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**AGRICULTURAL
EXPERIMENT STATION**

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

DEPARTMENT OF ANIMAL HUSBANDRY

**Corn Silage and Roots for
Steers**

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1912
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Corn Silage and Roots for Steers

James W. Wilson

This bulletin includes the results of two experiments in feeding corn silage to steers. The object of these experiments was to determine the value of silage as a sole ration for wintering steers; and also as a roughage, when fed with grain, for fattening operations. It was further desired to determine the value of different root crops when added to the grain ration for fattening steers.

Experiment No. 1. Twenty head of yearling steers were divided into five different lots of four head each and fed for 90 days on the following rations: Lot 1, silage from green corn cut when in the dent stage; Lot 2, one-half as much silage as was consumed by lot 1 and all the hay they would eat; Lot 3 silage from corn fodder cut at same time as for lot 1 but put into silo ten weeks after it was cut; Lot 4, millet hay cut when green and before seed matured; Lot 5, corn fodder from the field.

Experiment No. 2. Twenty-four head of yearling steers were divided into six different lots of four head each and fed for 120 days. One-tenth as much oil meal, by weight, as shelled corn was fed to each lot daily, and in addition the following: Lot 1, silage; Lot 2, one-half as much silage as Lot 1 and what hay they would eat; Lot 3, sugar beets and hay; Lot 4, mangel-wurzel beets and hay; Lot 5, stock beets and hay; Lot 6, hay.

The silage for each experiment was made from the Minnesota No. 13 variety of corn. This variety is not considered a rank grower but it is one of the best for a short growing season and matures ears before frost.

EXPERIMENT NO. I.



Lot 1

Corn Silage

These steers received corn silage without further roughage or grain than that furnished by the corn plant. As a feed it was the best of the five rations tried for wintering steers. The silage was made from corn that was drilled, yielded 11 tons of green corn per acre, cut when most of the ears were in the dent stage and put into the silo when green. The amount fed was increased gradually until the lot of four was consuming at the close of the experiment 280 pounds daily. The feed was quite palatable and no bad results were obtained by feeding it as a sole ration. These steers were in good condition and would have sold on the market as killers.

	Pounds
Average weight at the beginning.....	773.
Average weight at close.....	989.
Average gain per head for period of 90 days.....	216.
Average gain per head, daily.....	2.40
Average pounds of silage for pound of gain.....	26.
Average silage consumed per head, daily.....	63.
Average dry matter for a pound of gain.....	7.02



Lot 2

Corn Silage and Hay

One-half as much of the same kind of corn silage was given this lot as was fed lot 1 and in addition all the wild hay they would eat. The object of this method of feeding was to determine the advantage, if any, in feeding a dry roughage with the succulent feed made from the corn plant. The steers made a trifle more than one-half as much gain as those fed on silage alone, or a gain corresponding to the quantity of silage fed, and were not in as good condition at the close of the experiment as steers of lot 1. They would have ranked in the market as stockers or feeders.

	Pounds
Average weight at the beginning.....	757.
Average weight at close.....	869.
Average gain per head for period of 90 days.....	112.
Average gain per head, daily.....	1.25
Average pounds of silage for pound of gain.....	25.
Average pounds of hay for pound of gain.....	7.7
Average pounds of silage consumed daily.....	31.5
Average dry matter for pound of gain.....	13.7



Lot 3

Corn Fodder Silage

Ten weeks after the corn was cut and shocked in the field it was run through the cutter and blown into the silo. Sufficient water was added to the fodder in the silo to cause it to pack better in order to exclude the air. This was the sole ration for this lot and while the cattle consumed a large quantity daily it was not as palatable a feed as that fed to lot 1. It did not have the pleasant aroma noticeable in feed for lot 1, but was comparatively sour. However, there were no bad results from its use as a feed and the gains per head were exceeded only by the steers of lot 1. The cattle were in good condition and suitable for the butcher at the end of the experiment.

