

1973

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Recommended Citation

Wahlstrom, Richard C.; Libal, George W.; and Robbins, Steve, "Blood Meal as a Protein Supplement for Growing-Finishing Pigs" (1973). *South Dakota Swine Field Day Proceedings and Research Reports, 1973*. Paper 3.
http://openprairie.sdstate.edu/sd_swine_1973/3

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Blood Meal as a Protein Supplement for
Growing-Finishing Pigs

Richard C. Wahlstrom, George W. Libal and Steve Robbins

Soybean meal is the basic ingredient of most protein supplements for swine. However, in times of high soybean meal prices, interest increases in the value of alternate sources of protein. Blood meal is a high protein by-product containing from 70 to 80% protein. It also contains a relatively high level of lysine, the amino acid most needed in swine diets. On the basis of the analysis of blood meal, one might expect it to be a good supplement for swine. Early research, however, indicated a low digestibility of protein from blood meal and also suggested that lysine availability was reduced. The high temperature used in the processing of blood meal is thought to be responsible for these decreases in protein digestibility and availability.

The objective of the experiment reported herein was to determine if blood meal as it is now produced could be used as a partial substitute for soybean meal in diets for growing-finishing pigs.

Experimental Procedure

Forty-eight crossbred pigs with an average weight of approximately 51 lb. were randomly allotted to three replications of four treatments on the basis of weight, sex and ancestry. Each lot consisted of four pigs, two barrows and two gilts. The pigs were housed in pens with concrete floors and had access to an outside pen where self-feeders were located.

The four dietary treatments were as follows:

1. Corn-soybean meal basal diet
2. Two percent blood meal replaced 2% soybean meal
3. Four percent blood meal replaced 4% soybean meal
4. Two percent blood meal replaced an equivalent amount of protein from soybean meal.

The composition of the 14% protein grower and 12% finisher diets for the four treatments is shown in tables 1 and 2, respectively. The blood meal contained about 70% protein. Diets were reduced in protein content when the pigs averaged 120 pounds. The experiment was terminated at an average weight of approximately 205 pounds.

Results

Results of this trial are summarized in table 3. There were no statistically significant differences among treatments in average daily gain, average daily feed or feed/gain. Substituting either 2 or 4% blood meal for soybean meal did not affect gains during either the growing or finishing periods. However, pigs fed the diet of 2% blood meal replacing 2% soybean meal (treatment 2) consumed less feed during the growing period and required 18% less feed per unit of gain during this period than pigs fed the soybean meal diet. This improvement in feed/gain was noted in all three replicates. No logical explanation can be offered as to why this improvement occurred. A slight reduction in gain occurred in treatment 4 during the growing phase. The diet fed to treatment 4 contained less protein than did diets fed pigs in treatments 2 and 3, that also contained blood meal, but was equal in protein content to the soybean meal diet fed pigs in treatment 1. It is possible that the decrease in gain of pigs in treatment 4 was the result of reduced protein availability in this diet.

Growth and feed/gain were less variable between treatments during the period from 120 lb. to market weight. For the entire experiment, daily gain averaged 0.09 lb. more for pigs fed treatments 1, 2 or 3 than for treatment 4. Feed/gain during the total period was similar for treatments 1, 3 and 4. However, these pigs required about 10% more feed per unit of gain than pigs in treatment 2. Barrows gained significantly faster than gilts. Gains for the complete experiment were 1.81 and 1.57 lb. per day for barrows and gilts, respectively.

Summary

Pigs fed diets containing 2 and 4% blood meal replacing an equal amount of soybean meal gained at similar rates. Feed efficiency was improved when pigs were fed the diet of 2% blood meal, particularly during the early growth period and when averaged over the entire trial. Diets formulated with 2% blood meal replacing an equivalent amount of protein from soybean meal resulted in slightly reduced daily gains, but feed efficiency was not affected. It would appear from the results of this experiment that up to 4% of soybean meal can be replaced with an equal level of blood meal without adversely affecting pig performance.

