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Millet for Fattening Swine

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March 1904.

SOUTH DAKOTA

AGRICULTURAL COLLEGE

EXPERIMENT STATION

BROOKINGS, SOUTH DAKOTA.

Millet for Fattening Swine.

Department of Animal Husbandry.

TIMES POWER PRESS, Springfield, S. D.

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

MILLET FOR FATTENING SWINE.

James W. Wilson

H. G. Skinner.

This experiment was undertaken to ascertain the relative feeding value of millet, as a fattening ration when fed to hogs, as compared to that of the more commonly grown cereals. Various millets have been widely grown in this state for several years and considered a very valuable forage crop for cattle and sheep if harvested at the proper stage of maturity. There is probably no crop that can be sowed that will mature in so short a growing season and under the variable climatic conditions in South Dakota, and produce so large a yield of forage or grain per acre, as millet. There are, however, numerous new varieties of millet which have been introduced into this section of the country by this station through the co-operative work which has been carried on for several years with the United States Department of Agriculture. These new millets were imported by the department from foreign countries where the climatic conditions are similar to ours and, as a result, many varieties have been introduced, well suited to our country which probably would not have reached us otherwise. Among the kinds imported, one from Russia, the Black Voronesh (*Panicum miliaceum*), or commonly known as "hog millet," has proved to be one of the best, not only from the fact that it is a heavy yielder of forage and grain, but that it is a quick grower, drought-resistant and the grain furnishes, when ground, a very palatable and nutritious feed for cattle, sheep and swine. It can be sown as late as the middle of June and will be ready to harvest the latter part of August or before frost.

During the season of 1902 it produced 30 bushels of seed to the acre at the home station and a heavy yield of forage at the forage testing station at Highmore. This millet can be harvested the same as other grains, when intended to be thrashed,

but care should be taken to avoid handling, as much as possible, to prevent waste by shelling.

The following is an analysis of the grain as prepared by the chemist of this station:

	Air Dry Substance.	Water Free Substance.
Water.....	9.79
Ash	3.17	3.51
Ether Extract.....	4.36	4.83
Crude Fibre	10.40	11.40
Crude Protein	14.28	15.65
N.-free Extract	58.00	64.61
	<hr/>	<hr/>
Total Nitrogen.....	2.28	2.52
Albuminoid Nitrogen.....	2.18	2.41

Director Henry, of the Wisconsin Experiment Station, places the digestible nutrients in 100 pounds of millet as follows: Protein, 8.9 pounds, carbohydrates, 45.0 pounds, and ether extract, or fat, at 3.2 pounds. This, figured out in the form of a nutritive ratio, makes one similar to oats with practically the same per cent of digestible ingredients. By a nutritive ratio is understood the ratio existing between the per cent of digestible protein in a food and the per cent of digestible carbohydrates and fat. According to the above figures millet has a nutritive ratio of 1:5.9, although the nutritive ratio of the variety used in this test was never determined. Barley has a nutritive ratio of 1:7.7, and wheat 1:6.1. Plate No. 1 shows the kind of millet used in this test.

THE EXPERIMENT.

This experiment will be considered in two periods. The first covering an interval of fifty-six days, or two-thirds of the whole time the animals were fed; and the second twenty-eight days, or the last four weeks of the test. This division of the fattening period was made in order to show when the most profitable time in the fattening period existed. Six head of pure-bred Yorkshire pigs, raised on the College Farm, were divided into three lots of two head each. These pigs, while considered a bacon breed, were selected for this test on account of their extreme thriftiness. Whether the gains would have been otherwise than reported herein remains to be determined in future tests with other breeds; however, the gains are satisfactory when it is considered that they were allowed but the single feeds. On November 7 they were placed into small pens in the hog house with a door opening into a yard outside. On account of the continued cold weather during the latter part of the experiment there were very few days they could be allowed access to the yard. However, with the exception of feed, the lots were kept under the same conditions.

Previous to weighing these pigs up for the experiment they had been running on rape pasture and were in just good growing condition. The test covered a period of eighty-four days. During this time each lot were given all the feed they would eat up clean.

