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SHEEP LOSSES IN COLORADO FEED LOTS

Study No. 1

Feeding Experiments

By GEO. H. GLOVER and I. E. NEWSOM

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SHEEP LOSSES IN COLORADO FEED LOTS

By GEO. H. GLOVER and I. E. NEWSOM

In the fall of 1899, two brothers, I. W. and E. J. Bennett, fed the first lambs in the Fort Collins district. With this small beginning, the feeding industry has grown in Colorado until now, in favorable years, more than a million and a half lambs are winter fed within the State. Some of the lambs originate in Colorado, but most of them come from New Mexico, Arizona, Wyoming, Montana, Idaho and Utah. It is customary to ship them in from the ranges during October, November and December, and after a feeding period of from three to five months, ship them out again to eastern markets.

At present there are three lamb-feeding districts within the State; namely, Northern Colorado, the Arkansas Valley and the San Luis Valley. The Northern Colorado district embraces that territory contiguous to such towns as Longmont, Loveland, Fort Collins, Greeley, Fort Morgan and Sterling, where about a million lambs are fed each year. The Arkansas Valley district is that area contiguous to the Arkansas River between Pueblo and the State line. Lamb feeding has never been practiced extensively in this district, but a few thousand are fed there every winter. The San Luis Valley is a high mountain park, having an altitude from 7500 to 8000 feet, and is about 40 miles wide and 100 miles long. However, most of the feeding is done in the vicinity of Monte Vista and Del Norte. As many as 500,000 lambs have been fed in this district in one year, but in recent years this number has dwindled to from 50,000 to 100,000, owing largely to the death loss which has developed.

The feeds used are approximately the same in the first two districts; namely, alfalfa for roughage, with corn and barley shipped in from Kansas and Nebraska for the grain feed. Occasionally beet pulp is used to some extent and oats may be added to the grain ration. In the San Luis Valley, however, alfalfa forms practically no part of the usual ration, nor is it feasible to either raise or ship in barley or corn in any considerable quantity. Field peas, however, do well at this altitude and are raised extensively. It is the practice to allow the lambs to harvest the peas in order to save labor. Consequently, the lambs are placed on the peas just a few minutes each day at the beginning and this time is gradually increased until near the end of the feeding period when the lambs may be allowed on the peas several hours each day. No other grain or roughage is ordinarily used. The feeding period averages about 100 days, after which the lambs are sent to market.

In the earlier years in these districts, the loss from disease was practically negligible, but in more recent years the losses have

been particularly heavy, and in the eastern district, are especially noticeable within the first two or three weeks of the feeding period, whereas, in the San Luis Valley, the losses are usually most apparent after the animals have been on the peas for thirty days or more. While the Experiment Station has been somewhat concerned with these losses during the past 10 or 12 years, no definite experiments were outlined until the fall of 1916. Since that time, a considerable amount of investigative work has been done, and much data compiled. From time to time papers have been published in veterinary journals and an extension bulletin was issued from the Colorado Agricultural College, dealing with these maladies. (1) (2) (3) (4) (5) (6). It has seemed desirable, however, to set down in considerable detail much of the data which has been accumulated, even though some of it may have been previously published. As a consequence, it is our purpose to publish a number of studies under the general title as given above.

GRAIN FEEDING SUSPICIONED

It was early noted that the outbreaks were associated with diarrhea and that, on post mortem examination, the fourth stomach and duodenum were frequently inflamed. Since in the Fort Collins district, at least, the most serious troubles came within the first two weeks after arrival in the pens, and at a time when the lambs were just beginning to eat grain, there was a strong suspicion that the grain feeding was the cause. A few cases which are typical of the conditions at the time, will suffice to illustrate this point.

Lot No. 2

A lot of 2,650 Wyoming lambs was first visited on December 24, 1916, near Timnath, Colorado. They had been in the pens for two weeks and at that time were getting three-fourths of a pound of barley a day. The owner explained that he had been feeding sheep for thirteen years, but had never increased the grain ration quite as rapidly as this before. Neither had he had any appreciable loss in previous years. At the time of our visit, some 35 lambs had died and a few were showing diarrhea. Post mortem examinations were made of two that had died the night previously. Bright red hemorrhagic areas were present in the small intestines, and in one of them a highly inflamed fourth stomach. Tape worms were present in the bile ducts and also in the small intestines. The lungs were normal, but one animal showed a severe laryngitis.

On December 26th the place was visited again. The owner had lost three the previous night. A sick and a dead one were brought to the laboratory for examination. The dead one showed the presence of tape worms and a hemorrhage fourth stomach, but no other lesions. Visits were made from time to time during the next month. The lesions in those posted varied from an extensive

inflammation of the gastro-intestinal tract with laryngitis, tracheitis and pneumonia to a few pin-point hemorrhages in some of the serous membranes. The owner found that when he cut down his grain ration the losses would seem to disappear, but that when he began to increase they began again. Finally, he fed them as had been his custom in previous years and took his losses, which amounted to 95 head during the feeding season.

Lot No. 4

Located six miles northwest of Fort Collins, was a lot consisting of 1100 Wyoming lambs that had been on feed for a period of three months. They had been started on barley but about two weeks before the date of our visit, they had been suddenly changed to whole corn. Since that time, the loss had been about 50 head. The place was visited on January 27th, 1917, at which time the owner had reduced the grain ration, but some sheep were still dying. One animal had died just previous to our arrival but there were no lambs sick. The pens appeared dry and the hay was of excellent quality.

The post mortem examination on the dead lamb showed little of significance, outside of a rather severe inflammation of the first twelve inches of the duodenum and of the mucous lining of the bile duct. Several tape worms were present in the bile duct, as well as in the duodenum.

No particular recommendations were made, but the loss gradually subsided and the balance of the sheep were fattened in the usual time.

Lot No. 6

This lot consisted of a thousand head on feed six miles northeast of Fort Collins. The animals had been on feed for about two months. They were in a very good state of flesh, being strong and vigorous. The lambs, without apparently showing any preliminary symptoms, were frequently found dead in the morning, or in a few instances they would die during the day, being sick only a few minutes previous to death. Several were brought to the Station for autopsy, but no lesions whatever were discovered. This being one of the very early cases, it is quite possible that lesions, if they did exist, were overlooked. At the time, no cause could be assigned for the loss. Later the owner reported that he had found the cause of the difficulty.

Previous to the beginning of the outbreak, there had been an extremely heavy snow which prevented those in charge of the feeding from bringing grain to the lambs for some four days. When the grain was delivered, the owner suspected that the lambs were overfed and that this was accountable for the death. Whatever may have been the real cause, some 95 head were lost before the disease stopped.

Other cases might be given but these are probably sufficient to show that suspicion strongly pointed to the feed. It was, therefore, customary in those days to advise feeders to cut down the ration, even though in many instances this procedure seemed not to be very valuable.

In Cornell Bulletins Nos. 285 and 305, a condition is described which Wing calls "Apoplexy" and which may or may not be similar to curs. (6) At any rate he concludes that it is due to overfeeding.

