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# RATIONS FOR PIGS

Bulletin No. 192.

January, 1921

On January 1, 1915, there were 1,283,656 head of swine in South Dakota or 268,784 more than on the same date in 1910. While the census figures for the period ending 1920 are not yet available it is estimated that they will show at least a total of 2,500,000 head. The increased production was caused partially by the high prices of pork and also a desire on the part of the producer to do better part in winning the war. At the same time the South Dakota State College has been a factor in this increased production.

## RATIONS FOR PIGS

Sections of South Dakota which were formerly considered suitable for range purposes only have been transformed into tillable lands. These lands are yielding abundantly of the forage and grain that are necessary for the production of high class hogs.

There are two outlets in South Dakota for fat hogs; the Missouri river and the Pacific coast markets. Light live hogs are shipped weekly in double headed cars from Mitchell across the Rockies. Some claim this western market to be better than the central market.

This bulletin includes results of two experiments:  
Part I.—Protein supplements for pigs while in corn field.  
Part II.—Treatment of porkers; value of different ways of feeding porkers; value of bloodworm treatment for fattening pigs.

### PART I

In the fall of 1917 an experiment in feeding pigs protein supplements was conducted. The object of this experiment was to ascertain whether it was more profitable to buy the comparatively expensive supplements to furnish the required protein or whether rape town in the cornfield after the last milchew would suffice.

In 1918 was conducted an experiment in "hogging-off" corn with three different varieties to determine the value of rape town. The results in each case showed that where the pigs had the rape town much larger gains were made than where they had the cornfield only.

AGRICULTURAL EXPERIMENT STATION  
SOUTH DAKOTA STATE COLLEGE OF  
AGRICULTURE AND MECHANIC ARTS

Brookings, South Dakota

## RATIONS FOR PIGS

By James W. Wilson and Arthur H. Kuhlman

On January 1, 1915, there were 1,263,655 head of swine in South Dakota or 253,734 more than on the same date in 1910. While the census figures for the period ending 1920 are not yet available it is estimated that they will show at least a total of 2,300,000 head. The increased production was caused partially by the high prices of pork and also a desire on the part of the producers to do their part in winning the war. Again, the boys' and girls' pig club work in many counties, supervised by the Extension Division of this College, has been a factor in this increased production.

Sections of South Dakota which were formerly considered suitable for range purposes only have been transformed into tillable fields. These fields are yielding abundantly of the legumes and grains that are necessary for the production of first class meat products.

There are two outlets in South Dakota for fat hogs; the Missouri river and the Pacific coast markets. Light live hogs are shipped weekly in double decked cars from Mitchell across the Rockies. Some claim this western market to be better than the central markets.

This bulletin includes results of two experiments:

Part I.—Protein supplements for pigs while in cornfield.

Part II.—Fishmeal vs. Tankage; value of different ways of feeding barley; value of bluegrass pasture for fattening pigs.

### PART I.

In the fall of 1917 an experiment in feeding pigs protein supplements while running in the cornfield was conducted. The object of this experiment was to ascertain whether it was more profitable to buy the comparatively expensive byproducts to furnish the required protein or whether rape sown in the cornfield after the last cultivation would suffice.

In 1914 was conducted an experiment in "hogging-off" corn with three different varieties to determine the value of rape pasture. The results in each case showed that where the pigs had the rape pasture much larger gains were made than where they had the cornfield only.

In the present experiment there were four lots as follows:

Lot I.—Rape pasture plus cornfield.

Lot II.—Oilmeal in self-feeder plus cornfield.

Lot III.—The cornfield only.

Lot IV.—Tankage in self-feeder plus cornfield.



Lot I. Rape Pasture in Cornfield.

There were five pigs in each lot and they had the run of the fields for 45 days. These pigs were of early March farrow and weighed from 100 to 150 pounds apiece when put into the lots and from 160 to 265 pounds at the close of the experiment. The individual gains per head ranged from 44 to 112 pounds, depending on the feed, during the 45 days period. There was a difference in condition of the finish on the pigs at the close of the experiment as may be seen by the pictures. The poorest lot of pigs was in Lot III or the check lot. Their condition shows the need of furnishing the pig something in addition to the cornfield.



