naturally into the soil to complete their transformation into the mature insect. General constitutional disturbance is the natural consequence of the local rav-

[12] Annual Rept. of the Zoölogist, Journal of the Royal Agr. Soc. of England, Vol. 63, 1902, pp. 297, 298.

ages of the maggots; the sheep fall away in condition, their appetites are impaired. In fact, it is impossible, under the circumstances, with the constant irritation which they suffer, for them to feed in comfort or enjoy their natural rest.

"*Prevention and Curative Treatment* is perfectly simply in principle, but in practice demands a large amount of personal attention. In countries where sheep are habitually housed, ingenious devices in the form of fine network, covering the windows and other openings, are adopted to exclude the flies. When the flock is turned out protective coverings are applied to the head and hinder parts of the sheep, which flies are fond of attacking, particularly if wounds from slight injuries are found about the head, as they often are. Such arrangements are not likely to find favor with English flock-masters and shepherds, further, the protection against the flies in sheds or houses is rarely wanted, as sheep are seldom housed, and probably never in the summer and autumn, when flies are most abundant and active.

"A more convenient plan would be to render the skin and wool of the sheep uninviting to the insects by the use of medicated fluids, having either an objectionable odor or nauseous flavor—or both Several mixtures are recommended for this purpose. For example, a weak decoction of tobacco (about a quarter of an ounce boiled in a quart of water), or a very dilute solution of aloes, which dissolves readily in hot water; or a few grains of asafoetida, dissolved in vinegar, and then diluted with water, are preparations easily made, and they are harmless. The use of these remedies involves labor, and flock-owners will not for a moment question the prominent part which a good shepherd will play in any efficient system of prevention and cure. From the mere habit of constant association and observation, the shepherd can hardly avoid obtaining more knowledge of the habits of the flies, their modes of attack, the atmos-

pheric changes which suit them best, and generally the circumstances which are favorable to them, as well as the condition of the sheep which are most likely to become victims, than he cares to put into words, often perhaps because his views are not asked for. In any case, it is not unreasonable to expect that the guardian of the flock should take some interest in the welfare of the animals, and be prepared to exercise the necessary care to protect them from injury.

"Flies which attack sheep are not nocturnal in their habits; on the contrary, they appear boldly in the daylight—do not, in fact, object to a glaring sun, so that they may be seen at their work. It has been said that a dog can detect a fly-blown sheep, but the flies themselves are perhaps a better evidence, as their presence is quite a sufficient indication of their intentions. The shepherd must, moreover, be aware of the fact that a very close, muggy day—as his own expression most probably would be—is the time which flies select to attack the sheep rendered sleepy and sluggish by the climatic conditions. Again, every weakly sheep, especially the youngest members of the flock, are the first victims to be selected; and young or old sheep suffering from diarrhoea are eminently attractive subjects. The adherence of solid and fluid excreta to the wool calls for constant attention from the shepherd and his shears; otherwise, the collection of decomposing manure will offer an irresistible temptation which the insects are not likely to resist. All these obvious attractions to flies afford no excuse for neglect, but rather indeed, a stimulus to action.

"Curative measures, when suspicion is aroused, as it should be in the above described conditions, ought not to be delayed. The most likely sufferers should be immediately examined in those parts where eggs or larvae may have been deposited. Both eggs and young larvae are visible to the unaided eye. Any wound, however slight, should be carefully noted, and in any case dressed

with disinfecting and astringent fluid. Sheep with diarrhoea are best away from the rest, in a place where they may receive regular attention; and the same thing may be said of all the sickly and feeble subjects.

"There is not so much difficulty in getting rid of the maggots as there is in finding them. Local remedies, it is true, less potent than boiling water, do not affect them much; but they are easily scrapped out of a wound into a convenient vessel from which they can be at once transferred to boiling water or to a fire of sticks which may be at hand. To let them escape and hide themselves in the soil to emerge as perfect insects is only to add to the risks of the following season. A dressing of tar oil diluted with olive oil, or a weak solution of chloride of zinc will clean the wound and facilitate the healing process, besides protecting the injured part from another attack of the fly for some time."[13]

THE SCREW-WORM FLY.

(*Compsomyia macellaria*, Fabr.)

This fly was fully described in the Second Annual Report of the Board of Commissioners of Agriculture and Forestry, having been observed by Nörgaard on the Island of Molokai. Since that time it seems to have been completely superceded by the Hawaiian sheep-maggot fly and only one sheep has been seen by the writers which showed evidence of having been attacked by the screw-worn fly. The manner of attack and the lesions produced by the larvae of these two flies are entirely different and can be easily distinguished in all cases where the uninjured skin is affected.