Since the gastro intestinal tract was so frequently affected, it was very early supposed that food was the chief factor in the losses. We conceived the idea that it would be possible to destroy feeding lambs by allowing them to change grain, and that by carefully planned experiments, we might be able to determine with some degree of accuracy how much of the various grains and under what conditions it would take to produce death. In order to determine this point, feeding experiments were carried on during the winter of 1916-17, and also during 1917-18.

FEEDING EXPERIMENTS OF 1916-17

For this work a band consisting of 32 small, thin, rather sickly lambs was purchased and brought to the Station on December 2, 1916. One of the lambs was dead on arrival, another died the same afternoon, and a third on the following day. Nineteen of these that were in fair condition were separated from the others and used for the feeding experiments. The average weight was about 35 pounds. The grain used in the experiment was barley, corn chop and peas, with some combinations, including two or all three of these concentrates. Alfalfa was kept before the lambs constantly and plenty of water was provided. Considerable detail is given in this series, because, to our knowledge, no such details have been previously published.

Barley Chop
LAMB NO. 6

Date	Pounds Grain Eaten	Remarks
Dec. 22		Ration ¼ lb. per day
Dec. 23	0	¼ lb. per day
Dec. 24	0	No more given
Dec. 25	⅛	Grain removed—new put in with little salt
Dec. 26	⅛	¼ lb. given
Dec. 27	0	No grain given
Dec. 28	¼	Ration increased to ½ lb.
to Jan. 24	½ daily	Ration increased to 1 lb.
to Jan. 27	1 daily	
Jan. 28	0	Dull, bloated
Jan. 29		Found dead

This lamb was started on ¼ lb. of barley chop per day raised to ½ lb. on the sixth day, and to 1 lb. on the thirty-third day of the feeding period. It did not eat the ration readily at first, but after the 6th day, the whole ration was consumed, until four days after it had been raised to 1 lb., when the animal was noticed to be dull and bloated, and had not eaten its grain the previous day. It was found dead on the next day with the following post mortem:—

General condition—carcass somewhat bloated, evidence of a diarrhea. On removal of the skin, a considerable number of subcutaneous hemorrhages over the shoulder and loin and on the side on which the animal lay. In the thoracic cavity, there was one large subpleural hemorrhage near the diaphragm on the costal pleura, with a few smaller ones near it. The lungs appeared to be normal and there were several subepicardial hemorrhages. In the abdominal cavity, there were several small, blackened, blood clots in the abomasum. Hemorrhages were numerous in the mucous membrane of the abomasum and in the first 12 inches of the duodenum. There was a heavy, dirty, catarrhal exudate on the abomasal mucous membrane. There were a few tape worms in the bile duct, with a reddening of the lining of the duct and of the gall bladder. There were no tape worms in the duodenum. All other organs appeared normal.

LAMB NO. 5

Date	Pounds Grain Eaten	Remarks
Dec. 22		Ration ½ lb. per day
Dec. 23	0	Given ½ lb
Dec. 24	0	No more given
Dec. 25	⅛	Old removed — new given with salt
Dec. 26	¼	Ration increased to 1 lb.
Dec. 27	1	
Dec. 28	¾	
Dec. 29	¾	
Dec. 30	¼	
Dec. 31	¾	
Jan. 1	1	
Jan. 2	1	
Jan. 3	7/8	
Jan. 4	1	
Jan. 5	1	
Jan. 6	¾	
Jan. 7	¾	
Jan. 8	½	
Jan. 9	¾	
Jan. 10	¾	
Jan. 11	7/8	
Jan. 12	¾	
Jan. 13	5/6	
Jan. 14	5/6	
Jan. 15 to Jan. 18	1	
Jan. 19	2/3	
Jan. 20	5/6	
Jan. 21	¾	
Jan. 22	1	
Jan. 23	1	
Jan. 24	1	Ration increased to 2 lbs.
Jan. 25	1 ¾	
Jan. 26	¾	
Jan. 27	2	
Jan. 28	2	
Jan. 29	1 ½	
Jan. 30	2	
Jan. 31	2	
Feb. 1, 2 & 3	1	
Feb. 4	¾	
Feb. 5	1 ½	
Feb. 6	1 ¼	
Feb. 7	1	
Feb. 8	1	
Feb. 9	¾	
Feb. 10	1	
Feb. 11	1	

Date	Pounds Grain Eaten	Remarks
Feb. 12	1	
Feb. 13	¾	
Feb. 14	½	
Feb. 15	1½	
Feb. 16	1	
Feb. 17	1½	
Feb. 18	½	
Feb. 19	¾	
Feb. 20	1	
Feb. 21	1	
Feb. 22	1	
Feb. 23	1½	
Feb. 24	1	
Feb. 25	¼	
Feb. 26	½	
Feb. 27	½	
Feb. 28	1	
Mar. 1	1	
Mar. 2	¾	
Mar. 3	½	
Mar. 4	¾	
Mar. 5	5/6	
Mar. 6	5/6	
Mar. 7	5/6	
Mar. 8	5/6	
Mar. 9	½	
Mar. 10	¼	
Mar. 11	½	
Mar. 12	¼	
Mar. 13	5/6	
Mar. 14	½	
Mar. 15	1	
Mar. 16	2/3	
Mar. 17	4/5	
Mar. 18	¾	
Mar. 19	2/3	
Mar. 20	1/5	
Mar. 21	½	
Mar. 22	¼	
Mar. 23	2/3	
Mar. 24	3/4	
Mar. 25	3/4	
Mar. 26	¼	
Mar. 27	½	
Mar. 28	½	
Mar. 29	1	
Mar. 30	1	
Mar. 31	1	
Apr. 1	3/4	
Apr. 2	1	
Apr. 3	1	
Apr. 4	1	
Apr. 5	½	
Apr. 6	½	
Apr. 7	3/4	
Apr. 8	3/4	
Apr. 9	¼	
Apr. 10	½	
Apr. 11	¼	Sold.

This lamb was started on a half pound of barley chop per day, increased to 1 lb. on the 4th day and to 2 lbs. on the 29th day of the feeding period. The 2 lbs. were continued until the end of the feeding period, which totals 78 days. No symptoms of illness developed at any time and the lamb never refused food after the first two days.

LAMB NO. 9

Date	Pounds Grain Eaten	Remarks
Jan. 5		Ration 1 lb. with little salt
Jan. 6	3/4	Ration 1 lb. with little salt
Jan. 7	½	Box cleaned—1 lb. given
Jan. 8	0	
Jan. 9	1	
Jan. 10	7/8	Ration increased to 2 lbs.
Jan. 11	1½	
Jan. 12	1/8	
Jan. 13	0	
Jan. 14	0	
Jan. 15	1/8	
Jan. 16	½	
Jan. 17	2	
Jan. 18	½	
Jan. 19	1	
Jan. 20	1¼	
Jan. 21	1½	
Jan. 22	1¼	
Jan. 23	3/4	
Jan. 24	1¼	
Jan. 25	1½	
Jan. 26	½	
Jan. 27	1½	
Jan. 28	1	

