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University of Idaho
Agricultural Experiment Station
Department of Agriculture

1.—STEER FEEDING
2.—FEEDING LAMBS
3.—ANALYSIS OF STOCK FOODS

BY

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BULLETINS.

The regular bulletins of the Station are sent free to all citizens of Idaho who request them. Late Bulletins are :

28. Some Idaho Soils.
29. (1) Annual Report of Director for 1 98-1900. (2) Meteorological Records.
30. The Service of Soils.
31. Some Spraying Experiments.

EXPERIMENT NO. 2 IN STEER FEEDING.

In Bulletin No. 24, a report was made of experiments in feeding steers to determine the economy of stall feeding cattle with food products grown on the farms of this section.

The results were fairly satisfactory under the conditions which prevailed at the time. Since then we have a new stock barn supplied with water from an artesian well located on the farm. The feeding tests reported in this bulletin were made under the improved conditions mentioned.

Conditions Surrounding Experiment.

The animals were confined in stalls with a chain tie fastened to an iron rod on side of mangers. They were turned in the yard to water at nine o'clock in the morning, and remained in yard until noon, except in very stormy weather. Water was supplied in a trough in the yard,

Preliminary to feeding test, steers ran in small field and were fed on corn fodder from the shock. They were put in stalls a few weeks before the feeding began, to accustom them to their quarters and to being handled. It is surprising how soon wild steers will learn to keep quiet, and go into their places in the stalls, when handled quietly and persistently. As stated in other experiments with range steers, there is no difficulty in stall feding such cattle, on account of their never having been handled. It requires a little tact, and much patience; but these qualities must be prominent in any successful feeder of live stock.

Kind of Steers.

The steers were common stock, with some short-horn blood, and some Jersey in the two which showed the poorest gains. It was not easy to find good feeders in this section at the time these animals were secured. It was fortunate in one respect that two of the animals were not so desirable, for they serve to illustrate the fact that the success is largely measured by the feeding qualities of the individual animal. It is not safe to make comparisons on effect of food in the different lots, owing to the individual factors which enter into the problem. In fact such comparisons are always open to criticism on account of the individual characteristics of the animals. It is like comparing varieties of plants when very often there is as much difference in individual plants of the same variety as there is in the varieties themselves. The steers were what is termed by cattle men as "long two year-olds."

Food Consumed by Lot 1.

During the first two periods, or for 28 days, the steers in this lot were fed chopped wheat alone as a grain ration. During this time they made a gain of 130 pounds, or one pound of gain for every 3.43 pounds of grain consumed.

For the third period the grain ration consisted of 1 part of chopped rye, 1 part bran and two parts chopped wheat. During this period the steers made one pound of gain for 6.63 pounds of grain consumed, not quite as good a showing as in the first period, but better than in the second.

The last period a complete change was made. During this period the grain ration consisted of equal parts of chopped barley and shorts, and there was an increased gain during this period. The gain was one pound for every 3.97 pounds of grain eaten. This is the best gain, except the first period, when the gain was one pound for every 2.13 pounds of grain. On the whole the gain to the amount of grain consumed, compares favorably with that secured in localities where corn is the basis of the grain

ration. The roughage fed to steers in lot 1 consisted of hay made of mixed grasses and clover, and corn silage. The silage contained very little grain.

Food Consumed by Lot 2.

During first two periods the steers in this lot were given chopped wheat alone the same as lot one. These steers were given a lighter ration however for they would not consume as much as steers in lot 1. The gain in lot 2, was one pound for 2.91 pounds of grain eaten. This is a better showing than in lot 1, during the same period. These stee s were given more hay and less silage, as shown in the table.

In the third period the steers were given three parts of chopped rye, one part bran and one part chopped wheat. The same varieties of grain were in the ration as for lot 1, but in different amounts. Instead of one part rye to two of wheat, and one of bran, as in lot 1, these st ers were fed three parts rye, and one each of the other grains. The results were not satisfactory, for the gain was only 1 pound to 12.27 pounds of grain, the poorest showing made at any time during the feeding period. It was very plain that the rations contained too much rye. The animals did not eat as much hay or silage during this period, showing a lack of appetite for other foods.

