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The Feeding Value of Speltz in Beef and Pork Production

J.W. Wilson

South Dakota Agricultural College

H.G. Skinner

South Dakota Agricultural College

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SOUTH DAKOTA

Agricultural College

EXPERIMENT STATION

BROOKINGS, SOUTH DAKOTA

The Feeding Value of Speltz **IN** **Beef and Pork Production**

DEPARTMENT OF ANIMAL HUSBANDRY

WILL A. BEACH PRINTING CO.,
Sioux Falls, S. D.

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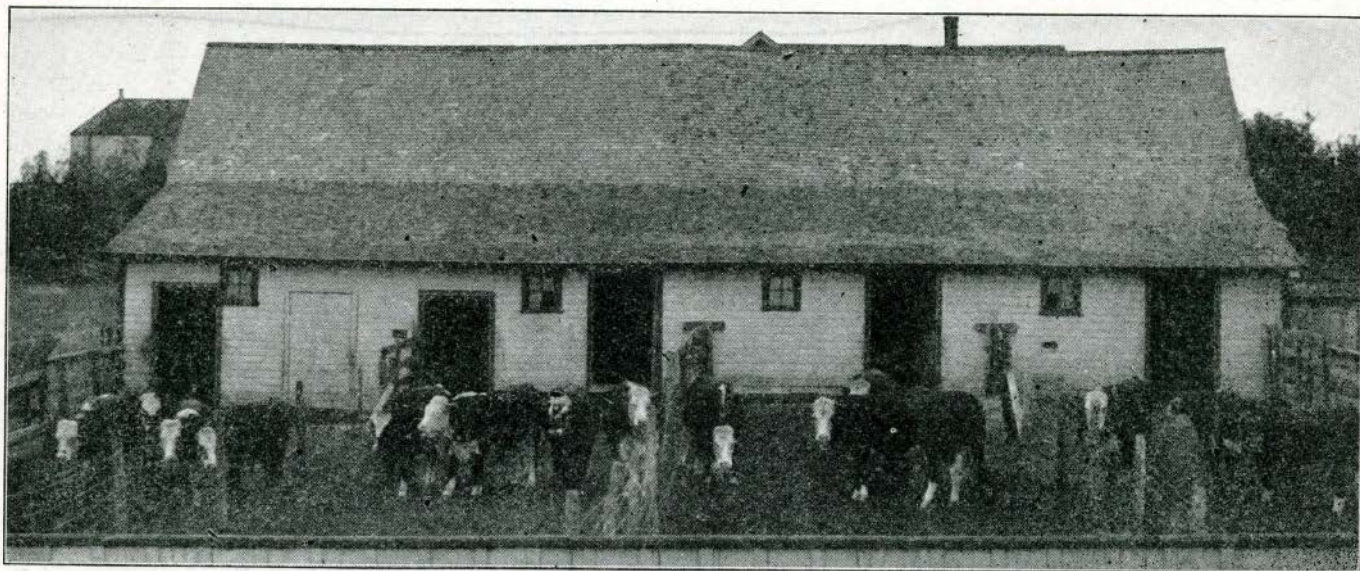
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Any farmer of the state can have the Bulletins of this Station free upon application to the Director.



GROUND SPELTZ

CORN AND SPELTZ

WHOLE SPELTZ

WHOLE CORN

THE FEEDING VALUE OF SPELTZ IN BEEF AND PORK PRODUCTION.

James W. Wilson

H. G. Skinner

Three subjects were investigated in this experiment: (1) The value of speltz, both whole and ground, for steers as compared to whole corn. (2) The value of speltz, both whole and ground, for the production of pork. (3) The comparative value of speltz and corn for hogs when following steers fed on these grains.

Speltz is of Russian origin and has evidently found a home in the semi-arid region of the Northwest. The real name is Emmer (*Triticum dicoccum*,) but speltz is the commonly accepted term. With the exception of three counties west of the Missouri river it is now grown in every county in the state.