Date	Pounds Grain Eaten	Remarks
Jan. 29	1	
Jan. 30	1	
Jan. 31	1¼	
Feb. 1	1	
Feb. 2	1	
Feb. 3	3/4	
Feb. 4	3/4	
Feb. 5	1¼	
Feb. 6	3/4	
Feb. 7	1	
Feb. 8	1¼	
Feb. 9	1	
Feb. 10	1	
Feb. 11	1	
Feb. 12	1	
Feb. 13	1 3/4	
Feb. 14	1½	
Feb. 15	1	
Feb. 16	½	
Feb. 17	2½	
Feb. 18	1/7	
Feb. 19	1/3	
Feb. 20	1	
Feb. 21	1	
Feb. 22	3/4	
Feb. 23	1¼	
Feb. 24	5/6	
Feb. 25	3/4	
Feb. 26	1	
Feb. 27	½	
Feb. 28	1	
Mar. 1	1	
Mar. 2	1	
Mar. 3	1	
Mar. 4	1	
Mar. 5	1	
Mar. 6	1½	
Mar. 7	1¼	
Mar. 8	1¼	
Mar. 9	1¼	
Mar. 10	3/4	
Mar. 11	1	
Mar. 12	1	
Mar. 13	¼	
Mar. 14	1/3	
Mar. 15	1/3	
Mar. 16	½	
Mar. 17	4/5	
Mar. 18	3/4	
Mar. 19	1	
Mar. 20	3/4	
Mar. 21	1	
Mar. 22	1	
Mar. 23	1¼	
Mar. 24	1	
Mar. 25	1	
Mar. 26	3/4	
Mar. 27	1	
Mar. 28	1	
Mar. 29	1	
Mar. 30	1¼	
Mar. 31	1½	
Apr. 1	1	
Apr. 2	1 3/8	
Apr. 3	1	
Apr. 4	1	
Apr. 5	1½	
Apr. 6	1	
Apr. 7	1½	
Apr. 8	1 3/8	
Apr. 9	3/4	
Apr. 10	1½	
Apr. 11	3/4	Sold

Started on 1 pound daily and raised to 2 lbs. on the 5th day, which ration was continued throughout the rest of the feeding period, which totaled 91 days. The lamb refused food on the 3rd, 8th and 9th days, but otherwise ate heartily, and never showed any signs of illness.

LAMB NO. 13

Date	Pounds Grain Given	Remarks
Jan. 30		Ration all it would eat. Given 2 lbs.
Jan. 31	1½	
Feb. 1	1	
Feb. 2	½	
Feb. 3	½	
Feb. 4	½	
Feb. 5	1 3/4	
Feb. 6	1	
Feb. 7	½	
Feb. 8	3/4	
Feb. 9	2/3	
Feb. 10	1	
Feb. 11	2/3	
Feb. 12	½	
Feb. 13	2/3	

Date	Pounds Grain Eaten	Remarks
Feb. 14	0	
Feb. 15	1 1/3	
Feb. 16	0	
Feb. 17	0	Health seemed O.K. during this period.
Feb. 18	0	
Feb. 19	0	
Feb. 20	0	
Feb. 21	0	
Feb. 22	½	
Feb. 23	½	
Feb. 24	½	
Feb. 25	¼	
Feb. 26	0	
Feb. 27	¼	
Feb. 28	½	
Mar. 1	½	
Mar. 2	1	
Mar. 3	1	
Mar. 4	1	
Mar. 5	1	
Mar. 6	1 ¼	
Mar. 7	1 ¼	
Mar. 8	1	
Mar. 9	3/4	
Mar. 10	5/6	
Mar. 11	1	
Mar. 12	3/4	
Mar. 13	½	Dull Feces soft
Mar. 14	0	Dull Feces covered with mucus
Mar. 15	0	Health fair
Mar. 16	0	Health fair
Mar. 17	¼	Health good
Mar. 18	½	
Mar. 19	1	
Mar. 20	1	
Mar. 21	3/4	
Mar. 22	¼	
Mar. 23	5/6	
Mar. 24	3/4	
Mar. 25	5/6	
Mar. 26	1	
Mar. 27	1	
Mar. 28	1	
Mar. 29	1½	
Mar. 30	1¼	
Mar. 31	1¼	
Apr. 1	1¼	
Apr. 2	½	
Apr. 3	1 3/8	
Apr. 4	1	
Apr. 5	1 3/8	
Apr. 6	1	
Apr. 7	1½	
Apr. 8	1 3/8	
Apr. 9	1½	
Apr. 10	1 3/4	
Apr. 11	1	Sold

This lamb was given all the grain it would eat from the beginning. The old grain being removed daily and new grain added —always in such an amount as would allow some to be left over. It is particularly interesting that while the lamb had had no grain previously, it ate 1½ lbs. on the first day. It continued to eat heartily until the 16th day when it refused grain. It ate no grain from the 18th to the 23rd day, but appeared in as good health as ever during all of this period. On the 33rd day, it was noticed to be dull and showed some scouring. The same condition existed the following day, after which it rapidly improved. No grain was eaten on the 34th, 35th or 36th day. Following this indisposition, the lamb remained in good health to the end of the 72-day feeding period.

LAMB NO. 19

Date	Pounds Grain Eaten	Remarks
Feb. 7		Ration—All it would eat
Feb. 8	1½	
Feb. 9	1/8	Dull, listless
Feb. 10	0	Dull, listless
Feb. 11	0	Feels better
Feb. 12	0	Feels better.
Feb. 13	1/8	
Feb. 14	1	Seems all right.
Feb. 15	1	

Date	Pounds Grain Eaten	Remarks
Feb. 16	1	
Feb. 17	1 1/4	
Feb. 18	1/8	
Feb. 19	1	
Feb. 20	1 1/2	
Feb. 21	2/3	
Feb. 22	1 3/4	
Feb. 23	1 1/2	
Feb. 24	1 1/4	
Feb. 25	1 1/3	
Feb. 26	1 1/2	
Feb. 27	1 1/2	
Feb. 28	1	
Mch. 1	1	
Mch. 2	1 3/4	
Mch. 3	1	
Mch. 4	1	
Mch. 5	1 1/2	
Mch. 6	1 1/4	
Mch. 7	1 1/4	
Mch. 8	1	
Feb. 9	3/4	
Mch. 10	1	
Mch. 11	1 1/4	
Mch. 12	1 3,	
Mch. 13	1½	
Mch. 14	3/4	
Mch. 15	1 1/4	
Mch. 16	1 1/2	
Mch. 17	1¼	
Mch. 18	1	
Mch. 19	1½	
Mch. 20	1½	
Mch. 21	1 3/4	
Mch. 22	1½	
Mch. 23	1	
Mch. 24	1¼	
Mch. 25	1¼	
Mch. 26	1	
Mch. 27	½	
Mch. 28	1	
Mch. 29	1	
Mch. 30	½	
Mch. 31	¼	
Apr. 1	1	
Apr. 2	3/4	
Apr. 3	1½	
Apr. 4	1½	
Apr. 5	1 3/8	
Apr. 6	1½	
Apr. 7	1½	
Apr. 8	1½	
Apr. 9	1½	
Apr. 10	1	
Apr. 11	3/4	Sold

This lamb was given all the grain it would eat from the beginning to the end of the experiment, being treated much the same as No. 13. It also started out by eating 1½ lbs. of grain the first day, but this was followed by two days of illness. No grain was consumed on the 3rd, 4th, or 5th days, after which the animal appeared to improve and remained in good condition throughout the 63-day feeding period.