Table 1. Composition of Diets Fed to 120 Pounds (Percent)

| Treatment number | 1 | 2 | 3 | 4 |
|--|------|------|------|------|
| Ground yellow corn | 82.7 | 82.7 | 82.7 | 84.1 |
| Soybean meal (45%) | 14.6 | 12.6 | 10.6 | 11.2 |
| Blood meal | -- | 2.0 | 4.0 | 2.0 |
| Dicalcium phosphate | 1.5 | 1.5 | 1.5 | 1.5 |
| Ground limestone | 0.5 | 0.5 | 0.5 | 0.5 |
| Trace mineral salt (0.8% zinc) | 0.5 | 0.5 | 0.5 | 0.5 |
| Vitamin-antibiotic premix ^a | 0.2 | 0.2 | 0.2 | 0.2 |

^aProvided per lb. of diet: vitamin A, 1500 IU; vitamin D, 200 IU; riboflavin, 1.25 mg; pantothenic acid, 5 mg; niacin, 10 mg; choline, 50 mg; vitamin B₁₂, 7.5 mcg and chlortetracycline, 10 mg.

Table 2. Composition of Diets Fed from 120 to 200 Pounds (Percent)

| Treatment number | 1 | 2 | 3 | 4 |
|--|------|------|------|------|
| Ground yellow corn | 88.4 | 88.4 | 88.4 | 89.8 |
| Soybean meal (45%) | 9.0 | 7.0 | 5.0 | 5.6 |
| Blood meal | -- | 2.0 | 4.0 | 2.0 |
| Dicalcium phosphate | 1.4 | 1.4 | 1.4 | 1.4 |
| Ground limestone | 0.5 | 0.5 | 0.5 | 0.5 |
| Trace mineral salt (0.8% zinc) | 0.5 | 0.5 | 0.5 | 0.5 |
| Vitamin-antibiotic premix ^a | 0.2 | 0.2 | 0.2 | 0.2 |

^aProvided per lb. of diet: vitamin A, 1500 IU; vitamin D, 200 IU; riboflavin, 1.25 mg; pantothenic acid, 5 mg; niacin, 10 mg; choline, 50 mg; vitamin B₁₂, 7.5 mcg and chlortetracycline, 10 mg.

Table 3. Effect of Partial Replacement of Soybean Meal
With Blood Meal in Swine Diets

| Treatment number | 1 | 2 | 3 | 4 |
|-----------------------------|-------|-------|-------|-----------------|
| Number of pigs | 12 | 12 | 12 | 11 ^a |
| Avg. initial wt., lb. | 51.6 | 51.7 | 51.6 | 51.8 |
| Avg. final wt., lb. | 202.8 | 203.6 | 202.5 | 201.8 |
| Avg. daily gain, lb. | | | | |
| 51 to 120 lb. | 1.52 | 1.56 | 1.49 | 1.37 |
| 120 to 203 lb. ^b | 1.93 | 1.89 | 1.96 | 1.85 |
| 51 to 203 lb. ^b | 1.71 | 1.73 | 1.72 | 1.63 |
| Avg. daily feed, lb. | | | | |
| 51 to 120 lb. | 5.13 | 4.30 | 4.61 | 4.45 |
| 120 to 203 lb. | 6.97 | 6.63 | 7.37 | 6.89 |
| 51 to 203 lb. | 6.03 | 5.48 | 5.95 | 5.54 |
| Feed/gain, lb. | | | | |
| 51 to 120 lb. | 3.38 | 2.76 | 3.15 | 3.25 |
| 120 to 203 lb. | 3.63 | 3.51 | 3.76 | 3.71 |
| 51 to 203 lb. | 3.53 | 3.18 | 3.48 | 3.49 |

^aOne pig removed, data not included.

^bSignificant (P<.01) sex difference.