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Speltz and Millet for the Production of Baby Beef

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SOUTH DAKOTA
Agricultural College

EXPERIMENT STATION

BROOKINGS, SOUTH DAKOTA

Speltz and Millet

— FOR —

The Production of Baby Beef

DEPARTMENT OF ANIMAL HUSBANDRY

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SUMMARY

1. In feeding calves for the production of baby beef the following prices were obtained per bushel for grains used: Corn 47 cents, oats 26 cents, millet 38 cents and speltz 33 cents.

2. They were shipped to Chicago under two years old; averaged 1,250 pounds, and sold on their merits in lots, same as they were fed, at the following prices per hundred pounds: The corn lot, \$6.25; the oats lot, \$6.00; the millet lot, \$5.75; the speltz lot, \$5.85.

3. It required .37 of a pound more of ground millet seed than it did ground corn to produce a pound of gain on calves fattened for baby beef.

4. Calves raised and fattened on Black Veronesh millet seed, sown on the 28th day of June on spring breaking of prairie sod, were made to average 1,175 pounds per head at 1 year, 10 months and 23 days of age, and brought \$5.75 per hundred pounds on the Chicago market.

5. Fat made by Black Veronesh millet seed was much softer to the touch than that made by either corn, oats or speltz.

6. When fed as a fattening ration, this variety of millet seed seems to be more like oats than corn. This is shown by the fact that the lot fed on oats required practically the same quantity of hay per pound of gain as did the lot fed on millet.

7. Black Veronesh millet seed produced a carcass equal in quality to that of corn, as is shown by the cut on page 74 of this Bulletin.

8. The best gains were made with the ground millet during the fattening period, being 1.76 pounds per head daily, while the lot fed on corn meal produced 2.08 pounds per head daily during this period.

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.

14. Ground oats proved to be a profitable feed for the production of baby beef. From a careful examination of the lots before shipping these steers were nearly as fat as those fed on corn. The cut of rib and loin from an average carcass of the oat lot on page 74 of this Bulletin shows a high quality of meat.

15. When calves were fed in lots on the same kind of grain from birth to maturity those which received the most highly carbonaceous grain produced the largest per cent of dressed meat.

SPELTZ AND MILLET FOR THE PRODUCTION OF BABY BEEF

James W. Wilson

H. G. Skinner

Three subjects were investigated in this experiment: 1. The relative value of speltz, oats, millet and corn as a growing ration for calves raised on separator milk. 2. The relative value of these grains for yearlings while on pasture. 3. The practicability of fattening yearlings for the production of baby beef.

Speltz or emmer and numerous varieties of millet have been grown quite extensively throughout the northwest as feed for live stock, and their value is recognized by the feeder. But little has been accomplished by experimenters to establish their actual food value as compared with that recognized standard of all fattening grains, Indian corn (*Zea Mays*). It must be remembered there are localities in South Dakota where the production of a profitable yield of corn cannot be relied upon, owing to the short growing season and the cool nights. However, we appreciate the fact that the corn belt is gradually being extended northward, and we hope that the results of this test will furnish some light as to the best substitute for corn for fattening animals.

The experiment extended over a period of 431 days, somewhat longer than the average time necessary for fattening cattle, but as fair gains were made, everything considered, it was desirable to finish them in the best condition possible, with the single grain, for market. The results will be reported in three different periods, known as the calf period, grass period and the fattening period. This will show under what conditions the best gains were made.

The calves used in this test were bred and raised on the College farm. During the separator milk period, with the

exception of the lot fattened on speltz, they were fed the same kind of grain ration as they were finished on for market. Their dams were common dairy cows kept by the College farm to furnish milk for instructional purposes in dairying and domestic science.

In 1902 these cows were purchased in the vicinities of DeSmet, Iroquois and Brookings, South Dakota, and were considered a good average of those kept in these localities for dairying purposes. In selecting them no attention was given to breed characteristics, as milking qualities were desired. The result was that grades of the following breeds were secured: Shorthorn, Ayrshire and Jersey.

Their sires were pure-bred registered bulls and average representatives of their respective breeds, viz: Aberdeen Angus, Shorthorn and Hereford. An effort was made to breed these cows so that a grade of each breed would be available for each lot of three in this experiment, but the scheme failed to materialize. However, the calves were placed in lots of three head each as they were dropped until twelve head were secured of practically the same age. They were fed separated milk until six months old, a report of which will appear later.

