Fish Flour in Replacement of Dry Buttermilk and Soybean Meal in Starter Rations for Pigs

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The source and biological value of the protein in starter rations has an important bearing on the performance of young pigs. Milk or fish protein is ordinarily included in starter rations to supply the required amino acid levels and balance. In this test a fish flour processed by an azeotropic solvent method was substituted for a combination of soybean meal, dry butter milk and DL methionine in a starter ration. The compositions of the two starter rations used are shown in Table 1. The fish meal was used to the extent permitted by its mineral content. Soybean meal and dry buttermilk were used to supply an equal level of protein. DL methionine was added to ration 1 at the rate of 2.6 pounds per ton.

The sows used in this test were all first and second litter, primary and secondary specific pathogen free Yorkshire females. The litters were all sired by Yorkshire boars that were very closely related. Farrowing took place between November 1, 1963, and January 20, 1964. Sows and their litters were moved to six by twenty-four foot pens, a portion of which is covered by an open shed, when they were fourteen days old. The starter rations were placed before the pigs at this time. The sows were self-fed the ration shown in Table 2.

Table 1: Composition of Starter Rations Fed.

Ration[1]	1	2
Milo (Western Yellow-finely ground)	1235.2	1443.8
Soybean meal (50% protein)	463.0	82 0
Fish flour[2]	----	260.0
Buttermilk (Dry 32% protein)	60.0	-----
Whey (Dry 12% protein)	100.0	100.0
Molasses (wet)	100.0	100.0
Dicalcium phosphate	22.0	-----
Calcium carbonate	6.4	-----
Trace mineral salt	10.0	10.0
Vitamin mineral pr-mix	3.4	3.4
Total[3]	2,000.0	2,000.0

[1] Hygromix was added to this base ration at the rate of 5.0 pounds per ton; Aureo S.P. 250 was also added at the rate of 5.0 pounds per ton. Both of these products were supplied by the manufacturers, Eli Lilly and Co., Indianapolis, Indiana, and American Cyanamid, Agriculture Division, Prnceton, N. J.

[2] The fsh flour used was supplied by the Vio Bin Corporation of Monticello, Illinois. Analysis available on this material ndicated that t has 73 to 75% protein, 15-18% ash and 1.5% fat.

[3] Ration 1 is calculated to contain the following quantities of nutrients, protein, 18%; calcium, 0.70%; phosphorus, 0.60%; vitamin A, 1020 I.U.; lysine, 1.08%; methionine, 0.30%; and pantothenic acid, 10.0 Mgs; riboflavin, 3.0 Mgs, per pound. This ration contains four pounds of DL methionine added per ton. Ration 2 has slightly more lysine (1.28%) and methionine (0.35%). No DL methionine as such was added to ration 2.

Table 2: Composition of Sow Ration—Gestation and Lactation

Sow Ration During Gestation and Lactation [1] [2]	Pounds Per Ton
Milo (Western Yellow—finely ground)	1607.7
Soybean meal (50% protein)	208.6
Tankage (60% protein)	50.0
Alfalfa meal (dehydrated 17% protein)	100.0
Dicalcium phosphate	12.4
Calcium carbonate	7.3
Trace mineral salt	10.0
Vitamin B_{12}	2.4
B complex vit. supplement	1.2
Zinc sulfate	0.4
Total	2,000.0

[1] The base ration used was as listed. To this base ration 5.0 pounds of Hygromix was added per ton for the last 30 days of gestation. Aureo S.P. 250 was added at the rate of 5.0 pounds per ton for the last few days of gestation and during lactation. Aureo S.P. 250 contains chloretracycline 20 grams, sulfamethazine 20 grams, and penicillin 10 grams per pound of material. Thus the medication amounts to 100 grams of aureomycin, 100 grams of Sulfamethazine and 50 grams of penicillin per ton of complete sow ration.

