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Barley as a Fattening Feed for Cattle and Swine in South Dakota

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Barley as a Fattening Feed for Cattle and Swine in South Dakota

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South Dakota State College
of Agriculture and Mechanic Arts
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Barley as a Fattening Feed for Cattle and Swine in South Dakota

by

James W. Wilson and Turner Wright

Introduction

This bulletin includes the results of feeding barley to cattle and swine. There is an increasing demand for information along this line. This demand is no doubt caused by the excellent quality of barley produced in South Dakota and by the dependability of barley as a feed crop in the state.

The increase in the use of tractors on the farms, of trucks in the cities, and of other motor vehicles, undoubtedly has reduced the demand for oats for horse feed. With this decreased outlet, for what has been considered one of our principal grain crops, many farmers are looking for a feed crop that can be marketed through stock other than horses, to take the place of oats in their crop rotations. It is very important to utilize the greatest of economy in growing and fattening stock for the market. Barley furnishes a new feed crop several weeks earlier than does corn. This enables the feeder in supplying part of his requirement for feed to shift from higher to lower priced feeds earlier in the season than would be the case if he relied entirely on corn as a fattener. Statistics show that most of our barley is grown in the East-Central and the Northeastern sections. However, barley production is not confined to these localities, but is grown quite generally throughout the state. Because of its popularity as a feed the acreage has been increased in recent years.

According to the 1930 yearbook of the United States Department of Agriculture, most of the barley is grown in the North-Central division of states. This area includes that section of the country known as the corn-belt, or the place where choice beef, pork and mutton is produced. So, evidently there is a relation between the growing of barley and the production of choice meat producing animals.

For the past five years, 1926 to 1930 inclusive, the average yield of barley and corn in South Dakota has been 21 and 21.2 bushels per acre respectively. It is presumed that these averages are for all varieties of both grains and under different growing conditions. The feeding value of barley might vary from year to year. It is well understood that shrunken grain of any kind does not have the feeding value of fully matured plump grain.

Because of its composition barley is the most commonly fed grain of the cereals for fattening.

As to the best variety to grow for South Dakota conditions, the reader is referred to bulletin 256 of this station.

THE EXPERIMENTS

Some of these experiments were conducted several years ago and others just recently. With the cattle we used two-year-old steers and calves. With the swine, we used spring and fall pigs.

In comparing the composition of the two feeds we find that, according to Henry and Morrison's "Feeds and Feeding," barley has a nutritive ratio of one pound of digestible protein to 7.8 pounds of digestible carbohydrates, while corn has one pound of digestible protein to 10.3 pounds of digestible carbohydrates. The principal differences are that corn has three pounds more of digestible fat than barley and barley has 1.5 pounds more of digestible protein than corn.

These differences are no doubt responsible for the better returns of corn over barley usually reported in feeding experiments.

The grains and hays were purchased in the local market as needed and no doubt included many different varieties. For convenience we are reporting the results under two separate headings as follows: Barley for Fattening Cattle, and Barley for Fattening Swine.

Barley for Fattening Cattle

For these experiments we used two-year-old steers and calves. As a rule barley is not used as a single feed for fattening cattle where there is an abundance of corn, but where there is no corn available or available only in limited amounts, barley is a valuable substitute.

Eight head of two-year-old high-grade Shorthorn steers were purchased and divided into two lots of four head each. To steers of lot 1 we gave whole barley and alfalfa hay for a period of 90 days. To steers of lot 2 we gave shelled corn and alfalfa hay. This would be considered a shorter feeding period than the average, but with cattle of this age a wonderful improvement can be made in this time, while with younger cattle a longer feeding period is necessary to put them in a similar condition.

The following table includes the record for first 90 days.

TABLE 1
Weights and Gains—Whole Barley and Alfalfa Hay

Lot I						
No. Steer	Weight at beginning	Weight Apr. 5	Weight May 5	Weight at end June 4	Gain	Av. gain per head daily
35	722	824	900	1002	280	3.11
29	897	1006	1082	1138	241	2.67
19	805	912	1004	1084	279	3.10
37	824	904	1000	1086	262	2.91
Totals	3248	3646	3986	4310	1062	2.95
Gain per lot		398	340	324		
Shelled Corn and Alfalfa Hay						
Lot II						
20	785	902	996	1064	279	3.10
38	771	860	950	1028	257	2.85
33	763	852	936	1050	287	3.18
21	881	966	1054	1120	239	2.65
Totals	3200	3580	3936	4262	1062	2.95
Gain per lot		380	356	326		

From the above table it may be seen that both lots of steers made good individual gains. In fact, the total gain for each lot was the same. This is the period when cattle make their largest gains and some prefer this system of feeding in preference to keeping them longer. Had these cattle been put on the market at the end of the 90 day period the steers in lot 2 would have brought more per pound than those of lot 1, probably as much and more than steers of lot 1 outsold those of lot 2 later on, as they were fatter.

The following is the record of feeds:

TABLE 2

	Barley	Corn
Number of days fed -----	90	90
Average weight at beginning -----	812	800
Average weight at end -----	1077	1065
Average gain per head -----	265	265
Average gain per head, daily -----	2.95	2.95
Total pounds of grain fed -----	7294	6332
Grain for pound of gain -----	6.86	5.96
Alfalfa hay fed -----	2347	2468
Hay for pound of gain -----	2.21	2.32
Pounds of beef for bushel grain fed ---	6.98	9.39
Pounds of pork for bushel grain fed ---	.88	.67

It required only nine-tenths of a pound more of barley to produce a pound of gain than it did corn. Barley is higher in fibre content than corn and hence is not equal to corn for fattening purposes.

Valuing barley at 40 cents, corn at 60 cents a bushel and alfalfa hay at \$15.00 a ton it cost \$7.38 to produce 100 pounds gain with barley and \$8.12 with corn.

TABLE 3
Weights and Gains

No. Steer	Weight at beginning	July 5	Weight at end July 31	Gain	Av. gain per head daily
35	1002	1066	1149	147	2.57
29	1135	1208	1254	116	2.03
19	1084	1162	1221	137	2.40
37	1086	1164	1212	126	2.21
Totals	4310	4600	4836	526	2.30
Gain per lot		290	236		

Lot II continued for 57 days on shelled corn, alfalfa hay and linseed meal.

20	1064	1104	1144	80	1.40
38	1028	1118	1172	144	2.52
33	1050	1146	1184	134	2.35
21	1120	1184	1180	60	1.05
Totals	4262	4552	4680	418	1.83
Gain per lot		290	128		

Since many inquiries are received as to whether it will pay to add linseed oil meal to the ration, we kept these two lots of cattle for 57 days longer and started them gradually on linseed oil meal and increased it until they were getting one-tenth as much linseed oil meal as they were eating grain. During this period, we had warmer weather than for the first 90 days and any experienced feeder knows that fat cattle do not make large gains in warm weather. At this time the steers in lot 1 had not shed off as well as steers in lot 2.

Lot I continued for 57 days on whole barley, alfalfa hay and linseed oil meal.

The feeding of linseed oil meal for the last 57 days was an advantage. While our gains were not as large as for the first period, the cattle were in better condition for the market. The attractiveness of a bunch of steers in the market is of value as is uniformity as to breed, age, and condition.

Prices were put on these lots by salesmen as follows: The barley fed steers \$9.90 and the corn fed steers \$9.60 a hundred.

TABLE 4

The following is the record:

	Barley	Corn
Number of days fed	57	57
Average weight at beginning	1077	1065
Average weight at end	1209	1170
Average gain per head	131	104
Average gain per head daily	2.35	1.83
Total pounds grain fed	5286	4019
Pounds grain for pound of gain	10.04	9.61
Total pounds of alfalfa hay fed	1258	938
Pounds hay for pound of gain	2.39	2.24
Total pounds of linseed oil meal fed ...	656	656
Linseed oil meal for pound of gain ...	1.24	1.58
Pounds of beef for bushel of grain	4.77	5.82
Pounds of pork for a bushel of grain ...	.79	.96

The barley steers consumed one-third more of alfalfa hay for a pound of gain than the corn steers and about one-fifth more barley. Valuing the feeds as before stated and the oil meal at two and one-half cents per pound, the cost of producing a pound of gain during the additional 57 day period with each lot was as follows: barley 13 cents, corn 15 cents.

Ground Barley vs. Ground Corn for Fattening

In an experiment in fattening 1000-pound steers with ground barley, corn silage and linseed oil meal, as reported in Bulletin 160 of this station (Edition exhausted) for a fattening period of 101 days, results show that it required an average of 7.2 pounds of barley, 7.6 pounds of corn silage and .07 of a pound of linseed oil meal for a pound of gain as compared

to a similar bunch of steers fed on corn meal which required an average of 6.9 pounds of corn, 7.7 pounds of corn silage and .07 pounds of linseed oil meal for a pound of gain. The salesman stated that the corn fed steers were the better lot. It also required more pounds of barley to produce a pound of gain in this experiment than it did corn.

Value of Barley for Fattening Calves

The calves used in these experiments were purchased direct from the growers in the Black Hills country after they were weaned.

It is a good practice when the calves are to be continued on a grain ration to teach them by the use of a creep to eat grain before they are weaned. By following this practice more of the milk fat is retained. Calves soon learn to make use of the creep. Sheaf oats is a good feed to begin feeding them, gradually changing to the other feeds desired.

These calves were all high grade Herefords and very uniform as to quality and condition throughout. Our experience is that calves on a full feed of grain do not get in good condition for the butcher as quickly as do older cattle. However, the daily gains for 1000 pounds live weight are larger.

This bunch of 14 calves was fed in two different lots of seven head each for a period of 224 days. During the first 91 days they received the grains as mentioned and in addition alfalfa hay, corn silage and oilmeal with the following results:

TABLE 5

December 6 to March 7		
	Barley	Corn
Number of days fed -----	91	91
Average weight at beginning -----	383	352
Average weight at end -----	537	539
Average gain per head -----	154	187
Average gain per head daily -----	1.69	2.05
Total pounds of grain fed -----	4643	4631
Pounds of grain for pound of gain ----	4.30	3.53
Total pounds of linseed oil meal fed --	474	448
Linseed oil meal for pound of gain ----	.44	.34
Total pounds of corn silage fed -----	9920	9662
Pounds of silage for pound of gain ---	9.19	7.36
Total pounds of alfalfa hay fed -----	1656	1112
Pounds of hay for pound of grain ---	1.53	.84
Beef for bushel of grain fed -----	11.11	15.86
Pork for bushel of grain fed -----	.28	.26

Again the barley fed cattle required more grain for pound of gain than the corn fed cattle. They also consumed more corn silage and alfalfa hay than the corn-fed lot.