LAMB NO. 20

Date	Pounds Grain Eaten	Remarks
Feb. 7		Ration—all it would eat
Feb. 8	1	
Feb. 9	3/4	
Feb. 10	0	Health good
Feb. 11	0	Health good
Feb. 12	0	Health good
Feb. 13	0	Health good
Feb. 14	0	Health good
Feb. 15	0	Health good
Feb. 16	1	
Feb. 17	1½	
Feb. 18	3/4	
Feb. 19	3/4	
Feb. 20	1	
Feb. 21	1	
Feb. 22	2/3	
Feb. 23	1/3	
Feb. 24	1	
Feb. 25	¼	
Feb. 26	3/4	
Feb. 27	½	
Feb. 28	1	
Mch. 1	1	
Mch. 2	1	
Mch. 3	3/4	
Mch. 4	5/6	
Mch. 5	½	
Mch. 6	½	
Mch. 7	1/3	

Date	Pounds Grain Eaten	Remarks
Mch. 8	5/6	
Mch. 9	3/4	
Mch. 10	5/6	
Mch. 11	1	
Mch. 12	1	
Mch. 13	½	
Mch. 14	½	
Mch. 15	1	
Mch. 16	1	
Mch. 17	1	
Mch. 18	1	
Mch. 19	1	
Mch. 20	1¼	
Mch. 21	1½	
Mch. 22	1¼	
Mch. 23	1½	
Mch. 24	1	
Mch. 25	1¼	
Mch. 26	1¼	
Mch. 27	3/4	
Mch. 28	1	
Mch. 29	½	
Mch. 30	1	
Mch. 31	1	
Apr. 1	1	
Apr. 2	1¼	
Apr. 3	1½	
Apr. 4	1½	
Apr. 5	1½	
Apr. 6	1½	
Apr. 7	1¼	
Apr. 8	1 3/8	
Apr. 9	1	
Apr. 10	1¼	
Apr. 11	3/4	Sold

Lamb was given all the grain it would eat throughout the 63-day period. The conditions being the same as that of No. 19. It ate 1 pound during the first day; ¾ lb. on the second, and then failed to eat its grain for six days, although during this time the lamb appeared to be perfectly healthy. No untoward symptoms were noticed at any time.

Summary of the Barley Experiment

Of the six animals fed barley, three sickened during the feeding period and one died. It is rather peculiar that the animal that died was fed most carefully and given the least amount of grain. It will be noted that the other animals of the lot all received ½ to 1 lb. or all they could eat from the very start; whereas No. 4, the one that died, was started in with ¼ lb. and died on being raised from ½ to 1 lb. No. 13 sickened on the 33rd day and No. 19 on the second day. There was no apparent cause for the sickening of No. 13, but No. 19 became ill after having consumed 11½ lbs. of grain.

Corn Chop

LAMB NO. 6

Date	Pounds Grain Eaten	Remarks
Dec. 22		Ration ¼ lb.
Dec. 23	0	Given ¼ lb.
Dec. 24	1/8	
Dec. 25	1/8	Old grain removed. New put in with little salt
Dec. 26	¼	Ration increased to ½ lb.
Dec. 27	½	
Dec. 28 to Jan. 24	½	daily Ration increased to 1 lb.
Jan. 25 to Mar. 10	1	daily All it would eat.
Mar. 11	2	
Mar. 12	¼	Dull
Mar. 13	¼	Dull
Mch. 14	¼	Dull
Dec. 15	0	Better
Dec. 16	1/8	Brighter

Date	Pounds Grain Eaten	Remarks
Mar. 17	1/8	Brighter
Mar. 18	½	Normal
Mar. 19	1	
Mar. 20	3/4	
Mch. 21	1¼	
Mch. 22	1	
Mch. 23	1	
Mch. 24	1	
Mch. 25	1	
Mch. 26	1½	
Mch. 27	1¼	
Mch. 28	1	
Mch. 29	1	
Mch. 30	1¼	
Mch. 31	1½	
Apr. 1	1	
Apr. 2	1¼	
Apr. 3	1	
Apr. 4	1	
Apr. 5	1	
Apr. 6	1	
Apr. 7	1¼	
Apr. 8	1	
Apr. 9	3/4	
Apr. 10	1	
Apr. 11	1	Sold

This lamb was started on ¼ lb. of corn chop, which was increased to ½ lb. on the 4th; to 1 lb. on the 30th day and to all it would eat on the 47th day. On the 49th day, following a 2 lb. gorge, it was noticed to be dull but continued to consume ¼ of a pound for 3 days. On the fourth day of illness, it consumed no grain but appeared to be better. The consumption of grain gradually returned to normal and the animal became brighter, and continued to the end of the 110-day feeding period without further mishap.

LAMB NO. 7

Date	Pounds Grain Eaten	Remarks
Dec. 22		Ration ½ lb.
Dec. 23	0	Given ½ lb.
Dec. 24	1/8	
Dec. 25	1/8	
Dec. 25	1/8	Old grain removed, new put in yit little salt
Dec. 26	½	Ration increased to 1 lb.
Dec. 27	3/4	
Dec. 28	1	
Dec. 29	1	
Dec. 30	1	
Dec. 31	½	
Jan. 1	½	
Jan. 2	1	
Jan. 3	5/6	
Jan. 4	1	
Jan. 5	1	
Jan. 6	1	
Jan. 7	1	
Jan. 8	1	
Jan. 9	1	
Jan. 10	1	
Jan. 11	3/4	
Jan. 12	3/4	
Jan. 13	7/8	
Jan. 14	to	
Jan. 24	1	Ration increased to 2 lbs.
Jan. 25	1¼	
Jan. 26	1	
Jan. 27	1	
Jan. 28	1½	
Jan. 29	2/3	
Jan. 30	3/4	
Jan. 31	2	
Feb. 1	1 2/3	
Feb. 2	1	
Feb. 3	1	
Feb. 4	1	
Feb. 5	2	
Feb. 6	1¼	
Feb. 7	3/4	
Feb. 8	1¼	
Feb. 9	1 1/3	
Feb. 10	1	
Feb. 11	1 6/7	
Feb. 12	1½	
Feb. 13	1	
Feb. 14	3/4	
Feb. 15	1	
Feb. 16	1	
Feb. 17	1½	

Date	Pounds Grain Eaten	Remarks
Feb. 18	⅓	
Feb. 19	⅓	
Feb. 20	3/4	
Feb. 21	½	
Feb. 22	1	
Feb. 23	1½	
Feb. 24	5/6	
Feb. 25	¼	
Feb. 26	½	
Feb. 27	½	
Feb. 28	⅓	
Mch. 1	½	
Mch. 2	1	
Mch. 3	1	
Mch. 4	1	
Mch. 5	1	
Mch. 6	1½	
Mch. 7	2	
Mch. 8	½	
Mch. 9	1	
Mch. 10	1	
Mch. 11	1	
Mch. 12	1	
Mch. 13	2½	Dull
Mch. 14	½	Dull
Mch. 15	0	Dull
Mch. 16	1/8	Brighter

Date	Pounds Grain Eaten	Remarks
Mch. 17	¼	Better
Mch. 18	½	O. K.
Mch. 19	½	
Mch. 20	3/4	
Mch. 21	1¼	
Mch. 22	1	
Mch. 23	1	
Mch. 24	¼	
Mch. 25	1¼	
Mch. 26	3/4	
Mch. 27	1¼	
Mch. 28	3/4	
Mch. 29	1¼	
Mch. 30	1¼	
Mch. 31	1½	
Apr. 1	1¼	
Apr. 2	1¼	
Apr. 3	1½	
Apr. 4	1½	
Apr. 5	1	
Apr. 6	1¼	
Apr. 7	1½	
Apr. 8	1 3/8	
Apr. 9	1	
Apr. 10	1¼	
Apr. 11	1¼	Sold

Lamb was started on a ration of ⅓ lb., increased to 1 lb. on the 4th day and to 2 lbs. on the 33rd day. On the 81st day, following the consumption of 2½ lbs., the animal became dull and showed a diminished appetite for three days, following which he continued to the end of the 110-day feeding period, without showing any signs of illness.

