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AGRICULTURAL EXPERIMENT STATION

**SOUTH DAKOTA STATE COLLEGE OF AGRICULTURE
AND MECHANIC ARTS**

DEPARTMENT OF ANIMAL HUSBANDRY

ROUGHAGE FOR FATTENING LAMBS

BROOKINGS, SOUTH DAKOTA

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Roughage for Fattening Lambs.

James W. Wilson

The object of this experiment was to determine the value for lambs of corn silage as a sole ration, and the relative feeding value of shredded corn fodder and hay made from sweet clover, field peas and the yellow-flowered alfalfa to hay from upland prairie grass and common alfalfa when fed as roughage with the same kind of a grain ration.

By the breaking up the prairie the stockmen will soon be deprived of one of the cheapest and best roughages in South Dakota.

The fodders used in this experiment were all home-grown and some are considered of little value as a feed. The more extensive use of these fodders by stockmen appears advisable since the lambs made a larger gain than in other experiments at this Station where costly commercial by-products were fed with grain. There is a difference in the gain in weight of lambs during a feeding period, depending on the kind of a roughage they receive. Fattening lambs as well as fattening steers relish first class roughages. It should be fine in quality and properly cured. For example, the second cutting of alfalfa is preferable to the first cutting because it is finer. Coarse grasses and fodders must be avoided for the best results, because as a rule, they contain a large per cent of woody fibre and are less palatable and less digestible than the finer parts. Although the sheep is considered the "plant scavenger" on the farm, practice shows that he is not the hay scavenger.

The great value of a proteinaceous roughage from a feeder's standpoint, is the furnishing of the element that tends to balance the ration. This can be purchased in the market in the form of oil meal, cotton-seed meal, etc., but the cost of these products have become such in recent years, for the feeder in the Northwest that their use in many sections, long distances from the place where they are manufactured, is practically prohibitive. By using a feed of this nature with our naturally carbonaceous grains, much larger gains are secured, as the results of this experiment show, that if the carbonaceous roughages are fed with grains with a similar composition. The gains are more uniform, the animals are in a better marketable condition at the close of the fattening period and the manure made, as has been shown by experiments, is of greater value to put back on the land.

THE EXPERIMENT

Sixty head of lambs were purchased from local growers. They had been running in stubble and stalk fields all fall and were in a good healthy growing condition. They were dipped and three days afterward, were divided into seven lots for the experiment. Not having sufficient hay of the Siberian variety of alfalfa five lambs were placed in the alfalfa lots. The grain ration consisted of the same quantity per head per day of shelled corn and oats mixed half and half by weight. Each lot was fed all of its respective fodder it would consume and all feed was carefully weighed both morning and evening.

Chemical Analysis of Feeds.

By GUY E. YOUNGBERG, Assistant in Chemistry.

	Moisture %	Ash %	Ether Extract %	Crude Protein %	Nitrogen— free extract %	Crude fibre %
Siberian Alfalfa	7.47	7.20	4.86	17.69	32.62	30.16
Common Alfalfa	9.76	8.64	4.51	19.69	34.69	22.71
White						
sweet clover ..	8.38	7.42	3.78	16.44	38.49	25.49
Canadian field						
pea hay.....	7.85	7.62	3.30	17.69	31.55	31.99
Shredded						
corn fodder ...	6.50	6.15	2.42	7.46	47.55	29.92
Prairie hay	6.40	7.13	3.82	6.62	44.59	31.44
Corn silage	67.82	1.77	1.70	2.80	18.18	7.73
Dried distilled						
grains	4.19	1.97	12.50	33.12	34.55	13.67
Oil meal	6.56	5.17	7.64	33.87	37.11	9.65
Cottonseed meal..	4.73	4.75	7.56	37.46	30.50	15.00

From a study of the above table of the analyses of feed it will be seen that the per cent of crude protein for the two alfalfas, the sweet clover and the pea hay, is from two and one-half to three times as large as the per cent of crude protein in the other fodders. Also that the per cent of this constituent in these fodders is one-half as great as in the commercial by-products, distillery spirit feed, oil meal and cottonseed meal. This is why these four are known as proteinaceous fodders since they contain a comparatively large per cent of protein. There is another value these proteinaceous plants have and that is the extended root system, have nitrogen-gathering nodules on these roots, and furnish much humus to the soil, something

of which many of our South Dakota lands are greatly in need.