Corn Silage as a Sole Roughage

For the next 133 days the calves were fed without alfalfa hay and only corn silage as a roughage, with the following results:

TABLE 6
March 7 to July 18

	Barley	Corn
Number of days fed	133	133
Average weight at beginning	537	539
Average weight at end	774	814
Average gain per head	236	274
Average gain per head daily	1.77	2.06
Total pounds of grain fed	13778	12860
Pounds grain for pound of gain	8.32	6.68
Total pounds linseed oil meal	1359	1290
Linseed oil meal for pound of gain .....	.82	.67
Total pounds of corn silage	13250	9296
Silage for pound of gain	8	4.83
Beef for bushel grain fed	5.81	8.37
Pork for bushel grain fed	1.08	.25

During this period it required more grain to produce a pound of gain than for the first 91 days. The consumption of corn silage was much greater with the barley calves than with the corn calves. Possibly the composition of the feed had an important bearing. It may be seen that larger daily gains per head were made during this period with calves that received barley than during the first 91 days, while gain for calves receiving corn was practically the same as for the first 91 days.

THE SECOND EXPERIMENT WITH CALVES

TABLE 7
January 3 to July 31

	Barley	Corn
Number of days fed	210	210
Average weight at beginning	450	446
Average weight at end	908	948
Average gain per head	458	502
Average gain per head daily	2.18	2.39
Total pounds of grain fed	18627	17083
Grain for pound of gain	5.8	4.86
Total linseed oil meal fed	1862	1709
Linseed oil meal for pound of gain .....	.58	.48
Total corn silage fed	15620	15315
Corn silage for pound of gain	4.86	4.35
Total alfalfa fed	3022	4123
Alfalfa for pound of gain .....	.94	1.17
Beef for bushel of grain fed	8.26	11.52
Pork for bushel of grain fed .....	.67	.91

The calves more than doubled their weights in 210 days feeding. It is evident that they preferred corn silage as a roughage to alfalfa hay as they had their choice, the object being to give them all the grain and roughage they would eat.

We present this table of weights and gains to show how one ill-doing calf can change the record in experimental feeding. It would be valuable if we knew how to detect such individuals at the beginning.

TABLE 8
Weights and Gains

Whole Barley, Linseed Oil Meal, Corn Silage and Alfalfa Hay										
No. Calf	Weight at begin'g	Weight Feb. 2	Weight Mar. 3	Weight Apr. 2	Weight May 2	Weight May 31	Weight June 30	Weight at end	Gain	Gain per head da.
36	500	576	660	726	788	804	920	966	466	2.21
7	482	550	638	700	770	832	854	926	444	2.11
41	554	646	736	808	870	942	982	1041	487	2.31
30	488	572	672	748	822	900	946	1000	512	2.43
50	322	386	476	544	650	664	740	811	489	2.32
2	342	402	450	504	550	604	652	696	354	1.68
6	466	532	630	694	780	828	874	922	456	2.17
Totals- Av'ges.	3154	3664	4262	4724	5230	5634	5968	6362	3208	2.18
Gain per lot		510	598	462	506	404	334	394		

Just why this calf No. 2 should gain 90 pounds less than the next smallest gaining calf in this lot is something unexplainable. He was not the smallest or lightest calf in the lot at the beginning, and yet his gain reduces the average gain per head daily to 2.18 pounds. Eliminating his weights we find that the average daily gain per head for the six head is 2.26 pounds.

TABLE 9
Weights and Gains

Shelled Corn, Linseed Oil Meal, Corn Silage and Alfalfa Hay										
No. Calf	Weight at begin'g	Weight Feb. 2	Weight Mar. 3	Weight Apr. 2	Weight May 2	Weight May 31	Weight June 30	Weight at end	Gain	Gain per head da.
25	424	476	526	600	678	748	842	898	474	2.25
26	465	542	626	698	744	796	860	940	475	2.26
27	534	630	736	818	880	942	1000	1056	522	2.48
29	445	528	600	692	718	804	870	928	483	2.30
32	460	528	618	702	800	852	940	989	529	2.51
33	388	466	524	596	664	750	812	872	484	2.30
43	410	456	530	624	714	792	876	957	547	2.60
Totals- Av'ges.	3126	3626	4160	4730	5198	5684	6200	6640	3514	2.39
Gain per lot		500	534	570	468	486	516	440		

Summary

From the results of these experiments we may summarize as follows:

1. South Dakota barley as a single feed is not equal to corn for fattening two-year-old steers or calves.
2. The addition of linseed oil meal to the ration, while it increased the

- cost of gain, also increased the value of the gain made during the first part of the experiment and was a benefit.
3. In each experiment it required more barley for a pound of gain than it did corn. The average for the experiments shows that about one-eighth more barley was necessary.
 4. The reason for this difference is no doubt due to the composition of the two feeds. The larger per cent of oil corn contains than barley and the larger per cent of protein barley contains than corn, together with the additional hull on barley, is probably the principal reason why better results are obtained from feeding corn.
 5. Corn silage as the sole roughage proved to be suitable for calves on a grain ration. Of course, the corn was in the silage and to this factor might be attributed to the calves doing so well the second period. It is possible that barley fed with the corn silage furnished a better fattening ration than that fed with alfalfa hay during the first 91 days. However, these calves consumed about one-third more alfalfa hay during the 91 day period than did the lot that received shelled corn.

Barley for Fattening Swine

What is the value of barley compared with corn as a feed for fattening pigs for market? How should barley be fed to fattening pigs? Does it pay to feed tankage or a supplementary protein mixture with barley to pigs being fattened for market? The foregoing and similar questions have been asked many times during the last few years. Growing and fattening hogs for market has increased very rapidly in South Dakota. The indications are that hog growing and feeding will be still more important in this section in years to come. With every increase in hog production there is likewise an increase in the interest in the grains which can be grown in the state and which can be substituted for corn for either a part or all of the fattening feed. As stated previously barley is a dependable crop which supplies good quality grain several weeks earlier in the season than does corn. This in itself is an important factor in selecting a feed crop for spring pigs which are to be pushed for the early fall market.

Results of experiments conducted at this station and reported in Bulletins No. 192 and No. 252 show that it pays to grind barley when fed to hogs. The ground barley fed dry in self-feeders proved more efficient than the whole barley fed either dry or soaked. These results are comparable to results obtained from similar tests conducted at other experiment stations.

Results of experiments at other stations in which barley has been compared with corn as a feed for fattening pigs have varied greatly. In some of the tests the feeding value of barley has been practically equal to that of corn while in others it has been lower. Barley grown in different sections and even in the same section during different years varies in weight per bushel and quality. These differences in the feed account for many of the differences in experimental results which have been noted. It is only by considering the results of several experiments that information can be obtained which will serve as a reliable guide by which the grower and feeder can use his feed to the best advantage.

The results of two experiments conducted at this station in which barley was compared with corn were reported in bulletins No. 192 and No. 216. In the experiment reported in Bulletin No. 192 barley was compared with corn for both dry lot and pasture feeding. Ground barley and shelled corn, each supplemented by tankage, were used in both of these comparisons and in each case the feeding was done by means of self-feeders. It was found that the pigs fed in the dry lot required 334.3 pounds of shelled corn and 36 pounds of tankage for each 100 pounds of gain, while those fed ground barley and tankage under the same conditions required 378.7 pounds of ground barley and 52.5 pounds of tankage for each 100 pounds gain. In this test the pigs fed barley required 13.2 per cent more grain and 45.8 per cent more tankage for 100 pounds of gain than did the pigs fed corn.

The pigs fed the shelled corn and tankage on bluegrass pasture required 319.4 pounds of shelled corn and 33.6 pounds of tankage for 100 pounds gain, while the pigs fed ground barley and tankage on bluegrass pasture required 389.6 pounds of barley and 32.8 pounds of tankage to make the same gain. It will be noted that the pigs fed barley on pasture did not eat so much tankage in proportion to the gains made as did the pigs fed on barley in the dry lot.

In the experiment reported in Bulletin No. 216, fall pigs were fed during the winter in the dry lot. All feeds were self-fed by the free choice method. A ration of shelled corn and tankage was compared with a ration of ground barley and tankage. Also a ration of ground barley supplemented by a protein mixture consisting of two parts tankage, one part linseed oil meal, and one part chopped alfalfa hay, by weight, was compared with a ration of ground barley supplemented by tankage alone. In this experiment the pigs fed shelled corn and tankage required 374 pounds of shelled corn and 32.5 pounds of tankage for each 100 pounds of gain while those fed ground barley and tankage required 395 pounds of barley and only 23.8 pounds of tankage for each 100 pounds gain. Just why these fall pigs fed during the winter on ground barley and tankage should have required almost 50 per cent less tankage for each 100 pounds gain than did the spring pigs fed during the summer in a dry lot is difficult to understand. The pigs fed ground barley and the mixed protein supplement required 382 pounds of barley and 35.5 pounds of the supplement for 100 pounds gain. These results when compared with those obtained from the lot fed ground barley and tankage only, indicated that there was no advantage in using a mixed protein supplement instead of tankage alone when barley was fed. The results of the experiments noted showed clearly that considerable more work should be done before definite conclusions can be made.

Since the foregoing experiments were reported a sufficient number of tests have been conducted for the results to be indicative of what may be expected from feeding barley to pigs under farm conditions over a period of several years. The plan of feeding and the results of these later experiments follow:

Feeds Used

Good quality yellow corn, shelled, was fed in all comparisons. The barley used was of good quality testing from 46 to 48 pounds to the bushel. All barley fed was medium ground as experimental results have shown that barley ground to a medium degree of fineness gives just as good results as barley finely ground and the cost of grinding is less. All barley was fed dry in self-feeders. The best quality alfalfa hay available was selected for each experiment. All the alfalfa hay used was from second or third cuttings, bright green and leafy. It was self-fed in racks. ✓

The rape pastures were started during the last days of April or the first half of May. A good seed bed was prepared and the rape seeded at the rate of approximately seven pounds per acre. The drills used did not always sow accurately and in turning in small lots there was some overlapping. Thus the amount of seed used per acre varied. Ordinarily it is considered that five pounds of seed to the acre is sufficient. The Dwarf Essex variety was used.

Experimental results have shown that rape pasture gives practically the same feeding value as alfalfa pasture. It comes on a little later in the spring but lasts about a month in the fall after the alfalfa has been killed by frost.

Weighing

The pigs used in the experiment conducted in 1926 were weighed once at the beginning of the experiment, at the end of each week or seven-day period, and once at the close of the experiment. The pigs in all of the experiments conducted after 1926 were weighed on three consecutive days at the beginning of each experiment. The average of these three weights was taken as the initial weight. The pigs in experiments Nos. 3, 4, 5, 6, and 11 were weighed on three consecutive days when the average weight of all of the pigs in each lot was approximately 225 to 230 pounds. Thus each lot was fed to approximately the same weight. The average of the three last weights was taken as the final weight. The pigs in experiments 7, 8, 9, and 10 were weighed on three consecutive days when each pig reached an average weight of approximately 225 to 230 pounds. Each pig on reaching that weight was taken out of the experiment. The average of the three last weights was taken as the final one. By this method of weighing every pig, except those taken out because of accidents or sickness, was fed to a final weight of 225 to 235 pounds. This plan of taking the pigs out of the experiment when they reach market weight corresponds to the method of "topping out" and selling the best finished hogs practiced by most farmers in these days of truck transportation. All the pigs were weighed during each experiment at regular seven-day intervals.