LAMB NO. 10

Date	Pounds Grain Eaten	Remarks
Jan. 5		1 lb. with little salt
Jan. 6	1/8	No more given
Jan. 7	1/8	No more given
Jan. 8	1/8	No more given
Jan. 9	1/8	Ration—Increased to 2 lbs.
Jan. 10	2	
Jan. 11	1/8	Dull—lying down Abdomen full
Jan. 12	0	Lies down
Jan. 13	0	Still dull
Jan. 14	1/8	Still down most of time, appears constipated
Jan. 15	7/8	About the same
Jan. 16	0	Seems improved
Jan. 17	1/8	Better

Date	Pounds Grain Eaten	Remarks
Jan. 18	1/8	Better
Jan. 19	0	Much better
Jan. 20	0	Normal
Jan. 21	1/8	
Jan. 22	½	
Jan. 23	2/3	
Jan. 24	1 3/4	
Jan. 25	2	
Jan. 26	3/4	
Jan. 27	½	
Jan. 28	½	
Jan. 29	2	
Jan. 30	1/3	
Jan. 31	1 3/4	
Feb. 1	3/4	
Feb. 2	2	
Feb. 3	½	

Date	Pounds Grain Eaten	Remarks
Feb. 4	2	
Feb. 5	2	
Feb. 6	2	
Feb. 7	1½	
Feb. 8	1½	
Feb. 9	1 3/4	
Feb. 10	2	
Feb. 11	1	
Feb. 12	1 2/3	
Feb. 13	2	
Feb. 14	1	
Feb. 15	2	
Feb. 16	2	
Feb. 17	2	
Feb. 18	1 3/4	
Feb. 19	1½	
Feb. 20	1½	
Feb. 21	1 4/5	
Feb. 22	1	
Feb. 23	1½	
Feb. 24	1	
Feb. 25	2	
Feb. 26	1¼	
Feb. 27	1½	
Feb. 28	1	
Mch. 1	1	
Mch. 2	2	
Mch. 3	1 3/4	
Mch. 4	2	
Mch. 5	1 3/4	
Mch. 6	2	
Mch. 7	1 3/4	
Mch. 8	1½	
Mch. 9	1¼	
Mch. 10	1½	
Mch. 11	2	
Mch. 12	1½	
Mch. 13	2½	
Mch. 14	1	
Mch. 15	1	
Mch. 16	1	
Mch. 17	1½	
Mch. 18	1¼	
Mch. 19	1½	
Mch. 20	1	
Mch. 21	1¼	
Mch. 22	1½	
Mch. 23	1 7/8	
Mch. 24	1	
Mch. 25	1	
Mch. 26	1½	
Mch. 27	2	
Mch. 28	1½	
Mch. 29	1¼	
Mch. 30	1½	
Mch. 31	1½	
Apr. 1	1	
Apr. 2	1½	
Apr. 3	1½	
Apr. 4	1¼	
Apr. 5	1¼	
Apr. 6	1½	
Apr. 7	3/4	
Apr. 8	1½	
Apr. 9	1½	
Apr. 10	1½	
Apr. 11	1	Sold

Started on 1 lb. per day and increased to 2 lbs. on the 4th day. On the sixth day following the consumption of 2 lbs. of grain, it became ill, laid down most of the time and showed some bloating of the abdomen. The consumption of grain was much decreased until the 15th day, when the animal appeared normal and continued so during the rest of the 96-day feeding period.

LAMB NO. 16

Date	Pounds Grain Eaten	Remarks
Jan. 30		Ration all it would eat
Jan. 31	1¼	
Feb. 1	1/8	
Feb. 2	1	
Feb. 3	1	
Feb. 4	1	
Feb. 5	1 3/4	
Feb. 6	0	
Feb. 7	0	
Feb. 8	¼	
Feb. 9	1	
Feb. 10	1¼	
Feb. 11	1	
Feb. 12	3/4	
Feb. 13	1 3/4	
Feb. 14	1/8	
Feb. 15	1½	
Feb. 16	3/4	Scouring, but looks well

Date	Pounds Grain Eaten	Remarks
Feb. 17	1	Still scouring
Feb. 18	½	O. K.
Feb. 19	4/5	
Feb. 20	½	
Feb. 21	3/4	
Feb. 22	5/6	
Feb. 23	2/3	
Feb. 24	2/3	
Feb. 25	3/4	
Feb. 26	3/4	
Feb. 27	1	
Feb. 28	1	
Mch. 1	½	
Mch. 2	1	
Mch. 3	1	
Mch. 4	1	
Mch. 5	1	
Mch. 6	1½	
Mch. 7	1½	
Mch. 8	1¼	
Mch. 9	1¼	
Mch. 10	1¼	
Mch. 11	1½	
Mch. 12	1	
Mch. 13	1½	
Mch. 14	3/4	
Mch. 15	3/4	
Mch. 16	1	
Mch. 17	1½	
Mch. 18	1¼	
Mch. 19	1¼	
Mch. 20	1	
Mch. 21	1 7/8	
Mch. 22	1¼	
Mch. 23	½	
Mch. 24	½	
Mch. 25	3/4	
Mch. 26	1	
Mch. 27	1	
Mch. 28	1	
Mch. 29	1½	
Mch. 30	1¼	
Mch. 31	½	
Apr. 1	1½	
Apr. 2	1½	
Apr. 3	1¼	
Apr. 4	1	
Apr. 5	1	
Apr. 6	1½	
Apr. 7	1½	
Apr. 8	1½	
Apr. 9	1	
Apr. 10	1½	
Apr. 11	3/4	Sold

Was started on all it would eat and continued so for 72 days. On the 18th and 19th day, the animal was noticed to be scouring but otherwise continued well and showed no decrease in the consumption of grain.