**WEIGHTS AND GAINS**  
**Lot 1.—Rape Pasture and Cornfield**

No. of Pig	Wt. Oct. 8	Wt. Nov. 7	Wt. Nov. 22	Gain Per Head	Gain Per Head Daily
851	99	146	173	74	1.64
852	157	220	247	90	2.00
853	147	212	236	89	1.97
854	112	141	164	52	1.15
855	132	192	222	90	2.00
Total ..	647	911	1042	395	
Average	129	182	208	79	1.75

**Lot II.—Oilmeal and Cornfield**

No. of Pig	Wt. Oct. 8	Wt. Nov. 7	Wt. Nov. 22	Gain Per Head	Gain Per Head Daily
856	163	226	265	102	2.26
857	116	170	200	84	1.86
858	115	164	185	70	1.55
859	132	174	187	55	1.22
860	135	186	214	79	1.75
Total ..	661	920	1051	390	
Average	132	184	210	78	1.73

**Lot III.—Cornfield.**

No. of Pig	Wt. Oct. 8	Wt. Nov. 7	Wt. Nov. 22	Gain Per Head	Gain Per Head Daily
866	117	172	205	88	1.95
867	154	211	234	80	1.77
868	121	154	165	44	.97
869	108	154	176	68	1.51
870	125	184	202	77	1.71
Total ..	625	875	982	357	
Average	125	175	196	71	1.58



Lot IV. Tankage in Self-Feeder Plus Cornfield.

Lot IV.—Tankage and Cornfield.

No. of Pig	Wt. Oct. 8	Wt. Nov. 7	Wt. Nov. 22	Gain Per Head	Gain Per Head Daily
871	155	224	265	110	2.44
872	98	184	210	112	2.48
873	109	182	216	107	2.37
874	123	183	203	80	1.77
875	106	167	195	89	1.97
Total ..	591	940	1089	498	
Average	118	188	217	99	2.21

From the examination of the above records of weights and gains it will be seen that some of the lightest pigs at the beginning made some of the largest gains, a condition not usually met with when pigs are hand fed. The comparatively uniform gains made by the pigs in Lot IV, and because



Lot II. Oilmeal in Self-Feeder Plus Cornfield.

the gains are so much larger than in other lots, is evidence in itself that the requirements for the animal body were provided to a greater extent than in any of the other lots. The pigs in Lot IV consumed .5 of a pound of tankage per head daily while the pigs in the oilmeal lot consumed but .04 of a pound per head daily. The oilmeal was not as palatable as the tankage, and it is just possible that larger gains would have been obtained had oilmeal been fed in the form of slop.

The practise of "hogging-off" corn is a good one as labor is saved, manure is distributed and good gains are made by the pigs. Whether the gains are large or small depends altogether on the feed the pig receives in addition to the cornfield as results above show. We do not advise feeding the brood sows in this manner as there is danger of them becoming too fat; but for the production of pork the system should be more generally practised. An early maturing variety of corn could be planted, the pigs turned in early and in turn could be sold before the big run reaches the market.





Lot III. Check Lot, Cornfield Only.

## PART II.

The results reported in this part represent data secured in a feeding trial conducted during the summer and fall of 1919. Although representing one year's work only, the results agree so closely with those of similar trials at several other stations that they may be considered to indicate the general results which may be expected in feeding hogs under like conditions.

### OBJECT OF THE EXPERIMENT

The object of this experiment was to demonstrate methods of pork production under South Dakota conditions by using farm grown grains supplemented by purchased protein concentrates and pasture. The important considerations in the trial included (1) a comparison of fishmeal and tankage as a protein supplement for fattening pigs, (2) a comparison of the feeding value of shelled corn and ground barley, (3) a comparison of several methods of feeding barley, (4) a com-



parison of shelled corn with oats and corn for fattening pigs and (5) to demonstrate the value of blue grass pasture for fattening pigs.