Pigs Used and Rations Fed

Experiment No. 3. July 30, 1926 to November 5, 1926

Spring pigs were used. Four Duroc-Jerseys, three Poland Chinas, and one Hampshire were put into each of two lots used for this comparison and fed as follows:

Lot 1. Shelled corn, and a mineral mixture, each self-fed.

Lot 2. Ground barley and a mineral mixture, each self-fed.

The mineral mixture consisted of ground limestone, bone meal and salt, mixed equal parts by weight.

Experiment No. 4. January 19, 1927 to May 18, 1927

The pigs used in this experiment were farrowed in the fall of 1926. Sixteen purebred Duroc-Jersey and Poland China pigs were divided as evenly as possible considering weight, sex, breed, and litter mates into two lots. They were fed as follows:

Lot 3. Shelled corn, self-fed; a protein mixture consisting of two parts tankage and one part linseed oil meal, by weight, the mixture self-fed; alfalfa hay, self-fed.

Lot 4. Ground barley, self-fed; the same protein mixture as fed to lot 3, self-fed; alfalfa hay, self-fed.

One pound of salt for each 99 pounds of grain was mixed with the corn and barley fed each lot.

Experiment No. 5. April 19, 1927 to July 7, 1927

Poland China and Duroc-Jersey fall pigs which had been fed on a limited ration during the previous 120 days were divided as uniformly as possible into two lots for this comparison. They were fed as follows:

Lot 5. Shelled corn, self-fed, and a protein supplement consisting of two parts tankage and one part linseed oil meal, by weight, this mixture self-fed.

Lot 6. Ground barley, self-fed, and the same protein mixture as fed to Lot 5, self-fed.

Salt was mixed with the grain fed each lot at the beginning of the experiment at the rate of one pound of salt to each 99 pounds of grain, but after a short time it was found that the pigs fed shelled corn were leaving most of the salt in the feeder and from that time on the salt was self-fed to each lot. Both lots of pigs had free access to alfalfa pasture.

Experiment No. 6. July 22, 1927 to November 23, 1927

Fourteen Poland China, five Duroc-Jersey, and five Hampshire spring pigs were divided as uniformly as possible into three lots for these comparisons. The three lots were fed as follows:

Lot 7. Shelled corn, self-fed; a protein mixture consisting of tankage two parts and linseed oil meal one part, by weight, the mixture self-fed; salt, self-fed; bone meal, self-fed.

Lot 8. Ground barley, self-fed; the same protein mixture as fed to Lot 7, self-fed; salt, self-fed; bone meal, self-fed.

Lot 9. Ground barley, tankage, salt; bone meal, each self-fed, free choice.

Each lot of pigs had free access to rape pasture until October 29, when the rape was injured by freezing. The rape continued, however, to supply some green feed until the pigs used for these comparisons reached market weight.

Experiment No. 7. January 12, 1928 to May 26, 1928

Chester White, Duroc-Jersey, and Poland China fall pigs were divided

into four uniform lots of seven pigs each for this experiment. The four lots were fed as follows:

- Lot 10. Shelled corn, tankage, alfalfa hay, salt, and bone meal, each self-fed, free choice.
 - Lot 11. Shelled corn, self-fed; a protein mixture consisting of two parts tankage and one part linseed oil meal, by weight, the mixture self-fed; alfalfa hay, salt, and bone meal, each self-fed, free choice.
 - Lot 12. Ground barley, tankage, alfalfa hay, salt, and bone meal, each self-fed, free choice.
 - Lot 13. Ground barley, the same protein mixture as fed to lot 11, alfalfa hay, salt, and bone meal, each self-fed, free choice.
- The pigs were kept in dry lots during the experiment.

Experiment No. 8. August 8, 1928 to January 24, 1929

Chester White, Duroc-Jersey, and Poland China spring pigs were divided into five uniform lots of eight pigs each for this experiment. The five lots were fed as follows:

- Lot 14. Shelled corn, tankage, and a mineral mixture, each self-fed.
- Lot 15. A grain ration consisting of shelled corn, and ground barley mixed equal parts by weight, the mixture self-fed; tankage self-fed; mineral mixture, self-fed.
- Lot 16. Ground barley, tankage, and a mineral mixture, each self-fed, free choice.
- Lot 17. A ration of ground barley plus tankage, the tankage being added in the proportion of one-half the amount eaten by the pigs in Lot 16 the previous week, this mixture self-fed; a mineral mixture, self-fed.
- Lot 18. Ground barley, self-fed; the same protein mixture as fed to lot 15, self-fed; mineral mixture, self-fed.

The mineral mixture fed consisted of salt mixed with soft coal ashes at the rate of one pound of salt to five pounds of ashes.

The pigs in each lot had access to good rape pasture from the time the experiment was started until November 16 when a freeze practically killed the rape. The pigs were left in the lots until November 29 at which time those still in the experiment were moved to a central house and given access to outside dry lots.

Experiment No. 9 February 13, 1929 to June 22, 1929

Duroc-Jersey and Poland China fall pigs were used in this experiment. They were divided into five uniform lots of seven pigs each. The five lots were fed in dry lots as follows:

- Lot 19. Shelled corn, tankage, alfalfa hay, and mineral mixture, each self-fed, free choice.
- Lot 20. Shelled corn, self-fed; a protein mixture consisting of two parts tankage and one part linseed oil meal, by weight, the mixture self-fed; alfalfa hay, self-fed; a mineral mixture, self-fed.
- Lot 21. Ground barley, tankage, alfalfa hay, and a mineral mixture, each self-fed, free choice.

Lot 22. Ground barley, the same protein mixture as fed to lot 20, alfalfa hay, and a mineral mixture, each self-fed, free choice.

The results from Lot 23 fed in this experiment are not reported in this bulletin as the ration used was not comparable with the other rations fed.

The mineral mixture used in this experiment consisted of 50 pounds ground limestone, 28 pounds bone meal, 20 pounds salt, 2 pounds iron oxide, 4.536 grams copper sulphate, and 9.072 grams potassium iodide.

Experiment No. 10 July 15, 1929 to January 9, 1930.

Chester White, Duroc-Jersey, Poland China, Duroc-Hampshire and Duroc-Poland China cross bred pigs were used. They were divided into seven uniform lots of eight pigs each. They were fed on rape pasture as follows:

Lot 24. Ground barley and a mineral mixture, each self-fed, free choice.

Lot 25. Shelled corn and a mineral mixture, each self-fed, free choice.

Lot 26. Ground barley, tankage, and a mineral mixture, each self-fed, free choice.

Lot 27. Shelled corn, tankage, and a mineral mixture, each self-fed, free choice.

Lot 28. Ground barley plus tankage mixed with the barley in the proportion of one-half the amount of tankage consumed by lot 26 the previous week, the mixture, self-fed; a mineral mixture, self-fed.

Lot 29. Ground barley, self-fed; a protein mixture consisting of two parts tankage and one part linseed oil meal, by weight, the mixture self-fed; a mineral mixture, self-fed.

Lot 30. Shelled corn, the same protein mixture as fed to lot 29, and a mineral mixture, each self-fed, free choice.

The mineral mixture fed consisted of 50 pounds ground limestone, 28 pounds bone meal, 20 pounds salt, 2 pounds iron oxide, 4.536 grams copper sulphate, and 9.072 grams potassium iodide.

The pigs in all the lots had access to good rape pasture until a freeze on November 12 killed the rape. The pigs then remaining in the experiment were moved to the central hog house where they were given access to outside yards.

Experiment No. 11 March 6, 1930 to May 26, 1930

Chester White, Duroc-Jersey, and Poland China fall pigs were used in this experiment. Two uniform lots of eight pigs each were used for this comparison. These two lots were fed as follows:

Lot 31. Shelled corn, tankage, alfalfa hay, and a mineral mixture, each self-fed, free choice.

Lot 32. Ground barley, tankage, alfalfa hay, and a mineral mixture, each self-fed, free choice.

The mineral mixture fed consisted of 50 pounds ground limestone, 28 pounds bone meal, 20 pounds salt, 2 pounds iron oxide, 1 ounce potassium iodide, and 2 ounces of copper sulphate.

Ground Barley Compared with Shelled Corn for Fattening Spring Pigs on Rape Pasture When Fed Without a Protein Supplement

Data obtained through two seasons are used for this comparison. The weights and gains and the amounts of feed consumed by the pigs fed in Experiment No. 3 during the summer of 1926 are given in Table No. 10.

TABLE 10

Lot Number	1	2
Results of Experiment Number 3		
July 30, 1926 to Nov. 5, 1926		
	Ration 1	Ration 2
	Shelled corn Min. mixture	Ground barley Min. mixture
Number of pigs -----	8	8
Number of days fed -----	98.	98
Initial weight per lot -----	460.0	475.0
Average initial weight per pig -----	57.5	59.4
Final weight per lot -----	1148.0	1530.0
Average final weight per pig -----	143.5	191.3
Total gain per lot -----	688.0	1055.0
Average gain per pig -----	86.0	131.9
Average daily gain per pig -----	0.88	1.35
Total feed consumed		
Shelled corn -----	2756.4	
Ground barley -----		4568.8
Mineral mixture -----	55.0	54.4
Feed consumed for 100 pounds gain		
Shelled corn -----	400.6	
Ground barley -----		433.0
Mineral mixture -----	7.99	5.16

The most striking thing brought out in the results is the more rapid gains made by the pigs fed barley. The pigs fed shelled corn gained only

TABLE 11

Lot Number	25	24
Results from Experiment No. 10		
July 15, 1929 to January 9, 1930		
	Ration 1	Ration 2
	Shelled corn Min. mixture Rape pasture	Ground barley Min. mixture Rape pasture
Number of pigs -----	8	8
Number of day fed -----	136	120
Initial weight per lot -----	588.0	601.5
Average initial weight per pig -----	73.5	75.2
Final weight per lot -----	1867.0	1821.0
Average final weight per pig -----	233.4	227.6
Total gain per lot -----	1297.0	1219.5
Average gain per pig -----	159.9	152.3
Average daily gain per pig -----	1.17	1.28
Total feed consumed		
Shelled corn -----	5519.4	
Ground barley -----		5778.4
Mineral mixture -----	33.3	31.0
Feed consumed for 100 pounds gain		
Shelled corn -----	431.5	
Ground barley -----		473.8
Mineral mixture -----	2.6	2.5

.88 of a pound a day and weighed only 143.5 pounds each on November 5 when frost killed the rape. The pigs fed ground barley gained 1.35 pounds a day and weighed 191 pounds each on November 5. The corn-fed pigs needed an additional feeding period in order to get them to market weight while the barley fed pigs could have been sold as light weight butchers. The barley-fed pigs, however, required 33 pounds more feed for each 100 pounds of gain made.