SIBERIAN ALFALFA

The Siberian, or yellow-flowered alfalfa is of recent introduction into South Dakota and not to our knowledge has it been fed in an experiment before in this country. Prof. N. E. Hansen, of this Station was sent upon three expeditions to Europe and Asia, by the United States Department of Agriculture, as agricultural explorer, in search of seeds and plants that might be of value to the farmers of the Northwest. Among the many seeds secured were small quantities of several kinds of the yellow-flowered alfalfa from Siberia and eastern European Russia. This Station received its quota from the federal department and the plant seemed quite at home in its new surroundings. Not until the explorer took an active interest in its propagation did it reach the farmers in the region for which it was intended or the semi-arid region west of the Missouri river. This was brought about as rapidly as the limited supply of seed would permit.

Two years ago a small appropriation was made by the state legislature to demonstrate to the farmers in that section that this was a forage plant suited to their conditions. These two years of demonstration work were sufficient to convince the law makers of South Dakota that this variety of alfalfa was just what was needed and consequently the next legislature appropriated \$10,000.00 to send the introducer back to Siberia for a supply of seed and \$15,000.00 to further demonstrate to the farmers the value of this important plant.

The kind used in this experiment is known as the Samara variety (see Bulletin 141) a large upright rank-growing sort in this comparatively moist climate.

Because of the scarcity of seed we were compelled to make our hay for this test of some several rows of alfalfa growing in the Horticultural gardens. These rows were made up from individual plants set in hills some two feet

apart in the rows for the purpose of growing the maximum quantity of seed. The plants covered the ground completely. We obtained two cuttings, the second cutting not being as coarse in quality as the first one. Because of this system of growing, the alfalfa was not as fine in quality as the hay that was made from the common or blue-flowered alfalfa cut from a field where it had been sown broadcast. The stalks were coarser and from the table of analysis of the fodders fed there were 7.45 per cent more crude fibre in the yellow-flowered alfalfa than in the blue-flowered, and consequently was less palatable and less digestible. This then accounts for the larger number of pounds of grain for a pound of gain with the lambs that received the Siberian variety of alfalfa than with the lot that received the common or blue-flowered variety. The hay was highly palatable and greatly relished by the lambs.

Because of its drouth-resisting qualities and its adaptability to a large portion of South Dakota and adjoining states (see Bulletin 141 of this Station), it is a most valuable addition to our list of highly proteinaceous forage plants.

RESULTS

Pounds of oats and corn consumed in 67 days.....	639.00
Pounds of hay consumed in 67 days.....	476.00
Pounds of gain, 5 lambs.....	164.00
Pounds of grain for a pound of gain.....	3.89
Pounds of hay for a pound of gain.....	2.90
Average gain per head daily.....	.48

COMMON ALFALFA

With the several hundred head of lambs fattened at this Station during the past eleven years, the largest gains have been secured with those that received alfalfa hay with a grain mixture. The results reported in Bulletin 119 (edition exhausted) show that the lot fed alfalfa as a roughage with grain made an average daily gain of fifty-one hundredths of a pound during a sixty-one day feeding period. In this experiment during a sixty-seven day feeding period,

an average daily gain of fifty-six hundredths of a pound was secured. With ordinary feeding, gains from one quarter to one-third of a pound are considered good.

From a careful study of the table of individual weights and gains on page 196 it will be noted that every lamb in all of the lots receiving alfalfa made comparatively large gains. The grain ration consisted of oats and shelled corn mixed half and half by weight. While with the other lots some of the lambs did not make much more than one-half as much gain under the same conditions. This then puts a high feeding value on alfalfa as a roughage for lambs.

RESULTS

Pounds of oats and corn consumed in 67 days.....	639.00
Pounds of hay consumed in 67 days.....	574.00
Pounds of gain, 5 lambs	190.00
Pounds of grain for a pound of gain.....	3.36
Pounds of hay for a pound of gain.....	3.02
Average gain per head daily.....	.56

WHITE SWEET CLOVER (*Melilotus alba*)

The white-flowered sweet clover, considered an obnoxious weed in most sections, when fed to lambs with the same kind of a grain ration as other lots received, did not yield the poorest results. In fact, the gains were equalled only by the lots that received the alfalfa hays. The gains for the lot were comparatively uniform, the hay palatable and from the results we believe it should be considered one of the principal crops in a system of livestock farming instead as a worthless weed.

There are two varieties of sweet clover, the white and the yellow-flowered. The white is the most common and is usually found growing along road sides and in waste places.

From Bulletin No. 40 of this Station (edition exhausted) I quote the following: "Similar to yellow melilot but with the leaflets as if cut off square at the tips, the flower

white, and the standard of the corolla longer than the other petals.

This has about the same distribution as the yellow melilot but is more common in South Dakota and is much more valuable as a forage plant. Though stock do not like it very well while green they eat it readily when cured with other forage plants. Both of the sweet clovers are fragrant while drying. White melilot is a valuable bee plant, producing an abundance of nectar. As it is only a biennial at most and grows so rank it may often be used as a nurse plant to shade the ground and protect certain of the slower growing forage plants. Like yellow melilot it is very hardy and may prove of value in silage mixtures. White melilot is often advertised in seed catalogues as "Bokhara clover."