### THE EXPERIMENT

Sixty-four spring farrowed purebred pigs belonging to the Poland-China, Duroc-Jersey, and Chester White breeds were used in this trial. These pigs were divided into eight lots, each lot consisting of eight pigs selected in such a manner as to have uniformity as to breed representation and total weight of each lot. Care was also exercised to secure as far as possible a uniform range in variation of weights from the heaviest to the lightest pig in each lot.

Each pig was numbered by inserting an ear tag in the right ear. A record was also made of the number of each pig, its litter mark, breed and initial weight.

The average weight per pig in each lot at the beginning of the experiment was approximately 49.5 pounds. The trial began August 2 and continued until November 15, a period of 105 days.

### WEIGHT RECORDS

At the end of each week the total weight of each lot was obtained and at the end of every fourth week the individual pigs in each lot were weighed separately.

A record of the feed consumed weekly by each lot was also kept throughout the period of the trial.

### RATIONS AND METHOD OF FEEDING

The rations and method of feeding were as follows:

Lot I.—Shelled corn and tankage (both self-fed in separate compartments.)

Lot II.—Shelled corn and Fishmeal (both self-fed in separate compartments.)

Lot III.—Whole barley and tankage (both self-fed in separate compartments.)

Lot IV.—Ground barley and tankage (both self-fed in separate compartments.)

Lot V.—Whole oats and tankage (both self-fed in separate compartments) (first six weeks of trial)—(last nine weeks, whole oats, shelled corn and tankage.)

Lot VI.—Shelled corn and tankage (both self-fed in separate compartments.) Blue grass pasture.

Lot VII.—Ground barley and tankage (both self-fed in separate compartments.) Blue grass pasture.

Lot VIII.—Soaked whole barley (hand fed), tankage (self-fed)

Water was available in each lot at all times during the entire feeding trial.

## A COMPARISON OF FISHMEAL AND TANKAGE AS PROTEIN SUPPLEMENTS FOR FATTENING PIGS

The fishmeal for this experiment was furnished by the Bureau of Animal Industry, United States Department of Agriculture. Mr. Buckley, of the bureau, reports on its manufacture as follows:

"The product was prepared from Manhaden fish caught in the lower Chesapeake bay or in the ocean and while still fresh were cooked with live steam until thoroughly disintegrated. The pulp was then secured through the use of hydraulic pressure which extracted the oil and water. This pulp was then broken up and dried to a point where it would keep without decomposition when it was ground into a fine meal suitable for feeding purposes."

The manufacture of fishmeal seems to be carried on quite extensively on both the eastern and western coasts. However there is another kind that is made from fish scrap. This would not be as valuable for feeding purposes as the former because it contains the waste parts of the fish such as the heads, fins, tails, etc.

A comparison of the results given in Table I shows both Lot I and II made satisfactory gains and that the average daily gains per pig were very similar in the two lots.

The average amounts of feed consumed daily per pig in the two lots were almost alike being 5.27 pounds for Lot I and 5.57 pounds for Lot II, a difference of only .3 of a pound. However, the consumption of fishmeal was not as great as that of tankage. This is shown even more strikingly in considering the total amount of feed consumed by each lot. Although Lot II consumed 461 pounds more corn, the consumption of fishmeal was 112 pounds less than of tankage. This seems to indicate that the fishmeal is slightly more efficient as a protein supplement than tankage when fed with shelled corn, both feeds being self-fed in separate compartments.

The significant point shown in this trial is that fishmeal has a very high feeding value, which makes it rank with tankage as a source of protein for supplementing corn when fed to fattening pigs.

As a number of other experiment stations, supplied with fishmeal by the United States Department of Agriculture at the same time, have reported equally good results, it is evident that fishmeal may become a valuable feed in the swine industry.