	Pounds
Average weight at the beginning.....	780.
Average weight at close.....	956.
Average gain per head for period of 90 days.....	176.
Average gain per head, daily.....	1.94
Average pounds of fodder silage for pound of gain.....	23.
Average pounds of fodder silage consumed daily.....	45.
Average dry matter for a pound of gain.....	9.56



Lot 4

Millet Hay

The common millet of the Fox-tail type is grown quite generally as a crop on ground where other crops have failed, and is usually a heavy yielder, but as a feed without grain results show it evidently is not very valuable. This millet was cut when green before the seeds were matured and apparently was a first class feed. The lot received all the millet hay they would eat and as a feed it was quite palatable.

These steers at the close of the experiment were eating 22 pounds per head daily and received enough nutriment to supply the needs of their bodies without making additional gain. They would have ranked as stockers in the market as they were not fat enough for the butcher. As a single feed we do not recommend millet hay for cattle during cold weather.

	Pounds
Average weight at the beginning.....	786.
Average weight at close.....	800.
Average gain per head for period of 90 days.....	14.
Average gain per head, daily.....	.63
Average pounds of millet hay for pound of gain.....	132.
Average pounds of millet consumed per head daily....	21.
Average dry mater for a pound of gain.....	122.55



Lot 5

Corn Fodder

Probably more cattle, in the corn-belt, receive, as their major ration, corn fodder for wintering than any other single feed. This fodder was made of corn from the same field that corn was taken to fill the silos and was cut and shocked at the same time. This was the only lot in which it was necessary to have a hog to pick up the waste. The kernels of corn in the silage lots were soft and were evidently masticated and digested more completely than with this lot. The fodder was left in the field for 14 weeks and evidently lost many of its once nutritious qualities from the action of the sun, rain, wind and frost, as more pounds of dry matter were required for a pound of gain than with either of the other two lots where corn silage was fed alone. These steers would have ranked in the market as stockers.

	Pounds
Average weight at the beginning.....	765.
Average weight at close.....	923.
Average gain per head for period of 90 days.....	158.
Average gain per head, daily.....	1.76
Average pounds of corn fodder fed for pound of gain..	16.
Average lbs. of corn fodder consumed per head daily...	28.
Average waste of corn stalks per head daily.....	2.5
Average lbs. of dry matter for pound of gain.....	11.46
Pounds of pork made by hog following steers.....	44.

EXPERIMENT NO. II.

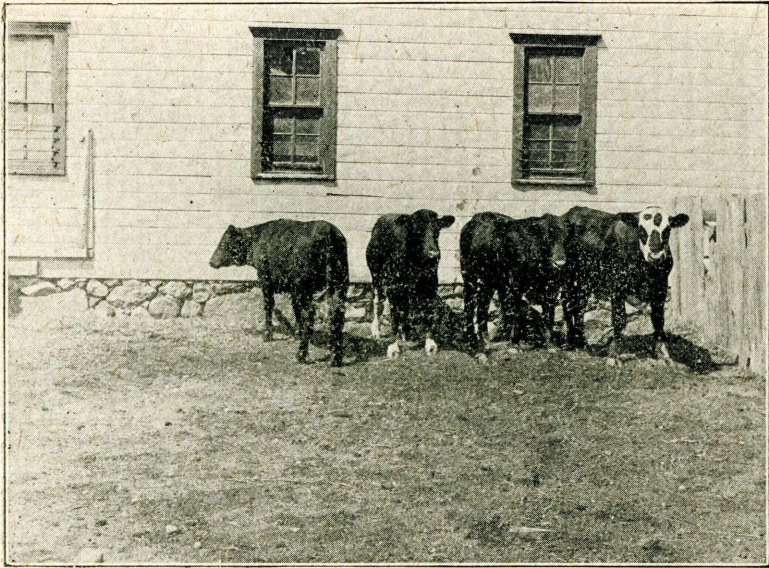


Lot 1

Grain, Corn Silage

This lot received shelled corn, oilmeal, and corn silage for roughage, made from corn cut when the kernels were in the dent stage. They made eight-hundredths of a pound more gain per head daily than steers of lot 6, where the same kind of grain ration was fed but received hay for roughage, and eighteen hundredths of a pound less per head daily than lot 2 that received one-half as much silage and all the hay they would eat. The gain for this lot is smaller than for either of the root lots each fed practically the same quantity of grain. However, steers of this lot were smoother, shed hair sooner and were sleeker than those of other lots at close of the experiment.

