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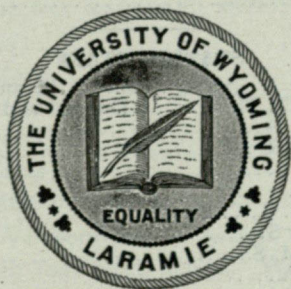
UNIVERSITY OF WYOMING  
AGRICULTURAL  
EXPERIMENT STATION

LARAMIE, WYOMING

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CATTLE FEEDING

Oat and Pea Silage for Beef Cows  
Oat and Pea Silage for Growing Cattle



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Bulletins will be sent free upon request.

Address: Director Experiment Station, Laramie, Wyoming.

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# Cattle Feeding

A. D. FAVILLE.

## INTRODUCTION.

Winters like the past one drive home the importance of providing feed for cattle of all classes, and many a stockman has found to his sorrow that it does not pay to depend too much on Providence and too little on haystacks and silos. For years hay has served as a western measuring standard, and but little effort has been made to utilize crops of a succulent nature. That they have their place is being amply demonstrated through investigational work and field tests carried out by practical stockmen. The object of three years' work, embodied in this bulletin, has been to measure, if possible, the feeding value of oat and pea silage in terms of alfalfa hay, our most valuable western roughage. The silage has in all cases been fed as a supplement to a partial ration of hay, no attempt being made at complete substitution.

### DIVISIONS MADE AND RATIONS FED.

Lot I.	(7 cows)	.....	Grain, alfalfa, silage
Lot II.	(4 heifers)	.....	Grain, alfalfa, silage
Lot III.	(4 heifers)	.....	Grain, alfalfa
Lot IV.	(4 heifers)	.....	Grain, alfalfa, silage
Lot V.	(4 heifers)	.....	Grain, alfalfa
Lot VI.	(7 heifers or steers)	.....	Grain, alfalfa, silage

Lots I and VI were put on rations which were reversed at the end of each four week period. With the small number of animals available, it was thought advisable to follow this method rather than to attempt to divide the animals into two lots.

### FEEDS.

The grain portion of the rations was not the same for all of the lots. In each case, however, animals under comparison received the same grain mixture. Lot I was fed millrun bran

(wheat mixed feed). Lots II and III were given a mixture composed of millrun bran, 4 parts; corn meal, 2 parts; oats, 2 parts, and linseed meal, 1 part. Lots IV and V received a mixture of millrun bran, 2 parts; corn meal, 2 parts, and oats, 1 part; while lot VI was given millrun bran, 2 parts, and corn meal, 1 part.

All the alfalfa fed was grown a short distance from the University Farm and was above the average in quality. Lots II and III received first cutting, and the balance of the lots second cutting, hay (but two cuttings are made on the Laramie Plains).

The silage consisted of oats and peas, with oats predominating. Whenever peas occurred in large amounts, it was noticed that stock of all kinds ate the ensilage much more greedily. In order to provide the necessary moisture, rather large amounts of water were added to the cut feed as it passed into the silo. During the winter of 1915-16, considerable amounts of silage next to the wall spoiled, due to the entrance of air. This loss was reduced to a minimum the following year by painting the silo, both inside and outside, a wash of cement being applied to the outer surface, and a prepared cement silo paint to the inside.

A table of feed analyses will be found at the end of the bulletin.

#### PRICE OF FEEDS.

Feed prices were arbitrarily fixed at the figures used in Bulletin 108. With prices the same from year to year, a comparison of results becomes easier. Where cost estimates are given, alfalfa is valued at \$12.00, and silage at \$4.00, a ton, and grain at \$1.25 per hundred.

#### CATTLE.

The cattle used were from the college herd and consisted largely of beef bred animals, though in several of the lots of heifers there were a few French-Canadians. Two cross-bred (Hereford-Angus) steers were included in the experiments.

In every case, divisions were made on a basis of breed, as well as of age and weight, so that all the lots fed against one another were as uniform as possible.

#### WEIGHTS.

Individual records, with weighings every two weeks, were kept for all the animals on experiment. At the beginning and at the close of feeding periods, weights were taken on three consecutive days, and the average of the three weighings were taken for initial and final weights, respectively. At the end of each four week period, when rations were to be reversed, as was the case with Lots I and VI, two weighings were taken, and the average of the two weights was used.

#### SHELTER.

All of the cattle were well stabled and were given the run of sheltered yards during the daytime.