The next two lots of pigs used for this comparison were fed in Experiment No. 10 during the summer and fall of 1929. The weights and gains of these pigs and the amounts of feed consumed are given in Table No. 11.

A comparison of the results shows that the pigs fed barley made faster gains than the pigs fed corn though the difference was not so great as with the pigs fed in 1926. In this experiment, however, both lots of pigs were fed to good market weights. Again as in the previous experiment the pigs fed shelled corn required less feed for 100 pounds gain.

A summary of the results of the two experiments is given in Table No. 12.

TABLE 12—SUMMARY

Lot Numbers Results from Experiments Numbers 3 and 10	1 and 25		2 and 24	
	Ration 1		Ration 2	
	Shelled corn Min. mixture Rape pasture	Ground barley Min. mixture Rape pasture	Shelled corn Min. mixture Rape pasture	Ground barley Min. mixture Rape pasture
Number of pigs -----	16	16		
Number of days fed -----	117	109		
Initial weight per lot -----	1048.0	1042.7		
Average initial weight per pig -----	65.5	65.2		
Final weight per lot -----	3015.0	3351.0		
Average final weight per pig -----	188.4	209.5		
Total gain per lot -----	1967.0	2308.3		
Average gain per pig -----	122.9	144.3		
Average daily gain per pig -----	1.05	1.32		
Total feed consumed				
Shelled corn -----	8275.8			
Ground barley -----		10347.2		
Mineral mixture -----	88.2	85.4		
Feed consumed for 100 pounds gain				
Shelled corn -----	420.7			
Ground barley -----		448.3		
Mineral mixture -----	4.5	3.7		

The combined results of these two experiments indicate that if spring pigs are to be full fed on rape pasture without the use of a protein supplement they will make faster gains and reach market weights at an earlier date if fed on ground barley than they will if fed on shelled corn. When the amount of feed required to produce 100 pounds of gain is considered, however, the barley did not prove so efficient as the corn. In this case, 27.6 pounds or 6.5 per cent more barley than corn was required for each 100 pounds of gain made. These results suggest that if a protein supplement is not used a mixture of corn and barley might prove more satisfactory than either alone.

Ground Barley Compared with Shelled Corn for Fattening Spring Pigs on Rape Pasture When Fed with Tankage

The data for this comparison were obtained from four lots of pigs fed during two seasons. The first two lots compared were fed in Experiment No. 8 during the summer and fall of 1928. The weights and gains made by these pigs and the total amounts of feed consumed are given in Table No. 13.

TABLE 13

Lot Number	14	16
Results from Experiment No. 8		
August 8, 1928 to January 24, 1929		
	Ration 3	Ration 4
	Shelled corn Tankage Min. mixture Rape pasture	Ground barley Tankage Min. mixture Rape pasture
Number of pigs -----	8	8
Number of days fed -----	119	124
Initial weight per lot -----	360.0	359.7
Average initial weight per pig -----	45.0	44.9
Final weight per lot -----	1834.3	1757.0
Average final weight per pig -----	229.3	219.6
Total gain per lot -----	1474.3	1397.3
Average gain per pig -----	184.3	174.7
Average daily gain per pig -----	1.55	1.41
Total feed consumed		
Shelled corn -----	4934.6	
Ground barley -----		5719.1
Tankage -----	333.0	264.0
Mineral mixture -----	22.0	53.6
Feed consumed for 100 pounds gain		
Shelled corn -----	334.7	
Ground barley -----		405.3
Tankage -----	22.6	18.9
Mineral mixture -----	1.5	3.8

One pig in lot 16 developed pneumonia about November 1 and was taken out of the experiment on that date. This pig weighed 137 pounds at the time. The gain made and the feed consumed by this pig are included in the tabulation. As this pig weighed less than 225 pounds at the time it was taken out of the experiment the average final weight per pig for lot 16 is less than for lot 14.

Comparing these results we find that the pigs fed corn made slightly faster gains than the pigs fed barley. Both groups of pigs made faster gains than pigs fed in other experiments on corn and barley without tankage, but the addition of the tankage resulted in a greater improvement for the corn ration than for the barley ration. Comparison of the results also shows that the pigs fed corn made 100 pounds of gain on 60.6 pounds less grain but required 3.7 pounds more tankage than the pigs fed barley.

A summary of the results of the two experiments is given in Table No. 14.

A comparison of the results obtained shows that the pigs fed corn made slightly faster gains than the pigs fed barley. The greatest difference, however, comes in the feed required to make 100 pounds of gain. The pigs fed barley required 416.8 pounds of grain for 100 pounds gain

TABLE 14

Lot Number	27	26
Results from Experiment No. 10 July 15, 1929 to November 21, 1929.		
	Ration 3	Ration 4
	Shelled corn Tankage Min. mixture Rape pasture	Ground barley Tankage Min. mixture Rape pasture
Number of pigs -----	8	8
Number of days fed -----	101	103
Initial weight per lot -----	576.7	579.3
Average initial weight per pig -----	72.0	72.4
Final weight per lot -----	1843.0	1827.8
Average final weight per pig -----	230.4	229.0
Total gain per lot -----	1266.8	1248.5
Average gain per pig -----	158.4	156.6
Average daily gain per pig -----	1.57	1.53
Total feed consumed		
Shelled corn -----	4283.0	
Ground barley -----		5204.2
Tankage -----	215.6	176.8
Mineral mixture -----	19.5	23.3
Feed consumed for 100 pounds gain		
Shelled corn -----	338.5	
Ground barley -----		416.8
Tankage -----	17.0	14.2
Mineral mixture -----	1.5	1.9

while the pigs fed corn required only 338.5 pounds of grain for the same gain. There was only a slight difference in the tankage requirement in favor of the pigs fed barley. In this case the ground barley showed a feeding value of only 80 per cent of that of shelled corn.

TABLE 15

Lot Numbers	14 and 27	16 and 26
Results from Experiments Numbers 8 and 10		
	Ration 3	Ration 4
	Shelled corn Tankage Min. mixture Rape pasture	Ground barley Tankage Min. mixture Rape pasture
Number of pigs -----	16	16
Number of days fed -----	110	113
Initial weight per lot -----	936.7	939.0
Average initial weight per pig -----	58.5	58.7
Final weight per lot -----	3677.3	3584.8
Average final weight per pig -----	229.8	224.1
Total gain per lot -----	2741.1	2645.8
Average gain per pig -----	171.3	165.4
Average daily gain per pig -----	1.56	1.46
Total feed consumed		
Shelled corn -----	9217.6	
Ground barley -----		10923.3
Tankage -----	549.6	440.8
Mineral mixture -----	41.5	76.9
Feed consumed for 100 pounds gain		
Shelled corn -----	336.3	
Ground barley -----		412.9
Tankage -----	20.0	16.7
Mineral mixture -----	1.5	2.9

The next two lots compared were fed in Experiment No. 10 during the summer and fall of 1929. The weights and gains and the amounts of feed consumed by these pigs are given in Table No. 15.

The most important thing brought out by this summary is the difference in the amount of feed required for 100 pounds of gain in the two groups. The corn-fed pigs required only 336.3 pounds of grain for each 100 pounds of weight made while the barley fed pigs required 412.9 pounds of grain. The barley-fed pigs required a smaller amount of tankage, but this is not sufficient to offset the extra amount of grain used. The corn-fed pigs also made slightly faster gains than did the barley-fed pigs. Results show that in these two trials the ground barley had only 82 per cent the feeding value of the shelled corn.

Ground Barley Compared with Shelled Corn for Fattening Spring Pigs on Rape Pasture When Fed With a Protein Supplement Consisting of Two Parts Tankage And One Part Linseed Oil Meal

The data for this comparison also were obtained from four lots of pigs fed during two seasons. The first two lots were fed in Experiment No. 6 during the summer and fall of 1928. There were two short periods during that summer when the gains of the pigs were checked considerably by extremely hot weather. The rape, while checked in growth continued to supply plenty of green feed. A freeze on the night of October 27 injured the rape but it continued to supply a little green feed until November 28 when the pigs in Lot 8 reached market weight. The weights and gains of these pigs and the amounts of feed consumed are given in table No. 16.

TABLE 16

Lot Number	7	8
Results from Experiment No. 6 July 22 to November 23, 1928.		
	Ration 5	Ration 6
	Shelled corn Tankage Lins'd oil meal Salt Bone meal Rape pasture	Ground barley Tankage Lins'd oil meal Salt Bone meal Rape pasture
Number of pigs -----	8	8
Number of days fed -----	104	124
Initial weight per lot -----	439.4	432.7
Average initial weight per pig -----	54.9	54.1
Final weight per lot -----	1862.0	1859.7
Average final weight per pig -----	232.8	232.5
Total gain per lot -----	1422.6	1427.0
Average gain per pig -----	177.9	178.4
Average daily gain per pig -----	1.72	1.45
Total feed consumed		
Shelled corn -----	4358.6	
Ground barley -----		5895.3
Tankage -----	414.5	221.4
Linseed oil meal -----	207.2	110.8
Feed consumed for 100 pounds gain		
Shelled corn -----	306.5	
Ground barley -----		413.1
Tankage -----	29.2	15.5
Linseed oil meal -----	14.6	7.8

While the pigs in each lot had access at all times to salt and bone meal the amounts eaten, if any, were so small they were considered insignificant and within the limits of error in weighing. For that reason the salt and bone meal has been disregarded in the tabulation of results. A comparison of the results obtained for the two lots shows that the pigs fed corn gained faster and required 106 pounds less grain for each 100 pounds gain than the pigs fed barley. The barley-fed pigs, on the other hand, required 47 per cent less tankage and linseed oil meal. If we value shelled corn at \$1.00 a cwt., tankage at \$3.00 a cwt. and linseed oil meal at \$2.50 a cwt., the ground barley in this experiment gave a return of 88 cents a cwt. Or it had 88 per cent the feeding value of corn.

The next two lots of pigs used for this comparison were fed in Experiment No. 10 during the summer and fall of 1929.

The rape for these two lots was of good quality and supplied an abundance of green feed until killed by a hard freeze on the night of November 12. At that time all of the pigs had been weighed out of lot 29 and only three remained in lot 30. These were weighed out on November 21, November 27 and December 6. Thus there was only a short period when these three pigs did not have access to good rape pasture.

The weights and gains of the pigs and the amounts of feed consumed are given in table No. 17.