LAMB NO. 17

Date	Pounds Grain Eaten	Remarks
Jan. 30		Ration—all it would eat
Jan. 31	1	
Feb. 1	0	
Feb. 2	3/4	
Feb. 3	½	
Feb. 4	3/4	
Feb. 5	1½	
Feb. 6	3/4	
Feb 7	1 3/4	
Feb. 8	1¼	
Feb. 9	1 1/3	
Feb. 10	2/3	Health seems O K.
Feb. 11	0	Health seems O. K.
Feb. 12	¼	Health seems O. K.
Feb. 13	0	Health seems O. K.
Feb. 14	½	Health seems O. K.
Feb. 15	1¼	
Feb. 16	0	
Feb. 17	1½	
Feb. 18	3/4	
Feb. 19	½	
Feb. 20	½	
Feb. 21	1 1/3	
Feb. 22	1¼	
Feb. 23	1¼	
Feb. 24	½	
Feb. 25	6/7	
Feb. 26	3/4	
Feb. 27	0	
Feb. 28	¼	
Mch. 1	½	
Mch. 2	¼	
Mch. 3	½	
Mch. 4	1	
Mch. 5	1	
Mch. 6	1½	
Mch. 7	1¼	
Mch. 8	1½	
Mch. 9	1½	

Date	Pounds Grain Eaten	Remarks
Mch. 10	1¼	
Mch. 11	1½	
Mch. 12	1½	
Mch. 13	1/8	
Mch. 14	0	Dull
Mch. 15	0	Better
Mch. 16	1	O. K.
Mch. 17	1	
Mch. 18	1	
Mch. 19	1	
Mch. 20	1¼	
Mch. 21	1	
Mch. 22	1	
Mch. 23	1¼	
Mch. 24	1	
Mch. 25	4/5	
Mch. 26	1	
Mch. 27	1	
Mch. 28	1	
Mch. 29	1½	
Mch. 30	1	
Mch. 31	1½	
Apr. 1	3/4	
Apr. 2	1	
Apr. 3	1 3/8	
Apr. 4	1¼	
Apr. 5	1 3/8	
Apr. 6	1	
Apr. 7	3/4	
Apr. 8	1	
Apr. 9	1	
Apr. 10	1½	
Apr. 11	1¼	Sold.

Continued on all it would eat for a period of 72 days. On the 44th day the animal was noticed to be dull and ate no grain for 2 days, but otherwise appeared normal throughout the feeding period.

Summary Corn Chop

Of the five animals fed corn chop, all sickened sometime during the feeding period; No. 6 on the 49th day and No. 7 on the 81st day, No. 10 on the 6th day, No. 16 on the 18th day, and No. 17 on the 44th day—Nos. 6, 7, 10 and 16 sickened following the consumption of an extra large amount of grain; whereas, there appeared to be no explainable reason for the sickening of No. 17.

Peas and Barley

LAMBS NOS. 21 AND 22

Date	Pounds Grain Given	Remarks
Mch. 7		Ration all peas they would eat
Mch. 8	3	
Mch. 9	3	
Mch. 10	3	
Mch. 11	2	
Mch. 12	1	
Mch. 13	2	
Mch. 14	3¼	
Mch. 15	2¼	
Mch. 16	1 3/4	
Mch. 17	1¼	
Mch. 18	2½	
Mch. 19	2¼	
Mch. 20	3	
Mch. 21	4¼	
Mch. 22	3¼	
Mch. 23	3¼	
Mch. 24	3¼	
Mch. 25	2½	
Mch. 26	1	Changed to Barley chop
Mch. 27	4½	
Mch. 28	0	
Mch. 29	2	
Mch. 30	1½	
Mch. 31	1½	
Apr. 1	1 3/4	
Apr. 2	2½	
Apr. 3	2¼	
Apr. 4	2½	
Apr. 5	2½	
Apr. 6	2½	
Apr. 7	1½	
Apr. 8	2¼	
Apr. 9	2¼	
Apr. 10	2	
Apr. 11	1½	Sold.

These two lambs were placed in the same pen and started on all the peas they would eat. This ration was continued to the 19th day, when they were changed to all the barley they would eat. They were sold on the 34th day of the experiment without having shown any unusual symptoms.

Peas and Corn Chop

LAMB NO. 14

Date	Pounds Grain Eaten	Remarks	Date	Pounds Grain Eaten	Remarks
Jan. 30		Ration all peas it would eat	Mch. 7	1¼	Changed to peas.
			Mch. 8	1	
Jan. 31	0		Mch. 9	3/4	
Feb. 1	1/8		Mch. 10	1	
Feb. 2	0		Mch. 11	1	
Feb. 3	0		Mch. 12	1½	
Feb. 4	0		Mch. 13	1	
Feb. 5	1		Mch. 14	¼	
Feb. 6	¼		Mch. 15	½	
Feb. 7	3/4		Mch. 16	1/8	
Feb. 8	1¼		Mch. 17	1	
Feb. 9	1		Mch. 18	4/5	
Feb. 10	3/4		Mch. 19	1	
Feb. 11	1		Mch. 20	1	
Feb. 12	1¼		Mch. 21	1½	
Feb. 13	1¼		Mch. 22	1¼	
Feb. 14	0	Changed to corn chop	Mch. 23	1	
Feb. 15	3/4		Mch. 24	1	
Feb. 16	0		Mch. 25	3/4	Changed to corn chop
Feb. 17	0				
Feb. 18	¼		Mch. 26	1¼	
Feb. 19	1 3/4		Mch. 27	1	
Feb. 20	3/4		Mch. 28	2/3	
Feb. 21	5/6		Mch. 29	1	
Feb. 22	½		Mch. 30	1 3/4	
Feb. 23	3/4		Mch. 31	½	
Feb. 24	1¼		Apr. 1	1½	
Feb. 25	1 3/4		Apr. 2	1¼	
Feb. 26	1 1/3		Apr. 3	0	
Feb. 27	1½		Apr. 4	1	
Feb. 28	1¼		Apr. 5	1½	
Mch. 1	1		Apr. 6	1½	
Mch. 2	1		Apr. 7	1½	
Mch. 3	2		Apr. 8	1½	
Mch. 4	1½		Apr. 9	1½	
Mch. 5	1 2/3		Apr. 10	1¼	
Mch. 6	1 3/4		Apr. 11	3/4	Sold

This lamb was started on all the peas it would eat. On the 16th day, it was changed to corn chop; on the 32nd day, back to peas and on the 55th, back to corn chop; grain being kept before it continuously throughout the feeding period of 72 days. No signs of illness were shown at any time.

LAMB NO. 15

Date	Pounds Grain Given	Remarks
Jan. 30		All the peas it will eat
Jan. 31	¼	
Feb. 1	1½	
Feb. 2	1	
Feb. 3	3/4	
Feb. 4	3/4	
Feb. 5	1½	
Feb. 6	1¼	
Feb. 7	1	
Feb. 8	1¼	
Feb. 9	1	
Feb. 10	1 3/4	
Feb. 11	1 2/3	
Feb. 12	1½	
Feb. 13	1½	
Feb. 14	1/8	Changed to corn chop
Feb. 15	3	
Feb. 16	1	Feces soft
Feb. 17	0	
Feb. 18	0	
Feb. 19	0	
Feb. 20	0	
Feb. 21	0	
Feb. 22	0	
Feb. 23	0	
Feb. 24	0	Some scouring —dull
Feb. 26	0	Health seems normal
Feb. 27	0	
Feb. 28	0	
Mch. 1	0	
Mch. 2	0	
Mch. 3	0	
Mch. 4	1/8	
Mch. 5	0	
Mch. 6	0	
Mch. 7	0	Changed to peas
Mch. 8	2	
Mch. 9	1	
Mch. 10	1/8	
Mch. 11	1	
Mch. 12	1 3/4	
Mch. 13	2¼	
Mch. 14	2	
Mch. 15	1½	
Mch. 16	1½	
Mch. 17	2¼	
Mch. 18	1½	
Mch. 19	2	
Mch. 20	1 3/4	
Mch. 21	1 7/8	
Mch. 22	2	
Mch. 23	1 3/4	
Mch. 24	1½	
Mch. 25	1 3/4	Changed to corn chop
Mch. 26	0	
Mch. 27	1/8	
Mch. 28	0	
Mch. 29	¼	
Mch. 30	¼	
Mch. 31	1	
Apr. 1	7/8	
Apr. 2	1	
Apr. 3	1	
Apr. 4	1	
Apr. 5	1¼	
Apr. 6	1½	
Apr. 7	1½	
Apr. 8	1½	
Apr. 9	2	
Apr. 10	½	
Apr. 11	3/4	Sold