According to the second census report of South Dakota, published in 1905, of the crops for 1904, two-thirds of the speltz produced in this state was grown in a section lying east of the Missouri river and north of a line passing through the southern boundary of Brookings county westward to the Missouri river.

During 1904 there were 2,952,214 bushels of speltz raised as compared to 5,637,230 bushels of corn in this section showing that it is one of the principal crops.

The following is an analysis of the grain, prepared by J. H. Shepard, Chemist of this Station:

Analysis of Speltz

HUSKS

| | Air Dry Substance | Water Free Substance |
|---------------------------|----------------------|-------------------------|
| Water | 8.12 | |
| Ash | 7.45 | 8.10 |
| Ether Extract | 1.48 | 1.61 |
| Crude Fiber | 39.02 | 42.46 |
| Crude Protein | 2.39 | 2.60 |
| N.-free Extract | 41.54 | 45.23 |
| Total Nitrogen | .383 | |
| Albuminoid Nitrogen | .300 | .326 |

HUSK AND GRAIN

| | Air Dry Substance | Water Free Substance |
|---------------------------|----------------------|-------------------------|
| Water | 10.172 | |
| Ash | 2.956 | 3.29 |
| Ether Extract | 2.467 | 2.75 |
| Crude Fiber | 11.450 | 12.75 |
| Crude Protein | 11.577 | 12.90 |
| N.-free Extract | 61.398 | 68.31 |
| Total Nitrogen | 1.84 | 2.04 |
| Albuminoid Nitrogen | 1.42 | 1.58 |

Plan of Experiment

In the Spring of 1906 sixteen head of two-year-old grade Hereford steers of uniform type were purchased in the stock yards at Omaha. They came from a western ranch, were hay fed, and knew nothing about eating grain. Upon arrival at the Station they were divided into four different lots, quality and weight for each lot considered, so they would be equal as far as possible, and weighed up for the experiment. On account of an accident, one in the shelled corn lot had to be thrown out at the beginning of the experiment. The grain

and hay were weighed before each feeding and each lot was given all they would eat both morning and evening. On the same date two head of swine of similar size and age were weighed and put in each lot. The cattle were kept in the dry lots until the close of the experiment when they were shipped to the Chicago market and sold on their merits, at the following prices per hundred pounds: Corn, \$6.10; Speltz, \$5.85; Corn and Speltz, \$5.75 and ground Speltz \$5.75. This was the highest price paid for cattle that day, but had there been a load of each they would no doubt have brought more. They had the run of a small yard (see cut) and with the exception of the grain ration, each lot was under the same conditions.

The experiment extended over a period of 170 days with the following ration per lot:

Lot I. Shelled corn and prairie hay.

Lot II. Whole speltz and prairie hay.

Lot III. Shelled corn and speltz (mixed half and half by weight) and prairie hay.

Lot IV. Ground speltz and prairie hay.

All rations were fed inside sheds so that no loss would occur by blowing fine particles of feed from troughs.

With the exception of Lot I the swine were fed extra as there did not seem to be sufficient grain in the droppings, and Lot I was fed extra only until the steers were on full feed.

The average daily grain fed per steer from the beginning to the end of the experiment was as follows: Shelled corn 20 pounds, whole speltz 18.9 pounds, corn and speltz 18.48 pounds and ground speltz 15.39 pounds. The largest consumption of grain per head daily was as follows: Shelled corn 29 pounds, whole speltz 28 pounds, corn and speltz 28 pounds and ground speltz 18 pounds.

The grains were purchased in the local market from time to time but the speltz for the three lots was of the same quality.

The swine were fed from 2 to 8 pounds per lot, extra, daily.

Two different lots of swine were used and, with the exception of those following steers in corn lot, the second lot were fed forty-four days after the steers were sold, on same kind of feed the steers were getting, to determine the quantity of grain required to produce a pound of gain.

The swine following steers fed on corn were much fatter than those of other lots and a further test of the value of corn for hogs in this condition was not deemed advisable. But the average of three trials from three different Experiment Stations with hogs of similar weight for the production of a pound of pork with shelled corn, which is 5.43 pounds, is taken as a basis for computing gains of swine for the corn lot. Swine in the other lots were not fat but in good condition.