On January 2, 1905, the lots were weighed up individually for the experiment and accurate account kept of all the hay and grain consumed until they were shipped to Chicago.

As it was not convenient at the time to have swine follow the calves the grains were all ground. Each lot received all the grain and clover hay they could be induced to eat during the entire grain periods, with an ample supply of salt and water at all times. They were weighed at the end of each month to note the gain, and, as no effort was made to select these calves for quality or uniformity as to breed, the individual gain for each calf is reported separately for each period, so as to show when the largest gains were made, and to furnish data for comparison with the different feeds.

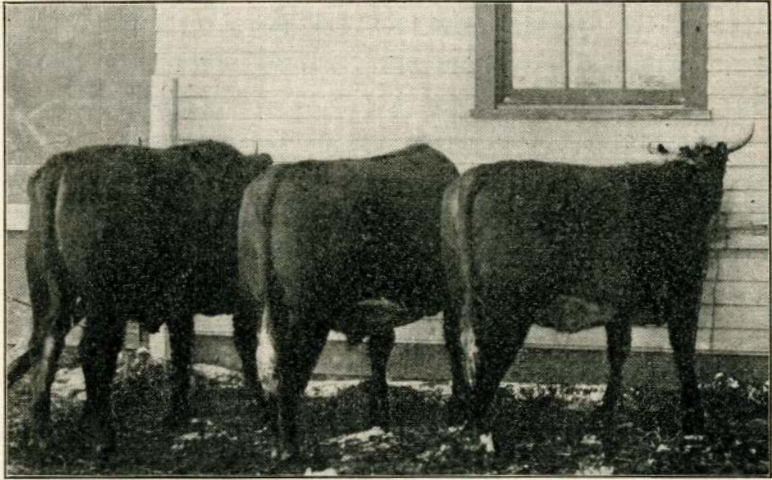
With the exception of lot II, the one fed ground oats, each contained a spayed heifer. The spaying was done May 2d by the College veterinarian, when they were taken from their respective lots, but were put back on May 9th; this lessened the gains for these lots during the month of May.

During the fly season the following preventives were used by applying with a common spray pump: Fly-o-curo, Kreso Dip and fish oil. Fly-o-curo proved to be the most effective. A single spraying would keep flies off for two days. At the close of the experiment they were shipped to Chicago, and after reaching the yards were divided into lots, as they had been fed, and sold on their merits, topping the market for this class of cattle that day. With the exception of the millet, the grains were purchased in the open market, care being taken to have them as good in quality as possible. The millet was of the Black Voronesh (*Panicum Miliaceum*) variety. This is one of the largest seeded varieties of the broom corn millets from Russia, recently introduced by the United States Department of Agriculture from the Kirghiz Tartar steppes of Siberia and Turkestan, also cultivated in Voronesh and other provinces of European Russia. A yield of thirty bushels per acre of this millet was obtained from a carefully conducted experiment in crop rotation at this Station in 1902. For two years it has been grown successfully on the College farm as a grain crop on the spring breaking of the native prairie sod; in 1905 the seeding was done as late as the 28th day of June.

In an experiment in fattening range lambs at this Station, Bulletin No. 86, Black Veronesh millet seed, when ground, was found to be superior to barley and nearly equal to corn for producing a pound of gain. See Bulletin No. 83 of this Station for variety of millet used.

Speltz (*Triticum dicoccum*), according to Bulletin No. 69 of this Station, was first grown in South Dakota by the Russians, who doubtless brought it over with them from their native land, but was later introduced by the United States Department of Agriculture. It is claimed that this grain is more drought-resistant than barley or oats, and under similar conditions yields heavier than either. A yield of sixty-three bushels per acre is reported on the College farm.

The lot fed on speltz did not consume as much hay as the other lots, and were ready for market as soon as any.