The almost complete disappearance of this pest would seem to confirm the suggestion made in the above mentioned report to the effect that powerful natural enemies of this species must be present in the Territory.

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[13] Maggots in Sheep. Journal of the Royal Agr. Soc. of England, Vol. 63, 1902, pp. 418, 417-420.

THE AMERICAN BLUE-BOTTLE FLY.

(*Lucilia caesar*, Linn.)

This fly of the same genus as the preceding species is recorded from the Island of Hawaii in Fauna Hawaiiensis.[14] Osborn discusses the species as an animal parasite in the United States. Its local occurrence and status will be determined.

THE FLESH FLIES.

(*Sarcophaga barbata*, Thomson, and *S. pallinervis*, Thom.)

The former has been bred in immense numbers from meat during the past season and both have been collected on the Islands of Oahu and Molokai. Living larvae or maggots are deposited on any exposed meat by the adult female. Various species of this genus of flesh flies are recorded in the literature of animal parasites as infesting the wounds of animals. These flies must therefore receive consideration in any general survey of the insects affecting live stock in Hawaii.

THE SHEEP BOT-FLY OR HEAD-MAGGOT.

(*Oestrus ovis*, Linn.)

This injurious fly, peculiar in that it attacks only sheep, is recorded from the Island of Kauai in Fauna Hawaiiensis.[15]

Charasteristics and Habits. The sheep head-maggot fly is a very serious pest in the countries where it has become established. Investigations will be made to determine whether or not the pest has become established on Kauai or elsewhere in the Territory. The fly is one of the most persistent of animal parasites in its efforts to infest its host and is as well one of the most dreaded. The eggs or larvae are deposited in the nostrils of the sheep and the maggots on hatching work their way to the upper part of the nostrils and finally lodge in the frontal and maxillary sinuses.

[14] Grimshaw. Diptera. Fauna Hawaiiensis, Vol. III, pt. I, 1901, p. 28.

[15] Grimshaw. Diptera. Fauna Hawaiiensis, Vol. III, pt. I, 1901, p. 20.

They are with the utmost difficulty dislodged. Though known for centuries, no effective and practical remedy has been discovered for eradicating the pest from a herd of sheep when the same have become infested. The species will be dealt with more in detail in the forthcoming report. In the meantime the following information is quoted from Osborn:

"The flies make their appearance in June and July, and deposit living maggots in the nostrils of the sheep.

"This point may be considered as well established by competent observers, although the older authorities all speak of the deposition of an egg. It may be possible, however, that eggs are deposited in cases where the flies are particularly fortunate in finding their victim without delay, but in such cases the eggs doubtless hatch almost immediately after deposition. The larvae at once commence to work their way up the nostrils and nasal passages, causing great irritation on their way until they reach the frontal sinuses, cavities located between the two plates of the skull and lying one on each side of the central line of the head and between and a little above the eyes. There they attach themselves by the little hooks or tentacula, placed each side of the head, to the membranes which line the cavities, feeding on the mucus which is always to be found in them.

"*Prevention and Remedy.* To prevent it from depositing its young different means are resorted to. Mr. Randall says 'some farmers turn up the soil in portions of pasture so that the sheep may thrust their noses into soft ground on the approach of the fly, while others smear their noses with tar or cause them to do so themselves.' But as the fly is very persevering and generally attains her object, the means to be most depended on is the dislodging of the larvae or grub, and so far lime has been thought the most effectual and should be given them so that by sniffing it they may be made to sneeze, and thus dislodge the grub in many cases. Some sheep

keepers even shut their sheep up for several nights in a tight barn when first taken up in the fall, believing that the close and heated atmosphere induces the grub to descend, and is therefore more easily dislodged, and that the injury accruing from such foul air is trifling compared to the benefit received from dislodging the grubs. Other sheep breeders are in the habit of fixing salt logs in their pastures, of sufficient length to enable all the sheep to get at them. Into these logs, at intervals of 5 to 6 inches holes are bored with a 2-inch auger, and during the season a little salt is kept in these holes, while every few days a little tar is smeared around them with a brush. The sheep in obtaining the salt tar their noses and the odor of the tar keeps the fly away. In severe cases, where the grubs are already in the head, they may be dislodged in a measure by a feather dipped in turpentine, which should be run up the nose and quickly turned. This, of course, can be but partially effective, as it is difficult to reach the extremity of the tortuous canals, and it is in such localities that they must cause greatest difficulties. For the same reason and on account of the great pain caused the animal the use of a wire to remove the larvae as recommended by some should be discountenanced entirely. The burning of sulphur or other destructive substances in a closed room is likely to kill the sheep before reaching the larvae, in their retreats. It would be interesting, however, to determine what effect pyrethrum would have upon them. Valuable animals may be treated by trepanning, to remove the grubs from the sinuses—an operation that should be performed by a veterinarian or skilled operator."[16]

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[16] Osborn. Insects Affecting Domestic Animals. U. S. Dept. of Agr., Div. of Ent., Bul. No. 5, 1896, pp. 103, 104, 105.