The last period the grain ration consisted of equal parts of chopped barley and chopped wheat. The gain during this period was one pound to 3.17 pounds of grain eaten This is a good showing.

The steers in lot 2 were fed a heavier ration of hay than those in either of the other lots, and less silage. The increased amount of hay seemed to take the place of a portion of the grain ration, for the amount of grain for each pound of grain is less in this lot, than in either of the other lots.

Food Consumed by Lot 3.

In this lot an effort was made to feed as much silage as the animals would eat with a short ration of hay. The grain ration,

the first two periods, consisted of two parts chopped wheat and one part bran; and the gain was one pound to 7.28 pound of grain.

During the third period, the grain was $\frac{1}{3}$ each chopped wheat, rye and bran, and the gain was one pound to 8.23 pounds of grain, not as good a showing as in preceding periods. In the fourth period there is a better showing however, and we have one pound of gain to 4.40 pounds of grain eaten. The barley and shorts seem to agree with the animals, and all seem to relish the combination very much, This is true of all the animals in the experiment. As stated elsewhere, the steers in lot 3 were not as good feeders as those in either of the other lots; and, on account of this individual factor, it is not safe to draw too close comparisons in the various lots fed. It is safe and interesting, and instructive as well, to study the results by periods in each lot.

The cost of producing 100 pounds of gain is the same in lot 1 and 2, but there is quite an increase in cost in lot 3. This is due to the individuality of the steers, more than to the kind of feed. While the steers in this lot had made fairly good growth, and were heavier than those in lot 2, they had passed the profitable point in their growth as feeders. Not because they were better finished, but because they had not the capacity to convert food into flesh as rapidly as the other steers.

Conclusions.

1. On the whole the feeding was profitable in all the steers, showing a net average increase for 56 days feeding, of $15.13 per head.

2. The barley-shorts and the barley-chopped-wheat combinations constitute an excellent grain ration for steers.

3. The chopped rye was not especially well relished by the steers.

4. Chopped wheat alone is a good grain ration when combined with corn silage and hay.

5. That the conditions in this locality, so far as effected by climate and food supply, are favorable for stall feeding cattle.

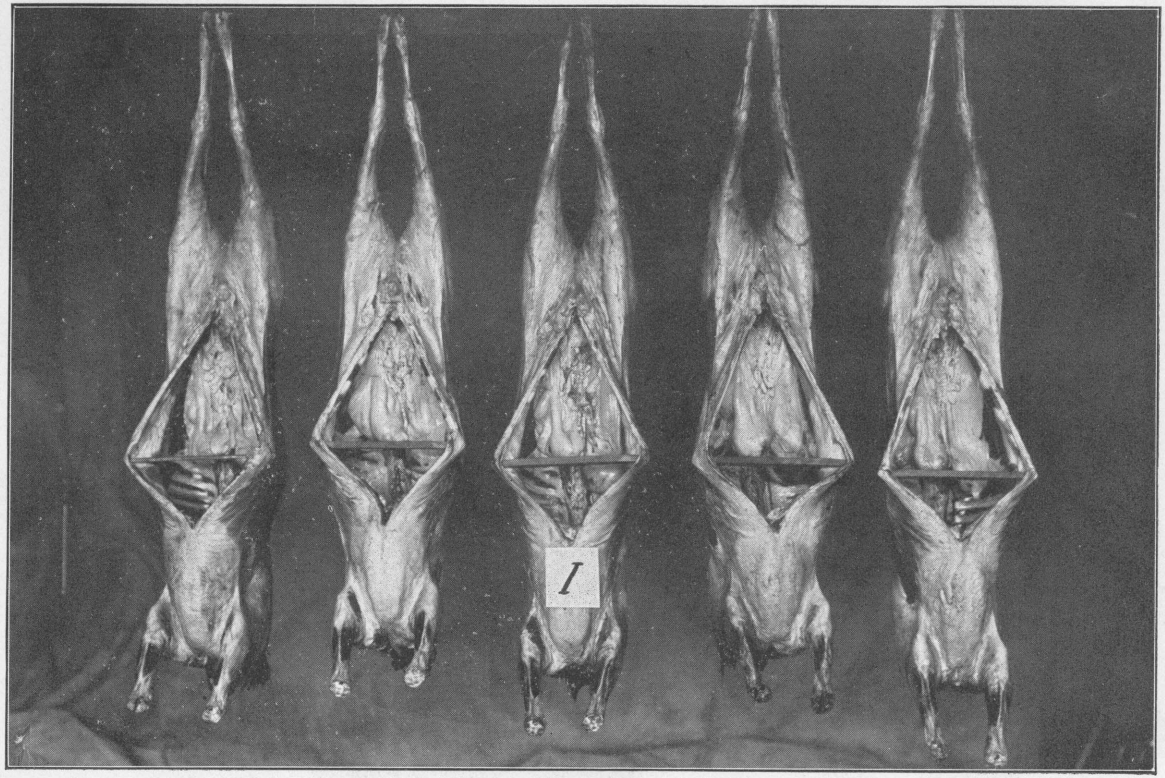
Table No. 1, Giving Results by Periods of Two Weeks Each.