TABLE 17

Lot Number	30	29
Results from Experiment No. 10 July 15, 1929 to December 6, 1929.		
	Ration 5	Ration 6
	Shelled corn Tankage Lins'd oil meal Min. mixture Rape pasture	Ground barley Tankage Lins'd oil meal Min. mixture Rape pasture
Number of pigs -----	8	7
Number of days fed -----	108	92
Initial weight per lot -----	585.0	525.1
Average initial weight per pig -----	73.1	75.0
Final weight per lot -----	1849.7	1519.0
Average final weight per pig -----	231.2	217.0
Total gain per lot -----	1264.7	993.9
Average gain per pig -----	158.1	141.9
Average daily gain per pig -----	1.46	1.54
Total feed consumed		
Shelled corn -----	4388.0	
Ground barley -----		3747.7
Tankage -----	152.0	121.0
Linseed oil meal -----	76.0	60.5
Mineral mixture -----	22.2	13.7
Feed consumed for 100 pounds gain		
Shelled corn -----	347.0	
Ground barley -----		377.1
Tankage -----	12.0	12.2
Linseed oil meal -----	6.0	6.1
Mineral mixture -----	1.8	1.4

Lot 29 was started with eight pigs. One was found dead in the yard on July 27. The initial weight of this pig and one eighth of the feed consumed up to that time were deducted from the totals in tabulating the results. Another pig in this lot was found with a broken shoulder on September 28. This pig was weighed on September 28, 29 and 30 and taken

out of the experiment. The gain made and the feed consumed, however, were included in the totals for the lot. The pig taken out weighed 137 pounds. This light final weight lowered the average final weight per pig for the lot.

The results show that both lots of pigs made their gains with a low feed cost. There was practically no difference in the amounts of tankage, linseed oil meal, and mineral required to produce 100 pounds of gain. The only difference was in the amount of grain required. The corn-fed pigs required 30 pounds less feed than the barley-fed pigs for each 100 pounds of gain. This gives the ground barley a feeding value of 94 per cent that of shelled corn.

A summary of the two experiments is given in Table No. 18.

TABLE 18

Lot Numbers Results from Experiments Numbers 8 and 10	7 and 30	8 and 29
	Ration 5	Ration 6
	Shelled corn Tankage Lins'd oil meal Min. mixture Rape pasture	Ground barley Tankage Lins'd oil meal Min. mixture Rape pasture
Number of pigs -----	16	15
Number of days fed -----	106	109
Initial weight per lot -----	1024.4	957.8
Average initial weight per pig -----	64.2	63.8
Final weight per lot -----	3711.7	3378.7
Average final weight per pig -----	232.0	225.2
Total gain per lot -----	2687.3	2420.9
Average gain per pig -----	168.0	161.4
Average daily gain per pig -----	1.58	1.48
Total feed consumed		
Shelled corn -----	8746.6	
Ground barley -----		9643.0
Tankage -----	566.5	342.4
Linseed oil meal -----	283.2	171.3
Mineral mixture -----	22.2	13.7
Feed consumed for 100 pounds gain		
Shelled corn -----	325.5	
Ground barley -----		398.3
Tankage -----	21.1	14.1
Linseed oil meal -----	10.5	7.1
Mineral mixture -----	.8	.6

The results brought out by this summary show that the corn-fed pigs made slightly faster gains than the barley fed pigs. This difference in the rate of gain, however, would not make much difference in actual practice in the time the hogs would be put on the market. The corn-fed hogs produced 100 pounds of gain on 73 pounds less grain than the barley-fed hogs. However, they required 50 per cent more of the protein supplement. The saving in the protein supplement is an important factor. By using barley, more of the feed can be grown at home and a smaller amount bought. If we value shelled corn at \$1.00 a cwt., tankage at \$3.00 a cwt., and linseed oil meal at \$2.50 a cwt., the ground barley fed in these experiments was worth 89 cents a cwt. Expressed in terms of corn, its feeding value was 89 per cent that of corn.

What Is the Value of a Mixture of Tankage and Oil Meal Compared with Tankage Alone When Used to Supplement Ground Barley for Fattening Spring Pigs on Rape Pasture?

Feeders often ask if it will pay to replace part of the tankage with oil meal instead of feeding tankage alone to supplement ground barley for fattening pigs. Several comparisons have been made in these experiments, both with pigs fattened on rape pasture and in dry lots, to obtain information which would help answer this question. The first comparison with pigs fattened on pasture was made with two lots fed in Experiment No. 6 during the summer and fall of 1927. The weights and gains of the pigs in these lots and the amounts of feed consumed are given in Table No. 19

TABLE 19

Lot Number	9	8
Results from Experiment Number 6 July 22, 1927 to November 23, 1927.	Ration 4	Ration 6
	Ground barley Tankage	Ground barley Tankage
	Bone meal Rape pasture Salt	Linseed oil meal Bone meal Rape pasture Salt
Number of pigs -----	8	8
Number of days fed -----	109	124
Initial weight per lot -----	430.3	432.7
Average initial weight per pig -----	53.8	54.1
Final weight per lot -----	1740.3	1859.7
Average final weight per pig -----	217.5	232.5
Total gain per lot -----	1310.0	1427.0
Average gain per pig -----	163.8	178.4
Average daily gain per pig -----	1.51	1.45
Total feed consumed		
Ground barley -----	5495.0	5895.3
Tankage -----	235.2	221.4
Linseed oil meal -----		110.8
Feed consumed for 100 pounds gain		
Ground barley -----	419.5	413.11
Tankage -----	18.0	15.5
Linseed oil meal -----		7.8

One pig in lot 9 died from the excessive heat on September 16. This pig weighed 163 pounds at the time and had been one of the fastest gaining pigs in the lot. The gain made and feed consumed by this pig were included in the totals in tabulating the results for this lot. The lighter weight at the time it died, however, reduced the final average weight per pig for the lot.

As stated previously common white salt and bone meal were fed to the pigs in this experiment but the amounts eaten were so small they were considered negligible and within the limits of error in weighing.

The results from the two rations show only slight differences. The pigs fed the linseed oil meal required 6.4 pounds less barley and 2.5 pounds less tankage for each 100 pounds of gain than those fed tankage alone. This small saving in tankage and barley, however, was more than offset by the 7.8 pounds of linseed oil meal.

The second comparison of rations 4 and 6 was made with lots 16 and 18 fed in experiment No. 8 during the summer and fall of 1928. The weights and gains of the pigs in these lots and the amounts of feed consumed are given in Table No. 20.

TABLE 20

Lot Number	16		18	
	Ration 4		Ration 6	
Results from Experiment No. 8 August 8, 1928 to January 24, 1929				
	Ground barley Tankage		Ground barley Tankage Lins'd oil meal	
	Min. mixture Rape pasture		Min. mixture Rape pasture	
Number of pigs -----	8		8	
Number of pigs fed -----	124		114	
Initial weight per lot -----	359.7		352.7	
Average initial weight per pig -----	44.9		44.0	
Final weight per lot -----	1757.0		1741.3	
Average final weight per pig -----	219.6		217.6	
Total gain per lot -----	1397.3		1388.6	
Average gain per pig -----	174.7		173.6	
Average daily gain per pig -----	1.41		1.52	
Total feed consumed				
Ground barley -----	5719.1		5172.2	
Tankage -----	264.0		216.3	
Linseed oil meal -----			108.2	
Mineral mixture -----	53.6		38.3	
Feed consumed for 100 pounds gain				
Ground barley -----	405.3		372.5	
Tankage -----	18.9		15.6	
Linseed oil meal -----			7.8	
Mineral mixture -----	3.8		2.8	

TABLE 21

Lot Numbers	9, 16 and 26		8, 18 and 29	
	Ration 4		Ration 6	
Results from Experiments Nos. 6, 8, and 10.				
	Ground barley Tankage		Ground barley Tankage Lins'd oil meal	
	Min. mixture Rape pasture		Min. mixture Rape pasture	
Number of pigs -----	24		23	
Number of days fed -----	112		111	
Initial weight per lot -----	1369.3		1310.5	
Average initial weight per pig -----	57.1		56.9	
Final weight per lot -----	5325.1		5120.0	
Average final weight per pig -----	221.9		222.6	
Total gain per lot -----	3955.8		3809.5	
Average gain per pig -----	164.8		165.6	
Average daily gain per pig -----	1.47		1.5	
Total feed consumed				
Ground barley -----	16418.3		14815.2	
Tankage -----	676.0		558.7	
Linseed oil meal -----			279.5	
Mineral mixture -----	76.9		51.9	
Feed consumed for 100 pounds gain				
Ground barley -----	415.0		388.9	
Tankage -----	17.1		14.7	
Linseed oil meal -----			7.3	
Mineral mixture -----	1.9		1.4	

The results show that the pigs fed the linseed oil meal made slightly faster gains than those fed tankage alone. As in the previous experiment the pigs fed oil meal mixed with the tankage required less barley for 100 pounds gain than the pigs fed tankage alone, but the difference was greater. Also, as in the previous experiment the pigs fed the oil meal required more protein supplement for 100 pounds gain than the pigs fed tankage without oil meal. Considering both barley and protein supplement there was a difference in favor of feeding the oil meal but this difference was small.

The third comparison of these rations was made with lots 26 and 29 fed in Experiment No. 10 during the summer and fall of 1928. The weights and gains made by the pigs in these lots and the amounts of feed consumed are given in tables numbers 15 and 17. The results from these two lots show practically the same differences shown by the two lots fed in Experiment No. 8. The feed requirements for 100 pounds of gain for each ration also are very close.

A summary of the three experiments is given in Table No. 21.

This summary shows a slight difference in favor of substituting linseed oil meal for one-third of the tankage. This difference, however, amounts to only 26 pounds of barley and 2.4 pounds of tankage which is partly offset by the use of 7.3 pounds of oil meal. At the prices for feed used in this bulletin, the difference would amount to only about 12 cents per 100 pounds gain.

Does It Pay to Feed a Limited Amount of Tankage Mixed with Ground Barley to Spring Pigs Fattened on Rape Pasture Instead of Feeding Ground Barley and Tankage, Each Self-fed, Free Choice?

Four lots of pigs fed during two seasons were used for this comparison. The first two lots used were fed in Experiment No. 8 during the summer and fall of 1928. The weights and gains of these pigs and the amounts of feed consumed are given in table No. 22.

TABLE 22

Lot Number	16	17
Results from Experiment No. 8		
August 8, 1928 to January 24, 1929		
	Ration 4	Ration 7
	Ground barley Tankage Min. mixture Rape pasture	Ground barley Tankage Min. mixture Rape pasture
Number of pigs -----	8	8
Number of days fed -----	124	126
Initial weight per lot -----	359.7	361.7
Average initial weight per pig -----	44.9	45.2
Final weight per lot -----	1757.0	1832.7
Average final weight per pig -----	219.6	229.1
Total gain per lot -----	1397.3	1470.9
Average gain per pig -----	174.7	183.9
Average daily gain per pig -----	1.41	1.46
Total feed consumed		
Ground barley -----	5719.1	5970.9
Tankage -----	264.0	144.9
Mineral mixture -----	53.6	52.5
Feed for 100 pounds gain		
Ground barley -----	405.3	405.9
Tankage -----	18.9	9.8
Mineral mixture -----	3.8	3.6

The amount of tankage mixed with the barley fed to lot 17 each week was limited to one-half the percentage amount eaten by lot 16 the previous week. Thus if the total amount of feed consumed by lot 16 for a given week consisted of 96 per cent ground barley and 4 per cent tankage the grain mixture fed to lot 17 the following week consisted of 98 per cent ground barley and 2 per cent tankage. Limiting the amount of tankage fed, in this way, resulted in a saving of one-half the amount of tankage required for 100 pounds gain without increasing the amount of barley required.