**Table I.**  
**Fishmeal Versus Tankage as a Protein Supplement to Corn**  
**for Fattening Pigs**

Ration	Lot 1	Lot II
	Shelled Corn Tankage	Shelled Corn Fishmeal
No. of pigs per lot .....	8.	8.
No. of days fed .....	105.	105.
Average initial weight per pig .....	49.50	49.88
Average final weight per pig .....	198.88	206.88
Average gain per pig .....	149.38	157.
Average daily gain per pig .....	1.42	1.50
Feed consumed—		
Shelled corn .....	3995.	4356.
Tankage .....	432.	
Fishmeal .....		320.
Feed required for 100 lbs. gain .....		
Shelled corn .....	334.31	346.81
Tankage .....	36.07	
Fishmeal .....		25.48
Total .....	370.38	372.29
Average daily feed .....		
Shelled corn .....	4.76	5.19
Tankage .....	.51	
Fishmeal .....		.38
Total .....	5.27	5.57

**Table II.**  
**Chemical Analysis of Fishmeal and Tankage**  
 By B. A. Dunbar, Station Chemist.

The following analyses show that the two feeds are similar in composition.

	Fishmeal	Meatmeal
Moisture .....	5.17%	4.14%
Fat .....	3.75	7.91
Protein .....	58.06	56.50
Ash .....	21.53	22.81
N-Free Extract .....	11.49	8.64



## SHELLED CORN VS. GROUND BARLEY FOR FATTENING PIGS

Barley has been an important small grain crop in South Dakota for many years. Because it fits in well in many crop rotation plans and as it lengthens the harvest season, since it usually ripens earlier than oats, barley will undoubtedly continue to be grown as one of the major cereal crops in many counties of this state.

Although it has long been known that barley ranks high as a feed, only a comparatively small portion of the entire crop produced annually in this country has been used for livestock feeding purposes. Undoubtedly larger and larger quantities will be used for feeding purposes on those farms where it can be grown successfully.

**Table III.**  
**Corn vs. Barley as a Feed for Fattening Pigs.**

Ration	Lot I.	Lot IV.
	Shelled Corn Tankage	Ground Barley Tankage
No. of pigs per lot .....	8.	8.
Number of days fed .....	105.	105.
Average initial weight per pig .....	49.50	49.36
Average final weight per pig .....	198.88	189.00
Average gain per pig .....	149.38	139.62
Average daily gain per pig .....	1.42	1.33
Feed consumed—		
Shelled corn .....	3995.	
Ground barley .....		4230.
Tankage .....	432.	586.
Total .....	4427.	4816.
Feed required for 100 lbs. gain—		
Shelled corn .....	334.31	
Ground barley .....		378.69
Tankage .....	36.07	52.46
Total .....	370.38	431.15
Average daily feed—		
Shelled corn .....	4.76	
Ground barley .....		5.04
Tankage .....	.51	.70
Total .....	5.27	5.74

Table III shows the relatively high value of barley as a feed for fattening pigs. The average daily gain per pig in the lot receiving ground barley was 1.33 pounds which is only .093 of a pound less than that of Lot I receiving shelled corn. For practical purposes it may be said that these results indicate that the gains of hogs fed ground barley are 93.5 percent as large as the gains produced by shelled corn.

A study of the amounts of feed consumed shows that the barley lot consumed more grain and tankage than the corn lot and as the total gains were less the amount of feed required for 100 pounds gain was 60.77 pounds greater for Lot IV than for Lot I. Lot IV when self-fed ground barley and tankage consumed 13.3 percent more grain and 45.4 percent more tankage than Lot I for every 100 pounds of gain produced. Trials at other stations, completed recently, show that ordinarily 10 to 12 percent more barley is required than corn to produce the same gain. When it is considered that barley contains a higher protein content than corn it seems strange that Lot IV should consume 45.4 percent more tankage than Lot I. The amount of tankage consumed by Lot IV was altogether too large and at the present high price of tankage makes the gains of this lot very costly. It would perhaps be advisable to restrict the amount of tankage available for pigs receiving ground barley self-fed.

This end may be secured by feeding the required amount of tankage daily in a separate trough or the tankage may be mixed with the ground barley.

### METHODS OF FEEDING BARLEY

Farmers who have fed whole dry barley to hogs have usually obtained very unsatisfactory results.

In order to demonstrate the value of several methods of feeding barley to fattening pigs, Lot III was fed dry whole barley in a self-feeder, Lot IV received ground barley in a self-feeder, and Lot VIII received soaked whole barley. This lot was hand fed, receiving all the feed the pigs would clean up within an hour after the morning and evening feeding. During the fore part of the experiment the barley was allowed to soak from morning until evening. With the approach of cooler weather which lessened the chances of fermentation the barley was allowed to soak for 24 hours.