No. of Lot; Two Steers in Each.	Weight Jan. 19th.	Weight Feb. 2nd.	Gain.	Food Consumed.		
				Hay.	Grain.	Silage.
1st Period.						
Lot 1	2170	2275	105	148	224	812
Lot 2	1830	1915	85	174	174	473
Lot 3	2000	2040	40	119	250	950
2d Period.	Feb. 2d.	Feb. 16.				
Lot 1	2275	2360	25	148	222	800
Lot 2	1915	1960	45	204	204	513
Lot 3	2040	2070	30	140	260	944
3d Period.	Feb. 16.	Mar 2d.				
Lot 1	2300	2335	35	148	232	783
Lot 2	1960	1975	15	184	184	462
Lot 3	2070	2100	30	110	247	887
4th Period.	Mar 2d.	Mar 16.				
Lot 1	2335	2405	70	147	278	840
Lot 2	1975	2030	55	194	174	490
Lot 3	2100	2150	50	120	220	941

Table No. 2. Summary of Results.

	Lot 1.	Lot 2.	Lot 3.
	Lbs.	Lbs.	Lbs.
Weight at beginning	2170	1830	2000
Weight at close	2405	2030	2150
Total gain 56 days	235	200	150
Average gain per head	117.5	100	75
Daily gain per head	2.10	1.78	1.38
Grain consumed	953	732	977
Hay consumed	591	742	489
Corn silage	3235	1938	3722
Grain eaten for pound gain	4.05	3.66	6.51
Hay eaten for pound gain	2.51	3.71	3.26
Silage eaten for pound gain	13.72	9.69	23.61
*Cost of food for 100 lbs. gain	$4.39	$4.39	$7.05
Total cost of food	$10.32	$8.78	$10.57
Original cost of steers	$60.00	$60.00	$60.00
†Selling price of steers	$102.21	$96.42	$101.82
Increase over cost	$42.21	$36.42	$41.82
Net profit above cost of feed	$31.89	$27.64	$31.25

*Grain valued @ $13.50 per ton.
Hay valued @ $5.00 per ton.
Silage valued @ $1.50 per ton.
†Steers sold for $4.75 per 100 live weight.



OXFORD GRADE--PLATE I.

FEEDING LAMBS.

The matter of feeding lambs or sheep of any kind has not been given very much attention by the farmers of Idaho. It is true that some work has been done in the irrigated sections of Southern Idaho, and the results obtained by some of the breeders in those sections are very flattering and speak well for the future of the industry. The Sweepstake prize offered for the best carload of mutton lambs at the international stock show held at Chicago, has been awarded to Hon. F. R. Gooding of Shoshone, Lincoln county, two years in succession.

The feeding of lambs for market is a growing industry in Southern Idaho, and has been undertaken to a limited extent in other parts of the state.