Average weight at beginning.....	807.
Average weight at end of 120 days fattening period....	1091.
Average gain per head.....	284.
Average gain per head, daily.....	2.36
Shelled corn for pound of gain.....	7.97
Oilmeal for pound of gain.....	.69
Silage for pound of gain.....	5.52
Total pork made by two 143-lb. pigs following steers.	169.
Average bushels of corn consumed per head.....	40.
Average pounds of pork produced per steer.....	42.

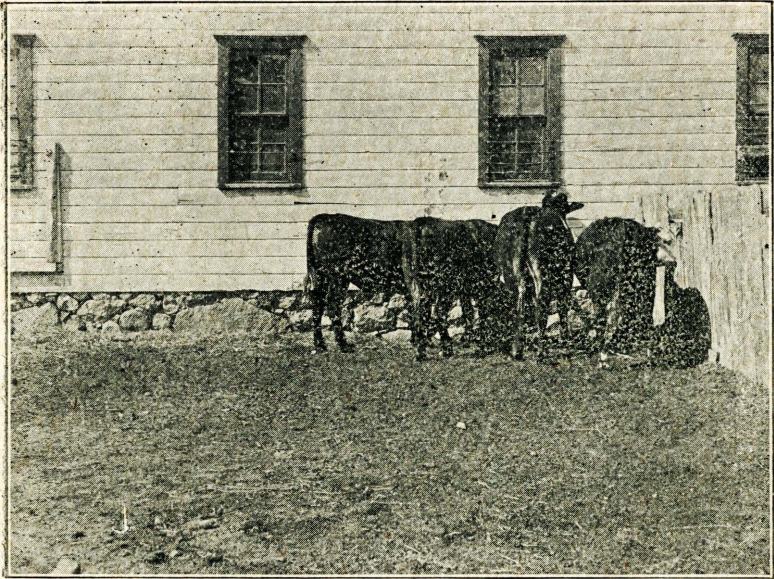


Lot 2

Grain, Hay, Corn Silage

These steers received one-half as much silage as lot No. 1 and in addition all the hay they would eat. They made an average of .26 of a pound more gain per head daily than steers that did not receive silage or beets. The feeding of hay caused a larger consumption of grain than with lot 1 and evidently was a benefit. At the close of the experiment these cattle were similar in appearance to lot 1.

	Pounds
Average weight at beginning.....	835.
Average weight at end of 120 days fattening period....	1140.
Average gain per head.....	305.
Average gain per head, daily.....	2.54
Shelled corn for pound of gain.....	7.68
Oilmeal for pound of gain.....	.67
Silage per pound of gain.....	2.77
Hay for pound of gain.....	2.27
Total pork made by two 156-lb. pigs following steers.	224.
Average bushels of corn consumed per head.....	42.
Average pounds of pork produced per steer.....	55.



Lot 3

Grain, Hay, Sugar Beets

The sugar beet does well in South Dakota and as a feed with grain and hay it ranked second to the mangel-wurzel for fattening steers. With the same quantity of grain it was impossible to get the steers to eat as many sugar beets as other lots, probably on account of the large per cent of sugar they contained. As compared to lot 6 sugar beets added to grain ration caused a saving of 1 pound of corn for every pound of gain and yielded .27 of a pound more per head daily.

	Pounds
Average weight at beginning.....	793.
Average weight at end of 120 day fattening period....	1099.
Average gain per head.....	306.
Average gain per head, daily.....	2.55
Shelled corn for pound of gain.....	7.56
Oilmeal for pound of gain.....	.67
Hay for pound of gain.....	2.17
Sugar beets for pound of gain.....	2.48
Total pork made by two 120-lb. pigs following steers.	203.
Average bushels of corn consumed per head.....	41.
Average pounds of pork produced per steer.....	51.