3

2

1

CORN LOT

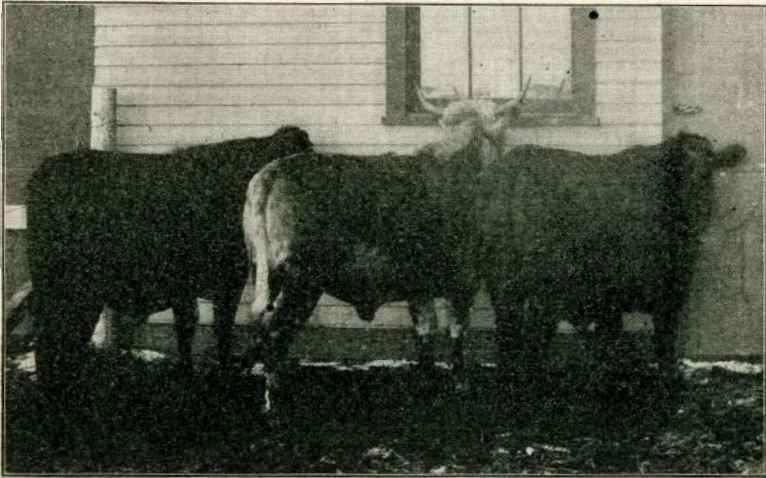
Average age at close of experiment, 1 year, 8 months and 26 days.

	Pounds
Average weight at beginning.....	480
Average weight at close.....	1277
Average weight in Chicago.....	1233
Loss in shipping, per head.....	44
Grain required for pound of gain during calf period... ..	4.94
Grain required for pound of gain during grass period.. ..	7.03
Grain required for pound of gain during fattening pe- riod	7.16
Hay required for pound of gain during calf period.	3.99
Hay required for pound of gain during fattening period	6.87
Average gain per head daily.....	1.84

Cost of feeds used: Hay, \$6.00 per ton; pasture 75 cents per head per month. Cost of calves at beginning, \$3.50 per hundred. Deducting these items gives the corn a feeding value, per 56 pound bushel, of 47 cents. Selling price in Chicago, per hundred, \$6.25.

Percentage of dressed weight in slaughter test, based on last weights at home:

No. 1, Hereford (spayed) heifer.....	60.7 %
No. 2, Hereford steer.....	60.5 %
No. 3, Shorthorn steer.....	60.2 %



6

OAT LOT

4

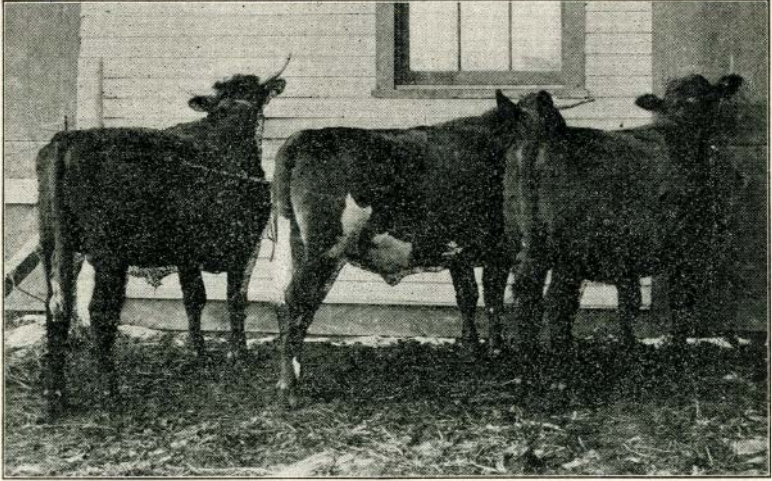
Average age at close of experiment, 1 year, 11 months and 12 days.

	Pounds
Average weight at beginning.....	579
Average weight at close.....	1338
Average weight in Chicago.....	1280
Loss in shipping, per head.....	58
Grain required for pound of gain during calf period....	4.74
Grain required for pound of gain during grass period..	8.28
Grain required for pound of gain during fattening period	6.28
Hay required for pound of gain during calf period....	4.67
Hay required for pound of gain during fattening period	8.31
Average gain per head daily.....	1.76

Cost of feeds used: Hay, \$6.00 per ton; pasture, 75 cents per head per month. Cost of calves at beginning, \$3.50 per hundred. Deducting these items, gives the oats a feeding value, per 32 pound bushel, of 26 cents. Selling price in Chicago, per hundred, \$6.00.