#### METHOD OF FEEDING.

Lots receiving hay and silage were given silage in the morning and hay in the evening. Grain was generally fed in the morning. When hay alone was given, it was fed both morning and evening.

W. A. Berry, Riley Oakes and Sam Majury were responsible for the feeding of the stock and the keeping of the records, and credit is due them for the careful carrying through of the work.

#### OAT AND PEA SILAGE FOR BEEF COWS.

A problem ever before Wyoming cattlemen is to provide cheap, satisfactory rations for breeding cows; rations that will keep the cattle in good condition and prepare them for the raising of strong, healthy calves. Severe winters, coupled with short hay crops, often make it desirable to replace at least part of the hay ration with some other roughage. As succulent feeds are generally lacking in western rations, the question is at once raised as to the value of silage in hay rations. Oats

and peas supply good ensilage material in sections not adapted to the growing of corn, hence a study of their value as silage is well worth while.

## BEEF COWS, 1915-16.

Feeding experiments with the beef herd were unavoidably interrupted during the winter of 1915-16, and the number of cattle left on experiment was too small to make it worth while to elaborate results obtained. Data gathered, however, indicated that seven pounds of a fifteen pound alfalfa ration might be satisfactorily replaced by fifteen pounds of oat and pea silage.

## BEEF COWS, 1916-17.

As has been previously stated, the cows fed experimentally during the winter of 1916-17 were considered as one lot and fed rations that were reversed at the end of each four week period, that is, they were fed silage during one period, no silage during the next, etc. Table I gives the results obtained during the sixteen weeks the cows were on test.

TABLE I—*Grain and Alfalfa vs. Grain, Alfalfa and Silage for Beef Cows; Rations Reversed Every Four Weeks.*

December 5th, 1916, to March 27th, 1917—112 Days.

Average initial weight.....	1153.	lbs.
Average final weight.....	1191.	lbs.
Average gain on silage (8 weeks).....	31.	lbs.
Daily gain on silage.....	.55	lbs.
Average gain without silage (8 weeks).....	7.	lbs.
Daily gain without silage.....	.13	lbs.
Average daily ration on silage—		
*Grain . . . . .	2.3	lbs.
Alfalfa . . . . .	10.	lbs.
Silage . . . . .	25.	lbs.
Average daily ration without silage—		
*Grain . . . . .	2.3	lbs.
Alfalfa . . . . .	18.	lbs.
Cost of daily ration with silage.....	13.8	cents
Cost of daily ration without silage.....	13.7	cents

\*Grain was fed only to cows nursing calves and was given at the rate of 4 pounds per day during the whole feeding period.

The cost of both types of rations was practically the same and both proved to be satisfactory. However, that 25 pounds of silage more than replaced 8 pounds of hay, is shown by gains made while on the silage and hay rations. An average gain of over half a pound a day was made by the cows while they received silage, and only thirteen one-hundredths of a pound when hay replaced the silage.

A study of these results, together with returns reported in Bulletin 108, and general conclusions drawn from the work of 1915-16, would seem to indicate that oat and pea silage may be substituted for good alfalfa hay in about the proportion of two pounds of silage to one of hay. With alfalfa at prices prevailing in many sections, it becomes a matter of sound economy to supplement it with a home-grown succulent feed, such as oat and pea silage.

#### OAT AND PEA SILAGE FOR GROWING CATTLE.

Too little effort is made to provide satisfactory rations for growing cattle, hay alone being considered all that is necessary, and in many cases, even hay is doled out sparingly. With the rapid increase in livestock values in recent years, progressive stockmen are devoting more study to the problem of the winter feeding of young stock and some among them are investigating the merits of silos and silage crops.

Feeding tests with oat and pea silage, begun at this station in 1913, have been continued each winter in order to definitely determine the value of this western silage crop. Data on the first year's work appeared in Bulletin 108, while figures for the last three years are found on the following pages.

#### RESULTS IN 1914-15.

Details concerning the hay and grain, prices of feeds, etc., will be found in the forepart of this bulletin, while Table II summarizes the results obtained.

TABLE II—*Grain, Alfalfa and Silage vs. Grain and Alfalfa for Growing Cattle.*

December 18th, 1914, to May 5th, 1915—161 Days.