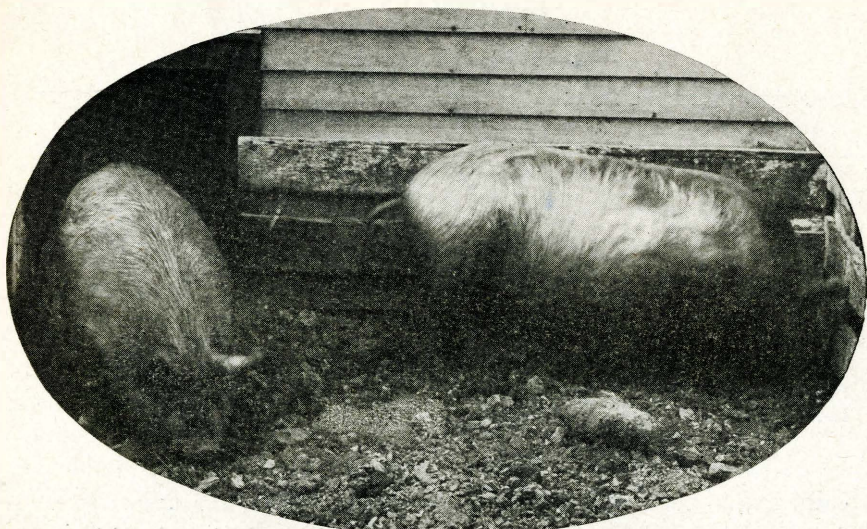
To Lot I. was fed barley, Lot II. millet, and to Lot III. wheat. These feeds were all ground, in order to increase their digestibility and palatability, weighed out regularly, morning and evening, and moistened with water before feeding. This constituted the ration they received daily, all they would eat of the one grain with the addition of water. They were also fed salt and soft coal twice per week.

It was noticed that the lot receiving millet relished their feed and were apparently in as good condition, physically, during the whole period as the other two lots.

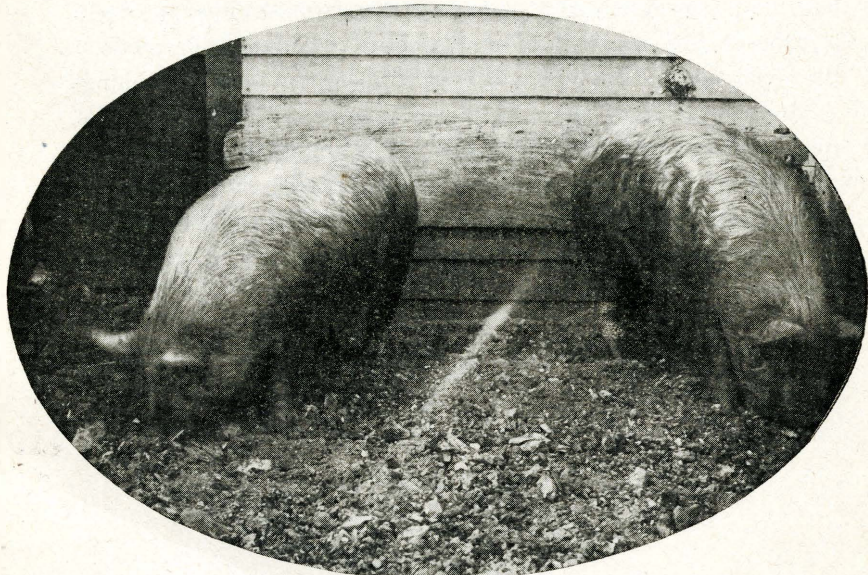
TABLE NO. I.
Weights and Gains.