Percentage of dressed weight in slaughter test, based on last weight at home:

No. 4, Aberdeen Angus steer.....	56.3 %
No. 5, Hereford steer.....	58.1 %
No. 6, Shorthorn steer.....	56.8 %



9

8

7

MILLET LOT

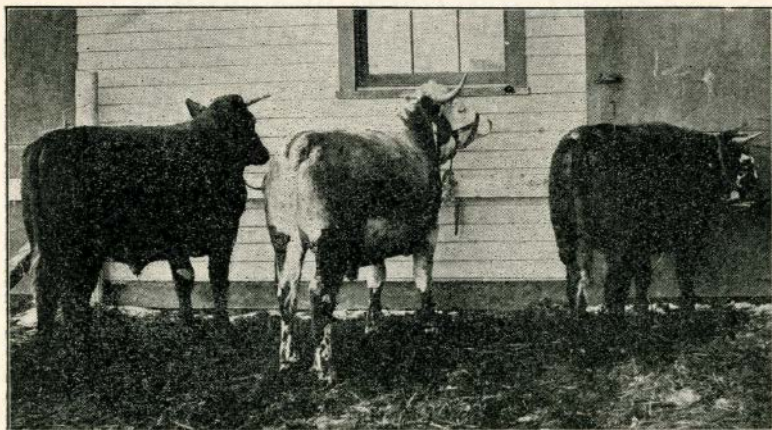
Average age at close of experiment, 1 year, 10 months and 23 days.

	Pounds
Average weight at beginning.....	480
Average weight at close.....	1175
Average weight in Chicago.....	1120
Loss in shipping, per head.....	55
Grain required for pound of gain during calf period....	5.84
Grain required for pound of gain during grass period..	6.35
Grain required for pound of gain during fattening period	6.97
Hay required for pound of gain during calf period....	5.34
Hay required for pound of gain during fattening period	8.84
Average gain per head daily.....	1.47

Cost of feeds used: Hay, \$6.00 per ton; pasture, 75 cents per head per month. Cost of calves at beginning, \$3.50 per hundred. Deducting these items, gives the millet a feeding value, per 60 pound bushel, of 38 cents. Selling price in Chicago, per hundred, \$5.75.

Percentage of dressed weight in slaughter test, based on last weight at home:

No. 7, Aberdeen Angus (spayed) heifer.....	58.6 %
No. 8, Hereford steer.....	56.0 %
No. 9, Shorthorn steer.....	59.3 %



12

11
SPELTZ LOT

10

Average age at close of experiment, 1 year, 10 months and 7 days.

	Pounds
Average weight at beginning.....	482
Average weight at close.....	1209
Average weight in Chicago.....	1160
Loss in shipping per head.....	49
Grain required for pound of gain during calf period....	6.28
Grain required for pound of gain during grass period..	5.16
Grain required for pound of gain during fattening pe- riod	7.25
Hay required for pound of gain during calf period....	3.59
Hay required for pound of gain during fattening period	6.67
Average gain per head daily.....	1.69

Cost of feeds used: Hay, \$6.00 per ton; pasture, 75 cents per head per month. Value of calves at beginning, \$3.50 per hundred pounds. Deducting these items, gives the speltz a feeding value, per 45 pound bushel, of 33 cents. Average selling price, per hundred, in Chicago, \$5.85.

Percentage of dressed weight in slaughter test, based on last weight at home:

No. 10, Hereford (spayed) heifer.....	58.0 %
No. 11, Hereford steer.....	58.6 %
No. 12, Shorthorn steer.....	58.4 %

INDIVIDUAL GAINS BY PERIODS

Corn Lot

	Calf Period	Grass Period	Fattening Period	Total Gain
Hereford steer	340	162	852	854
Shorthorn steer	342	140	369	851
Hereford (spayed) heifer.....	280	124	282	686
Total gain	962	426	1003	2391
Gain per head daily.....	2.15	1.16	2.08	1.84

Oat Lot

	Calf Period	Grass Period	Fattening Period	Total Gain
Shorthorn steer	338	138	330	806
Hereford steer	300	110	285	695
Aberdeen Angus steer.....	348	100	327	775
Total gain	986	348	942	2276
Gain per head daily.....	2.20	.95	1.96	1.76

Millet Lot

	Calf Period	Grass Period	Fattening Period	Total Gain
Aberdeen Angus (spayed) heifer.....	254	116	260	630
Shorthorn steer	262	152	300	714
Hereford steer	240	38	288	566
Total gain	756	306	848	1910
Gain per head daily.....	1.69	.83	1.76	1.47

Speltz Lot

	Calf Period	Grass Period	Fattening Period	Total Gain
Shorthorn steer	264	254	330	848
Hereford steer	222	146	336	704
Hereford (spayed) heifer.....	238	138	254	630
Total gain	724	538	920	2182
Gain per head daily.....	1.62	1.46	1.91	1.69

The above table is presented to show at what time the best gains were made. The lot fed on oats was the oldest and the one fed on corn was the youngest, there being a difference of two months and sixteen days in the average age; the other two lots being nearer the same age.