In Northern Idaho, where wheat growing has been the prevailing industry, little attention has been given to raising sheep; but we believe the region is well adapted to the raising of mutton sheep and the feeding of lambs, under proper conditions.

The winter season is too mild and wet to feed successfully in open yards except in the fore part of the season. Up to Christmas time the ground does not get too soft for comfort in most localities; but from this time until April. it is not easy to keep sheep comfortable without having covered, well drained yards. These however are not beyond the reach of the average farmer where lumber and straw are as cheap as in most parts of Northern Idaho.

The grain growing section has the advantage of cheap grain to offset the expense of providing a dry, sheltered feed yard.

With a view of throwing some light upon the feeding of lambs in Northern Idaho, some experiments were carried on during the winter of 1900-1901. These experiments were undertaken to determine the economy, if there should be any, in feeding range lambs in close quarters for a few months during the winter.

Two lines of work were taken up, one to make a comparison between grade Shropshire and Oxford down lambs, and the other to feed with no special reference to breeds, and to see how much increase could be secured for the amount of grain consumed.

Lambs Used in Experiment.

The lambs used in this experiment were purchased of Mr. C. B. Wade of Pendleton, Ore. They were the result of crossing pure bred Shropshire and Oxford down rams on range merino ewes. The lambs were a very even lot and were all wethers.

The lambs were received in Moscow about November 1st. and the feeding began on November 15th.

The lambs cost $2.75 per head, freight included, at Mocow.

Experiment--No. 1.

Twenty of the best lambs were selected to feed for the Christmas market. These were weighed up and placed in a box stall and fed on a grain ration of whole wheat and oats-1½ pounds per head with all the coarse food they could consume.

The lambs averaged 75 pounds at the beginning of the feeding period Nov. 15th, and Dec. 21st., after 36 days feeding, 80½ pounds, making an average gain of 5½ pounds or a daily gain of .15 pounds. This is not as large as we should expect, and can only be accounted for in the fact that the lambs were not accustomed to close confinement, and we had no open shed for them. This is one condition which we are satisfied helped very materially in reducing the total gain. Sheep do best, and especially those which are accustomed to the open range, when given plenty of shed room.

The lambs sold for $4.50 per hundred live weight, making a gross income over cost of 87 cents per head. Subtracting the cost of the grain at ¾ of cent per pound 40½ cents, would leave 46½ cents for the coarse food consumed.

There is one very discouraging feature connected with the work throughout, and that is the low price at which the lambs had

OXFORD GRADE—PLATE II.

to be sold. There is no distinction in our market, where the lambs had to be sold, between sheep and lambs. And the market last season, as all sheep feeders have reason to remember, was lower than usual, and especially for lambs. However in the experiment there was no loss, and a good price was realized for the coarse foods raised on the farm.

Experiment--No. 2.

Fifty-nine lambs, the remainder of the flock, after selecting the grade Shrops and the Oxford downs for the grade tests, were fed from Nov. 15th to Feb. 26th-a period of 103 days. These lambs were not quite so heavy as those selected for the Christmas feeding, and for the grade test; but were an even lot and all in a good vigorous condition.

These lambs were fed on pea hay, clover hay, some corn silage, some roots, and whole grain made up of oats and wheat. The grain was in the proportion of ⅓ wheat and ⅔ oats.

The coarse food was not weighed to the animals, but the grain was weighed at each feeding time. The grain was given in two feeds morning and evening, and was fed in the bottom of the feed racks.

The lambs were watered once a day by allowing them to run out into a yard where the water trough was located. The yard was not dry enough to permit the animals to remain there very long.

The remainder of the time the lambs were confined in box stalls with the feed racks on the sides of the stalls. The pens were kept clean and dry by using plenty of straw each day. The windows of the basement of the barn, where the sheep were confined, were kept open for ventilation.

This bunch of lambs, 59 head, ate 6700 pounds of grain or a daily average of 1.10 pounds per head. The lambs gained 1250 lbs. or one pound of gain for 5.36 pounds of grain consumed. Weight of lot on Nov. 15th--4130 lbs. Weight Feb. 26th--5380

lbs. Average gain per head 20.18 pounds or an average daily gain of .20 pounds.