Table No. I.
VALUE OF SPELTZ FOR STEERS

| Kinds of Feed | Pounds of grain | Pounds of hay | Gain | Pounds of grain for a pound gain | Pounds hay for pound of gain | Gain per head daily | Cost producing pound of gain, cents |
|-------------------------------|-----------------|---------------|------|----------------------------------|------------------------------|---------------------|-------------------------------------|
| Shelled corn, Prairie hay... | 10388 | 5684 | 1218 | 8.48 | 4.66 | 2.33 | 7.4 |
| Speltz, Prairie hay | 12853 | 7291 | 1212 | 10.60 | 6.01 | 1.78 | 8.1 |
| Speltz, Corn, Prairie hay.... | 12569 | 8181 | 1377 | 9.12 | 5.94 | 2.02 | 7.7 |
| Ground Speltz Prairie hay.. | 10470 | 9261 | 1049 | 9.98 | 8.82 | 1.54 | 9.3 |

When speltz is ground it separates into two parts, the husk and the grain. From the analyses of this grain found on a preceding page, it may be seen that there is a large per cent of crude fibre in both the husk and the grain.

Armsby in his Manual of Cattle-Feeding states the following in regard to the digestibility of crude fibre: "A portion of the crude fibre of coarse fodders is digestible. This fact is so well ascertained, and has been so uniformly observed,

that no special proof of it need be brought forward here. The amount digested varies, according to the quality of the fodder and other circumstances, from 25 per cent to as high as 70 per cent of the total quantity.

"The ruminants, in particular, have the power of digesting large amounts of crude fibre, a power due, doubtless to the great extent of their alimentary canal and the length of time during which the food remains in it. They are hence especially adapted to the consumption of coarse fodder, such as hay and straw, and can extract from it considerable quantities of nutrients, while the horse stands considerably below them in this respect, and the hog seems, like the carnivorous animals and man, to be able to digest only young and tender fibre, such as is found in roots and in young and juicy green fodder." Analyses show that corn contains from 2 to 3 per cent of crude fibre.

In comparing the pounds of grain and the pounds of hay required to produce a pound of gain, with the lots getting whole speltz and ground speltz, it will be noticed there is quite a difference, not only in the quantity of feed consumed but in the gain made by lot. It was impossible to get the lot fed on ground speltz to eat as much grain daily as did the lot receiving the whole grain, which indicates that the dividing of the natural speltz grain into two feeds, by grinding, is a detriment rather than a benefit. The palatability of the feed is decreased. This was found to be the case in feeding ground speltz to sheep (Bulletin No. 80 of this Station).

As to the value of grinding grain for fattening cattle, the following is taken from Smith's Profitable Stock Feeding: "It undoubtedly saves some feed, though this saving is not ordinarily great enough to pay for the grinding. At the Kansas Station 8 per cent was saved, which would be considered a good showing, yet this saving would mean but $4\frac{1}{2}$ pounds of corn to the bushel—with corn high in price, perhaps enough to pay the grinding bill, but not the labor. In the case of sore mouths, or when a quick finish is sought, or with cholera too prevalent to make the keeping of pigs for

running behind cattle safe, grinding is practicable. The feasibility of grinding, therefore, depends entirely upon circumstances, but for Western conditions it is not ordinarily profitable to grind grain for cattle."

The results obtained, as reported in Table No. I, are comparable with those obtained at the Nebraska Experiment Station where a similar ration was fed.

Smith found that it required 9.5 pounds of corn and 5.2 pounds of prairie hay for the production of a pound of gain with western bred steers.

From Table No. I it may be seen that there was a gain of .24 of a pound more daily with the lot getting whole speltz than with the lot getting ground speltz. The ground speltz lot did not have the finish, when sold that the other lots had. Their lines were not filled out as they should be after feeding this period of time.

The cost of producing a pound of gain is based on the following prices of feeds:

Shelled corn 40 cents per bushel.