With the exception of steer No. 8 in the lot fed on millet, each made a good gain during the different periods. This steer became injured during the early part of the grass period and did not fully recover until fall. The cause was not attributed to the nature of the feed, as average gains were made by him during the calf and the fattening periods.

GRAIN FOR POUND OF GAIN

	Grain Required for Pound of Gain during Calf Period	Grain Required for Pound of Gain during Grass Period	Grain Required for Pound of Gain during Fattening Period	Total Pounds of Grain for Pound of Gain during Calf and Fattening Periods	Hay Required for Pound of Gain during Calf Period	Hay Required for Pound of Gain during Fattening Period	Total Pounds of Hay for Pound of Gain during Calf and Fattening Periods
Corn	4.94	7.03	7.16	6.07	2.99	6.87	5.46
Oats	4.74	8.28	6.28	5.52	3.36	6.33	5.43
Millet	5.84	5.35	5.97	5.44	3.34	6.34	5.19
Speltz	6.28	5.16	7.25	6.83	3.59	6.37	5.31

The above table includes the number of pounds of grain and hay for a pound of gain during each of the three periods. It also gives the total quantity of grain required to produce a pound of gain while the steers were on dry feed and while they were receiving grain on the grass. It required more grain and hay during the fattening period for each pound of gain than it did during the calf period or the grass period, thus increasing the cost of producing a pound of gain as the feeding period increased.

During the calf period ground oats proved to be the best for producing a pound of gain, although the difference was not large between oats and corn, while it required over one pound more of ground millet and ground speltz than it did ground oats to produce a pound of gain during this time.

Referring to the table of individual gains, it may be seen that the lot fed on speltz made the largest gain of all while on the grass. The above table shows that it required only

5.16 pounds of speltz for a pound of gain during this period, as compared with 7.03 pounds of grain for the lot receiving corn, and 6.35 for the lot receiving millet. This apparently places both millet and speltz, pound for pound, ahead of the corn as a feed for yearling steers, on grass. But the lot receiving millet was not in as good condition as the lot receiving corn at the close of the grazing period, while there was very little difference in the condition of the animals of the speltz and the corn lots at this time. The quantity of grain for a pound of gain during the fattening period was nearer equal than at any other time during the test, there being only a difference of .97 of a pound of grain for a pound of gain with the four feeds, but the record for the quantity of hay consumed at this time varies from 6.67 to 8.84 pounds for a pound of gain. The lot fed on speltz consumed .15 of a pound of hay less for each pound of gain than did the lot fed on corn, which indicates that the husk of the speltz, containing a large per cent of protein, is a substitute for hay. This husk also proved to be of great value for yearlings on pasture, as it required 1.87 pounds more of ground corn to produce a pound of gain during this time than it did with ground speltz. For the least number of pounds of grain for a pound of gain for the three periods they rank as follows: oats, corn, millet and speltz.

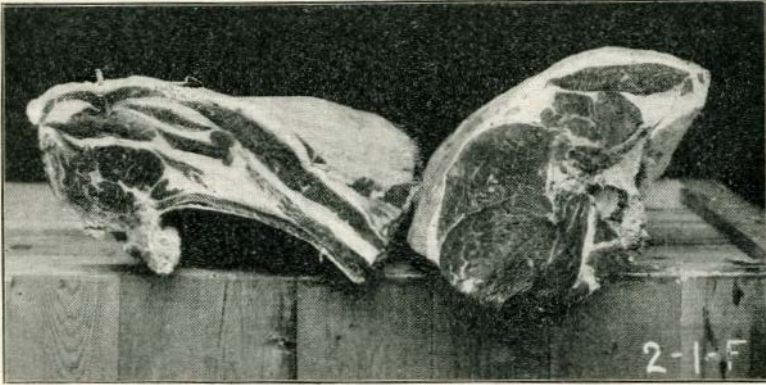
A photograph of a rib and loin cut from an average carcass of each lot was taken. The expert butchers at Swift's packing house would not make any statement in regard to different qualities of carcasses, as there was in fact no appreciable difference except in the thickness of the fat. As can be seen from the photographs, the per cent of fat to lean meat is about the same in each, and there is no apparent difference as to distribution of fat among the lean meat.