[2] The calculated composition of the sow ration during gestation and lactation was as follows: protein 14.0%, calcium 0.6%, phosphorus 0.5%, vitamin A 4,000 I.U., pantothenic acid 7.7 milligrams, riboflavin 2.2 milligrams and B_{12} 33 micrograms per pound.

As the litters reached 42 days of age, the sows were driven out and the pigs continued on the same ration until they were weighed out at 56 days of age.

The results of this trial are summarized in Table 3. It was considered that the pigs on both starter rations performed exceptionally well. Some scouring was observed in the farrowing quarters but no scouring or other digestive disturbance was observed after significant quantities of the starter rations were being consumed. The litters on starter ration 1 averaged 449.2 pounds each at 56 days for an average pig weight of 48.3 pounds. Litters on starter ration 2 averaged 418.6 pounds with an average pig weight of 45.5 pounds. Pigs on ration 1 average 0.86 pounds of weight for each day of age to 56 days. Those on ration 2 average 0.81 pounds. Pigs on ration 1 consumed an average of 46.1 pounds each between the 14th and 56th day. Those on ration 2 consumed 39.1 pounds each or 7.0 pounds less. This amounts to 15.2 percent lower feed consumption. In terms of creep feed consumed per pound of weight of the pigs the figures are 0.95 and 0.86 pounds respectively. Figuring starter ration 1 at $4.50 and ration 2 at $4.73 per cwt the feed cost was $2.07 and $1.85 per pig for rations 1 and 2 respectively.

The sows also performed exceptionally well on the ration used. No sows went off feed or showed signs of lactation fatigue. Perhaps the exceptionally heavy feed consumption of 19.1 and 18.5 pounds per day helped to meet the heavy lactation requirements common for nursing

Summary of Results

Table 3: Starter Rations for Pigs Weaned at 42 Days-Rations Continued to 56 Days

Ration No. Treatment Variables	1 Buttermilk Methionine	2 Fish Flour
No. of litters	15	13
No. of pigs	139	120
Av. pigs per litter	9.3	9.2
Pig weights		
Birth (lbs.)	2.8	2.7
14 days (lbs.)	8.2	8.3
42 days (lbs.)	30.7	29.4
56 days (lbs.)	48.3	45.5
Pig gains		
Up to 14 days (lbs.)	5.2	5.5
14 to 42 days (lbs.)	22.7	21.6
42 to 56 days (lbs.)	17.5	16.1
Rate of gain—per day		
Up to 14 days (lbs.)	0.37	0.39
14 to 42 days (lbs.)	0.81	0.77
42 to 56 days (lbs.)	1.25	1.15
Feed consumed per pig		
14 to 42 days (lbs.)	14.4	11.9
42 to 56 days (lbs.)	31.7	26.4
14 to 56 days (lbs.)	46.1	39.1
Creep feed per lb. gain (lbs.)	0.95	0.86
Cost of creep feed per pig $	2.07	1.85
Weight changes on sows		
Loss farrowing to 14 days (lbs.)	67.7	73.2
Gain 14 to 42 days (lbs.)	24.9	33.2
Net loss entire farrowing and lactation (lbs.)	44.1	47.5
Feed consumed by sows (lbs.)	637.6	615.9
Sow feed per day (lbs.)	15.2	14.7
Sow feed costs $	19.13	18.48
Feed cost per pig $		
Sows feed after farrowing and Creep fed for pigs	4.13	4.07

sows. The fact that these sows gained 0.89 and 1.19 pounds per day during the twenty-eight days of the nursing period that they were on test is proof that they were in strong condition. They did, however, sustain net losses of 44 and 47 pounds from 110 days of gestation to weaning at 42 days post-farrowing.

Considering the feed cost of the sows and the pigs, each pig at weaning represented a feed cost of $4.13 for those on ration 1 and $4.07 for those on ration 2. To offset this slight difference in feed cost the pigs fed ration 1 were 2.8 pounds heavier. It thus appears that either ration could be used with little choice between them.