

# Alfalfa Meal as a Protein Supplement for Finishing Swine

R. H. Hines, B. A. Koch and Gary L. Allee

## Summary

Two experiments involving 144 finishing pigs were conducted to evaluate alfalfa meal in diets of finishing swine. Results indicate that finishing swine can utilize diets with up to 20% alfalfa meal without significantly effecting pig performance. This suggests the maximum crude fiber level that the finishing pig (125 lbs. to market) can tolerate without a significant reduction in daily gain is 6-7% of the diet. Pelleting the diet may extend this level in that we noted a satisfactory rate of gain and feed/gain ratio when 25% alfalfa meal diets (7.4% crude fiber) were fed.

## Introduction

To date, soybean meal and animal by-products have been the major source of supplemental protein for balancing swine diets. In the summer of 1973, the price of soybean meal and meat and bone scraps increased three fold which caused renewed interest in finding alternative protein sources for finishing-swine diets. At that time dehydrated alfalfa meal could be purchased for \$4.20 per cwt. On a protein basis, one hundred pounds of alfalfa meal could replace 77 lbs. of sorghum grain, 13 lbs. of soybean meal, and 10 lbs. meat and bone scraps--for a combined value of \$7.32/cwt.

This study was designed to determine the limitations of including alfalfa meal above the 5-10% generally recommended in finishing diets.

## Procedure

General. Pigs were housed in a modified-open front building with concrete, slatted floors. Each pen (6' X 15') contained a two-hole self feeder and an automatic watering cup. Pigs were randomly allotted to treatments by breed, sex, and initial weight. Pig performance was summarized on an equal-time basis.

Trial 1. Sixty pigs averaging 125 lbs. were used to evaluate these diets: (1) basal diet, (sorghum grain supplemented with soybean meal and meat and bone scraps) (2) basal diet with 10% dehydrated alfalfa meal (3) basal diet with 15% dehydrated alfalfa meal (4) basal diet with 20% dehydrated alfalfa meal (5) basal diet with 25% dehydrated alfalfa meal. Composition of diets is shown in table 7.1. All diets (to which 3% molasses were added to reduce dustiness) were fed in meal form.

Trial 2. Eighty-four pigs averaging 125 lbs. were used to evaluate treatments 1 through 5 as outlined in trial 1 plus the addition of two treatments: (6) basal diet with 15% dehydrated alfalfa meal fed in pellet form and (7) basal diet with 25% dehydrated alfalfa meal fed in pellet form.

Table 7.1. Composition of Diets for Finishing Swine (Trial 1 & 2)

| Ingredients                           | Basal  | Alfalfa meal |        |        |        |
|---------------------------------------|--------|--------------|--------|--------|--------|
|                                       |        | 10%          | 15%    | 20%    | 25%    |
| Milo                                  | 79.95  | 72.25        | 68.40  | 64.55  | 60.70  |
| Soybean meal (44%)                    | 10.00  | 8.70         | 8.05   | 7.40   | 6.75   |
| Meat and bone scraps                  | 5.00   | 4.00         | 3.50   | 3.00   | 2.50   |
| Molasses                              | 3.00   | 3.00         | 3.00   | 3.00   | 3.00   |
| Dehy. alfalfa meal                    | -----  | 10.00        | 15.00  | 20.00  | 25.00  |
| Dicalcium phosphate                   | .90    | .90          | .90    | .90    | .90    |
| Salt                                  | .50    | .50          | .50    | .50    | .50    |
| Vitamin, trace mineral and antibiotic | .65    | .65          | .65    | .65    | .65    |
|                                       | 100.00 | 100.00       | 100.00 | 100.00 | 100.00 |

Calculated analysis:

|                  |      |      |      |      |      |
|------------------|------|------|------|------|------|
| Crude protein, % | 14.4 | 14.3 | 14.2 | 14.2 | 14.2 |
| Crude fiber, %   | 2.4  | 4.5  | 5.6  | 6.7  | 7.8  |
| Calcium, %       | .79  | .81  | .82  | .83  | .84  |
| Phosphorus, %    | .72  | .66  | .63  | .61  | .58  |

Proximate analysis:

|                  |      |      |      |      |      |
|------------------|------|------|------|------|------|
| Crude protein, % | 14.6 | 14.4 | 14.4 | 14.3 | 13.9 |
| Crude fiber, %   | 2.7  | 4.4  | 5.3  | 6.4  | 7.4  |