RESULTS

Pounds of oats and corn consumed in 67 days.....	1280.00
Pounds of sweet clover hay consumed in 67 days..	924.00
Pounds of gain, 10 lambs.....	289.00
Pounds of grain for a pound of gain.....	4.42
Pounds of hay for a pound of gain.....	3.19
Average gain per head daily.....	.43

PEA HAY

This hay was made by cutting the Canadian field pea after the bloom and before the pods were formed. It was a very palatable roughage and highly relished by the lambs. With the exception of the two lots that received alfalfa, and the lot that received sweet clover, more uniform gains were made than with either of the other lots. It is an advantage to secure uniform gains as the lambs are in a better condition for the market. This trial also emphasizes the importance of feeding a legume as a roughage.

The proteinaceous roughages are evidently a conditioner and causes a greater value to be secured from the grain consumed. With the exception of the silage lot, the grain allowance for each lamb was practically the same.

RESULTS

Pounds of oats and corn consumed in 67 days....	1280.00
Pounds of hay consumed in 67 days.....	748.00
Pounds of gain, 10 lambs.....	237.00
Pounds of grain for a pound of gain.....	5.40
Pounds of hay for a pound of gain.....	3.15
Average gain per head daily.....	.35

SHREDDED CORN FODDER

Shredded corn fodder proved a valuable roughage for lambs when they were receiving a grain ration of corn and oats mixed half and half. But it was not so good as the prairie hay with the same kind of a grain ration. Lambs prefer fine fodders, hence a larger per cent of this fodder was refused, and weighed back, than with the lot that received prairie hay. However should there be a scarcity of hay for roughage, shredded corn fodder is a valuable substitute.

RESULTS

Pounds of oats and corn consumed in 67 days....	1240.00
Pounds of corn fodder consumed in 67 days.....	865.00
Pounds of gain, 10 lambs	218.00
Pounds of grain for a pound of gain.....	5.68
Pounds of fodder for a pound of gain.....	3.96
Average gain per head daily.....	.32

PRAIRIE HAY

The upland prairie hay of South Dakota contains a large variety of grasses. This mixture has a high feeding value. With winters when the snowfall is light, sheep do well the year round with very little additional feed.

In 1908 an experiment in feeding lambs prairie hay and alfalfa with the same grain ration, the results of which were reported in Bulletin number 119 of this Station (edition exhausted) it was found that an average gain of thirty-eight hundredths of a pound daily was made as compared to fifty-one hundredths of a pound daily with lambs that received alfalfa hay.

In sections where the leguminous plants have not as yet become established, the native hay with grain is an excellent feed for lambs.

RESULTS

Pounds of oats and corn consumed in 67 days.....	1239.00
Pounds of hay consumed in 67 days.....	572.00
Pounds of gain, 10 lambs.....	243.00
Pounds of grain for a pound of gain.....	5.09
Pounds of hay for a pound of gain.....	2.35
Average gain per head daily.....	.36

CORN SILAGE

During the past few years many silos have been built in South Dakota to preserve the entire corn crop. Corn silage is an excellent feed for all kinds of livestock when given in the proper proportion with other feeds, but as a sole ration for lambs the results of this experiment show it to be of little value. One year ago corn silage, made of the same variety of corn as used in this experiment, proved to be an excellent ration for wintering yearling steers. (See Bulletin 137 of this Station.) An average daily gain of 2.4 pounds was secured and the cattle were fat enough to sell on the market as killers. But for lambs it seems to be a different proposition. Four and six-tenths pounds per head daily was the largest quantity they would eat and then much of the coarser parts had to be weighed back. This was not true with the steers. However, the lambs were in a thrifty, healthy, growing condition during the feeding period, appeared anxious to eat their feed but would not consume enough to gain in weight as did lambs in the other lots.

A few years ago silage was tried with sheep and the results were similar to those in this trial.

RESULTS

Pounds of silage consumed in 67 days.....2521
 Total loss in weight of 10 lambs..... 9

TABLE OF WEIGHTS AND GAINS

Lot 1 Corn Silage					Lot II. Grain and Shredded Corn Fodder				
Weight at beginning December 2	Weight January 2	Weight at close February 7	Gain		Weight at beginning December 2	Weight January 2	Weight at close February 7	Gain	Gain per head daily
87	88	91	4		96	110	121	25	.37
84	89	87	3		99	110	126	27	.40
83	91	91	2		74	78	80	6	.08
83	85	85	3		94	102	116	22	.32
73	79	76	3		95	108	118	23	.34
78	67	66	-12		106	119	130	24	.35
91	89	86	-5		82	102	115	33	.49
93	93	95	2		90	97	99	9	.13
90	92	89	-1		84	95	104	20	.29
64	62	60	-4		97	111	126	29	.43
835	835	826	-9		917	1032	1135	218	.32