INSECTS AFFECTING HORSES.

THE STABLE FLY.

(*Stomoxys calcitrans*, Linn.)

This pest is common in Hawaii, but has not been studied by the writers, but the following information is quoted from Osborn:

> "This well known species is widely distributed and a familiar pest in many countries. Its bite is severe and it causes a great amount of annoyance to cattle, horses, and other domestic animals, and it is frequently very troublesome to people working in places where it abounds. It is not confined to stables or the quarters of domestic animals, but occurs frequently in shady places, groves, and in dwellings, especially in cloudy weather, and puts the occupants to great inconvenience. Its bite is not poisonous, and aside from the pain given and the possibility of its disseminating disease, it is less injurious than some other members of the group. When abundant, however, this annoyance may be very great, and they all deserve attention. Indeed, it is especially charged against this species that they have been the means of transmitting glanders from diseased to healthy horses and anthrax among cattle, a charge which appears very reasonable from the fact that it inflicts a deep bite and does not gorge itself at a single animal, but may fly from one to another in securing a meal.
>
> "It does not appear that the life history of this species has been fully recorded, although it has been stated that the stages are probably passed in dung. In connection with the studies of the horn-fly by the Division of Entomology this species was reared with others from horse manure, and it may be considered as established that the eggs are laid in dung and the larval stages passed there, requiring greater or less time for their development, a number of generations being produced each year. The

prompt disposal of dung would therefore help greatly in reducing the numbers of this pest."[17]

THE HORSE BOT-FLY.

(*Gastrophilus equi*, Fabr.)

This fly is common in the Territory as every horse owner knows who has ever observed the small yellow eggs attached to the hair on the shoulder and front legs of horses.

In regard to the effect of the larvae, the so-called bots, in the internal organs of the horse, opinions differ to a great extent. On this subject Prof. Froggatt writes as follows:

> "Though there is no doubt about the damage that the warble-flies of the cattle and the nasal-flies of the sheep do to the animals they infest, there is a great diversity of opinion as to the effects of bot-flies in the internal organs of the horse; some authors even assert that their presence does not hurt the animal at all, but rather has a beneficial effect. Bracey Clark, who published a treatise on these flies in 1796, was of this opinion, and also the well known naturalist, Reaumur. Vallisnieri, however, attributed to this cause an epidemic which killed an immense number of horses in Italy in 1713, as many of the horses dissected were found to have their stomachs full of these larvae. At the present time, most authorities agree that a horse infested with bot-flies in any quantity (and as many as 400 have been taken out of the stomach of a horse), will lose flesh and waste away. Yet it is very rarely that a horse dies from bots; but where a horse has some other organic disease, the two combined may cause its death, and the bots being found covering the walls of the stomach, are credited with being the sole cause of its death. There can be no question that the local irritation caused by these larvae, each at-

[17] Osborn. Insects Affecting Domestic Animals. U. S. Dept. of Agr., Div. of Ent., Bul. No. 5, 1896, pp. 122, 123.

tached to the membrane by a double hook at the tip of its head, must be very great, though entire perforation of the stomach is very rare.

"*Life History.* The eggs are dull light brown to dirty white in color, elongate oval in form, somewhat pointed, and broadest at the apex. The fly deposits them singly upon the hairs, the shell being coated with a sticky substance that glues them on, so that it is a difficult matter to pull them off. I have had hair taken off an infested horse with hundreds of them, but never saw one hatch out in the jars in which they were kept. These eggs are generally deposited on the jaw, shoulders, or flanks of the animal, from whence, through the animal licking itself, they are conveyed to the lips and mouth, the warmth dissolving the gluey secretion and hatching the enclosed maggots, thus enabling it to crawl out into the throat, from which it gains access to the stomach, and takes up the position which it retains, attached to the coating of the stomach until it is fully developed, when it loosens its hold and is carried through the intestines and voided with the dung; but very soon afterwards it works its way downwards and buries itself in the soil, where it pupates, and from which the perfect fly emerges in about six weeks in the summer time; but the final development is retarded or accelerated by the time of the year in which they are cast out.

