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Sunflower Silage for Steers Smutted Corn Silage for Cows

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AGRICULTURAL EXPERIMENT STATION

South Dakota
State College of Agriculture
and Mechanic Arts

SUNFLOWER SILAGE FOR STEERS
SMUTTED CORN SILAGE FOR COWS

Animal Husbandry Department

BROOKINGS, SOUTH DAKOTA

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60 & .49 TO .92.
PP. 473, FIGURE GAIN PER
HEAD DAILY 1920 CORNSILAGE
LOT FOR 60 DAYS

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SUNFLOWER SILAGE FOR STEERS
SMUTTED CORN SILAGE FOR PREGNANT COWS.

By

James W. Wilson

Arthur H. Kuhlman

This bulletin includes the results of two experiments in feeding cattle as follows:

Part I Sunflower Silage for Steers.

Part II Corn Smut Silage for Pregnant Cows.

PART I SUNFLOWER SILAGE.

For several years we have been conducting experiments in feeding corn silage as the sole ration, as the sole roughage ration with grains, as the sole feed with protein by-products, silages made of corn cut at different stages of maturity, silage made of different varieties of corn, and silage made of proso millet. Excellent results have been obtained and the bulletins have had a wide distribution especially in the corn-belt. These silages have proven to be superior feeds for the production of a rapid gain, especially during the preliminary feeding period. These gains in many cases have been nearly as large, during the first 90 days, as gains made by cattle of same age during the grazing season. These gains have been maintained after cattle have been put on a full feed of grain. In some cases the steers have been sold in the market on their merits and have brought within a few cents per hundred as much as steers fed on a much more expensive ration.

To secure similar information as to the value of sunflower silage was the object of this experiment. For 2 different years sunflower silage was fed to different aged cattle. The

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first year the protein supplement oil meal was fed with the silage and the second year the cattle received sunflower silage alone. The sunflowers were grown, harvested and put into the silo the same as corn only they were more difficult to handle. In 1920, the silage was fed to 2-year old steers with oilmeal, while in 1921 the silage was fed to yearling steers without oilmeal. The sunflowers were all in blossom, some having formed seeds and lost from one-half to two-thirds of their leaves. The mammoth Russian variety of sunflowers was used.

For the first test the feeding began in January, and for the second test the feeding began in October, the object being to ascertain whether the cold weather had an influence on the thriftiness of the steers fed on sunflower silage. In the second test it was further desired to learn whether a mixture of corn silage and sunflower silage would not give better results than sunflower silage as the sole ration. In each test, as a check, a lot was fed on corn silage. The feed was weighed for each lot of steers both morning and evening and increased gradually until cattle were receiving all they would eat. The corn silage steers when on full feed were receiving about twice as much silage as the sunflower silage steers, indicating that sunflower silage was not as palatable a feed as corn silage. This was noticeable each year.

Table No. 1 shows the individual gains made by both lots of steers for the two different years, during a period of 90 days each, while receiving the sunflower and the corn silage. The largest gain made by any steer receiving sunflower silage in the 1920 test was .49 of a pound less daily than the smallest gain made by any steer receiving corn silage.

In the 1921 trial all steers receiving sunflower silage are credited with a loss in weight, while all steers receiving corn silage made a gain. We believe it just as important to keep cattle gaining in winter as is summer although it cannot be said that this is the general practise thruout the country. Uniformity of individual gains with a lot of steers is an indication of the value of a feed. These results indicate that oilmeal or other feed of this nature should be fed with sunflower silage.