The financial side of the account shows the following. Cost of lambs at $2.75 per head, $162.25. Selling price, after deducting 5 per cent shrinkage was $234.85, making a gross income of $71.60. Taking from this the value of the grain at $15.00 per ton $50.25 leaves $21.35 for the coarse food consumed.

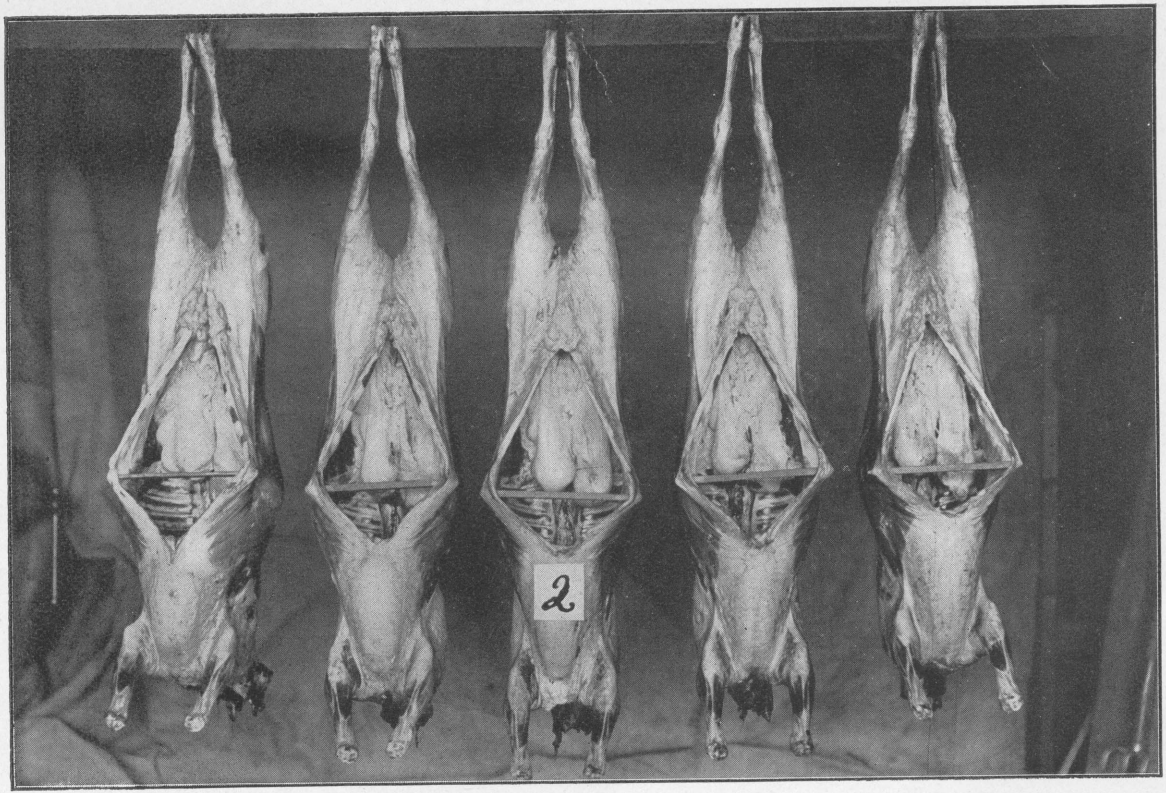
It is easy to conclude that there was little profit left, reckoning the cost of hay at the usual price offered for it in the market. The hay used in this experiment however was much cheaper than the hay usually offered for sale. It was made from field peas, cut while green, and from wild oats. Some clover was fed but not very much.

Had the lambs brought a price such as might have reasonably been expec ed, there would have been a margin of profit in the work; but in the price received there is no inducement for such work under conditions no more favorable than those under which we labored. We are convinced however that with proper shed room, and water supply, we can feed lambs successfully in this section. This is doubly true if the lambs are grown on the farm. In other words, it would not pay to sell lambs in the fall, thinking that it will not pay to feed them a portion of the winter at least.

