Observations

In this experiment the pigs that received the nf-180, furazolidone supplement made slower gains than the pigs receiving no drug or those receiving Terramycin-B_{12} antibiotic. The pigs receiving the 50-gm. level in lot 2 required more corn and more protein supplement per 100 pounds gain than did the pigs in lot 1 that received no furazolidone. Those on the 25-gm. level, lot 3, required 3.09 pounds corn less per 100 pounds gain but 5.9 pounds more protein supplement than the pigs in lot 1. When the performance of the pigs in lots 2 and 3, that were fed furazolidone, were compared with the antibiotic-terramycin-fed lot, lot 4, the differences were even wider. The terramycin lot made the fastest gains and the most economical use of their feed.

In conclusion it may be said that no advantage was noted in gains or in feed consumption under the conditions of this experiment by adding nf-180 to a ration of shelled corn and a mixed protein supplement to growing pigs.

Table 4

The Value of Furazolidone nf-180 and Terramycin Antibiotic in the Rations of Fattening Pigs in the Dry Lot.

December 1, 1956, to February 27, 1957—89 days.

Basal ration fed: Shelled corn, mixed protein supplement, in the dry lot	Basal	Basal + nf-180 50 gms. per ton level	Basal + nf-180 25 gms. per ton level	Basal + Bi-Con TM-10
Lot number	1	2	3	4
Number pigs in lot	10	10	10	10
Av. initial wt. per pig, lbs.	56.70	56.70	56.50	56.90
Av. final wt. per pig, lbs.	198.70	196.00	189.50	201.60
Av. total gain per pig, lbs.	142.00	139.30	133.00	144.70
Av. daily gain per pig, lbs.	1.59	1.56	1.49	1.62
Av. daily ration per pig, lbs.:				
Shelled corn	4.94	5.02	4.58	4.73
Protein supplement	.56	.57	.62	.57
Lbs. feed per 100 lbs. gain per pig:				
Shelled corn	309.85	321.24	306.76	291.01
Protein supplement	35.63	36.82	41.50	35.24

The Value of Progen, Arsanilic Acid, and Terramycin Antibiotic in the Ration of Fattening Pigs in Dry Lot (Project 110, Test 5).

C. E. Aubel

The use of arsanilic acid in swine rations has been receiving experimental attention for several years. It follows the use of arsenicals that have been used in medical practice hundreds of years. Fowler's solution containing 1 percent arsenic trioxide, a cheap but toxic inorganic arsenic, was first used as a tonic to improve the appearance and well-being of animals. The toxic properties of trioxide, however, greatly limited its use except as a general tonic in veterinary practice.

At the turn of the century, arsenic in the form of arsanilic acid was found to be much less toxic than the trioxide and was effective as "magic bullets" in the health of poultry. This, with its long known tonic properties, has brought it to the attention of swine feeders and has added it to the long list of disease fighters for pigs.

Studies up to this time indicate arsanilic acid to be a useful antibacterial agent in the ration of swine of different ages. It is particularly effective in treatment of bloody dysentery or bloody scours in swine.

The Food and Drug Administration has approved arsanilic acid concentrates which are fed on a free-choice basis with grain. Few experiments have been conducted on this method of feeding the arsonic acids.

This experiment was designed to obtain information on the use of arsanilic acid in supplements fed free choice to growing fattening pigs to evaluate it in its effectiveness in the growing ration.

In this test four lots of fall pigs were self-fed shelled corn and a mixed protein supplement in dry lot in winter. The mixed protein supplement was made up of 4 parts tankage, 4 parts soybean meal, 1 part linseed meal, 1 part alfalfa meal.

Lot 1 pigs received no supplement, except the mixed protein supplement with the basal ration.

Lot 2 pigs received the basal ration with Bi-Con TM-10, Terramycin antibiotic B_{12} supplement mixed with the protein supplement at the rate of 4½ pounds per ton.

Lot 3 pigs received arsanilic acid supplement as Progen mixed with the protein supplement at the rate of 3 pounds of Progen per ton. This supplied it to the pigs at the rate of about 90 gms. per ton of total feed.

