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.

Table 7

Average Body Weights, Feed Efficiencies, and Blood Serum Vitamin A Contents of Pigs.

Diet	Lot[1]	Average wt., lbs. 5/24/56	Average wt., lbs. 7/24/56	Average gain, lbs. By lot	Average gain, lbs. By diet	Feed efficiency By lot	Feed efficiency By diet	Vitamin A, mgs./100 mls. serum[2] By lot	Vitamin A, mgs./100 mls. serum[2] By diet
Vitamin A[3]	1[4]	23	92	69		2.7		21.6	
	2	25	95	70		2.6		22.2	
	3	25	87	62		2.9		17.9	
					67		2.7		20.6
Dehydrated alfalfa	1a	23	76	53		2.9		4.3	
	2a	25	87	62		2.8		3.1	
	3a	25	65	40		3.6		1.4	
					52		3.1		3.1
Yellow corn	1b	23	81	58		2.8		1.4	
	2b	25	89	64		2.9		1.3	
	2b	25	59	34		3.6		1.3	
					52		3.1		1.3

1. Three pigs per lot.
2. At termination of experiment.
3. Gelatin-stabilized vitamin A used was Pfizer A-10-P.
4. 1, 1a, 1b, etc., are groups balanced by litter, sex, and weight.

Table 8

Chemical Analysis of Feeds Used in Swine Feeding Trials, Summer, 1956.

	Protein, %	Ether extract, %	Crude fiber, %	Moisture, %	Ash, %	N-Free extract, %	Carbohydrates, %
Protein supplement, 4-4-1-1	45.88	4.04	6.33	7.84	11.34	24.57	30.90
Protein supplement 4-4-3	34.81	4.07	12.62	7.83	11.09	29.58	42.20
Whole corn, yellow	10.25	3.88	1.92	10.59	1.35	72.01	73.93
Hog pellets, 6 to 1	15.50	4.52	3.30	9.66	3.17	63.85	67.15
Hog pellets, 9 to 1	14.69	4.20	2.95	10.16	7.97	60.03	62.98
Chemical Analysis of Feeds Used in Swine Feeding Trials, Winter, 1956-1957.							
Protein supplement, 4-4-1-1	47.38	3.99	6.32	6.65	12.49	23.17	29.49
Corn, yellow	10.38	3.80	2.70	10.63	1.41	71.71	73.78
Hog feed, lot 1, test 6	14.44	3.76	2.80	10.06	2.81	66.13	68.93
Hog feed, 8-1, lot 2, test 6	15.31	3.22	2.80	9.58	4.00	65.09	67.89

Sheep

Lamb Feeding Experiments, 1956-57

Feed Lot and Pasture Fattening Tests with Feeder Lambs. Studies Carried on by the Department of Animal Husbandry and the Garden City Branch Experiment Station, Project 111-GC.

Carl Menzies, T. Donald Bell, and A. B. Erhart

Tests this year include the following roughage comparisons for fattening lambs in dry lot: (1) Axtell stover, (2) Axtell stover and alfalfa hay, (3) Axtell silage and alfalfa hay, (4) wheat silage and alfalfa hay, and (5) Axtell fodder and alfalfa hay.

The use of hormones in fattening lamb rations was again studied, using the standard sorghum stover, milo grain, cottonseed meal, salt, and limestone ration. This study consisted of the following four treatments: (1) controls, (2) 6 mgs. stilbestrol implants, (3) 2 mgs. of stilbestrol per lamb daily mixed with the ration, and (4) Synovex implants consisting of 200 mgs. progesterone and 2.5 mgs. of estradiol.

One lot of 50 lambs was pastured on irrigated wheat from November 2 to January 28, or 87 days. Twenty-five head were implanted with 6 mgs. of stilbestrol at the beginning of the grazing period. After the grazing period, the lambs were put in dry lot and fed the standard stover, milo cottonseed meal, salt, and limestone ration.

Two lots containing 50 lambs each were fed aureomycin in the form of Aurofac 2A along with the standard ration. Each lamb in both lots received approximately 14.4 mgs. aureomycin per head per day. In addition the lambs in one lot were implanted with 6 mgs. of stilbestrol.

All the lambs were shorn during the period February 18 to 20 and continued on feed except 10 each from lots 1, 2, 3, and 4. This group was taken to Manhattan for further study.

Lambs

The lambs for this year's tests were primarily whiteface finewools with a few blackface crossbreds from near Bernalillo, N.M. They were approximately one half ewe and one half wether lambs. They averaged 69.4 pounds at the loading point and 62 pounds off the cars in Garden City October 24, 1956. They were started on test November 2.

Feed prices: Milo grain, $2.25 per cwt.; alfalfa hay, $30 per ton; Axtell stover, $10 per ton; Axtell fodder, $12 per ton; Axtell silage, $8 per ton; wheat silage, $8 per ton; cottonseed meal, $70 per ton; salt, $1 per cwt.; limestone, $1 per cwt.; and wheat pasture, $0.50 per head per month.

Table 9

Results from Adding Hormones to Lamb-Fattening Rations, Garden City, Kansas, 1956-57.

Ration fed	No hormone	Stilbestrol implants (6 mgs.)	Stilbestrol In feed (2 mgs. daily)	Synovex implants[1]
	Whole milo, Axtell stover, C.S. meal, salt, limestone	Whole milo, Axtell stover, C.S. meal, salt, limestone	Whole milo, Axtell stover, C.S. meal, salt, limestone	Whole milo, Axtell stover, C.S. meal, salt, limestone
Lot number	1	2	3	4
Number lambs per lot	50	50	50	50
Days on feed	101	101	101	101
Initial wt. per lamb, lbs.	72.1	71.5	71.3	71.6
Final wt. per lamb, lbs.	95.5	99.0	99.5	100.9
Total gain per lamb, lbs.	23.4	27.5	28.2	29.3
Daily gain per lamb, lb.	.23	.27	.28	.29