Feeding operations with sheep cannot be carried on as successfully here as in a dryer climate, without having a sheltered yard free from mud. The mild, rainy climate is not as well adapted to feeding operations as a dryer, colder climate where the soil is more sandy and has better drainage.

Experiment—No. 3.

For this experiment twenty lambs were selected ten each of grade Shropshires and Oxford downs. The lambs were marked so that we could distinguish one from the other and all confined in one pen. The lambs were a very even lot, as shown by the



SHROP GRADE—PLATE I.

table giving weights. The Shrop grades were half a pound heavier than the Oxford-downs. At the beginning of the feeding period it was not easy to distinguish one grade from the other, but as the season advanced the Oxfords showed a longer, more open fleece, and a little difference in build. The Shropshire grades were a little more campact and blocky.

The lambs were treated the same as in the previous experiment. They were confined to the pen nearly all the time, only going into the yard for a short time to get water.

Kind of Feed.

The lambs were fed on grain made up of two parts of whole oats and one part wheat. The hay consisisted of clover, and a mixture of pea hay and wild oats. The roots were mangel wurzels and carrots mixed. The silage fed during the last two periods was made of corn and contained very little grain. Each ration was weighed when fed to the animals.

The animals were weighed every two weeks and results during each of those periods are given in Table No. 1.

In Table No. 2 a summary of results is given. Here it will be seen that the Shropshires made a slightly increased gain over the Oxfords. The entire gain is not as great as might have been expected. The amount of grain eaten is not equal to that usually fed to lambs; but it was our intention to feed as heavily of the coarse products as possible. In this, it is possible we went too far. A heavier ration of grain might have been better. This would have been safer, however, if the lambs had been given an open yard in which to run. We were fearful af getting them off their feed, and in avoiding this we were entirley successful for there was not a single day when the lambs refused to clean up their rations.

In the cost of food the price of clover hay is placed at just what it cost us. Grain at the market price, and roots and silage at prices usually put upon these crops.

In reckoning the cost of the two bunches of lambs, it will be seen that there is a small profit in favor of the Shropshires, one costing $3.66 per hundred and the other $3 92. This is due to the difference in weight, for both cost the same per head.

Five lambs out of each lot were dressed and photographed, and half tone cuts of carcasses made, which appear with the report. There was nothing in favor of either bunch as to dressed weight, both averaging 53.2 per cent.

No analysis was made to determine the exact per cent of lean to fat, but from close observations we were convinced that the Shropshire grades were a little better matured than the Oxford-down grades. They were a little better filled out, in the loin, as seen in cut, and carried a larger amount of fat in the kidney. The fat as shown in cut No. 2, is a little thicker than that of the Oxford in cut No. 1. The amount of lean in the loin cut is greater in the oxford grade as shown in plate No. 2 of cut No. 1.

Conclusions.

1. There was no profit in feeding the lambs under the conditions prevailing in this experiment, except such as would result from feeding the coarse products of the farm instead of selling them off the farm.

2. We believe it is better to feed lambs than to sell them for mutton in the fall, where more favorable conditions for feeding can be obtained.

3. If lambs are fed in winter in this section, they should have an open, dry shed in which to run a portion of the time. An open yard with no roof will not do for sheep here on account of the mud.

4. It will pay, where more excersise can be given, to feed a heavier grain ration, and make the feeding period shorter.

While the results in this experiment are somewhat negative, yet they will serve as a guide for further work, and we shall repeat the work under other conditions and at other seasons of the year.

SHROP GRADE—PLATE II.

Table No. 1, Giving Results by Periods of Two Weeks Each.