There was, however, a difference in the percentage of dressed weight in slaughter test, ranging from 57 per cent with lot fed on oats to 60.4 per cent with lot fed on corn. These percentages of dressed weights are based upon last weights at home.

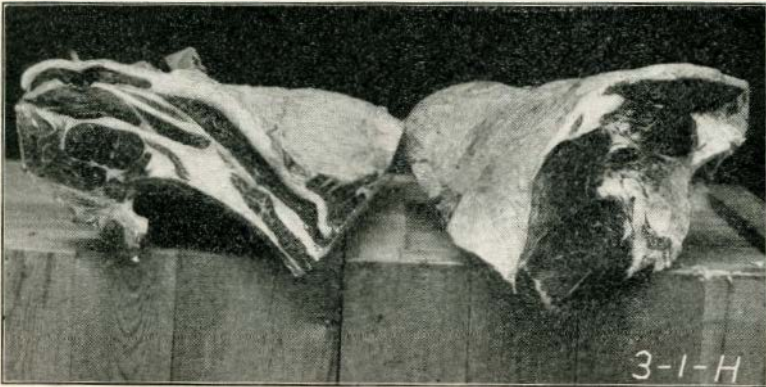
SHIPPING

They were loaded Saturday at 5 p. m., and unloaded Monday at 7 a. m., but not weighed up until noon on Monday.

The car was bedded with prairie hay and the racks were filled with sheaf oats. The difference between weight at stock yards at Brookings and final weight in Chicago was 41 pounds per head.



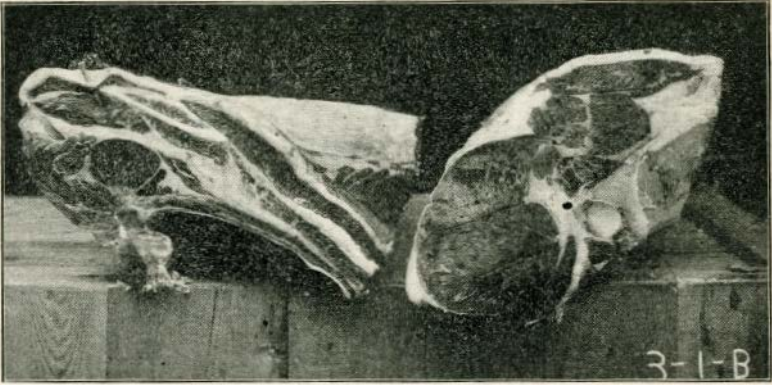
SPELTZ



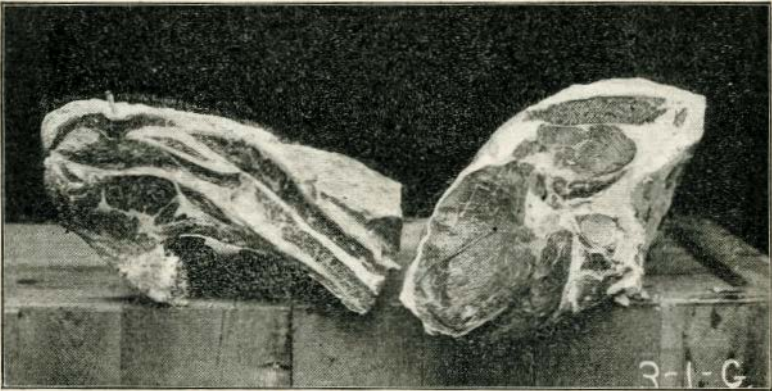
CORN

The most marked difference in results for each lot appears in the slaughter tests. Indications are that the highly carbonaceous grains produce a larger per cent of dressed meat than do the others. The lot fed on corn dressed over 3 per cent more than the lot fed on oats. Corn is a highly carbona-

aceous grain, while oats is considered to be about medium. The nutritive ratio of millet and speltz has never been determined, but results indicate that both are similar to oats in this respect.



OATS



MILLET