Table No. 1—Weights and Gains

Sunflower Silage and Oilmeal—1920						Sunflower Silage—1921					
No. of Steer	Weight Jan. 6	Weight Feb. 5	Weight Mar. 6	Gain	Gain per Head Daily	No. of Steer	Weight Oct. 21	Weight Nov. 19	Weight Dec. 20	Gain	Gain per Head Daily
82	1048	1084	1130	82	1.36	97	585	546	534	—51	
85	1031	1050	1086	55	.91	89	639	630	605	—34	
88	911	972	960	49	.81	80	672	670	652	—20	
89	995	1016	1020	25	.41	90	633	616	568	—65	
Total	3985	4122	4196	211			2529	2462	2359	—170	
Av. gain		34	18	52	.87			—16	—25		
Corn Silage and Oilmeal						Corn Silage					
83	969	1056	1106	137	1.52	92	618	676	695	77	1.28
84	1023	1146	1220	177	2.18	124	605	650	670	65	1.08
97	1071	1190	1250	179	1.98	100	610	654	681	71	1.18
99	969	1080	1134	165	1.83	81	725	760	816	91	1.52
Total	4032	4472	4710	658			2558	2740	2862	304	
Av. gain		110	12	164	1.88			45	30	76	1.26

Corn and Sunflower Mixtures

In the 1921 experiment there were three other lots of steers fed the following rations to determine whether by mixing sunflower silage with corn silage the ration would be improved. Lot II received three-fourths corn silage and one-fourth sunflower silage. Lot III received one-half corn silage and one-half sunflower silage. Lot IV received one-fourth corn silage and three-fourths sunflower silage. From the record of the individual gains in Table No. II it may be seen that the steers gained in proportion to the quantity of corn silage in the mixtures. All steers making larger gains than any of those receiving sunflower silage alone.

The average gain per head daily was largest with steers that received corn silage and smallest with steers that received sunflower silage. By mixing the silages daily gains were not increased.

Table No. II—Weights and Gains

Lot I—Corn Silage.

No. of Steer	Weight Oct. 21	Weight Nov. 19	Weight Dec. 20	Gain Per Head	Gain per Head Daily
92	618	676	695	77	1.28
124	605	650	670	65	1.08
100	610	654	681	71	1.18
81	725	760	816	91	1.52
Totals	2558	2740	2862		1.28
Average gain		45	30	76	1.26

Lot II—Three-fourths Corn Silage and one-fourth Sunflower Silage.

83	702	764	796	94	1.56
99	577	630	666	89	1.38
94	608	632	648	40	.66
23	648	690	704	56	.93
Totals	2535	2716	2814		
Average gain		45	24	69	1.16

Lot III—One-half Corn Silage and one-half Sunflower Silage.

82	669	690	722	53	.88
88	756	770	807	51	.85
84	627	660	701	74	1.23
95	522	516	533	11	.18
Totals	2574	2636	2763		
Average gain		15	32	47	.78

Lot IV—One-fourth Corn Silage and three-fourths Sunflower Silage.

85	758	788	791	33	.36
112	659	696	676	17	.18
12	652	666	661	9	.1
87	507	500	488	-19	
Totals	2576	2650	2616	1	
Average gain		74		10	

Lot V—Sunflower Silage.

97	585	546	534	-51	
89	639	630	605	-34	
80	672	670	652	-20	
90	633	616	568	-65	
Totals	2529	2462	2359	-170	
Average gain		-67	-103		

Table No. III

This table gives the average number of pounds of silage fed daily per head. Not all of this feed was consumed by the steers but the refuse consisted of the coarse parts of the feeds.

	Corn Silage	Sunflower Silage	Average Daily feed per head
Lot I	29		29
Lot II	23	8	31
Lot III	16	16	32
Lot IV	7	22	29
Lot V		20	20

The following is an analysis of the silages by Station Chemist, B. A. Dunbar:

Sample	Moisture	Ether Extract	Crude Fiber	Crude Protein	Ash	N-Free Extract
Corn	68.50 %	1.04	5.79	3.38	1.91	19.38
Sunflower ..	79.00 %	.60	8.04	1.73	1.60	9.03

Acidity:—Expressed as no. of cc of N/10 Sodium Hydroxide solution necessary to neutralize acidity of one gram of original sample.

Corn—2.24.

Sunflower—1.16.