The next two lots used in this comparison were fed in Experiment No. 10 during the summer and fall of 1929. The weights and gains for these pigs and the amounts of feed consumed are given in Table No. 23.

TABLE 23

Lot Number	26	28
	Ration 4	Ration 7
Results from Experiment No. 10		
	Ground barley Tankage Min. mixture Rape pasture	Ground barley Tankage Min. mixture Rape pasture
Number of pigs -----	8	8
Number of days fed -----	103	115
Initial weight per lot -----	579.3	568.0
Average initial weight per pig -----	72.4	71.0
Final weight per lot -----	1827.8	1796.3
Average final weight per pig -----	229.0	224.5
Total gain per lot -----	1248.5	1228.3
Average gain per pig -----	156.6	153.5
Average daily gain per pig -----	1.53	1.33
Total feed consumed		
Ground barley -----	5204.2	5447.2
Tankage -----	176.8	62.3
Mineral mixture -----	23.3	21.5
Feed consumed for 100 pounds gain		
Ground barley -----	416.8	443.5
Tankage -----	14.2	5.1
Mineral mixture -----	1.9	1.8

The limited tankage fed pigs, lot 28, consumed much less feed at the beginning of this experiment than did the pigs self-fed tankage. This resulted in the amount of tankage consumed for 100 pounds gain by this lot being about one-third the amount consumed by the pigs self-fed tankage, instead of one-half. The pigs fed a limited amount of tankage gained slower than the pigs self-fed tankage and required 26 pounds more barley for 100 pounds of gain. The amount of tankage saved, however, would offset the extra amount of barley required. The main difference is the loss of time in getting the pigs to market weight. The higher barley requirement also was due partly to the extra time fed. Feed records show that pigs self-fed ground barley and tankage, free choice, eat three to four times more tankage during the first five or six weeks of the feeding period than during the last five or six weeks. This suggests that if the amount of tankage is limited a slightly higher per cent should be fed during the first five or six weeks than was fed during that period to the pigs in lot 28.

A summary of the two experiments is given in Table No. 24.

TABLE 24

Lot Numbers	16 and 26	17 and 28
Results from Experiments Nos. 8 and 10	Ration 4	Ration 7
	Ground barley Tankage Min. mixture Rape pasture	Ground barley Tankage Min. mixture Rape pasture
Number of pigs -----	16	16
Number of days fed -----	113	113
Initial weight per lot -----	939.0	929.7
Average initial weight per pig -----	58.7	58.1
Final weight per lot -----	3584.8	3629.0
Average final weight per pig -----	224.1	226.8
Total gain per lot -----	2645.8	2699.2
Average gain per pig -----	165.3	168.7
Average daily gain per pig -----	1.46	1.49
Total feed consumed		
Ground barley -----	10923.5	11418.1
Tankage -----	440.8	207.2
Mineral mixture -----	76.9	74.0
Feed consumed for 100 pounds gain		
Ground barley -----	412.9	423.0
Tankage -----	16.7	7.7
Mineral mixture -----	2.9	2.9

The pigs fed a limited amount of tankage required 10 pounds more barley for 100 pounds gain than the pigs self-fed tankage. There was a saving, however, of 9 pounds of tankage for 100 pounds gain by limiting the amount of tankage fed. These results are very similar to results obtained at this station in an experiment conducted in 1922. In that experiment the pigs fed the tankage limited in the same way required less barley as well as less tankage for 100 pounds of gain, the amounts being 17 pounds less barley and 9 pounds less tankage. In that experiment also, the pigs fed a limited amount of tankage made slightly faster gains than the pigs self-fed tankage. The foregoing results show that limiting the amount of tankage fed with barley will enable the feeder to use a larger amount of feed grown at home and keep the amount of money he will have to spend for a protein supplement at a minimum.

In all of these experiments conducted at this station in which pigs fattened on barley and rape pasture have been compared with pigs fattened on barley, tankage, and rape pasture, the results have been in favor of the tankage fed lots. In-as-much as the results of the experiments just discussed show an advantage in limiting the amount of tankage fed with ground barley, more work should be done to determine the extent to which the tankage should be limited and the time during the feeding period when this should be done.

A Mixture of Equal Parts Shelled Corn and Ground Barley Compared with Shelled Corn Alone and Ground Barley Alone, Each Feed Being Supplemented with Tankage, for Fattening Spring Pigs On Rape Pasture

Three lots of pigs were fed in Experiment No. 8 during the summer and fall of 1928. These were lots 14, 15, and 16. The weights and gains of the pigs in lots 14 and 16 and the amounts of feed consumed are given in Table No. 13. The pigs in lot 15 self-fed a mixture of shelled corn and ground barley, mixed equal parts by weight, supplemented with tankage, self-fed, required 400.6 pounds of the grain mixture and 17.2 pounds of tankage to produce 100 pounds of gain. The amounts of grain and tankage eaten for 100 pounds gain by the pigs are almost identical with the amounts eaten by the pigs in lot 16. The rates of gain for the two lots also were practically the same. Thus there was no economy in feeding a ration of half barley and half corn as compared with feeding barley alone. It should be remembered, however, that these are the results of only one experiment and should not be taken as conclusive.

Comparing Ground Barley with Shelled Corn for Fattening Fall Pigs on Alfalfa Pasture

One experiment in fattening fall pigs on alfalfa pasture was conducted in the spring of 1927. The pigs used had been fed on limited rations during the previous 120 days. They had made good growth and

TABLE 25

Lot Number	5		6	
	Ration 8		Ration 9	
Results of Experiment No. 5	Shelled corn Prot'n Supple- ment Salt		Ground barley Prot'n Supple- ment Salt	
Number of pigs -----	15		16	
Number of days fed -----	67		75	
Initial weight per lot -----	1563.4		1603.0	
Average initial weight per pig -----	104.2		100.2	
Final weight per lot -----	3429.0		3658.7	
Average final weight per pig -----	228.6		228.7	
Total gain per lot -----	1865.6		2055.7	
Average gain per pig -----	124.4		128.5	
Average daily gain per pig -----	1.86		1.71	
Total feed consumed				
Shelled corn -----	7170.0			
Ground barley -----			9624.3	
Tankage -----	150.0		119.47	
Linseed oil meal -----	75.0		59.73	
Salt -----	13.8		15.9	
Feed consumed for 100 pounds gain				
Shelled corn -----	384.33			
Ground barley -----			468.18	
Tankage -----	8.04		5.81	
Linseed oil meal -----	4.02		2.91	
Salt -----	.74		.77	

were in thrifty condition. The weights and gains of these pigs and the amounts of feed consumed are given in Table No. 25.

The salt was mixed with the ground barley and shelled corn at the rate of one pound of salt to each 100 pounds of feed at the start of the experiment, but later it was self-fed, free choice, as it was found that the pigs getting the shelled corn did not consume all of the salt mixed with the corn. The pasture used was about two-thirds alfalfa and one-third blue grass but the yards were of sufficient size to supply the pigs all the alfalfa they wanted. It was noticed that the pigs fed ground barley grazed more than did the pigs fed shelled corn. The weights and gains of the pigs and the amounts of feeds consumed are given in Table No. 12.

It will be noted that the corn-fed pigs made slightly faster gains than did the barley-fed pigs. The barley-fed pigs ate more grain per day notwithstanding they seemed to graze more, and required more grain per 100 pounds gain than did the corn-fed pigs. The protein supplement requirement was low in each case but slightly higher for the corn-fed pigs than for the barley-fed pigs. The pigs fed the barley required eight days longer to reach market weight than did the corn-fed pigs and when sold to the Morrell Packing company in Sioux Falls were valued at 10 cents per hundred lower than the corn-fed pigs. On the basis of home weights and the Morrell yard scale weights the 15 hogs fed corn showed a shrink of 50 pounds while the 16 hogs fed barley showed a shrink of 77 pounds while being trucked to market, a distance of 60 miles. Both lots of hogs were killed under test. On the basis of the yard weights and the killing floor weights of the warm carcasses with the heads removed the corn-fed hogs yielded 73.6 per cent and the barley-fed hogs 71.7 per cent. All of the carcasses were put in the chill room for 20 hours and then graded by a committee of three men selected from the Morrell staff. All of the carcasses were classed as firm and graded No. 1. The corn-fed hogs showed a brighter color lean meat with a little heavier marbling than did the barley-fed hogs. The barley-fed hogs, on the other hand, had a little less fat than the corn-fed hogs and the fat was a trifle whiter. It also was noticed that the barley-fed hogs had thinner skins than the corn-fed hogs. In the cutting tests the corn-fed hogs yielded 1.75 per cent more of bellies while the barley-fed hogs yielded 1.64 per cent more of loins. There was only a slight difference in the percentage yield of hams.

Ground Barley Compared with Shelled Corn for Fattening Fall Pigs in Dry Lot When Fed with Tankage and Alfalfa Hay

The data for this comparison were obtained from six lots of pigs fed through three seasons. The first two lots compared were fed in Experiment No. 7 during the winter and early spring of 1928. The weights and gains of these pigs and the amounts of feed consumed are given in Table No. 26.

The pigs fed shelled corn in this experiment consumed 36 pounds less grain but 11 pounds more tankage for 100 pounds gain than the pigs fed ground barley. There was only a slight difference in the rate of gain

TABLE 26

Lot Number	10	12
Results from Experiment No. 7 January 12, 1928 to May 26, 1928.		
	Ration 10	Ration 11
	Shelled corn Tankage Alfalfa hay Bone meal Salt	Ground barley Tankage Alfalfa hay Bone meal Salt
Number of pigs -----	7	7
Number of days fed -----	101	96
Initial weight per lot -----	519.0	518.0
Average initial weight per pig -----	74.1	74.0
Final weight per lot -----	1599.0	1566.7
Average final weight per pig -----	228.4	223.8
Total gain per lot -----	1080.0	1048.7
Average gain per pig -----	154.3	149.8
Average daily gain per pig -----	1.52	1.56
Total feed consumed		
Shelled corn -----	4129.0	
Ground barley -----		4383.7
Tankage -----	425.0	295.8
Alfalfa hay -----	25.8	23.4
Salt -----	7.0	2.4
Bone meal -----	3.0	2.2
Feed consumed for 100 pounds gain		
Shelled corn -----	382.3	
Ground barley -----		418.0
Tankage -----	39.5	28.2
Alfalfa hay -----	2.4	2.2
Salt -----	.7	.3
Bone meal -----	.3	.2

so the chief difference is in the amounts of feed required. If we value shelled corn at \$1.00 a cwt., tankage at \$3.00 a cwt., alfalfa hay at \$10.00 a ton, and the salt and bone meal at 3 cents a pound, the ground barley

TABLE 27

Lot Number	19	21
Results from Experiment No. 9 February 13, 1929 to June 22, 1929		
	Ration 10	Ration 11
	Shelled corn Tankage Alfalfa hay Min. mixture	Ground barley Tankage Alfalfa hay Min. mixture
Number of pigs -----	7	7
Number of days fed -----	80	105
Initial weight per lot -----	569.3	566.7
Average initial weight per pig -----	81.3	81.0
Final weight per lot -----	1607.0	1579.3
Average final weight per pig -----	229.6	225.6
Total gain per lot -----	1037.7	1012.6
Average gain per pig -----	148.2	144.6
Average daily gain per pig -----	1.85	1.38
Total feed consumed		
Shelled corn -----	3639.5	
Ground barley -----		4566.6
Tankage -----	304.3	183.4
Alfalfa hay -----	3.5	9.1
Mineral mixture -----	2.1	6.0
Feed consumed for 100 pounds gain		
Shelled corn -----	350.7	
Ground barley -----		445.0
Tankage -----	29.3	18.1
Alfalfa hay -----	.3	.9
Mineral mixture -----	.2	.6

fed in this experiment proved to be worth \$1.00 a cwt. or the same as shelled corn.