Whole speltz 60 cents per hundred.

Ground speltz 67 cents per hundred.

Prairie hay \$6.00 per ton.

These prices may seem too high for some localities in the state but the results show the actual cost outside of labor, which is usually offset by the value of manure to the next crop, the marketing of the grains and roughage at home, etc.

This test shows that a pound of corn is equal to one and one-fourth pounds of speltz for steer-feeding. It also shows that where the corn and speltz were mixed half and half by weight, the relation is about the same with a small increase in gain in favor of the mixture.

Table No. II.
SPELTZ FOR SWINE

| Kind of Feed | Days fed | Grain fed | Gain made | Pounds feed for pound of gain | Cost producing pound of gain, cent |
|----------------------|----------|-----------|-----------|-------------------------------|------------------------------------|
| Whole Speltz..... | 44 | 702 | 91 | 7.71 | 4.6 |
| Speltz and Corn..... | 44 | 832 | 157 | 5.29 | 3.5 |
| Ground Speltz..... | 44 | 893 | 108 | 8.26 | 5.5 |

The swine used in this experiment had been following the three lots of steers fed on speltz for 57 days and weighed 250 pounds to 280 pounds per head at beginning of the test, but were not fat. All feeds were weighed carefully morning and evening before feeding.

From Table No. II will be seen that where the grain was ground they consumed more but it also required .55 of a pound more of grain to make a pound of gain.

Table No. III.
SWINE FOLLOWING STEERS FED ON SPELTZ.

| Kind of feed | steers per lot | Total Wt. of Steers at Beginning | Swine per lot | Total Wt. of Swine at Beginning | Grain Consumed by Steers and Swine | Gain made by Steers and Swine | Grain for lb. of gain | Extra Grain fed Swine | Estimated gain of swine following steers |
|-----------------|----------------|----------------------------------|---------------|---------------------------------|------------------------------------|-------------------------------|-----------------------|-----------------------|--|
| Corn..... | 3 | 3028 | 2 | 315 | 10467 | 1429 | 7.32 | 129 | 188 |
| Speltz..... | 4 | 4073 | 2 | 270 | 13418 | 1388 | 9.66 | 565 | 103 |
| Corn and Speltz | 4 | 4073 | 2 | 295 | 12958 | 1609 | 8.00 | 389 | 159 |
| Ground Speltz. | 4 | 4110 | 2 | 270 | 11411 | 1218 | 9.36 | 941 | 56 |

These results shows that there is very little feed for swine when following steers fed on ground speltz.

The gain of swine for the lots fed on speltz is determined by substituting the number of pounds of grain required in

table II to produce a pound of gain and deducting the same from the total number of pounds of gain made by the swine when following steers.

Lot I received, only, 129 pounds of corn extra and this was at beginning of experiment until steers were on full feed. After this the two swine were sufficient for the three steers.

As the second lot of swine in the corn lot at the close of the experiment were too fat to make a further test as to the number of pounds of corn for a pound of gain, the average of several experiments conducted at other stations was taken, which was 5.43 pounds, and deducted from the total gain.

At the Kansas Experiment Station is required 7.91 pounds of corn to produce a pound of gain on steers and swine.

The advantage of feeding grain at home is that a large per cent of rough material such as corn stalks, straw and hay is utilized where otherwise it would be wasted. Cattle feeding also has its place in the rotation of crops. This should be practiced on every farm in the state. The manure made by the feeding operations is needed by the soil to replace plant food removed by the crops. It is estimated that the feed required in fattening cattle, is reduced to one-eighth of its original weight by marketing in the form of beef and pork. Where transportation charges are high and the price of grains are low as is the case in the Northwest the cattle feeding proposition should be thoroughly considered before shipping both grain and stock to the market separately.

Summary of Experiments with Speltz, to date.

On account of the large number of inquiries as to the relative feeding value of speltz to other grains, a brief summary of the results of experiments conducted at this Station to date is included herein.

This grain, although better adapted to the more arid regions, has produced a yield of sixty-three bushels to the

acre on the low land of the College Farm. It is now quite generally grown as a grain crop and is highly spoken of wherever fed to live stock.