Table 7.2. Performance of Finishing Pigs Fed Diets with Varying Levels of Alfalfa Meal (Trial 1)

| Indicated item       | Basal | Alfalfa meal |       |       |       |
|----------------------|-------|--------------|-------|-------|-------|
|                      |       | 10%          | 15%   | 20%   | 25%   |
| No. of pigs          | 12    | 12           | 12    | 12    | 12    |
| Initial weight, lbs. | 126.9 | 127.8        | 133.4 | 131.2 | 131.7 |
| Final weight, lbs.   | 214.1 | 209.7        | 223.0 | 213.8 | 208.9 |
| Daily gain, lbs.     | 1.35  | 1.29         | 1.40  | 1.30  | 1.19  |
| Daily feed, lbs.     | 5.24  | 5.52         | 5.64  | 5.64  | 5.60  |
| Feed/gain            | 3.90  | 4.28         | 4.00  | 4.31  | 4.70  |
| Cost/lb. gain, ¢     | 29.6  | 30.7         | 28.0  | 29.2  | 30.9  |

Results and Discussion

The results of trial 1 are shown in table 7.2. Pigs fed diets containing 25% alfalfa meal gained slower and required more feed per pound of gain than did pigs fed any of the other diets. Pigs in other treatments gained at a similar rate; however, pigs fed the basal diet were the most efficient. Increasing fiber in the diets by substituting dehydrated alfalfa meal for other ingredients resulted in increased daily feed intake by the pig attempting to maintain his normal caloric appetite. But, capacity limitation prevailed, in that his daily feed intake leveled off at approximately 5.6 lbs. when the crude fiber content of the diet became 6 to 7%. At that fiber level, the caloric density of the diet was such to reduce the pigs

daily gain resulting in more pounds of feed required per pound of gain. Pigs fed the basal diet were 17% more efficient than those pigs receiving the diet containing 25% alfalfa meal. Cost per pound of gain favored the diet containing 15% alfalfa meal in that pigs gained faster, yet required only a 0.1 lb. more feed per pound of gain. Pigs fed the diet containing 20% alfalfa meal gained 0.05 of a pound per day slower than did the pigs fed the basal diet and they were 10% less efficient; however, the cost per pound of gain was slightly lower than that of pigs fed the basal diet because of cost per pound of diet was 60¢ per cwt. less.

The results of trial 2 (table 7.3.) were similar to those of trial 1, but showed a more definite trend in daily gain as the percentage of alfalfa meal was increased. Each addition of 5% alfalfa meal resulted in reduced daily gain; as in trial 1, reduction was greatest for 25% alfalfa meal. Pelleting the 25% alfalfa meal diet resulted in similar weight gains as in other treatments and improved efficiency of gain by 14%. Even with the pelleting cost, the cheapest cost of gain was observed for the group receiving the 25% alfalfa meal diet fed in pellet form. Both pelleted diets resulted in superior feed/gain ratios which more than offset the pelleting cost. As noted in trial 1, rations containing alfalfa meal can be fed to finishing swine in meal form providing the crude fiber does not exceed 7% of the diet.

Table 7.3. Performance of Finishing Pigs Fed Diets with Varying Levels of Alfalfa Meal (Trial 2).

| Indicated item       | Meal diets |                  |                  |                  | Pelleted diets   |                  |
|----------------------|------------|------------------|------------------|------------------|------------------|------------------|
|                      | Basal      | 10% Alfalfa meal | 15% Alfalfa meal | 20% Alfalfa meal | 15% Alfalfa meal | 25% Alfalfa meal |
| No. of pigs          | 12         | 12               | 12               | 12               | 12               | 12               |
| Initial weight, lbs. | 126.4      | 125.8            | 125.5            | 125.5            | 125.3            | 126.1            |
| Final weight, lbs.   | 222.0      | 215.5            | 213.9            | 212.4            | 213.6            | 212.3            |
| Daily gain, lbs.     | 1.62       | 1.56             | 1.50             | 1.47             | 1.50             | 1.49             |
| Daily feed, lbs.     | 6.30       | 6.72             | 6.82             | 6.41             | 6.08             | 6.16             |
| Feed/gain            | 3.89       | 4.32             | 4.54             | 4.36             | 4.06             | 4.13             |
| Cost/lb. gain, ¢     | 29.5       | 31.1             | 31.7             | 29.6             | 29.6             | 28.4             |