The next comparison was made with two lots of pigs fed in Experiment No. 9 during the winter and spring of 1929. The weights and gains of these pigs and the amounts of feed consumed are given in Table No. 27.

In this experiment the corn-fed pigs gained much faster than the barley-fed pigs. They also consumed practically 96 pounds less grain for 100 pounds of gain. The barley fed pigs, however, consumed 11 pounds less tankage for 100 pounds gain but this saving was not sufficient to balance the extra grain consumption. It should be noted that while the alfalfa hay fed was of good quality the pigs ate only a very small amount. Likewise the amounts of mineral eaten were very small. It would seem that these pigs got most of the protein and minerals needed from the other feeds used. Using the same prices as before, each 100 pounds of barley fed in this experiment was worth 86 cents. This gives the barley a feeding value of 86 per cent that of corn.

The third comparison was made with two lots of pigs fed in Experiment No. 11 during the winter and spring of 1930. The weights and gains of these pigs and the amounts of feed consumed are given in Table No. 28.

TABLE 28

Lot Number	31	32
	Results from Experiment No. 11 March 6, 1930 to May 26, 1930.	Ration 10	Ration 11
	Shelled corn Tankage Min. mixture Alfalfa hay	Ground barley Tankage Min. mixture Alfalfa hay
Number of pigs -----	8	8
Number of days fed -----	58	58
Average initial weight per lot -----	1170.7	1163.7
Average initial weight per pig -----	146.3	145.5
Final weight per lot -----	2045.7	1935.0
Average final weight per pig -----	255.7	241.9
Total gain per lot -----	875.0	771.3
Total gain per pig -----	109.4	96.4
Average daily gain per pig -----	1.89	1.65
Total feed consumed		
Shelled corn -----	2597.0	
Ground barley -----		2770.0
Tankage -----	157.5	96.5
Alfalfa hay -----	22.0	25.0
Mineral mixture -----	3.0	8.75
Feed consumed for 100 pounds gain		
Shelled corn -----	296.8	
Ground barley -----		359.13
Tankage -----	18.0	12.5
Alfalfa hay -----	2.5	3.2
Mineral mixture -----	.3	1.4

The pigs fed in this experiment were a little older and heavier at the beginning of the experiment than were the pigs used in the other two comparisons. They, however, were in good stocker condition and made rapid, cheap gain. As they were heavier at the beginning of the experiment they were fed to heavier final weight.

The results of this experiment as of the one the year before, show that the pigs fed shelled corn consumed less corn and more tankage for 100 pounds of gain than did the pigs fed barley. The rate of gain likewise was faster for the pigs fed corn than for those fed barley. The difference in feed consumed amounted to 52 pounds less grain but 5.5 pounds more tankage for the corn-fed pigs. The pigs in this experiment ate more alfalfa hay and slightly more mineral. Using the same feed values as before the ground barley fed in this experiment was worth 86 cents a cwt. This would give the barley fed a feeding value of 86 per cent of that of the corn.

A summary of these three experiments is given in Table No. 29.

TABLE 29

Lot Numbers	10, 19 and 31	12, 21 and 32
Results from Experiments Nos. 7, 9 and 11	Ration 10	Ration 11
	Shelled corn Tankage Alfalfa hay Min. mixture	Ground barley Tankage Alfalfa hay Min. mixture
Number of pigs -----	22	22
Number of days fed -----	80	86
Initial weight per lot -----	2259.0	2248.4
Average initial weight per pig -----	102.7	102.5
Final weight per lot -----	5151.7	5081.0
Average final weight per pig -----	234.2	231.0
Total gain per lot -----	2992.7	2832.6
Average gain per pig -----	136.0	128.7
Average daily gain per pig -----	1.7	1.5
Total feed consumed		
Shelled corn -----	10365.5	
Ground barley -----		11720.3
Tankage -----	886.8	575.7
Alfalfa hay -----	51.3	57.5
Mineral mixture -----	15.1	19.4
Feed consumed for 100 pounds gain		
Shelled corn -----	346.4	
Ground barley -----		413.9
Tankage -----	29.6	20.3
Alfalfa hay -----	1.7	2.0
Mineral mixture -----	.5	.6

The summary shows that during the three years of winter and spring feeding the pigs fed corn made faster gains than the pigs fed barley. It also shows that the pigs fed shelled corn produced 100 pounds of gain on 67.5 pounds less grain but required 9.3 pounds more tankage for the same amount of gain than the pigs fed ground barley. Both grains were supplemented with tankage, alfalfa hay, and mineral. Using the same feed prices as before for shelled corn, tankage, alfalfa hay, and mineral, the ground barley fed in the three comparisons had an average value of 90 cents a cwt. This expressed in relation to corn would give the ground barley a feeding value of 90 per cent of that of shelled corn.

Ground Barley Compared with Shelled Corn for Fattening Fall Pigs in Dry Lot When Fed with a Protein Mixture Consisting of Two Parts Tankage and One Part Linseed Oil Meal and Alfalfa Hay

This comparison was made with six lots of fall pigs fed during three winter and spring seasons. The first pigs used were fed in Experiment No. 4 during the winter and spring of 1927. These pigs were smaller at the beginning of the experiment than the pigs used in the later tests. Their weights and gains and the amounts of feed they consumed are given in Table No. 30.

TABLE 30

Lot Number	3	4
Results of Experiment No. 4 January 19, 1927 to May 18, 1927	Ration 12	Ration 13
	Shelled corn Tankage Lins'd oil meal Alfalfa hay Salt	Ground barley Tankage Lins'd oil meal Alfalfa hay Salt
Number of pigs -----	8	8
Number of days fed -----	120	114
Initial weight per lot -----	451.3	447.3
Average initial weight per pig -----	56.4	55.9
Final weight per lot -----	1807.0	1824.3
Average final weight per pig -----	225.9	228.0
Total gain per lot -----	1355.7	1377.0
Average gain per pig -----	169.5	172.1
Average daily gain per pig -----	1.41	1.51
Total feed consumed		
Shelled corn -----	5097.8	
Ground barley -----		5695.2
Tankage -----	317.6	209.3
Linseed oil meal -----	158.8	104.6
Alfalfa hay -----	40.8	61.6
Salt -----	51.49	57.5
Feed consumed for 100 pounds gain		
Shelled corn -----	376.0	
Ground barley -----		413.6
Tankage -----	23.43	15.2
Linseed oil meal -----	11.7	7.6
Alfalfa hay -----	3.0	4.5
Salt -----	3.8	4.2

During the first 49 days of this experiment the pigs fed barley made an average daily gain of 1.5 pounds per pig while those fed shelled corn made an average daily gain of only 1.23 pounds per pig. This probably was due to the barley being of relatively higher quality than the corn. The corn crop was poor in the vicinity of Brookings in 1926 and much of the corn harvested was soft or light and chaffy. While the corn used at the start of this experiment was the best that could be obtained it was of relatively lower quality than the barley. A supply of better quality corn was obtained on March 9. This corn was grown in 1925 and was graded No. 2.

During the remainder of the experiment the pigs fed in the two lots made the same average daily gain, 1.52 pounds a day for each pig. This

also indicates that the slower gains made during the first part of the experiment by the corn-fed hogs was due to the poorer quality of the corn. The important conclusion to be made is that in poor corn years we may have a good barley crop, the feeding value of which might excel that of the corn; and further that it would be a good plan to grow each crop to supplement the other.

The pigs fed the shelled corn consumed 37 pounds less grain for 100 pounds gain than the pigs fed barley. The barley-fed pigs, however, consumed 12.3 pounds less protein supplement. If we value shelled corn at \$1.00 a cwt., tankage at \$3.00 a cwt., linseed oil meal at \$2.50 a cwt., and salt at 2 cents a pound the ground barley fed in this experiment was worth 98.5 cents a cwt.

The next two lots compared were fed in Experiment No. 7 during the winter and spring of 1928. The pigs in these two lots were especially thrifty at the beginning of the experiment and were uniform as to weight and quality. The weights and gains of these pigs and the amounts of feed consumed are given in Table No. 31.

TABLE 31

Lot Number	11	13
	Results from Experiment No. 7 January 12, 1928 to May 26, 1928.	
	Ration 12	Ration 13
	Shelled corn Tankage Lins'd oil meal Alfalfa hay Salt Bone meal	Ground barley Tankage Lins'd oil meal Alfalfa hay Salt Bone meal
Number of pigs -----	7	7
Number of days fed -----	109	98
Initial weight per lot -----	519.0	519.0
Average initial weight per pig -----	74.1	74.1
Final weight per lot -----	1603.0	1612.7
Average final weight per pig -----	229.0	230.4
Total gain per lot -----	1084.0	1093.7
Average gain per pig -----	154.9	156.6
Average daily gain per pig -----	1.42	1.59
Total feed consumed		
Shelled corn -----	4514.8	
Ground barley -----		4405.7
Tankage -----	286.9	255.3
Linseed oil meal -----	143.5	127.7
Alfalfa hay -----	26.4	20.6
Salt -----	2.6	2.0
Bone meal -----	3.0	2.6
Feed consumed for 100 pounds gain		
Shelled corn -----	416.5	
Ground barley -----		402.8
Tankage -----	26.5	23.3
Linseed oil meal -----	13.2	11.7
Alfalfa hay -----	2.4	1.9
Salt -----	.2	.2
Bone meal -----	.4	.1

In this experiment the barley-fed pigs made 100 pounds gain on less than did the corn-fed pigs. This was true with respect to all feeds used. The barley-fed pigs also made faster gains than did the corn-fed pigs, reaching market weight in a 10 to 12 days shorter feeding period.