	LOT II Grain, alfalfa, silage		LOT III Grain, alfalfa	
Average initial weight.....	673.	lbs.	702.	lbs.
Average final weight.....	808.	lbs.	830.	lbs.
Average gain per heifer.....	135.	lbs.	128.	lbs.
Average daily gain.....	.84	lbs.	.80	lbs.
Average daily feed per heifer—				
Grain .....	3.	lbs.	3.	lbs.
Alfalfa .....	8.9	lbs.	16.	lbs.
Silage .....	9.6	lbs.		
Feed for 100 lbs. gain—				
Grain .....	358.	lbs.	377.	lbs.
Alfalfa .....	1058.	lbs.	2013.	lbs.
Silage .....	1139.	lbs.		
Cost of 100 lbs. gain.....	\$13.10		\$16.79	
Cost of daily ration per heifer....	11.0 cents		13.4 cents	

Gains made by both lots were practically the same. Approximately  $9\frac{1}{2}$  pounds of silage satisfactorily replaced 7 pounds of alfalfa. Although the grain and alfalfa ration fed to Lot III furnished the greater amount of dry matter, Lot II, getting silage in addition to the dry feed, gave better returns on the dry matter consumed.

The stock was in good flesh when put on experiment and no attempt was made to feed for heavy gains hence feed requirements for 100 pounds gain were rather high for both lots. A study of the requirements for a hundred pound gain reveals the fact that silage came close to replacing alfalfa pound for pound. With grain at \$1.25 per hundred and hay at \$12.00 per ton, a value of \$10.48 per ton could have been placed on the oat and pea silage without having the gains put on by Lot II more expensive than those made by Lot III.

## RESULTS IN 1915-16.

Added evidence as to the value of oat and pea silage in rations for growing cattle is given in Table III, which embodies results obtained during the winter of 1915-16. Additional details concerning the experiment will be found in the forepart of the bulletin.

TABLE III—*Grain, Alfalfa and Silage vs. Grain and Alfalfa for Growing Cattle.*

December 22nd, 1915, to April 13th, 1916—113 Days.

	LOT IV Grain, alfalfa, silage		LOT V Grain, alfalfa	
Average initial weight.....	723.	lbs.	737.	lbs.
Average final weight.....	837.	lbs.	804.	lbs.
Average gain per heifer.....	114.	lbs.	67.	lbs.
Average daily gain.....	1.	lbs.	.6	lbs.
Average daily feed per heifer—				
Grain .....	2.75	lbs.	2.75	lbs.
Alfalfa .....	5.	lbs.	10.	lbs.
Silage .....	10.	lbs.		
*Feed for 100 lbs. gain—				
Grain .....	273.	lbs.	464.	lbs.
Alfalfa .....	496.	lbs.	1687.	lbs.
Silage .....	991.	lbs.		
Cost of 100 lbs. gain.....	\$8.37		\$15.92	
Cost of daily ration per heifer....	8.4 cents		9.4 cents	

Lot IV on a ration of grain, alfalfa and silage, containing slightly less dry matter than that received by Lot V, made a gain of 114 pounds per head, as against a 67 pound gain for Lot V. Thus, 10 pounds of silage more than replaced 5 pounds of alfalfa. In requirements for 100 pounds gain, the silage ration again demonstrated its superiority in effecting a large saving of hay and grain.

\*Average waste per head: Lot IV—Hay, 37 lbs.; silage, 22 lbs. Lot V—Hay, 83 lbs. This waste was not deducted from the totals in determining the feed for 100 lbs. gain.

Perhaps the most striking difference in the value of the two rations is brought out in the cost of a hundred pound gain. With grain and alfalfa, the cost was \$15.92. With the substitution of silage for part of the alfalfa, the cost dropped to \$8.37, a saving of \$7.55 on every hundred pounds increase in weight. These figures do not represent total cost charges, since both lots had access to racks containing straw during much of the time they were out of doors. Possibly the animals getting silage ate more straw.

## RESULTS IN 1916-17.

With only a limited number of animals available it has been necessary to work with small lots each year. During the winter of 1916-17, rations were reversed every four weeks so that each animal received grain, alfalfa and silage for eight weeks and grain and alfalfa for the same length of time. While this method of procedure is open to criticism, in that it offers no available measure of the effect of the change in feeds, it does, in a general way, at least, supply data as to the value of succulence in a ration.

TABLE IV.—*Grain and Alfalfa vs. Grain, Alfalfa and Silage for Growing Cattle; Rations Reversed Every Four Weeks.*

December 5th, 1916, to March 27th, 1917—112 Days.