GRAIN FED.	Weight at beginning	Total Gain.	Gain per Head Daily	Gain for First Period	Gain per Head Daily for	Gain for Second Period	Gain per Head Daily 2d
	Two Pigs.		Whole Period.	56 Days.	First Period—56 Days.	28 Days.	Period 28 Days.
Lot I., Barley.....	250	211	1.25	151	1.34	60	1.07
Lot II., Millet	231	191	1.13	148	1.32	43	.76
Lot III., Wheat	336	281	1.67	196	1.75	85	1.51

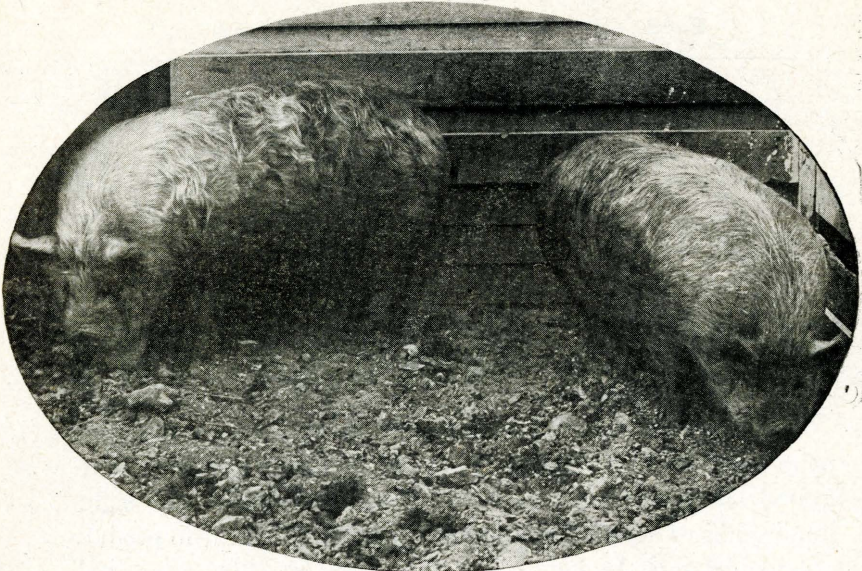
The above table shows the weight at the beginning, total gain, gains per head daily for the whole period, for first 56 days' feeding and for the last 28 days. It will be noticed by this that the gain per head daily for the first 56 days was much larger than it was from then to the end of the experiment, and had the test been closed at this time there would have only been a difference in gain of two-hundredths of a pound daily between the barley and millet lots, but by continuing for four weeks longer the rate of decrease in gain was greater with the millet lot than with either of the other lots. It is a well settled fact that the rate of gain decreases as the feeding period increases. The above table shows this feature in each lot, which suggests the advisability of disposing of swine before that period of small gain arrives.

**LOT I.**

This lot was fed barley and made 1.34 pounds daily during the first 56 days and 1.07 pounds the last 28 days of the experiment.

**LOT II.**

This lot was fed millet and made two hundredths of a pound daily less during the first 56 days of test than did the barley lot.



LOT III.

Lot III fed wheat and made about one-third more gain per head daily than the lot fed on millet during the 56 days.

These photos were taken at the close of the experiment.

FEEDING PERIOD.

The time of fattening extended over a period of 84 days. For the purpose of noting the time when the largest gain was made, each lot was weighed at the end of each 28 days.

The following table shows the total quantity of feed consumed, feed required to produce a pound of gain, average feed per head daily, feed for a pound of gain during first 56 days of the experiment and for the last 28 days, and price obtained per bushel for grain at intervals above enumerated for each lot.

TABLE NO. II.
Feeds and Prices Received Per Bushel.

	Total Feed.	Feed per lb. of Grain	Feed per Head Daily.	Feed per lb. of Gain First 56 Days.	Feed per lb. of Gain Last 28 Days.	Price Cents Received per bu. Whole Period.	Price Cents Received for 56 Days.	Price Cents Received for Last 28 Days.
Lot I., Barley	1045	4.95	6.22	4.47	6.65	41	46	34
Lot II., Millet	1138	5.95	6.77	5.34	8.06	41	45	30
Lot III., Wheat.....	1370	4.87	8.15	4.80	5.03	52	54	51

The price obtained for each grain is based on the following pounds per bushel: Barley 48, millet 56, and wheat 60. It required one pound more of millet than it did barley and eight-hundredths of a pound more barley than it did wheat to produce a pound of gain. In Lots I. and II. it took one-third more feed, during the last 28 days of the experiment, to make a pound of gain than it did the first fifty-six days. This suggests the advisability of not extending the feeding period too long on one kind of feed, as the quantity eaten was decreased during the period in the following amounts per head per day instead of an increased allowance, contrary to what might generally be supposed. Barley, from eight and one-fourth to six pounds; millet, seven and one-half to six and one-fourth pounds, and wheat from ten and one-half to seven pounds per head daily. Each lot was consuming the largest quantity of grain during the first two weeks of the second 28 days and the smallest quantity at the end of the 84 days' fattening period.