TABLE 32

Lot Number	20	22
Results of Experiment No. 9		
February 13, 1929 to June 22, 1929.		
	Ration 12	Ration 13
	Shelled corn Tankage Lins'd oil meal Alfalfa hay Min. mixture	Ground barley Tankage Lins'd oil meal Alfalfa hay Min. mixture
Number of pigs -----	7	7
Number of days fed -----	85	96
Initial weight per lot -----	572.3	570.0
Average initial weight per pig -----	81.8	81.4
Final weight per lot -----	1620.3	1596.3
Average final weight per pig -----	231.5	228.0
Total gain per lot -----	1048.0	1026.3
Average gain per pig -----	149.7	146.6
Average daily gain per pig -----	1.76	1.53
Total feed consumed		
Shelled corn -----	3751.5	
Ground barley -----		4187.5
Tankage -----	213.7	160.7
Linseed oil meal -----	106.8	80.3
Alfalfa hay -----	7.0	5.5
Mineral mixture -----	3.1	5.4
Feed consumed for 100 pounds gain		
Shelled corn -----	358.0	
Ground barley -----		408.0
Tankage -----	20.4	15.6
Linseed oil meal -----	10.2	7.8
Alfalfa hay -----	.7	.5
Mineral mixture -----	.3	.5

TABLE 33

Lot Numbers	3, 11 and 20	4, 13 and 22
Results from Experiments 4, 7 and 9		
	Ration 12	Ration 13
	Shelled corn Tankage Lins'd oil meal Alfalfa hay Min. mixture	Ground barley Tankage Lins'd oil meal Alfalfa hay Min. mixture
Number of pigs -----	22	22
Number of days fed -----	105	103
Initial weight per lot -----	1542.6	1536.3
Average initial weight per pig -----	70.1	69.8
Final weight per lot -----	5030.3	5033.3
Average final weight per pig -----	228.7	228.8
Total gain per lot -----	3487.7	3497.0
Average gain per pig -----	158.5	159.0
Average daily gain per pig -----	1.51	1.54
Total feed consumed		
Shelled corn -----	13364.1	
Ground barley -----		14288.4
Tankage -----	818.2	625.3
Linseed oil meal -----	409.1	312.6
Alfalfa hay -----	74.2	87.7
Salt -----	54.1	59.5
Mineral mixture -----	6.1	8.0
Feed consumed for 100 pounds gain		
Shelled corn -----	383.2	
Ground barley -----		408.6
Tankage -----	23.5	17.9
Linseed oil meal -----	11.7	8.9
Alfalfa hay -----	2.1	2.5
Salt -----	1.6	1.52
Mineral mixture -----	.2	.2

Using the same prices for feeds as before, the ground barley fed in this experiment was worth \$1.07 a cwt. In this experiment the barley fed had a feeding value seven per cent higher than the corn fed.

The third comparison in this series was made with two lots of pigs fed in Experiment No. 9 during the winter and spring of 1929. These pigs were a little larger at the beginning of the experiment than those used in the other two comparisons. The weights and gains of these pigs and the amounts of feed consumed are given in Table No. 32.

In this experiment the corn-fed pigs gained faster than the barley-fed pigs and reached the market weight 11 to 12 days earlier. The corn-fed pigs also produced 100 pounds of gain on 50 pounds less grain than the barley-fed pigs. The pigs fed barley, on the other hand, consumed less tankage and linseed oil meal per 100 pounds gain. The saving on protein supplement, however, was not sufficient to equal the value of the extra grain consumed. If we use the same values for the other feeds as before, the ground barley fed in this experiment was worth 93 cents a cwt.

A summary of the three comparisons is given in Table No. 33.

The summary shows that the pigs in the two groups averaged practically the same in weight at the beginning of the experiments and again at the end, the average daily gain being almost the same. There were only two days difference in the time required to reach the same average final weight. The corn-fed hogs consumed 25 pounds less grain than the barley-fed hogs for 100 pounds of gain. The average protein supplement requirement for 100 pounds gain was 8.4 pounds less for the barley-fed hogs than for the corn-fed hogs. Putting the same values on the other feeds as before, the ground barley fed in this series of comparisons was worth 98 cents a cwt. This value for barley is somewhat higher than that shown in the comparisons with tankage and alfalfa hay used as supplements. It should not be concluded from this, however, that a mixture of tankage and oil meal is more efficient as a supplement to ground barley for fall pigs fattened in dry lot than tankage without the oilmeal. Only eight of the lots out of the twelve used in the two series of comparisons are comparable.

What Is the Value of a Mixture of Tankage and Linseed Oilmeal Compared with Tankage Alone When Used to Supplement Ground Barley and Alfalfa Hay For Fattening Fall Pigs in Dry Lot?

Alfalfa hay is available on most farms to use in connection with ground barley for winter feeding to partly take the place of pasture which is available in summer. It is generally thought, however, that a more concentrated protein supplement should be fed with the barley, also, if best results are to be obtained. The question is, will a mixed supplement give better results than tankage fed alone? Four comparable lots which can be compared directly were fed in this series of fall pig feeding experiments. Lots 12 and 21 fed in experiments Nos. 7 and 9 were fed ground barley, tankage and alfalfa hay, and lots 13 and 22 fed in the same experiments were fed ground barley, tankage, linseed oil meal and alfalfa hay. The records of weights and gains and feeds consumed for

each of these four lots are given in tables Nos. 16, 17, 21 and 22 respectively. A comparison of the results for lots 12 and 13 fed in 1928 shows that the pigs fed oil meal consumed 12 pounds less barley and 5 pounds less tankage than the pigs not getting oil meal for 100 pounds gain. They ate 11.6 pounds of oil meal, however, for each 100 pounds gain. The value of the oil meal consumed equals the value of the barley and tankage saved; thus nothing was gained by substituting oil meal for part of the tankage for the pigs fed in this experiment. The rates of gain for the pigs in each lot were practically the same.

A similar comparison of the results for lots 21 and 22 fed in 1929 shows that the pigs fed the oil meal gained somewhat faster than the pigs fed tankage alone. The amounts of barley and tankage saved by feeding the oil meal also were larger than in the 1928 experiment. In the 1929 experiment there was a small net gain from using the oil meal.

A summary of the two experiments is given in Table No. 34.

TABLE 34

Lot Numbers	12 and 21	13 and 22
	Ration-11	Ration 13
Results from Experiments Nos. 7 and 9.	Ground barley Tankage Alfalfa hay Salt Min. mixture	Ground barley Tankage Lins'd oil meal Alfalfa hay Salt Min. mixture
Number of pigs -----	14	14
Number of days fed -----	101	97
Initial weight per lot -----	1084.7	1089.0
Average initial weight per pig -----	77.4	77.7
Final weight per lot -----	3146.0	3209.0
Average final weight per pig -----	224.7	229.2
Total gain per lot -----	2061.3	2120.0
Average gain per pig -----	147.2	151.4
Average daily gain per pig -----	1.46	1.56
Total feed consumed		
Ground barley -----	8950.3	8593.2
Tankage -----	479.2	416.0
Linseed oil meal -----		208.0
Alfalfa hay -----	32.5	26.1
Mineral mixture -----	10.6	8.0
Feed consumed for 100 pounds gain		
Ground barley -----	434.2	405.3
Tankage -----	23.2	19.6
Linseed oil meal -----		9.8
Mineral mixture -----	.5	.4

The summary does not show very much difference in the results from the two rations. On the basis of 100 pounds gain the pigs fed the oil meal ate less barley and tankage than those not getting the oil meal. These differences amounted to 28.9 pounds of barley and 3.6 pounds of tankage. The pigs fed the oil meal, however, must be charged with 9.8 pounds of oil meal consumed for each 100 pounds gain. If we value ground barley at 90 cents a cwt., tankage at \$3.00 a cwt., linseed oil meal at \$2.50 a cwt., and mineral at 3 cents a pound the gain produced by the pigs fed oil meal cost \$4.49 a cwt. while the gain produced by the pigs

fed tankage without oil meal cost \$4.61 a cwt. This is a difference of 12 cents on each 100 pounds gain in favor of replacing one-third of the tankage with linseed oil meal. It must be remembered, though, that this difference would change with varying feed prices.

Barley for Fattening Swine

Summary

1. Ground barley fed without a protein supplement used for fattening spring pigs on rape pasture produced more rapid gains than shelled corn fed without a protein supplement. The barley-fed pigs, however, required more grain to produce 100 pounds gain. The ground barley fed in this series of comparisons had a feeding value of 93.3 per cent of that of shelled corn.

2. When ground barley fed with tankage was compared with shelled corn fed with tankage for fattening spring pigs on rape pasture, the pigs fed the shelled corn made the fastest gains. The corn-fed pigs also ate less grain for 100 pounds gain but required more tankage. The ground barley fed in this series of comparisons had a feeding value of 82 per cent that of shelled corn.

3. When ground barley fed with tankage and linseed oil meal was compared with shelled corn fed with tankage and linseed oil meal for fattening spring pigs on pasture, the pigs fed the shelled corn again made the fastest gains. The feed requirements for 100 pounds of gain also were very much the same as when both grains were fed with tankage without the linseed oil meal. The ground barley used in this series of comparisons had a feeding value of 89 per cent that of corn.

4. The average of the experiments in which ground barley was fed with tankage and with tankage and linseed oil meal compared with shelled corn fed with tankage and with tankage and linseed oil meal for fattening spring pigs on rape pasture gives a feeding value for ground barley of 86 per cent that of corn.

5. There was only a slight saving from substituting linseed oil meal for one-third of the tankage in a ration of ground barley and tankage fed to spring pigs fattened on rape pasture.

6. When spring pigs were fed ground barley and tankage on rape pasture limiting the amount of tankage fed resulted in a slight decrease in the cost of gains.

7. Pigs fattened on ground barley, a protein supplement, and alfalfa or rape pasture produced as good carcasses as pigs fattened on shelled corn, a protein supplement and alfalfa or rape pasture.

8. Ground barley fed with tankage and alfalfa hay compared with shelled corn fed with tankage and alfalfa hay for fattening fall pigs in dry lot had a feeding value of 90 per cent that of corn.

9. Ground barley fed with tankage, linseed oil meal, and alfalfa hay compared with shelled corn and the same supplements for fattening fall pigs in dry lot had a feeding value of 98 per cent that of corn. This is the result of an average of three experiments. This value for barley should not be compared with the value obtained for ground barley and

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tankage fed without linseed oil meal as the lots used in the summary for one series are not comparable with the lots used in the summary for the other series.

10. Replacing one-third of the tankage with linseed oil meal in a ration of ground barley, tankage and alfalfa hay for fattening fall pigs in dry lot had a feeding value of 90 per cent that of corn.

11. The average of the results obtained from fall pigs fattened in dry lot on ground barley, tankage and tankage and linseed oil meal mixed, and alfalfa, compared with the results obtained from the same number of similar fall pigs fattened in dry lot on shelled corn and the same supplements, gives a feeding value for ground barley of 95 per cent that of corn.

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