	LOT VI	
Average initial weight.....	739.	lbs.
Average final weight.....	852.	lbs.
Average gain on silage (8 weeks).....	78.	lbs.
Daily gain on silage.....	1.4	lbs.
Average gain without silage (8 weeks).....	35.	lbs.
Daily gain without silage.....	.63	lbs.
Average daily ration on silage (8 weeks)—		
Grain . . . . .	3.	lbs.
Alfalfa . . . . .	6.8	lbs.
Silage . . . . .	14.6	lbs.

Average daily ration without silage (8 weeks)—		
Grain . . . . .	3.	lbs.
Alfalfa . . . . .	12.8	lbs.
Feed for 100 lbs. gain on silage—		
Grain . . . . .	215.	lbs.
Alfalfa . . . . .	486.	lbs.
Silage . . . . .	1050.	lbs.
Feed for 100 lbs. gain without silage—		
Grain . . . . .	480.	lbs.
Alfalfa . . . . .	2043.	lbs.
Cost of 100 lbs. gain with silage . . . . .	\$ 7.70	
Cost of 100 lbs. gain without silage . . . . .	\$18.26	
Cost of daily ration with silage . . . . .	10.8 cents	
Cost of daily ration without silage . . . . .	11.4 cents	

Here again we find that the silage fed cattle made the heavier gains. During the eight weeks that the heifers received silage they made the very satisfactory daily gain of 1.4 pounds per head, while with the silage cut out and with an increase of alfalfa more than equivalent to the dry matter in the silage, the gain dropped to .63 of a pound per day. The succulent feed evidently played an extremely important part in the ration. No doubt the low gains made while on alfalfa were in a measure responsible for the great increase in gains when silage was substituted in the ration. One hundred pounds was put on with the silage ration at the low cost of \$7.70, while with grain and alfalfa alone, it required \$18.26 worth of feed to make the same gain.

Four years' work with oat and pea silage in rations for growing cattle has given the silage a value far in excess of the figure arbitrarily assigned to it, and has clearly demonstrated the value of this succulent feed in winter rations for young stock.

## ACKNOWLEDGMENT.

The writer is indebted to Mr. F. E. Hepner, research chemist, for analyses of the feeds used in these experiments.

TABLE V—Percentage Composition of Feeds.

Feed	Water	Ash	Crude protein	Crude fiber	Nitrogen-free extract	Ether extract
1914-15						
Corn meal . . . . .	9.47	1.43	10.00	2.26	73.19	3.65
Millrun bran . . . . .	8.68	4.89	16.17	7.66	58.24	4.36
Oats . . . . .	7.68	3.77	11.94	10.80	60.56	5.25
Oil meal . . . . .	7.33	5.28	39.41	7.90	32.90	7.18
Alfalfa (first cutting) . . . . .	5.90	7.99	13.05	31.49	39.87	1.70
1915-16						
Corn meal . . . . .	8.71	1.45	9.57	2.14	74.79	3.34
Millrun bran . . . . .	7.14	5.35	16.38	8.81	58.30	4.02
Oats . . . . .	5.92	4.01	9.89	13.92	60.26	6.00
Alfalfa (second cutting) . . . . .	6.17	8.87	16.74	27.33	39.02	1.87
Oat and pea silage . . . . .	70.46	2.96	3.09	8.93	13.44	1.12
1916-17						
Corn meal . . . . .	6.99	1.48	10.27	2.42	74.98	3.86
Millrun bran . . . . .	6.40	5.43	16.57	8.64	58.77	4.19
Alfalfa (second cutting) . . . . .	5.68	8.44	18.66	22.82	41.87	2.53
Oat and pea silage . . . . .	67.55	2.25	3.33	9.26	16.26	1.35

## DIGEST.

Oat and pea silage may be used to advantage in winter rations for beef cows.

Feeding tests with beef cows seem to indicate that oat and pea silage may be substituted for good alfalfa hay in about the proportion of two pounds of silage to one of hay.

In rations for growing cattle, the introduction of oat and pea silage greatly cheapened the cost of gains.

Silage, when used to replace part of the hay in rations for growing cattle, had a value far in excess of the four dollars per ton at which it was figured in cost estimates.

Even with a lower amount of digestible material in their rations, the cattle getting silage made heavier gains.

Oat and pea silage fed with alfalfa hay in rations for growing cattle was worth practically as much as the alfalfa.