	Weight Lbs.	Weight Lbs.	Gain Lbs.	Amount of Food Eaten.		
				Grain.	Hay.	Roots.
	Nov 15.	Nov 28.				
1st Period.—						
Shrop Grades	750	780	30	280	420	470
Oxford Grades	700	735	35			
	Nov 28.	Dec. 12.				
2d Period.—						
Shrop Grades	780	825	45	280	590	850
Oxford Grades	735	770	35			
	Dec. 12.	Dec. 26.				
3d. Period.—						
Shrop Grades	825	855	30	300	750	840
Oxford Grades	770	805	35			
	Dec. 26.	Jan. 9.				
4th. Period.—						
Shrop Grades	855	885	30	280	590	700
Oxford Grades	805	835	30			
	Jan. 9.	Jan. 23.				
5th. Period.—						
Shrop Grades	885	930	45	380	560	700
Oxford Grades	835	885	50			
	Jan. 23.	Feb. 6.				
6th. Period.—						
Shrop Grades	930	990	60	420	560	700
Oxford Grades	885	915	35			
	Feb. 6.	Feb. 20.				Silage
7th. Period.—						
Shrop Grades	990	1015	25	420	575	685
Oxford Grades	915	920	5			
	Feb. 20.	Mar 6.				
8th. Period.—						
Shrop Grade	1015	1055	40	420	630	630
Oxford Grade	920	965	45			

Table No. 2. Summary of Results.

	Shrop.	Oxford.
	Lbs.	Lbs.
Average weight at beginning	75	70
Average weight at closing	101.5	92
Average daily gain	.24	.20
Number of days feeding		111
Amount hay consumed		3655
Amount of grain consumed		2760
Amount of roots consumed		4260
Amount of silage consumed		1315
*Total value of food consumed		$35.08
Value of increase @ $4.50 per cwt		$25.87
Increase in value of original weight		$10.29
Total increase in value		$36.16
Cost of 100 pounds gain		$6.10
Profit above cost of food		$1.08
Price received for lambs		$4.50
Per cent. Dressed weight		52.3

*Hay valued at $5.00 per ton.
Grain valued at $15.00 per ton.
Roots valued at $2.00 per ton.
Silage valued at $1.50 per ton.

Analysis of Stock Foods.

In the following table is given the chemical composition of some stock foods used in the feeding tests, together with several varieties of hay which will be of special interest to farmers in this state. The analysis of chopped rye, shorts, barley, millet seed, corn silage and pea hay was made by the Chemist of the Idaho Station, to whom credit is due for this work. The millet is from the Russian Broom-corn varieties, introduced by the Department of Agriculture at Washington D. C.

The table gives the percentage composition of the various substances.

Table Showing Composition of Stock Foods Used in Feeding Test, Together With List from Jordon's "Feeding Animals."

	Water,	Ash,	Protein,	Fiber,	Nitrogen-free extract.	Fat.
Grain fed on Station Farm.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent	Per Cent
Chopped Rye	9.84	2.07	9.13	2.70	74.71	1.55
Shorts	9.39	2.13	10.65	3.63	72.02	2.18
Barley	9.53	3.47	9.32	7.59	68.02	2.07
Millet Seed	10.63	3.29	8.94	8.53	66.71	1.96
Roughage.						
Corn Silage	78.38	1 92	1.61	5.59	11.60	.36
Pea Hay	10.29	7.53	7.06	21.94	51.57	1.61
List compiled from Jordon's "Feeding Animals."						
Hay.						
Orchard Grass	9.9	6.0	8.1	32.4	41.	2.6
Meadow Fescue	20.	6.8	7.0	25.9	38.4	2.7
*Tall Oat Grass	69.5	2.0	2.4	9.4	15.8	0.9
Timothy	13.2	4.4	5.9	29.0	45.0	2.5
Oat Hay, cut in milk	15.0	5.2	9.3	29.2	39.0	2.3
Barley Hay, cut in milk.	15.0	4.2	8.8	24.7	44.9	2.4
Kentucky Blue Grass	21.2	6.3	7.8	23.0	37.8	3.9
Red Clover	20.8	6.6	12.4	21.9	33.8	4.5
Alsike Clover	9.7	8.3	12.8	25.6	40.7	3.9
White Clover	9.7	8.3	15.7	24.1	39.3	2.9
Alfalfa	8.4	7.4	14.3	25.0	42.7	2.2

*Green.