Lot III. Grain and Wild Hay					Lot IV. Grain and Pea Hay				
Weight at beginning December 2	Weight January 2	Weight at close February 7	Gain	Gain per head daily	Weight at beginning December 2	Weight January 2	Weight at close February 7	Gain	Gain per head daily
94	112	129	35	.52	87	94	106	19	.28
100	119	121	21	.31	87	94	103	16	.23
67	91	100	33	.49	57	73	81	24	.35
69	83	80	20	.29	82	89	102	20	.29
71	82	84	13	.19	89	100	118	29	.43
84	96	101	17	.25	100	115	131	31	.46
91	105	111	20	.29	104	118	126	22	.32
85	98	109	24	.35	81	100	114	33	.49
95	112	126	31	.46	65	73	84	19	.28
80	92	109	29	.43	84	93	108	24	.35
836	987	1079	243	.36	836	949	1073	237	.35

Lot V. Grain and Sweet Clover Hay.

Weight at beginning December 2	Weight January 2	Weight at close February 7	Gain	Gain per head daily
83	94	103	20	.29
94	104	116	22	.32
92	102	120	28	.41
78	89	107	29	.43
102	122	147	45	.67
85	96	102	17	.25
90	111	128	38	.56
72	94	113	41	.61
67	82	99	32	.47
84	94	101	17	.25
847	988	1136	289	.43

Lot VI. Grain and Common Alfalfa Hay

Weight at beginning December 2	Weight January 2	Weight at close February 7	Gain	Gain per head daily
85	105	129	44	.65
80	99	122	40	.59
71	88	105	34	.50
68	85	102	34	.50
103	117	141	38	.56
407	494	597	190	.56

Lot VII. Grain and Siberian Alfalfa Hay

Weight at beginning December 2	Weight January 2	Weight at close Feb. 7	Gain	Gain per head daily
86	104	122	36	.56
82	102	120	38	.56
85	95	107	22	.32
89	105	125	36	.53
71	78	103	32	.47
413	484	577	164	.48

KINDS OF FEED FED

	No. of lambs in lot	Pounds of grain consumed	Pounds of hay consumed	Total gain	Pounds of grain for a pound of gain	Pounds of hay for a pound of gain	Average gain per head daily
Siberian alfalfa hay and grain.....	5	639	476	164	3.89	2.90	.43
Common alfalfa and grain.....	5	639	574	190	3.36	3.02	.56
White sweet clover and grain.....	10	1280	924	289	4.42	3.19	.43
Canadian field pea hay, grain.....	10	1280	748	237	5.40	3.15	.35
Shredded corn fodder and grain.....	10	1240	865	218	5.65	3.96	.32
Prairie hay and grain.....	10	1239	572	243	5.09	2.35	.36
Corn silage	10	2521	—	9	—	—	—

SUMMARY

1. Corn silage as a sole ration for lambs is not the best of feeds. The lambs were thrifty during the feeding period but would not eat enough silage to fatten. Only five of the ten head made a gain during the sixty-seven day feeding period. The total of these gains does not amount to as much as the average gains made by other lambs that received other feeds. The total loss for the ten head was nine pounds.

2. White sweet clover is an excellent roughage, when fed with a grain ration, for fattening lambs. The gains made rank next and close to gains made by lambs fed alfalfa hay as a roughage. This plant has a place in our system of grain and livestock farming for the production of hay. It is also one of the nitrogen-nodule bearing plants and the soil on which it grows will be in a better condition for the succeeding crop.

3. Pea hay is a good roughage with grain for fattening lambs. As a lot the lambs made a very uniform gain, ranking next to those that received sweet clover hay for roughage.

4. The results from the shredded corn fodder lot were the poorest of all roughages tried with a grain ration. The gains of the lambs were not uniform, ranging from six to thirty-three pounds per head in sixty-seven days. Neither was the average gain as large as that received from the lambs that were getting prairie hay with the same kind of a grain ration. However this fodder has a value for fattening with grain but is not equal to prairie hay ton for ton, for fattening lambs..

5. The new Siberian alfalfa recently introduced by Mr. N. E. Hansen, of this Station, while an agricultural explorer for the United States Department of Agriculture, proved second only in value to the blue-flowered alfalfa grown under different conditions at this Station. See

page 190. It is a palatable and highly nutritious feed for lambs. On account of its adaptability to the semi-arid section of the Northwest (see Bulletin 141 of this Station) it is a very valuable addition to our list of proteinaceous forage plants.