Lot 4

Grain, Hay, Mangel-Wurzel Beets

The mangel-wurzel proved to be the best of the three root crops fed. A pound of gain was produced with fewer pounds of corn than with any of the other lots. The same quantity was fed daily as of the stock beets and they were more palatable than the other beets. The results compared to those for lot 6, when no roots or silage was fed, shows that 1.07 pounds less of grain were required for a pound of gain and yielded .33 of a pound more per head daily.

	Pounds
Average weight at beginning.....	773.
Average weight at end of 120 day fattening period....	1087.
Average gain per head.....	314.
Average gain per head, daily.....	2.61
Shelled corn for pound of gain.....	7.48
Oilmeal for pound of gain.....	.65
Hay for pound of gain.....	2.84
Mangel-wurzel beets for pound of gain.....	3.43
Total pork made by two 139-lb. pigs following steers..	190.
Average bushels of corn consumed per head.....	42.
Average pounds of pork produced per steer.....	47.

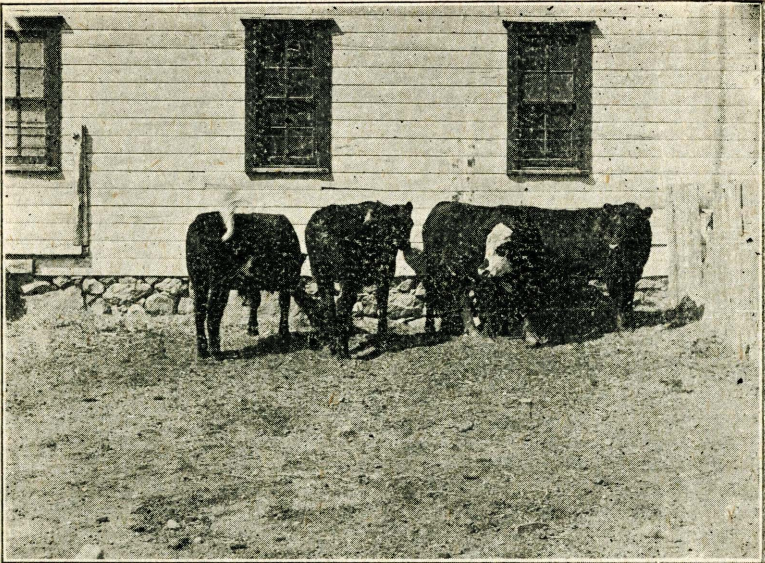


Lot 5

Grain, Hay, Stock Beets

More grain was required to produce a pound of gain with this than with either of the other two lots that received roots. The same quantity of roots were consumed as for Lot 4 but a smaller quantity of grain and hay. Of the three lots receiving beets the results show that this was the poorest feed. While the steers were fat they did not have the smooth appearance of the silage lots.

	Pounds
Average weight at beginning.....	798.
Average weight at end of 120 day fattening period...	1085.
Average gain per head.....	287.
Average gain per head, daily.....	2.39
Shelled corn for pound of gain.....	8.03
Oilmeal for pound of gain.....	.70
Hay for pound of gain.....	2.57
Stock beets for pound of gain.....	3.74
Total pork made by two 147-lb. pigs following steers..	157.
Average bushels of corn consumed per head.....	41.
Average pounds of pork produced per steer.....	39.



Lot 6

Grain, Hay

This was the check lot of the experiment. One-tenth as much oilmeal as shelled corn and all the wild hay they wanted constituted the ration. The steers were not as smooth and fat at the close of the experiment as the steers of the two lots that received silage or beets. It required more grain to produce a pound of gain than with any of the other lots.

From these results it is evident that a succulent ration such as beets or silage is very beneficial to add to the dry grain and hay ration for fattening cattle.

	Pounds
Average weight at beginning.....	837.
Average weight at end of 120 days fattening period.....	1112.
Average gain per head.....	275.
Average gain per head, daily.....	2.28
Shelled corn for pound of gain.....	8.55
Oilmeal for pound of gain.....	.75
Hay for pound of gain.....	3.72
Total pork made by two 136-lb. pigs following steers.....	207.
Average bushels of corn consumed per head.....	42.
Average pounds of pork produced per steer.....	52.