This lamb was started on all the peas it would eat, changed to corn chop on the 16th day, back to peas on the 37th day, to corn chop on the 55th day, on which it was continued to the end of the 72-day period. On the 17th day following the change to corn chop and the consumption of 3 lbs. of that grain, it showed signs of diarrhoea. There followed 19 days when the animal consumed no grain, with the exception of one day when about 1/8 of a pound was eaten; although during most of this period the animal appeared in normal health, showing a scouring only on two days. At that time it was changed to peas, which it began to eat readily and continued to do so until changed again to corn chop; when it refused this food during the first day, ate only 1/8 of a pound on the second, refused entirely on the 3rd, and then after eating a quarter of a pound during each of two days, it commenced to eat

a full feed of this grain and continued to do so throughout the rest of the feeding period of 72 days.

LAMB NO. 18

Date	Pounds Grain Given	Remarks	Date	Pounds Grain Eaten	Remarks
Feb. 7		Ration all peas it would eat	Mch. 11	1	
Feb. 8	1/8	Some barley from adjoining pen	Mch. 12	½	
Feb. 9	0		Mch. 13	2½	
Feb. 10	0		Mch. 14	2	
Feb. 11	0		Mch. 15	1¼	
Feb. 12	1½		Mch. 16	1	
Feb. 13	1 3/4		Mch. 17	1 3/4	
Feb. 14	0	Changed to corn chop	Mch. 18	1½	
Feb. 15	2	Dull, feces soft	Mch. 19	1 3/4	
Feb. 16	0	Lies down	Mch. 20	1½	
Feb. 17	0	About same	Mch. 21	1½	
Feb. 18	0	Better—eating hay	Mch. 22	1½	
Feb. 19	0	O. K.	Mch. 23	1½	
Feb. 20	0		Mch. 24	1½	
Feb. 21	4/5		Mch. 25	1½	Changed to corn chop
Feb. 22	1		Mch. 26	1½	
Feb. 23	3/4		Mch. 27	2	
Feb. 24	1		Mch. 28	2¼	
Feb. 25	2		Mch. 29	1½	
Feb. 26	1		Mch. 30	1 1/3	
Feb. 27	3/4		Mch. 31	1¼	
Feb. 28	1		Apr. 1	1 3/8	
Mch. 1	3/4		Apr. 2	1½	
Mch. 2	1½		Apr. 3	1 3/8	
Mch. 3	1		Apr. 4	1¼	
Mch. 4	½		Apr. 5	1½	
Mch. 5	1¼		Apr. 6	1½	
Mch. 6	2		Apr. 7	1½	
Mch. 7	1 3/4	Changed to peas	Apr. 8	1½	
Mch. 8	1½		Apr. 9	½	
Mch. 9	2		Apr. 10	1 3/8	
Mch. 10	2¼		Apr. 11	3/4	Sold

This lamb was started on all the peas it would eat, changed to corn chop on the 7th day, to peas on the 28th day and to corn chop on the 46th day—on which it was continued until the end of the 63-day feeding period. On the 8th day, following the change to corn chop and the consumption of 2 lbs., it showed signs of illness and refused grain for five days; after which it returned to normal and so remained throughout the rest of the period.

Peas, Corn Chop and Barley

LAMB NO. 11

Date	Pounds Grain Eaten	Remarks	Date	Pounds Grain Eaten	Remarks
Jan. 5		Ration ¼ lb. peas with little salt	Jan. 6	0	
			Jan. 7	1/8	

Date	Pounds Grain Eaten	Remarks
Jan. 8	¼	
Jan. 9	¼	Ration increased to ½ lb.
Jan. 10 to Feb. 7	½	Increased to 1 lb.
Feb. 14	1	Changed to corn chop
Feb. 15	2	Dull
Feb. 16	0	Dull scouring
Feb. 17	0	Dull scouring
Feb. 18	0	Feels better
Feb. 19	1/8	Feces soft
Feb. 20	1/8	Feces normal, health good
Feb. 21	1/3	
Feb. 22	¼	
Feb. 23	0	
Feb. 24	¼	
Feb. 25	1/3	
Feb. 26	¼	
Feb. 27	0	
Feb. 28	1/8	
Mar. 1	1/8	
Mch. 2	1/8	
Mch. 3	1/8	
Mch. 4	¼	
Mch. 5	¼	
Mch. 6	½	
Mch. 7	1½	Changed to peas
Mch. 8	1 3/4	
Mch. 9	1¼	
Mch. 10	2	
Mch. 11	1 3/4	
Mch. 12	1¼	
Mch. 13	2½	
Mch. 14	1½	
Mch. 15	1 3/4	
Mch. 16	1½	
Mch. 17	1 5/6	
Mch. 18	1½	
Mch. 19	1½	
Mch. 20	1¼	
Mch. 21	1¼	
Mch. 22	1½	
Mch. 23	1½	
Mch. 24	1	
Mch. 25	1	Changed to barley.
Mch. 26	2	
Mch. 27	3/4	
Mch. 28	0	
Mch. 29	¼	
Mch. 30	7/8	
Mch. 31	1	
Apr. 1	1½	
Apr. 2	0	
Apr. 3	½	
Apr. 4	1½	
Apr. 5	1	
Apr. 6	0	
Apr. 7	1½	
Apr. 8	1¼	
Apr. 9	1¼	
Apr. 10	1¼	
Apr. 11	½	Sold

This lamb was started on ¼ lb. of peas, was raised to ½ lb. on the 3rd day, to 1 lb. on the 33rd day, changed to all the corn chop it would eat on the 40th day. On the 61st day, it was changed to peas and on the 79th day to barley, on which it continued to the end of the 96-day feeding period. On the 41st day, following the change to corn chop and the eating of 2 lbs. of that grain, the lamb became dull and was scouring. For three days thereafter it ate no grain, and for a period of some 15 days following this, the grain consumption was greatly reduced. In fact, the animal did not return to full feed until changed to peas.