The results given in Table IV afford a consideration of the value of several methods of feeding barley.

Lot III, self-fed whole dry barley and tankage, made the poorest gains of the three lots. In fact, this was the poorest gain made by any of the eight lots fed in this trial. An

Table IV.

## A Comparison of Several Methods of Feeding Barley.

Ration	Lot III	Lot IV.	Lot VIII
	Whole Barley Tankage	Ground Barley Tankage	Soaked Whole Barley Tankage
Number of pigs per lot .....	8.	8.	8.
Number of days fed .....	105.	105.	105.
Average initial weight per pig ..	49.75	49.38	49.38
Average final weight per pig ....	144.38	189.	179.38
Average gain per pig .....	94.63	139.62	130.
Average daily gain per pig .....	.90	1.33	1.24
Feed consumed—			
Barley .....	3280.	4230.	4185.
Tankage .....	834.	586.	599.
Total .....	4114.	4816.	4784.
Feed required for 100 lbs. gain—			
Barley .....	433.29	378.69	402.40
Tankage .....	110.17	52.46	57.60
Total .....	543.46	431.15	460.
Average daily feed—			
Barley .....	3.90	5.04	4.98
Tankage .....	.99	.70	.71
Total .....	4.89	5.74	5.69

average daily gain of .901 for a 105 day period cannot be considered a very good one. Furthermore, this lot required an average of 543.46 pounds of feed to make 100 pounds of gain. This is greatly in excess of the amount required by any other lot in the entire trial.

Pigs fed whole dry barley seem to be unable to properly masticate and digest a large part of the grain consumed. Barley fed in that condition also seems to be unpalatable, for these pigs consumed only 3.90 pounds of barley daily. As the tankage was more palatable an excessive amount was consumed. During two different weeks this lot consumed a total of 92 and 94 pounds of tankage which is equivalent to more than 1.6 pounds daily per pig. At the close of the experiment the pigs in this lot were in poor condition, small and unthrifty. When sold on the Chicago market they brought 30 cents per hundred less than the other lots.



The pigs in Lot IV, receiving ground barley, made quite uniform gains throughout the feeding period and finished off well. These pigs were smooth and firm at the close of the trial.

During the first half of the trial the pigs in Lot VIII, receiving soaked whole barley (hand fed) and tankage self-fed, made exceptionally good gains. During this period they seemed to develop greater "stretch." They were very smooth and their coats appeared more glossy than those of any other lot. Toward the end of the trial they did not consume as much feed as some of the other lots; in fact, during the last seven weeks there was only one week in which they consumed more than 350 pounds of barley. During this same period Lot IV, during three consecutive weeks, consumed 428, 415 and 437 pounds of ground barley.

Doubtless this lack of capacity or ability to handle more feed prevented Lot VIII from making bigger gains. However, this method of feeding barley produced very satisfactory results and ranked next to the feeding of ground barley. It is interesting to note that the consumption of tankage by Lots IV and VIII was very similar.

In this trial the feeding of ground barley was the most efficient method of utilizing barley as a fattening feed for pigs. The pigs receiving soaked whole barley, hand-fed, required 6.3 percent more grain and 9.8 percent more tankage and those receiving whole dry barley self-fed required 14.4 percent more grain and 110 percent more tankage than those receiving ground barley and tankage, self-fed.

#### THE VALUE OF BLUE GRASS PASTURE FOR FATTENING PIGS

Producers of market hogs have realized for several years that it is becoming more and more difficult to realize a satisfactory profit from extensive feeding operations if grains and other concentrates only are fed. The most successful swine producers make extensive use of forage crops and make provision in their plans for a succession of crops which will make green forage or pasture available from spring until late fall.

Two half acre plots of excellent blue grass pasture were available for this experiment. Excellent forage was available throughout the feeding period; in fact, there was not a week during the entire trial when each grass lot could not have easily carried several more pigs.

While blue grass pasture does not rank as high as a forage crop for hogs as some others, such as rape, alfalfa or red clover, the results given in Table V show that it does have considerable value for fattening pigs. The pigs in Lot VI, receiving corn, tankage and blue grass pasture, averaged

Table V.