"The larvae vary from dull yellow to light reddish-brown, and are of a general oval form, measuring up to ¾ of an inch in length and 5 lines in diameter in the center. The head portion is attentuated and armed with two stout hooks placed back to back, each curving outward, with the mouth between them, and, when in position, these hooks and the mouth are buried in the membrane of the stomach, causing a pit or scar to form, which shows quite distinctly when the bot is detached. The segments of the larvae are very well defined, and each is ringed with a band of regular, short, fleshy

spines, tipped with a black point, which, together with the cephalic hooks, are very distinctive characteristics of the bot, by which it can be easily recognized.

"The fly is about half an inch in length, the male having the abdomen broad and rounded at the tip, but that of the female is slender and elongated, and is generally carried curled down beneath the base of the body. The head is dark yellow, thickly clothed with short golden-yellow down; the thorax clothed with fine pale yellow to light brown hairs or down, which gives it the appearance of a hairy bee. The abdominal hairs are lighter along the sides, and intermixed with shorter black ones on the dorsal surface. When flying about it makes a loud humming noise—a sound which the horses seem to recognize instinctively, for as soon as they hear it they gallop about and show decided signs of fear; yet, as the fly has no mouth, it cannot be caused by the dread of its bite.

"*Remedies.* As a medicine, 2 oz. of turpentine and 20 oz. of raw linseed-oil, mixed and given as a draught once a fortnight, is the best remedy, i. e., if it is thought the loss of flesh of the horse is due to bots.

"Prevention is better than cure, and in any district where the presence of bot-flies is suspected, a watch should be kept during the early summer, and the horses regularly examined to see if they are egg-infested. The eggs can be easily noticed on the hairs of the jaws, legs, and shoulders. They can be removed by grooming, and the horse rubbed with carbolized oil, or washed with carbolic soap, or other oily substances that will not hurt the skin, but are distasteful to the flies, and will deter them from depositing their eggs upon such evil-smelling coats. These flies are said to dislike dark places, and will not enter stables or sheds; so that where only one or two horses are kept, if remaining under cover during the time

when the flies are about, they would be safe from their attacks."[18]

The writers have found that the best method of removing the eggs, which are firmly attached to the hair, is to scrape them off with a sharp pocket knife or a razor. It is only a minute's work to do this and even though the injurious effect of the bot is doubtful it would seem to be well worth the trouble to prevent their development in the stomach of animals.

THE HORSE CHIN-FLY.

(*Gastrophilus nasalis*, Linn.)

This fly, which resembles the preceding one to a great extent, has been collected from both Oahu and Kauai and the specimens preserved in the Diptera collection of the Hawaiian Sugar Planters' Experiment Station. It has not been observed by the writers, but the following is quoted from Osborn:

> "This species has been more or less confused with *equi* in scientific writings and doubtless still more so in general observations.
>
> "The most essential point in habit of this species is the fact that the eggs are laid on the lips or nostrils, within easy reach of the tongue, and as it is quite probable that they hatch more promptly than those of *equi*, it is more difficult to adopt measures of prevention. Measures must consist in preventing, as far as possible, the deposition of eggs, for which purpose the application of a little tar and fish oil to the hairs of the under lip may be of service, and where eggs are suspected, the use of a wash of carbolic acid to the lips and margin of nostrils."[19]

The following parasitic insects affecting domestic animals have been collected by us in various parts of the Territory:

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[18] Froggatt. The Bot-Fly. Misc'l. Publications, No. 432, Dept. of Agr., Sydney, N. S. Wales, 1900, pp. 2, 3, 4.

[19] Osborn. Insects Affecting Domestic Animals. U. S. Dept. of Agr., Div. of Tnt., Bul. No. 5, 1896, ——. 85, 86.

HOGS.

The hog louse, *Hematopinus urius,* Nitzsch.

DOGS.

The dog flea, *Ctenocephalus canis,* Curtis.
The dog tick, *Rhipicephalus sanguineus,* Fabr.
Mosquitoes.

POULTRY.

The turkey louse, *Goniodes stylifer,* Nitzsch.
Lice. (Species undetermined.)
Mites. (Species undetermined.)
Mosquitoes.

PASTURE GRASSES.

Cutworms. (Undetermined.)

Dr. R. C. L. Perkins records *Spodoptera mauritia* as the cutworm most injurious to pasture grasses. He says:

> "This caterpillar is injurious to young sugar-cane and highly injurious to pasture lands periodically, when it is seen in incredible numbers devouring the fresh blades of grass. No parasites reported, but no doubt it is attacked by Tachinid flies. It forms the favorite food of the golden plover and the ring dove." [20]

They are all of minor importance except the mosquitoes which not alone annoy nearly all of the domestic animals by their blood sucking habits and poisonous stings, but which have also been found to be the transmitting agent of the disease known as "heartworm" in dogs. The study of the life-history of these insects, as well as their economic importance, will be continued with a view to finding the most effective remedies for the injuries inflicted by them as well as for their suppression and eradication. In the meantime the writers will be glad to receive from stock raisers and owners, information and suggestions pertaining to the subject under discussion.