From the results of these two trials we would not recommend the growing of sunflowers for filling the silo if corn could be grown. Even if corn would not mature ears we believe the immature corn will make a better forage than sunflowers for filling the silo. In fact, the results reported in bulletin No. 189 of this Station shows that steers that averaged 983 pounds, during a 90 day feeding period on corn silage made an average gain of 251 pounds per head or 2.09 average gain per head daily. A little oilmeal and oat straw was also fed with this green corn silage. Perhaps there are, however, some sections where the sunflower will grow and the corn plant will not. In this case it may be advisable to grow sunflowers for the silo. In each of our trials there evidently was sufficient moisture in the stalk of the sunflower to make good silage without additional water. The chemical analysis of the two silages shows that the sunflower silage contained 11 per cent more water, less protein, more crude fibre, less fat and less nitrogen-free extract than the corn silage.

PART II

SMUTTED CORN SILAGE FOR PREGNANT COWS

The comparatively large quantity of corn smut prevalent during the summer and fall of 1921 caused considerable uneasiness in many sections as to what effect the feeding of smutted silage would have on cattle and especially on the pregnant cow. Because of this uncertainty some silos were not filled last fall.

What Is Corn Smut?

The following was prepared by Arthur T. Evans, Crop Pathologist of this Station, which explains itself:

Smut is one of the best known fungous diseases of corn. It is most evident in the fall after the large smut masses burst open to dispose their masses of black spores. These smut masses are found on all parts of the plant, including roots, stalks, leaves, nodes, ears, silks, and tassels. They are most conspicuous and occur more often on the stalks, tassels and ears. If one remembers that the smut organism is a minute plant, parasitic upon the corn plant, he may better understand its relationships. Some years smut is very prevalent; again it may be very scarce.

The life history of the plant is interesting. The black masses of spores are blown about by the wind often settling into the soil. Here they may lie over winter and in the spring germinate. The minute black spores upon germination form minute plants. This small plant produces another type of spore which is known as the air conidia. These conidia are formed near the surface of the ground and are blown about and lodge upon the corn plants. In the presence of dew or other moisture these spores germinate and produce the familiar smut masses. The air conidia usually produce smut in the tender buds or in injured spots on the stalk. Each node has a tender bud so a corn plant is likely to be attacked at these points. If one plows corn during the latter part of June when it is rather large and causes a great deal of injury to the corn, smut is likely to manifest itself in these in-

jured places. Owing to the fact that this is the season when the air conidia are flying about, entrance to the corn stalk is readily gained through such injuries and also such injuries afford a supply of moisture for growth of these spores. The season of 1921 proved to be favorable to the growth of smut in South Dakota. This was probably due to the fact that the time when these air conidia were germinating on the minute plants in the ground there was very little rain to destroy them. The rainfall in June in 1921 in South Dakota was less than one inch. In most places there was no more than a trace of rain. This resulted in the air conidia developing in great numbers and blowing about in the wind in great quantity. Injury to the stalks at late plowing time probably augmented the epidemic of smut.

Smut has not been found poisonous even to humans. When the smut masses on the stalks are young they are of a white color until such time as the spores begin to form when they change to black. People have taken these smut masses before spores started to form and have eaten them much as mushrooms are eaten. They are pronounced quite palatable.

There is no treatment known for the prevention of smut. Seed treatment is of no avail since the air conidia which are formed on the ground are the direct means of attacking the plant. These attacks are purely local, for instance, smut attacking the lower part of the stem does not produce smut in the tassel. Even smut masses on the stalk are the result of a specific infection.

Smut resistant corn plants are a possibility but as yet little progress has been made in their development. Our best advice on the prevention of corn smut is to cut out the infected plants when not too numerous and burn them. This will avoid filling the ground with a mass of spores to develop in the advent of a favorable season the following year. If one has a large acreage or if the smut is very thick in the field, cutting out the smut masses is not practical. The next recommendation would be that a strict rotation be followed. Where smut occurs in a field one year it may be planted the following year to small grain. This will help to avoid infection and reduce its presence to a minimum.

The presence of much smut in 1921 does not indicate that there will be another epidemic in 1922, since this is largely dependent on 1922 weather conditions. Much or even an average amount of rain in June will help to prevent over-infection by destroying quantities of air conidia before they are blown about."