PRICES RECEIVED PER BUSHEL FOR GRAINS FED.

These pigs were sold to the local butcher for \$4.25 per hundred pounds live weight. Millet seed as a feed for stock has no value in the local market and, hence, the financial statement is presented in this form rather than the net profit resulting from the feeding operation. After these swine were dressed objection was made because they were too fat for the local trade, especially in the case of the wheat and barley lots, and had they been slaughtered four weeks sooner they would have been in a better condition for the butcher. The gains obtained for a pound of feed for barley and wheat in this test are similar to those recorded in other experiments.

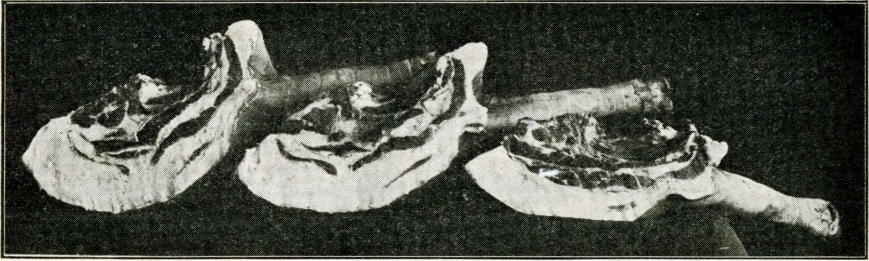
At the Wisconsin Station it was found that it required four and seventy one-hundredths pounds of barley to produce a pound of gain where the single grain was fed. Chilcott, of this station (bulletin 38, edition exhausted), found that it took four and eighty one-hundredths pounds of ground wheat to produce a pound of gain, while with the unground, but soaked, wheat it required four and ninety one-hundredths pounds to make a pound of gain, a difference of ten-hundredths of a pound in favor of the grinding. In this same experiment it took four and fifty-eight hundredths pounds of corn meal to produce a pound of gain, or a trifle over nine per cent more than it did wheat.

The Wisconsin Station found in comparing barley meal to corn meal, as a feed for pigs, that it required about eight per cent more of the former feed than it did the latter to produce a pound of gain. In this test it required eight per cent more millet to make a pound of gain than barley, and if it takes eight per cent more barley than corn to produce a pound of gain this test indicates that it would require sixteen per cent more millet to make a pound of gain than it would corn. But it must be remembered that millet can be raised much cheaper than either wheat, barley or corn. The kinds of soil it can be grown on, the handling of the crop, and the yield per acre, these advantages would go a long way toward effecting an offset in its inferior feeding value as compared to barley and wheat. A fine crop

was obtained last year on the College Farm on spring breaking of the prairie sod. Another field was sowed where it was too wet to plant corn and good yields of seed were obtained in each case.

The records of these crops grown on the one-tenth acre plots in the crop rotation experiment for 1902 shows average yields to be as follows: Barley 32.7, wheat 10.3, and millet 30 bushels per acre. The price received for the barley and millet, during the whole fattening period was the same, or 41 cents per bushel, while the wheat yielded 52 cents per bushel. Had the swine been sold at the end of 56 days' fattening period at the price received for them these grains would have fetched, barley 46 cents, millet 45 cents, and wheat 54 cents; but by keeping them four weeks longer during extremely cold weather it cut the prices to those enumerated above. Calculating then, the proceeds obtained from each by feeding the grains ground to swine as a single ration, not including the cost of labor (see table No. II. above), we have \$13.41 for barley, \$5.35 for wheat, and \$12.30 for millet per acre.