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[20] Rept. of the Governor, Terr .of Hawaii, 1902, p. 33.

PROF. KOEBELE'S TRIP TO EUROPE.

Honolulu, T. H., March 25, 1908.

Dear Sir:

It has been suggested tentatively that Prof. A. Koebele be sent to Europe to hunt for parasites of the Horn Fly, and it is our understanding the Board of Agriculture and Planters will pay his salary if the graziers will stand for his traveling expenses.

This is a matter of the greatest importance to the breeders of live stock on these Islands, and this Association urges the graziers to take advantage of this chance to exterminate one of the greatest pests to animal life.

All owners of stock, whether members of this Association or not, are now asked to contribute, and irrespective of what will be given by others will you kindly fill out the enclosed blank showing what amount you are willing to pledge for one year towards a fund sufficient to guarantee Prof. Koebele's expenses, which have been estimated at about $200.00 per month.

Please give the matter immediate attention, and return the enclosed pledge, duly signed, which will enable us to take advantage of the above offer, should it materialize.

Yours truly,

ZENO K. MYERS,
Secretary.
Hawaiian Live Stock Breeders' Ass'n.

In response to the above letter the graziers and those interested responded very promptly and liberally and a sufficient amount to guarantee Prof. Koebele's expenses has been guaranteed.

CATTLE STATISTICS OF THE TERRITORY OF HAWAII.

The following information has been kindly furnished by the assessors in the several taxation divisions and shows by ranches the number of cattle on each Island:

OAHU.

	Head of Cattle.
Oahu Railway & Land Co.	8,562
Dowsett Co., Ltd.	3,508
Kaneohe Ranch Co.	1,710
S. M. Damon	1,215
John Ii Est., Ltd.	753
L. L. McCandless	494
P. D. R. Isenberg	531
Waimanalo Sugar Co.	297
Laie Plantation	398
Heeia Agri. Co.	254
Kualoa Ranch	253
P. M. Pond	278
Ant. Perry, et al.	206
Waianae Company	154
Geo. H. Holt	152
M. P. Robinson	143
W. G. Irwin	104
Ahuimanu Ranch	162
Chas. Lucas	101
Frank Andrade	113
Ant. Lopez	35
Woodlawn Dairy	116
J. P. Mendonca	11
Sylvano Nobrega	22
R. W. Holt	50
Frank Gouveia	21
Total	19,583

KAUAI.

	Head of Cattle.
Gay & Robinson (Niihau)	505
Gay & Robinson (Kauai)	330
Knudsen Bros	806
Koloa Sugar Co	1,045
Lihue Plantation Co., Ltd	1,527
Grove Farm (G. N. Wilcox)	665
Rice, W. H., Sr	883
Kilauea Sugar Co	841
Princeville Plantation Co	1,016
Total	7,618

HAWAII.

	Head of Cattle.
W. H. Shipman	5,726
J. S. Canario	78
R. A. Lyman	315
O. T. Shipman	600
Kapapala Ranch	6,615
Hutchinson Plantation Co	5,564
Kahuku Ranch (Col. Norris)	2,500
J. D. Paris	1,061
H. N. Greenwell Est	4,529
John A. Maguire	4,108
Robt. Hind (Puuwaawaa Ranch)	3,550
A. P. Moranho	134
John Gaspar	65
J. G. Henriques	123
John Broad	112
Manuel Gomes	428
Mrs. E. Roy	330
W. F. Roy, Jr.	272
W. H. Johnson	270
J. D. Johnson	270

	Head of Cattle.
Mrs. C. J. Robinson	300
J. D. Ackerman	100
Parker Ranch	27,560
Kahua Ranch (J. F. Woods)	3,536
Kohala Ranch Co. (Puuhue)	3,429
Puakea Ranch	1,951
Kohala Sugar Co	286
John T. Baker	185
Kukaiau Plantation Co. (Horner)	4,942
Total	79,340

MAUI.