Lot 4 pigs received arsanilic acid supplement as Progen at the rate of 3 pounds per ton and Bi-Con TM-10 Terramycin antibiotic B_{12} supplement at the rate of 4½ pounds per ton, plus protein.

Table 5 gives the results of this experiment.

Table 5

The Value of Progen, Arsanilic Acid, and Terramycin Antibiotic in the Rations of Fattening Pigs in Dry Lot.

December 1, 1956, to February 27, 1957—89 days.

Basal ration fed: Shelled corn, mixed protein supplement	Basal	Basal + Bi-Con TM-10	Basal + Progen, 90 gms. to ton	Basal + Progen + Bi-Con TM-10
Lot number	1	2	3	4
Number pigs in lot	10	10	10	10
Av. initial wt. per pig, lbs.	56.70	56.90	56.70	56.80
Av. final wt. per pig, lbs.	198.70	201.60	196.10	198.50
Av. total wt. per pig, lbs.	142.00	144.70	139.40	141.70
Av. daily gain per pig, lbs.	1.59	1.62	1.44	1.59
Av. daily ration per pig, lbs.:				
Shelled corn	4.94	4.73	4.82	4.71
Protein supplement	.56	.57	.60	.57
Lbs. feed per 100 lbs. gain per pig:				
Shelled corn	309.85	291.01	308.32	296.25
Protein supplement	35.63	35.24	38.59	36.20

Observations

In this experiment pigs that received the arsanilic acid alone made the poorest gains of all the lots, only 1.44 pounds per head per day. The pigs receiving no arsanilic acid gained 1.59 pounds, those that received Terramycin gained 1.62 pounds, and those that received Terramycin and arsanilic acid gained 1.59 pounds.

The feed consumption was lowest in the lots receiving the antibiotic, lots 2 and 4, and the highest in lot 3 that received the arsanilic acid.

When arsanilic acid and terramycin were both added to the ration, a good response was achieved but not so good as when terramycin was added alone.

Acknowledgement is made to the Abbott Laboratories, North Chicago, Ill., for supplying the Progen, Arsanilic Acid supplement for this experiment, and to Chas. Pfizer and Co., Inc., Terre Haute, Ind., for supplying the Terramycin-B_{12} supplement, Bi-Con TM-10.

Producing Parakeratosis in Growing Fattening Swine (Project 110, Test 6).

C. E. Aubel

Parakeratosis has been a problem in farm swine herds for several years. It is a severe dermatitislike condition which may resemble mange. Pigs may show encrustations on the skin, particularly over the rear limbs and abdomen. The skin frequently cracks in advanced cases. The mortality rate is low, unless the condition occurs in very young pigs. The greatest loss to swine producers is increased feed cost and time required to get the pigs to market. In some cases there are dressing carcass losses.

Exact cause of the condition has not been understood. Rations containing excessive levels of calcium have been reported to be conducive to the condition, and a small quantity of zinc is reported to prevent as well as cure the condition.

Occasional instances of parakeratosis have occurred in the experimental herd at the college.

This test was conducted to obtain information on inducing the condition.

In the winter of 1956-57, 18 fall pigs including Poland Chinas and Durocs were divided into two lots. The pigs were allowed to run on limestone soil; rations were self-fed.

The basal mixture was ground corn 8 parts, mixed with 1 part of a mixed protein supplement made up of 4 parts tankage, 4 parts soybean meal, 1 part linseed meal, and 1 part alfalfa meal. This mixture contained approximately 15 percent protein. This feed plus 2 percent ground limestone for each pound of corn was mixed and pelleted and self-fed to the lot 2 pigs. The lot 1 pigs were self-fed free choice on shelled corn and the same mixed protein supplement as lot 2 pigs.

The first lesions of parakeratosis began appearing in 28 days after the experiment started. By 40 days, seven of the eight pigs in lot 2 receiving the added calcium developed parakeratosis. The experiment was continued 89 days and no attempt to correct the condition was made. Feed consumption, daily gains, and feed efficiency are shown in Table 6.