INDIVIDUAL GAINS BY PERIODS

EXPERIMENT NO. I.						EXPERIMENT NO. II.						
No. of steer	First 30 days	Second 30 days	Third 30 days	Total gain	Gain per head daily	No. of steer	Gain 1st 30 days	Gain 2nd 30 days	Gain 3rd 30 days	Gain 4th 30 days	Total gain	Gain per head daily
Corn Silage						Grain and Silage						
1	88	70	62	220	2.44	1	62	72	94	53	281	2.34
2	81	84	31	196	2.17	2	84	70	82	62	298	2.48
3	79	66	38	183	2.03	3	93	56	62	56	267	2.22
4	111	100	55	266	2.95	4	95	68	90	35	288	2.40
Ave.	89	80	46	216	2.40	83	66	82	51	284	2.36	
Silage and Hay						Grain, Silage and Hay						
1	29	24	28	81	.90	1	70	52	100	53	275	2.29
2	42	48	43	133	1.47	2	76	82	90	92	340	2.83
3	88	38	13	139	1.54	3	35	66	110	63	274	2.28
4	46	26	25	97	1.07	4	70	90	92	79	331	2.75
Ave.	61	34	27	112	1.25	63	72	98	72	305	2.54	
Fodder Silage						Grain, Sugar Beets and Hay						
1	96	54	79	229	2.53	1	99	52	120	14	285	2.37
2	68	58	31	157	1.74	2	52	58	116	97	323	2.69
3	48	82	39	169	1.87	3	64	56	112	76	308	2.56
4	56	46	44	146	1.62	4	100	34	104	69	307	2.55
Ave.	67	60	48	175	1.94	79	50	113	64	307	2.54	
Millet Hay						Grain, Mangle-wurzel and Hay						
1	16	22	-7	31	.34	1	64	58	42	68	232	1.93
2	20	-18	-21	-19	-.21	2	91	60	84	56	291	2.42
3	-19	74	1	56	.62	3	108	76	94	97	375	3.12
4	16	-4	-23	-11	-.12	4	88	56	94	118	356	2.96
Ave.	8	17	-12	14		87	62	78	84	313	2.61	
Corn Fodder						Grain, Stock Beets and Hay						
1	84	36	59	179	1.98	1	66	40	110	58	274	2.28
2	71	16	51	138	1.45	2	88	44	64	79	275	2.29
3	62	54	21	137	1.52	3	90	30	90	106	316	2.63
4	79	46	55	180	2.00	4	82	102	22	78	284	2.36
Ave.	74	38	46	158	1.76	81	54	71	80	287	2.39	
						Grain and Hay						
						1	58	70	88	86	302	2.51
						2	72	60	78	72	282	2.35
						3	68	66	82	46	262	2.18
						4	62	50	72	68	252	2.10
						Ave.	65	61	80	68	274	2.28

SUMMARY

Experiment No. 1

Results show that common millet hay of the fox-tail type was a comparatively poor feed as a sole ration, for wintering steers, as there was practically no gain made during the 90 day feeding period.

2. No bad results were received by feeding steers all the corn silage they would eat without other grain or roughage. At the end of the experiment they were consuming an average of 70 pounds per head daily. The steers were not as fat as they would have been had they received a full grain ration and evidently much of this gain can be credited to growth. Feeders in the corn belt could well afford to make this cheap gain before fattening for summer market.

3. Neither corn fodder from the field or fodder silage or a one-half ration of silage and hay proved as valuable for wintering steers as first class corn silage (fodders cut from same field at same time as corn for silage), as it required more pounds of dry matter for a pound of gain than with silage lot.

Experiment No. 2

4. In each case when silage or roots were fed with shelled corn and wild hay there was a larger gain than with the lot that did not receive these succulent feeds.

5. For fattening steers, hay with silage proved to be better than hay or silage alone as a roughage.

6. Results show that the mangel-wurzel beet was the best of the three kinds fed. As a feed it was more palatable than other varieties and less corn was required by this lot for a pound of gain than for any other lot.