LAMB NO. 12

Date	Pounds Grain Given	Remarks
Jan. 5		Ration ½ lb. peas
Jan. 6	0	Little barley
Jan. 7	1/8	
Jan. 8	1/8	
Jan. 9	½	Raised to 1 lb. per day
Jan. 10 to Feb. 7	1	Raised to 2 lbs. per day
Feb. 8	2	
Feb. 9	1 3/4	
Feb. 10	1½	

Date	Pounds Grain Eaten	Remarks
Feb. 11	1 3/4	
Feb. 12	1¼	
Feb. 13	1½	
Feb. 14	½	Changed to corn chop
Feb. 15	2½	
Feb. 16	¼	
Feb. 17	0	
Feb. 18	¼	
Feb. 19	1/8	
Feb. 20	0	
Feb. 21	0	
Feb. 22	0	
Feb. 23	1/8	
Feb. 24	½	
Feb. 25	2	
Feb. 26	1 3/4	
Feb. 27	¼	
Feb. 28	1/8	
Mch. 1	1/8	
Mch. 2	1/8	
Mch. 3	¼	
Mch. 4	½	
Mch. 5	½	
Mch. 6	1	
Mch. 7	1¼	Changed to peas
Mch. 8	2	
Mch. 9	1½	
Mch. 10	1 3/4	
Mch. 11	1¼	
Mch. 12	1½	

Date	Pounds Grain Eaten	Remarks
Mch. 13	2½	
Mch. 14	2½	
Mch. 15	1½	
Mch. 16	1¼	
Mch. 17	1 5/6	
Mch. 18	1½	
Mch. 19	1 3/4	
Mch. 20	1½	
Mch. 21	1½	
Mch. 22	1½	
Mch. 23	2½	
Mch. 24	1¼	
Mch. 25	1½	Changed to barley
Mch. 26	1 3/4	
Mch. 27	0	Health O. K.
Mch. 28	0	Health O. K.
Mch. 29	0	Health O. K.
Mch. 30	0	Health O. K.
Mch. 31	¼	Health O. K.
Apr. 1	1	Health O K.
Apr. 2	¼	Health O. K.
Apr. 3	0	Health O. K.
Apr. 4	0	Health O. K.
Apr. 5	0	Health O. K.
Apr. 6	0	Health O K.
Apr. 7	0	Health O. K.
Apr. 8	¼	Health O. K.
Apr. 9	0	Health O. K.
Apr. 10	0	Health O. K.
Apr. 11	0	Sold. Heatlh O. K.

This lamb was started on ½ lb. of peas, raised to 1 lb. on the 4th day and 2 lbs. on the 33rd day. On the 40th day it was changed to corn chop; on the 61st day to peas, and on the 79th day to barley, on which it was continued to the end of the 96-day period. Following the change to barley, the animal was practically off feed during the remainder of the experiment, altho it appeared to be bright and healthy during all this time.

FEEDING EXPERIMENTS OF 1917-18

Twenty lambs averaging about 50 lbs. and in good condition were purchased for this experiment. They had been running on beet tops but had had no grain. They were divided into two lots of ten each. The lambs in both lots were given alfalfa continuously throughout the experiment.

Lot No. 1

December 4th.—These lambs were given all the corn chop they would eat, which was kept continuously before them until December 30th, when the grain was changed to ground barley. On January 2, one lamb was showing some diarrhoea but the others appeared healthy. The barley was kept continuously before them until

January 29th, when no grain was given for four days. At the end of this period, the barley was continued, with the result that three of the lambs were noticed to be scouring on the second day of the resumed feeding. They became normal again within a few days and all lambs were in good condition on February 14th, when the grain feeding was stopped for eleven days. On February 25th, the lambs were again given all the corn chop they would eat, which was continued for one week without any untoward symptoms developing. The experiment ended on March 4th.

Lot No. 2

January 10th.—These 10 lambs were given all the ground barley they would eat until January 29th, when the grain was stopped for 4 days. It was resumed again February 1st, and continued until the 14th, when it was stopped for 11 days or until February 25th. Corn chop was then given in quantities larger than could be consumed for one week, when the experiment was discontinued.

Summary

It will be noted that in this experiment two lots of ten lambs each were given all the grain they would eat from the very start, that the grain was changed from barley to corn chop suddenly and that on two occasions the grain feeding was stopped for several days, when it was again continued. During the experiment a few of the lambs were noticed to scour slightly but it could not be said that any considerable symptoms of illness were apparent at any time.

GENERAL SUMMARY

Lambs were fed various grains in order to determine whether overfeeding and irregularity of feeding would produce death.

During the winter of 1916-17 eighteen were fed, six on barley, five on corn chop, two on peas and barley, three on peas and corn chop and two on peas, corn chop and barley.

Some of the lambs were started on one-fourth pound of grain and gradually increased to a maximum of two pounds, others were started on one-half pound, some on one pound, and still others on all they would eat.

The changes from one grain to another were always made radically and the lamb was in each case given all it would eat of the new grain.

The feeding period varied from 34 days to one hundred and ten.

One lamb, No. 4, died. This lamb was started on ¼-pound barley chop, raised to ½-pound on the sixth day, to one pound on the 33rd day, which ration it consumed for three days when it was noticed to be sick. On the following day it was found dead.

Out of the eighteen lambs fed, eleven sickened once, during

the feeding period. Of the lambs that sickened, 3 were in the lot fed on barley, 5 on corn, 2 on peas and corn, and 1 on peas, corn and barley. Those of the latter two lots were eating corn at the time of sickening.

One lamb sickened on the second day, one on the sixth, one on the eighth, two on the eighteenth and one each on the thirty-third, thirty-seventh, forty-first, forty-fourth, forty-ninth, and eighty-first days.

Illness followed an unusually large consumption of grain in nine of the animals and a change in grain in three.

During the winter of 1917-18 two lots of ten lambs each were fed in order to determine the effect of overfeeding and of radical changes from one grain to another and of intermittent feeding.

After the lambs were on full feed, they were changed from corn chop to barley, and from barley back to corn chop. Grain feeding was stopped in one instance for four days and in another for eleven days. No lambs were lost and only three lambs sickened, this being evidenced by scouring.

DISCUSSION

The greater amount of illness in the 1916-17 lot may possibly be explained by the fact that these lambs were smaller and less hardy.

It is difficult to attribute the death of Lamb No. 4 to the raising from one-half to one pound per day, since No. 5 was getting just twice the ration of No. 4, and nearly all of the other lambs in the experiment were increased more rapidly and consumed more grain per day.

Apparently corn chop is more liable to produce illness than either barley or peas, since, of the straight, corn-chop lot, all five animals sickened while, of the six on barley, only three showed illness. The two on peas and barley remained healthy, while those on peas and corn, and peas, corn and barley that sickened were eating corn at the time the trouble developed.

It is rather interesting that no lamb sickened more than once during the feeding period.

The reader is cautioned not to assume too much from the fact that illness in nearly all of the cases followed a large consumption of grain since there are many instances in the record where lambs ate as much and did not become sick. A similar observation may be made in regard to the change from one grain to another, i.e. there were several instances where the change was not followed by bad results.

CONCLUSION

Since these experiments were purposely arranged to determine whether lambs could be destroyed by overfeeding, radical changes in grain ration or by intermittent feeding, it seems that we can only say that they are probably not readily so destroyed. That they can be thrown "off feed" and made sick is probably true, but that any considerable number can be destroyed by manipulation of the grain ration, is at least not proven. The results suggest that lambs ill from dietary indiscretions may be more susceptible to other diseases.

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