	Head of Cattle.
Wailuku Sugar Co	21
Haw. Commercial & Sugar Co	1,500
J. H. Raymond	3,528
Kahoolawe	5
W. B. Keanu, "Kahakuloa"	76
W. L. Decoto, Lahaina	88
Pioneer Mill Co	30
Honolua Ranch	1,508
Olowalu Company	350
Est. W. H. Cornwell	200
Pika, Kaupo	20
Ant. Veira, Kaupo	102
P. P. Inaina, Kaupo	10
K. N. Kamuha, Kaupo	12
Natives Kipahulu	34
Drummond and families	303
Natives scattering from Pukuilua to Keanae and Wahinepee	100
T. K. Clark	100
Mrs. W. F. Pogen	33
P. N. Kahokuoluna	15
Henry Birch, Huelo	45

	Head of Cattle.
D. N. Opunui, Huelo	12
Francisco Pacheco, Huelo	35
J. K. Smythe, Huelo	62
Scattering Huelo	41
J. L. Neves	48
Scattering, Huelo, Peahi, Haiku, Paia	143
J. Kaluna, W. O. Aiken, and et al	173
John de Costa, Kaupakulua	82
Portuguese and others	241
Tavares Bros., Makawao	101
G. M. Maalo, Makawao	121
J. F. Philips, Makawao	181
A. F. Tavares, Makawao	105
Scattering in Makawao	330
Scattering in Waiakoa to Kamaole	483
Enos Ranch and Robinson Ranch	659
R. von Tempsky	282
Est. W. H. Cornwell	4,000
Maui Agricultural Co	1,794
Haleakala Ranch Co	4,128
Total	21,101

MOLOKAI.

	Head of Cattle.
American Sugar Co	5,359
H. R. Hitchcock, Kaluaaha, Pukoo	83
Mrs. E. N. Nakuina	50
Mrs. C. C. Conradt, Pukoo	36
Ed. Duvauchelle, Pukoo	15
O. Tollefson, Pukoo	75
Theo. Meyer, Kamalo	72
Otto S. Meyer & Bros., Kalae	404
J. F. Brown	166
H. McCorriston	75
Total	6,335

LANAI.

	Head of Cattle.
Chas. Gay	256
Est. W. H. Cornwell	300
Total	556

STATISTICAL TABLE SHOWING LIVE STOCK DELIVERED TO SLAUGHTERHOUSE FROM JULY 1, 1905, TO JUNE 30, 1906, WITH WEIGHTS AND VALUE OF SAME.

