COMPARISONS OF MEAL, CRUMBLES, PELLETS & REPELLETING

FEEDS for SWINE

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RESEARCH on pelleted barley rations for swine over the past 6 years have indicated the advantages of this practice. Some of the benefits are:

(1) Less waste. Pigs do not "root" the feed out of the feeders in an attempt to sort out the hull from the groat.

(2) Greater palatability. Pigs consume more feed and consequently need less time in the feed lot, and gain faster on less feed per pound of grain before marketing at a definite weight.

(3) Increased density. This permits the pigs to eat more and satisfy the appetite. Meal rations based on ground barley or oats are too bulky and feed intake is reduced with resulting slower gains and poorer feed efficiency.

(4) Makes barley competitive with corn. With the above advantages, plus the fact that less expensive protein supplement is necessary with barley, results in a ration which gives as cheap or cheaper gains than those obtained with corn.

(5) Labor saving. Preliminary studies indicate that feed costs account for 85 percent of the cost of producing pork as compared to the customary 80 percent with corn or meal rations. Thus labor and other costs are less when pelleted rations are used, resulting in a saving in total costs of production.

It is noted in previous experiments that the crude fiber analysis showed differences for crude fiber content on identical samples except that one was in meal form and the other had been pelleted. The rations which had been pelleted usually analyzed about ½ to 1 percentage point less in crude fiber than comparable meal rations. Further, this appeared to be constant and not related to the total crude fiber content—that is—the differences were about the same whether the fiber content was 6 percent or 12 percent. In an attempt to explain this, it was reasoned that it was possibly related to surface

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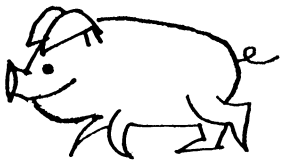

area of the pellet and that the fiber near or on the pellet surface was altered enough to be included in the other carbohydrate fraction, the nitrogen-free-extract, in a feed analysis.

Experiment 41 was designed to measure the effect, if any, of different treatments of the ration. These treatments included: (1) a ration in meal form; (2) a ration pelleted; (3) a ration pelleted and reground and fed in the meal form; (4) a ration pelleted and crumbled and fed as crumbles and (5) a ration ground and pelleted 3 times. It was thought that if the physical act of pelleting had any appreciable effect on reducing the fiber, it would be evident in these trials.

Fifty crossbred pigs of Duroc-Beltsville breeding were allotted into 10 pens. Five lots had initial weights of about 37 pounds and 5 of about 50 pounds. One lot from each group was placed on each treatment. The pigs were weighed every 2 weeks and feed consumption recorded. The pigs were marketed when the lots averaged about 200 pounds. All lots were self-fed the respective rations and water was available at all times. These pigs were raised to market weights on concrete platforms and were never on pasture or dirt dry lots.

The formula for the ration fed is reported in Table I. The only difference in rations was the preparation.

TABLE I.—**Ration Formulation Experiment 41.**

Ingredient	Percent
Barley	94.5
Fish meal, Menhadden 60 percent protein	2.0
Meat scraps, 55 percent protein	3.0
Limestone, 38 percent calcium	0.8
Salt	0.5
Vitamin and trace mineral mixture[1]	.2

[1]Included Vitamins A and D, Riboflavin, Pantothenic Acid, Niacin, Choline, and B_{12}. The trace mineral mix was also fortified with zinc sulfate.

Chemical analysis showed the rations to contain an average of 13.25 percent protein instead of 14 percent as expected on the basis of estimated analysis. About 16.5 percent of the protein in the ration was of animal origin. The phosphorus content was approximately 0.5 percent and slightly above the requirements for this mineral. The calcium content was about 0.7 percent and adequate. The analysis for crude fiber showed some differences between rations. The following values for crude fiber from the analysis were slightly higher than the 5.6 percent expected based on reported analysis. The treatment (ration) is reported first, followed by the

respective crude fiber value—meal, 7.7 percent; pellets, 7.0 percent; pelleted and reground, 7.0 percent; crumbles, 6.9 percent; and pelleted 3 times, 7.0 percent. These values are averages for 4 separate samplings over the feeding period. As in previous studies the meal ration appeared to have 0.7 percent more crude fiber than any of the rations which had been pelleted. The other rations vary only slightly—less than 0.1 percent and this could be due to random error of analysis. The ration which was pelleted and reground has similar fiber as the pellets, but pelleting and regrinding 3 times did not decrease the crude fiber value any more than 1 pelleting. If this reduction in crude fiber is a function of the surface area of the pellet it is not apparent from these analyses because theoretically regrinding and repelleting should have subjected between 2 and 3 times as much of the crude fiber to the surface of the pellet by the repeated pelletings.

A summary of results of the experiment is reported in Table II.