These yields per acre are probably somewhat smaller than those obtained for barley and wheat in some localities in this state, especially in case of the wheat; but, nevertheless, they are the actual returns for 1902 from a very carefully operated system of crop rotation. Statistics show that larger yields of millet have been obtained than that reported for this year, but we leave this to the reader to make his own deductions and to draw his own conclusions in accordance with the actual climatic conditions of his locality. Millet as a forage crop has long been known to be of great value for feeding dairy cows in the fall of the year when the pastures have dried up. This station has now under way experiments in feeding millet meal to dairy cows, calves and range lambs. In each case it has been found to be a very wholesome and palatable feed.



The above cut is produced to show the difference in the percentage of fat to lean meat in the various lots. These portions were taken from corresponding parts of one of each of the three different lots. The one on the right is from the millet lot, one in the center from the wheat lot and the one to the left from the barley lot. The color of the lean meat in the millet and wheat lots was lighter than that of the barley lot. The fat on the wheat and the barley carcasses was several shades darker than the fat made from millet, in fact it had a yellow tinge not noticeable in the millet lot. While the color of fat on the carcasses that had been fed on millet, was pure white, and was pronounced by the local butcher as being of superior quality to that of the other carcasses, although not so firm in texture.

It will also be noticed by the above cut that the per cent of fat to lean meat on the millet sample is much less and just the reverse on the other two samples. This pork was all pronounced too fat for the local trade, and it would have undoubtedly been advantageous to all concerned had they been slaughtered two weeks or one month sooner.

SUMMARY.

1. Millet seed can be grown profitably as a fattening ration for swine.

2. It does not furnish as good a ration as either barley or wheat for swine.

3. On account of being so well adapted to the conditions in this state, and so palatable a feed, it should have a place in the rotation of crops on every stock farm.

4. It was not so profitable to feed for a period of 84 as it was 56 days, as the rate of gain decreased.

5. The carcasses of the lot fed on millet were clothed with pure white fat of superior quality as compared with the fat of those fattened on barley or wheat.

6. It required one-fifth more millet than it did barley meal and a trifle more barley meal than it did wheat to make a pound of gain.

7. A bushel of 56 pounds of millet is equal to a bushel of 48 pounds of barley for hog feed.

8. Millet meal produced a softer quality of fat than did either barley or wheat meal.

9. Millet meal was found not to be so good for a fattening ration as barley meal or wheat meal during extremely cold weather.

LIST OF AVAILABLE BULLETINS.

- | NO. | SUBJECT. |
|-----|---|
| 53— | Forestry in South Dakota. |
| 54— | Subsoiling. |
| 55— | Feeding Sheep in South Dakota. |
| 56— | Sugar Beets in South Dakota. |
| 57— | Four Injurious Insects. |
| 58— | Moisture Investigations for 1897. |
| 59— | Forage and Garden Crops in the James River Valley. |
| 60— | Millet. |
| 61— | Forage and Garden Crops in the James River Valley. |
| 62— | Sugar Beets in South Dakota. |
| 63— | Pig Feeding in South Dakota. |
| 64— | Ferns and Flowering Plants of South Dakota. |
| 65— | Root Killing of Apple Trees. |
| 67— | Watermelons in South Dakota. |
| 68— | Vegetables in South Dakota. |
| 69— | Native and Introduced Forage Plants. |
| 70— | Drought Resistant Forage Experiments at Highmore, S.
D., for 1900. |
| 71— | Speltz vs. Barley. |
| 73— | Variations in Cream and Milk Tests. |
| 74— | Drought Resistant Forage Experiments at Highmore Sub-
station. |
| 75— | Smuts and Rusts. |
| 76— | A Study of Northwestern Apples. |
| 77— | Macaroni Wheat. |
| 78— | Fringed Tape Worm of Sheep. |
| 79— | Crop Rotation. |
| 80— | Lamb Feeding. |
| 81— | Forage Crops; Feeding Dairy Cows; Flies; Artesian Wells;
Some Destructive Insects; Elements of Prairie Horticulture. |
| 82— | Macaroni Wheat. Its Chemical and Milling Properties. |