	CATTLE			CALVES		SHEEP AND LAMBS			CATTLE		SHEEP	
OWNER	No.	Weight	Amount	No.	Amount	No.	Weight	Amount	Av. Weight Per Head	Av. Price Per Head	Av. Weight Per Head	Av. Price Per Head
American Sugar Co....	579	230,658	$ 17,930.65	...	$.....	1052	35,368	$ 3,565.60	398	$31.31	34	$3.39
" "	....	.....	.....	...	.....	861	(L) 22,710	2,619.04	...	.....	26	3.04
Brown, J. F.....	....	.....	.....	31	308.54	....	.....	.....	...	.....	..	....
Bolte, C.....	41	20,902	1,843.35	11	147.13	....	.....	.....	510	44.96	..	....
Bucholtz, C.....	30	12,166	829.00	...	.....	....	.....	.....	405	27.65	..	....
Cornwell Estate	58	22,202	1,514.63	168	1,966.30	....	.....	.....	382	26.11	..	....
Dowsett Co., Ltd.....	286	116,156	8,457.65	104	1,511.13	....	.....	.....	406	29.54	..	....
Damon S. M.....	38	15,852	1,169.35	26	489.16	....	.....	.....	417	30.77	..	....
Dimond, W. W., Est...	17	6,254	516.02	6	104.32	....	.....	.....	368	30.35	..	....
Greenwell, Mrs. E. C...	60	30,302	2,752.10	...	.....	....	.....	.....	505	45.37	..	....
Gay & Robinson.....	25	15,190	1,557.05	...	.....	2450	82,303	8,304.40	608	62.28	34	3.39
Gomes, M.....	88	39,900	3,225.58	...	.....	....	.....	.....	...	.....	..	....
Gay & Cornwell.....	....	.....	.....	20	302.58	....	.....	.....	435	37.78	..	....
Humuula Sheep Station	4	2,442	232.10	...	.....	2195	84,101	8,077.62	610	38.02	38	3.68
Haleakala Ranch.....	30	16,094	1,190.43	30	671.09	....	.....	.....	536	39.68	..	....
Holt, Geo.....	10	8,029	561.96	17	275.78	....	.....	.....	424	29.58	..	....
Hitchcock, H. R.....	....	.....	.....	30	368.49	....	.....	.....	...	.....	..	....
Hutchinson Plantation.	179	77,354	5,634.27	...	.....	....	.....	.....	452	31.48	..	....
Isenberg, D. P. R.....	6	1,958	138.09	31	215.39	....	.....	.....	326	23.02	..	....
Kukaiau Plant. Co....	835	447,562	37,248.44	22	310.32	....	.....	.....	544	44.61	..	....
Kahikinui Ranch.....	68	30,830	2,093.71	28	431.09	....	.....	.....	453	30.79	..	....
Kapeohe Ranch	176	95,422	8,015.08	12	188.69	14	737	73.70	542	45.54	53	5.27
Kapapala Ranch	612	293,878	24,290.97	60	912.27	....	.....	.....	480	39.69	..	....
Kohala Ranch	17	8,796	633.41	...	.....	....	.....	.....	517	37.24	..	....
Kahoolawe Ranch	....	.....	.....	...	.....	136	3,565	302.16	...	.....	26	2.22
Lanai Ranch	174	64,224	4,395.33	76	1,084.69	669	17,970	1,632.07	369	25.26	27	2.44
" "	....	.....	.....	...	.....	138	(L) 2,973	322.50	...	.....	21	2.34
Lucas, Chas.....	9	2,744	173.51	2	10.70	....	.....	.....	305	19.28	..	....
Maguire, J. A.....	60	23,596	2,048.04	24	393.34	....	.....	.....	393	34.13	..	....
Mendonca	26	10,034	630.13	...	.....	....	.....	.....	386	24.24	..	....
Meyer, Otto, & Bro...	20	6,714	474.51	80	1,428.99	....	.....	.....	336	23.73	..	....
McCandless, L. L.....	34	13,434	939.45	34	499.40	....	.....	.....	407	27.63	..	....
McCorriston	19	5,216	314.07	8	105.64	....	.....	.....	275	16.53	..	....
Nakuina, Mrs. E. M...	10	3,812	358.33	10	134.08	....	.....	.....	381	25.83	..	....
Oahu R. & L. Co.....	....	.....	.....	20	296.35	....	.....	.....	...	.....	..	....
Parker Ranch.....	2171	1,121,109	95,000.78	155	2,200.57	....	.....	.....	516	43.76	..	....
Puuloa Sheep Station..	....	.....	.....	...	.....	1187	45,598	4,464.94	...	.....	38	3.74
" " " ..	....	.....	.....	...	.....	12	(L) 384	46.08	...	.....	32	3.84
Paris, J. D.....	248	109,476	8,582.33	...	.....	....	.....	.....	441	34.61	..	....
Perry, Antone	15	6,322	492.66	43	562.77	....	.....	.....	421	32.84	..	....
Puakea Ranch	129	63,754	4,908.03	31	657.42	....	.....	.....	494	38.05	..	....
Swanzy, F. M.....	32	13,726	997.01	...	.....	....	.....	.....	429	31.16	..	....
Sundries	57	16,996	1,144.25	108	1,202.29	....	.....	.....	298	20.07	..	....
Shipman, W. H.....	86	62,406	4,412.68	...	.....	....	.....	.....	609	51.31	..	....
Woods, J. F.....	178	78,153	6,347.72	...	.....	....	.....	.....	439	35.66	..	....
Cattle totals.....	6436	3,083,660	$250,980.56	...	.....	....	.....	.....	...	.....	..	....
Calves "	....	.....	.....	1127	$16,879.02	....	.....	.....	...	.....	..	....
Sheep "	....	.....	.....	...	.....	6703	269,642	26,400.49	...	.....	..	....
Lambs "	....	.....	.....	...	.....	1011	(L) 26,067	2,987.62	...	.....	..	....

STATISTICAL TABLE SHOWING LIVE STOCK DELIVERED TO SLAUGHTERHOUSE FROM JULY 1, 1906, TO JUNE 30, 1907, WITH WEIGHTS AND VALUE OF SAME.