Table 6

Feeding Fattening Pigs to Produce Parakeratosis.

December 1, 1956, to February 27, 1957—89 days.

Ration fed	Shelled corn, mixed protein supplement self-fed free choice	Parakeratosis lot, ground corn, mixed protein supplt. 8 to 1 in pellet self-fed
Lot number	1	2
Number pigs in lot	10	8
Av. initial wt. per pig, lbs.	56.70	58.62
Av. final wt. per pig, lbs.	198.70	138.00
Av. total gain per pig, lbs.	142.00	81.30
Av. daily gain per pig, lbs.	1.59	.91
Av. daily ration per pig, lbs.:		
Corn and protein supplement	5.50	4.43
Lbs. feed per 100 lbs. gain per pig:		
Corn and protein supplement	345.49	387.45

Observations

In this experiment it will be noted the parakeratosis lot made very slow gains, only .91 pound daily compared with 1.59 pounds for the lot receiving a balanced calcium level. One pig in lot 2 did not exhibit any lesions of the disease, had nice smooth hair, and seemed to gain normally throughout the experiment. She was a Poland China gilt that weighed 211.5 pounds at the end of the experiment. She seemed normal in every way.

Summary and Recommendations

Parakeratosis was produced in pigs by feeding a high-calcium ration (1.3% ca.). Seven of eight pigs showed lesions within seven weeks from the time of feeding. One pig exhibited it as early as four weeks. Three of the pigs showed severe lesions.

From this experiment it is recommended that high levels of calcium in the rations of growing pigs be avoided. The National Research Council recommendation for calcium levels in the ration should be followed.

Although zinc was not added to the ration as a corrective measure in this experiment, it is reported that adding 1 pound of a high zinc trace mineral premix to a ton of feed alleviates the condition.

Metabolism of Carotenoid Pigments and Vitamin A by Swine (Project 311, Test 7).

Provitamin A from Alfalfa and Yellow Corn and Gelatin-stabilized Vitamin A as Sources of Vitamin A for Weanling Pigs.

D. B. Parrish and C. E. Aubel

There is relatively little information on the utilization of vitamin A of different sources by weanling pigs. In this test, three sources of vitamin A were used: (1) a gelatin-stabilized vitamin A product, (2) carotene as supplied by high-quality alfalfa meal, and (3) carotene and cryptoxanthin as supplied by yellow corn. Alfalfa and yellow corn were analyzed for carotene and crude cryptoxanthin and units of vitamin A calculated by multiplying micrograms of these carotenoid pigments by 1.6 and 0.8, respectively. From previous work it was estimated that 400 units of vitamin A per pound of feed would provide for satisfactory growth and health throughout the test, if the source of vitamin A were used efficiently. Twenty-seven weanling pigs were distributed among three groups of three lots each so that lots among the groups were balanced on the basis of litter, sex, and weaning weight. These pigs were from gilts fed a vitamin A-restricted diet during the gestation and nursing period. Although they were in apparent satisfactory condition, their vitamin A reserves were low.

The basal feed was composed of white corn 76 percent, soybean meal 17 percent, nonfat milk solids 2.5 percent, brewer's yeast 1.5 percent, salt, limestone, and bonemeal mix 1 percent, plus vitamins and trace minerals. To each feed one of the vitamin A sources was added at 400 units per pound. When yellow corn or alfalfa was used, it was substituted in the formula for an equivalent weight of white corn. The experiment lasted two months. The pigs were fed three per lot. Each day they were offered only a small excess of feed over what they would clean up. For the first five days they received basal feed only containing no vitamin A source.

Data from the study are presented in Table 7.

Observations

1. Pigs receiving 400 units of gelatin-stabilized vitamin A per pound of feed gained more weight, converted their feed more efficiently, and had larger concentrations of vitamin A in their blood serum than those getting the same unitage of vitamin A from alfalfa meal or yellow corn.
2. In this test alfalfa meal and yellow corn were of approximately the same value for supplying provitamin A for pigs.
3. Unit for unit, pigs utilized vitamin A from alfalfa and yellow corn less efficiently than that from stabilized vitamin A.