In Bulletin No. 71 results in feeding it to sheep as a fattening ration are reported as follows: It required 5.09 pounds of barley as compared to 7.47 pounds of speltz to produce a pound of gain. In Bulletin No. 80 results are reported in feeding it to lambs as compared to eight other different grain rations. In this experiment it required 7.2 pounds when fed whole and 8.3 pounds when ground as compared to 5.3 pounds of corn to produce a pound of gain.

Bulletin No. 81 contains results of feeding speltz to dairy cows. It required two pounds more of speltz to produce a pound of butterfat than it did barley or corn, other conditions being equal. The cows made a gain in weight of 18 pounds per head during the period. They consumed one-third more of speltz per head daily than did the lots receiving barley or corn. Speltz proved to be a good feed for the dairy cow.

In Bulletin No. 86 results are reported in fattening range lambs. There were ten different rations fed to as many different lots of 9 and 10 head each. Speltz was fed as a single grain, and mixed with corn, barley and wheat, half and half by weight to four different lots. From the summary we quote the following: 1. "The record of the lot fed on speltz in this test confirms the results obtained by feeding this grain in former experiments, that it requires from one to two pounds more to produce a pound of gain than with the other grains.

4. "The lot fed a mixture of speltz and barley, half and half by weight, made a larger gain for feed consumed than the average of the gain made by the two lots fed on barley and speltz. This was also true for lot nine where corn was mixed with speltz in the same proportion as above, but with both lots it required more pounds of the mixture to produce a pound of gain than it did with either lots fed on barley or corn, which indicates that speltz has a greater feeding value

for lambs when mixed with other grains than when fed alone."

And in Bulletin No. 97, "The Production of Baby Beef," speltz was used as one of the grain rations with the following results: "9. The lot fattened on speltz made an average daily gain of 1.69 pounds, while the lot fattened on corn made an average daily gain of 1.84 pounds.

"10. During the grass period the lot fed on speltz gained 112 pounds more than did the lot fed on corn. It required only 5.16 pounds of speltz for a pound of gain, as compared with 7.03 pounds of corn to produce a pound of gain during the grass period.

"11. The lot fed on speltz did not consume as much hay per pound of gain as did other lots, indicating that the husk of speltz is a good substitute for hay.

"12. Speltz produces a hard fat, about the same as oats; and as good a quality of meat as corn, as may be seen by cut of rib and loin on page 73 of this Bulletin.

"13. With the exception of the speltz lot, the spayed heifers brought the same price as the steers. In this case a reduction of 50 cents per hundred was made on account of the spayed heifer being smaller than the steers in the lot which brought \$6.00 per hundred."

The lot of calves fattened on speltz sold for 40 cents a hundred less on the Chicago market than did the lot fattened on corn, and dressed 2 per cent less than did the corn lot.

List of Available Bulletins

81. Forage Crops: Feeding Dairy Cows: Flies: Artesian Wells: Some Destructive Insects: Elements of Prairie Horticulture.
82. Macaroni Wheat: Its Chemical and Milling Properties.
83. Millet for Fattening Swine.
84. Report of Investigations at the Highmore Station for 1903.
85. Early Garden Peas.
86. Fattening Range Lambs.
87. The Improvement of the Western Sand Cherry.
88. Breeding Hardy Fruits.
89. Preliminary Experiments with Vapor Treatments for the Prevention of the Stinking Smut of Wheat.
90. Tankage and Other By-Products for Pigs. Shrunken Wheat for Swine.
91. Co-operative Vegetable Tests in 1904.
92. The Milling Qualities of Macaroni Wheat.
93. Plums in South Dakota.
94. Alfalfa and Red Clover.
95. The Treatment of Nail Pricks of the Horse's Foot.
96. Forage Plants and Cereals at Highmore Sub-Station.
97. Speltz and Millet for the Production of Baby Beef.
98. Crop Rotation.
99. Macaroni or Durum Wheat. A Continuation of Bulletin 92.