OWNER	CATTLE			CALVES		SHEEP AND LAMBS			CATTLE		SHEEP	
	No.	Weight	Amount	No.	Amount	No.	Weight	Amount	Av. Weight Per Head	Av. Price Per Head	Av. Weight Per Head	Av. Price Per Head
American Sugar Co.	638	263,393	$ 20,681.03	5	$ 94.80	688	19,358	$ 1,838.53	413	$32.41	28	$2.68
" "	....	.....	.....	...	.....	40	(L) 1,141	131.95	...	.....	28	3.30
Broad, John	31	10,254	724.03	43	667.42	....	.....	.....	331	23.35	..	....
Brown, J. F.	....	.....	.....	27	276.71	87	2,277	170.56	...	.....	27	1.96
Bucholtz, C.	67	18,244	813.48	21	193.70	....	.....	.....	272	12.14	..	....
Cornwell Estate	57	25,542	1,754.88	47	918.54	....	.....	.....	448	30.79	..	....
Dowsett Co., Ltd.	146	56,882	4,258.31	57	806.57	....	.....	.....	389	29.15	..	....
Damon, S. M.	40	15,400	1,101.05	13	247.96	....	.....	.....	385	27.52	..	....
Dimond, W. W., Est.	....	.....	.....	4	64.70	....	.....	.....	...	.....	..	....
Gay & Robinson	100	55,680	5,368.95	...	.....	250	9,039	903.90	556	53.68	36	3.61
Gomes, M.	91	42,685	3,384.46	1	20.00	....	.....	.....	469	37.19	..	....
Greenwell, E. C.	....	.....	.....	35	667.25	....	.....	.....	...	.....	..	....
Gilliland, R. L.	....	.....	.....	1	29.40	....	.....	.....	...	.....	..	....
Haleakala Ranch	105	56,704	4,596.44	...	.....	....	.....	.....	540	43.79	...	....
Hitchcock, H. R.	4	1,348	88.01	28	389.96	....	.....	.....	337	22.00	..	....
Holt, George	....	.....	.....	8	115.72	....	.....	.....	...	.....	..	....
Hind, Robert	....	.....	.....	20	439.60	....	.....	.....	...	.....	..	....
Humuula Sheep Co.	....	.....	.....	...	.....	2318	72,514	6,876.48	...	.....	31	2.96
Hutchinson Plant	269	114,038	8,461.87	...	.....	....	.....	.....	424	31.46	..	....
Isenberg, D. P. R.	15	4,768	326.78	57	368.62	....	.....	.....	316	21.65	..	....
Kukaiau Plantation	555	283,706	23,646.61	...	.....	....	.....	.....	511	42.60	..	....
Kahikinui Ranch	169	83,018	6,429.98	2	31.40	....	.....	.....	491	38.04	..	....
Kapapala Ranch	89	42,270	3,461.28	...	.....	....	.....	.....	475	38.89	..	....
Kahoolawe Ranch	....	.....	.....	...	.....	170	5,951	564.41	...	.....	35	3.32
" "	....	.....	.....	...	.....	25	(L) 635	69.85	...	.....	25	2.79
Lanai Ranch	211	73,788	4,465.05	31	574.88	519	13,978	.....	356	40.11	27	2.47
" "	....	.....	.....	...	.....	154	(L) 3,838	407.26	...	.....	25	2.64
Lucas, Chas.	3	708	46.40	1	22.20	....	.....	.....	236	15.46	..	....
Mendonca, J. P.	26	11,012	832.52	12	182.82	....	.....	.....	423	32.02	..	....
Meyer, T. T.	8	2,594	194.24	22	370.86	....	.....	.....	328	28.24	..	....
Meyer, Otto	....	.....	.....	46	760.90	....	.....	.....	...	.....	..	....
McCandless, L. L.	122	53,150	4,078.13	162	2,360.67	....	.....	.....	435	33.42	..	....
McDougall	33	12,694	920.01	...	.....	....	.....	.....	384	27.87	..	....
Norris, Colonel	30	13,656	614.37	...	.....	....	.....	.....	455	20.48	..	....
O. R. & L. Co.	120	53,096	4,324.84	42	463.27	....	.....	.....	442	36.04	..	....
Parker Ranch	2641	1,343,549	112,399.74	450	6,466.14	....	.....	.....	508	42.55	..	....
Puuloa Sheep St.	....	.....	.....	...	.....	1018	45,059	4,505.90	...	.....	44	4.42
Paris, J. D.	265	115,808	8,871.48	...	.....	....	.....	.....	437	33.47	..	....
Perry, Antone	31	11,046	890.89	36	497.72	....	.....	.....	356	28.73	..	....
Puakea Ranch	170	88,800	6,937.00	27	585.15	....	.....	.....	522	40.64	..	....
Swanzy, F. M.	40	14,942	969.28	5	67.83	....	.....	.....	373	24.23	..	....
Shipman, W. H.	300	159,588	13,587.24	...	.....	....	.....	.....	531	45.29	..	....
Sundries	37	11,882	756.41	88	873.04	....	.....	.....	321	20.44	..	....
Woods, J. F.	110	45,594	3,527.58	...	.....	....	.....	.....	414	32.07	..	....
Waianae Sugar Co.	....	.....	.....	24	304.45	....	.....	.....	...	.....	..	....
Cattle totals	6523	3,085,839	248,512.34	...	.....	....	.....	.....	...	.....	..	....
Calves "	....	.....	.....	1335	18,862.28	....	.....	.....	...	.....	..	....
Sheep "	....	.....	.....	...	.....	5050	168,176	16,143.99	...	.....	..	....
Lambs "	....	.....	.....	...	.....	219	5,614	609.06	...	.....	..	....