A Comparison of the Value of Blue Grass Pasture vs. Dry Lot  
in Fattening Pigs on Corn and Barley.

Ration	Lot I.	Lot VI.	Lot IV.	Lot VII.
	S. Corn Tankage	S. Corn Tankage Blue Grass Pasture	Ground Barley Tankage	Ground Barley Tankage Blue Grass Pasture
Number of pigs per lot ..	8.	8.	8.	7.
Number of days fed ....	105.	105.	105.	105.
Average initial weight per pig .....	49.5	49.5	49.38	50.57
Average final weight per pig .....	198.88	227.52	189.00	209.57
Average gain per pig....	149.38	178.12	139.62	159.
Average daily gain per pig .....	1.42	1.70	1.33	1.51
Feed consumed—				
Grain .....	3995.	4552.	4230.	4336.
Tankage .....	432.	479.	586.	365.
Total .....	4427.	5031.	4816.	4701.
Feed required for 100 lbs gain—				
Grain .....	334.31	319.44	373.69	389.58
Tankage .....	36.07	33.61	52.46	32.79
Total .....	370.38	353.05	426.15	422.37
Average daily feed—				
Grain .....	4.76	5.42	5.04	5.90
Tankage .....	.51	.57	.70	.50
Total .....	5.27	5.99	5.74	6.40

227.52 pounds at the close of the experiment while those in Lot I, receiving corn and tankage without pasture, averaged 198.88 pounds. This represents a difference of 28.79 pounds in favor of the grass lot. While the pigs in blue grass consumed a greater amount of feed than those in the dry lot, yet, when economy of production is considered, it is evident that Lot VI effected a saving of 14.87 pounds of corn and 2.46 pounds of tankage, or a total of 17.33 pounds of feed, for every hundred pounds of gain.

Reference has already been made to the excessive consumption of tankage by Lot IV but it is interesting to note that while the pigs receiving ground barley and tankage without pasture, in Lot IV, failed to balance their ration, yet, when these same feeds were offered with blue grass pasture, the consumption of tankage was greatly reduced; in fact the ratio of tankage to grain consumed in Lot VII is about what might be expected.

These results indicate that the use of blue grass as a forage crop for fattening pigs increased the gains in weight by increasing greater consumption of feed, lowered the cost of production by reducing the amount of feed required to produce 100 pounds of gain and perhaps induced hogs to balance their ration more efficiently when receiving ground barley and tankage in self-feeders.

Lot	7	8	9	10	Number of pigs per lot
Number of days fed	101	101	101	101	101
Average initial weight	50.34	49.38	48.5	49.5	49.5
Average final weight	200.57	183.00	183.52	183.00	183.00
Average gain per pig	150.23	133.62	135.02	133.50	133.50
Average daily gain	1.51	1.33	1.34	1.32	1.32
Feed consumed	1200	1200	1200	1200	1200
Grain	400	400	400	400	400
Tankage	800	800	800	800	800
Total	1200	1200	1200	1200	1200
Feed required for 100 lbs gain	793.3	897.8	897.8	897.8	897.8
Cost	30.00	30.00	30.00	30.00	30.00
Grain	10.00	10.00	10.00	10.00	10.00
Tankage	20.00	20.00	20.00	20.00	20.00
Total	30.00	30.00	30.00	30.00	30.00
Average daily feed	12.00	12.00	12.00	12.00	12.00
Grain	4.00	4.00	4.00	4.00	4.00
Tankage	8.00	8.00	8.00	8.00	8.00
Total	12.00	12.00	12.00	12.00	12.00

225 pounds of the size of the experiment while those in Lot I receiving corn and tankage without pasture averaged 120.50 pounds. This represents a difference of 105.50 pounds in favor of the grass lot. While the pigs in blue grass consumed a greater amount of feed than those in the lot fed corn when economy of production is considered, it is evident that Lot IV obtained a saving of 1.57 pounds of corn and 2.50 pounds of tankage or a total of 4.07 pounds of feed for every 100 pounds of gain.