TABLE II.—**Summary Results Experiment 41.**

Treatment	Meal	Pellet	Pelleted and Reground	Crumbles	Pelleted 3 Times
Ration Cost/Ton	$54.00	$57.00	$59.00	$57.00	$67.00
Lot	1	2	3	4	5
Initial Wt. Lbs.	37.0	38.4	37.6	37.4	38.0
Final Wt. Lbs.	191.8	199.6	194.4	197.0	200.0
Days on Feed	113	106	117	106	106
Days to reach 200 lbs.	120	106	121	108	106
Av. Da. Gain, lbs.	1.36	1.52	1.34	1.51	1.53
Feed/lb. gain	3.71	3.45	3.95	3.39	3.37
Feed per day	5.08	5.25	5.29	5.11	5.15
Feed cost per CWT gain	$10.02	$ 9.83	$11.65	$ 9.66	$11.29
Lot	6	7	8	9	10
Initial Wt. lbs.	49.8	50.8	50.4	50.0	50.2
Final Wt. lbs.	188.8	207.8	195.2	200.8	207.8
Days on feed	92	92	92	92	92
Days to reach 200 lbs.	99	88	95	91	88
Av. Da. Gain lbs.	1.51	1.70	1.57	1.64	1.70
Feed Per Day	5.93	5.95	5.94	6.01	6.05
Feed/lbs. gain	3.92	3.49	3.77	3.66	3.55
Feed cost per CWT gain	$10.58	$ 9.95	$11.12	$10.43	$11.89
Averages					
Av. daily gain lbs.	1.44	1.61	1.46	1.58	1.62
Av. feed/lbs. gain	3.81	3.47	3.86	3.53	3.46
	10.28	9.89	11.39	10.06	11.59
% Greater gain over basal meal		11.8%	1.3%	9.7%	12.5%
Av. Selling price	$19.25	$19.25	$19.25	$19.25	$19.25
% less feed per Gain over basal meal		9.8	−1.3	7.9	10.1

The pigs in the lots with heavier initial weights gained faster but were less efficient in feed conversion than the pigs started at lighter weights. The pigs in lots 2, 4, and 5 gained as rapidly as the heavier pigs on meal rations in lots 6 and 8. The rates of gain of these pigs are similar to those noted in other experiments with pigs of this type and breeding. The lots receiving the pellets or crumbles (lots 2, 4, 5, 7, 9, and 10) gained significantly faster (P=0.5 percent) than those on meal rations (lots 1, 3, 6, and 8.) The method of statistical analysis used was analysis of covariance. There was no appreciable advantage from pelleting where the ration was reground and fed in meal form (lots 3 and 8 over 1 and 6.) This observation has practical significance because even if a ration is pelleted, unless the pellets hold their shape until fed, the cost of pelleting is just an added expense.

Pelleting a ration 3 times did not increase rate of gain and feed efficiency over a single pelleting (lots 5 and 10 compared to 2 and 7.) If the temperature and pressure do alter the availability of nutrients it is not enough to be of economic significance with rations of this type. Pelleting and crumbling (lots 4 and 9) was no better than pelleting.

The feed efficiencies of these lots of pigs were fair. There was practically no waste of the meal rations as is usually observed with meal rations of this type. This accounts for the lower than average difference in feed efficiency between meal and pellets. Average daily feed consumption was slightly low for all lots. This may have been due to unsettled weather conditions.

Feed costs per hundredweight gain are in favor of the pelleted ration. The cost per ton of the meal ration fed in lots 1 and 6 was $54.00 per ton. This resulted in feed costs of $10.02 and $10.58 respectively for lots 1 and 6. Assuming that feed costs are 80 percent of the costs of production on meal type rations the "break-even" cost necessary would be $12.52 and $13.12 for these two lots. The cost for the same ration pelleted was $3.00 higher or $57.00 per ton. Thus the feed costs per hundredweight gain was $9.83 and $9.89 for lots 2 and 7. If the feed costs account for 85 percent of the costs with pelleted rations, than the "break-even" cost would be $11.53 and $11.60 for these lots. These hogs sold for an average selling price of $19.25 per hundred.

The pigs in lot 2 required 106 days to reach 200 pounds. Although the pigs in lot 1 were kept on feed only 113 days, had they been kept until they reached the same average weights as those in lot 1 it would have required 120 days, assuming the

same average daily gain of 1.36 pounds. The pigs with heavier initial weights in lot 7 required only 88 days to reach 200 pounds although they were kept on feed for 92 days. In contrast lot 6 would have required 99 days or 11 days more to reach 200 pounds. It is difficult to place a definite value on a difference of 11 or 14 days, as to saving in labor, etc. but on a falling price market the advantage is obvious. Most swine produced in North Dakota come to market during periods of price decline.

Summary:

1. Pigs receiving pelleted rations gained 11.8 percent faster on 9.8 percent less feed over those fed the same rations in meal form.

2. Crumbling or pelleting 3 times had no advantage over a single pelleting as measured by rate of gain and feed efficiency.

3. Pelleting and regrinding a ration for feeding in meal form did not appreciably improve rate of gain nor feed efficiency. The practical application—unless pellets hold shape until fed, the advantages from pelleting are not obtained.

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