The early planted corn on the college farm contained more smut than did the later planted.

The Experiment

To furnish information in this line an experiment was planned.

Two barrels were filled with corn plants on which ears were growing that were partially or all smut. These stocks and ears were cut with a hand cutter into small pieces and packed in the barrels. This furnished a feed that contained a larger percent of smut than is ever found in a corn field. A third barrel was filled with ears that were badly smutted.

Four dry cows were purchased for the trial. These cows had been in pasture during summer and averaged 1,096 pounds per head. The dates of breeding of these cows were unknown. It happened, however, that they were in different periods of gestation when the smut was fed which makes the results more valuable than if they had been bred on same date.

For 26 days these cows had from 2 to 5 pounds of smutted silage added to their grain rations and at the close of the trial they were eating 2 pounds per head daily of the smutted ears and the loose smut in the third barrel above mentioned, and evidently enjoyed their feeds. These cows gained 265 pounds during the feeding period of 26 days and all were in a thrifty condition. In general appearance the cows were more attractive at the close of the trial than at the beginning.

One of the cows calved December 17, 22 days after the close of the feeding period. The calf was alive and apparently normal in every respect, except it was not strong and died shortly afterward. The mother had a good flow of milk so we are confident the calf was carried the full period of ges-

tation. The other three cows had normal calves, January 14, May 8 and May 12, respectively, and calves were as strong at birth as one would expect.

From reports of other stations along this line, and made a part of this bulletin, we do not believe the feeding of smut to the cow that calved first was responsible for the weak condition of the calf. The silos on the college farm were filled with smutted corn last fall and no bad results were noticed in feeding to the purebred herds. In fact, corn silage is the principal feed for our cows during the winter.

From Bulletin No. 137 of the Michigan Experiment Station we quote:

“The conclusion which can be safely drawn from this experiment is, that where cows are gradually brought into the habit of consuming large quantities of smut it does not seem hurtful to them. Whether the same thing would be true where cows unaccustomed to smut suddenly gain access to large quantities of it must remain for future experiment. It is safe to say, however, that any quantity of smut that would be at all likely to exist in a cornfield or on the stalks as fed under normal conditions to the cows of the farmer, would not be dangerous to the health of the animals.

“In 1868, Professor John Gamgee, in investigating the ‘corn stalk disease’, fed experimentally 40 pounds of corn smut to two cows, beginning with 6 and increasing to 12 ounces daily. The smut was fed with ground grain and chopped hay. To one cow it was given wet, to the other dry. The cow that received the wet ration gained in weight during the trial, the other lost in weight, but both remained well.

“Dr. N. S. Mayo, in discussing the relation of corn smut to ‘the corn stalk disease of cattle,’ in Bulletin No. 58 of the Kansas Experiment Station, records the experience of a farmer living near Manhattan, who, believing that corn smut was liable to produce the disease, took pains to gather the smut from the field. ‘One night his cattle broke into the enclosure where the smutty corn and smut had been thrown out and ate all they wished; no injurious effects were noticed.’

"In Bulletin No. 10, U. S. Department of Agriculture, Bureau of Animal Industry, there is recorded the results of an experiment performed in January, 1894, of feeding corn smut in large quantities to two heifers. The results are reported as follows:

'Beginning on the morning of January 17, 1894, and continuing until noon of February 2 (16½ days), the heifers were fed morning and evening with from 2 to 3 quarts of a mixture of equal parts by weight of cut hay and a mixture of corn meal, middlings and wheat bran, and 16 quarts of smut. The actual quantity of the fungus consumed by one heifer was 61 pounds or a daily average of nearly 3.7 pounds, and by the others 67½ pounds, or a daily average of 4 1-5 pounds. The temperatures of the animals were taken every morning and evening. The animals appeared to be perfectly well throughout the time of feeding and continued so for several months, during which time they were kept under close observation.'

LIST OF AVAILABLE PUBLICATIONS

- Annual Reports**, 1917, 1918, 1919, 1920.
- Bulletins**
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