type hogs. Consequently, a Beltsville No. 1 (Poland x Landrace origin) was secured and matings planned with a Duroc. The test was to study vigor and size of the litter produced and ultimate performance in the feedlot of the litter compared with performance of purebred Duroc pigs raised under comparable conditions.

In the winter of 1953-54, six purebred Duroc sows were mated to a Duroc boar, and six Duroc sows were mated to a Beltsville No. 1 boar.

Results are given in Table 22.

Table 22.—Some studies on breeding market pigs by crossing Durocs with a Beltsville No. 1 boar for meat-type hogs.

Farrowing Data—Spring, 1954

	Purebred Duroc	Beltsville No. 1 x Duroc
Lot number	1	2
Number sows farrowed	6	6
Av. number pigs/litter	9.0	9.1
Av. birth wt. of pigs	2.1	2.4
Av. strong pigs/litter	6.1	7.6
Av. weak pigs/litter	2.5	.8
Av. born dead/litter	.3	.5
Av. 5-day wt. pigs in litter	3.3	3.6
Av. 56-day wt. pigs in litter	21.9	21.8
Av. pigs weaned/litter	7.2	6.4

From the pigs farrowed, 25 purebred Duroc pigs and 23 crossbred Beltsville No. 1 x Duroc pigs were selected to be fed for market. They were self-fed in separate groups on corn, tankage, and sudangrass pasture. Their initial weights were 34.63 pounds, purebred Durocs; 36.52 pounds, crossbreds. The following data show the results of this feeding test.

Table 23.—Some studies on breeding market pigs by crossing.

(June 9, 1954, to October 5, 1954—118 days)

	Shelled corn, tankage (self-fed on sudangrass)	
	Purebred Duroc	Beltsville No. 1 x Duroc
Lot number	1	2
Number pigs in lot	25	23
Av. birth wt. of pigs, lbs.	2.1	2.4
Av. 56-day wt. of pigs, lbs.	21.9	21.8
Av. initial wt. on feed, lbs.	34.63	36.52
Av. final wt. on feed, lbs.	188.12	188.26
Av. total gain/pig, lbs.	153.49	151.74
Av. daily gain/pig, lbs.	1.30	1.28
Feed/day/pig:		
Shelled corn, lbs.	3.47	3.40
Tankage, lb.	.80	.70
Feed for 100 lbs. gain/pig:		
Shelled corn, lbs.	258.08	265.18
Tankage, lbs.	57.35	54.44

Observations

The purebred pigs gained 153 pounds with 315.43 pounds of feed for 100 pounds gain, while the crossbred pigs gained 151.74 pounds with 319.62 pounds of feed for 100 pounds gain.

The Comparative Value of New Corn (1954 Crop) and Old Corn (Government Stored 1948-49) for Fattening Fall Pigs in Dry Lot.

PROJECT 110

C. E. Aubel

Numerous inquiries to the Department of Animal Husbandry in recent months concerning the probable value for hog feed of corn stored several years under government supervision prompted this test.

This experiment was initiated and conducted during the winter of 1954-55, starting with fall-farrowed pigs weighing about 55 pounds.

Three lots totaling 25 pigs were fed. Lot 1 was self-fed shelled old corn that had been government stored since 1948-49. Lot 2 was self-fed the same corn ground, and Lot 3 was the control group self-fed shelled new corn. All lots were self-fed free choice a mixed animal and plant protein supplement of 4 parts tankage, 4 parts soybean meal, 1 part cottonseed meal, and 1 part alfalfa meal, in dry lot.

Results are shown in Table 24.

Table 24.—Comparative value of new corn (1954 crop) and old corn (government stored 1948-49) self-fed for fattening fall pigs in dry lot.

(December 7, 1954, to March 15, 1955—98 days)

Ration fed	Shelled old corn	Ground old corn	Shelled new corn
	Prot. supplt. mixed, self-fed: 4 parts tankage, 4 parts soybean meal, 1 part cottonseed meal, and 1 part alfalfa meal		
Lot number	1	2	3
Number of pigs in lot	8	8	9
Av. initial wt. per pig, lbs.	55.25	55.25	53.88
Av. final wt. per pig, lbs.	204.75	204.62	205.88
Av. total gain per pig, lbs.	149.50	149.37	152.00
Av. daily gain per pig, lbs.	1.52	1.52	1.55
Av. daily ration per pig:			
Corn, lbs.	4.75	5.12	5.49
Protein supplt., lbs.	1.01	1.14	.95
Lbs. feed per 100 lbs. gain:			
Corn	311.87	349.14	354.53
Protein supplt.	66.47	74.89	61.40

Observations

1. There was little difference among lots in daily gains throughout the 98-day feeding period. Lot 1 on old shelled corn gained 1.52 pounds. Lot 2 on old ground corn made the same gain, and Lot 3 on the new shelled corn gained 1.55 pounds.

2. Daily consumption of the grain indicated that the new corn was a little more palatable. Ground old corn was consumed at 5.12 pounds per day compared with 4.75 pounds per day for the shelled old corn. There was a little difference in the protein supplement consumed daily. This might indicate that the old corn was harder than the new corn, and thus not relished.

3. For 100 pounds gain, Lot 1 required 311 pounds of shelled old corn and 66 pounds of protein supplement. Lot 2 required 349 pounds of ground old corn and 74 pounds of supplement. Lot 3 required 354 pounds of new corn and 61 pounds of supplement. All three lots of pigs made excellent use of their corn in making gains. The shelled old corn lot was a little more efficient, although, as noted above, they consumed less feed daily.

It may be concluded from this experiment that old government-stored corn may be expected to produce pork in the feed lot as efficiently as a new crop, when both have similar quality.

The Maximum Use of Alfalfa Meal in Protein Supplemental Mixtures for Fattening Fall Pigs in the Dry Lot.

PROJECT 110

C. E. Aubel

This experiment was designed to secure information on maximum use of alfalfa meal in protein supplemental mixtures for pigs in dry lot. The experiment on next page reports similar information from pigs on alfalfa pasture.

In this 1954-55 test four lots of fall-farrowed pigs were self-fed corn in dry lot. Each lot received different amounts of alfalfa meal in protein supplements. Lot 1 received an animal plant protein mixed supplement of 4 parts tankage, 4 parts soybean meal, 1 part cottonseed meal, and 1 part alfalfa meal. Lot 2 received one of 4 parts tankage, 4 parts soybean meal, and 2 parts alfalfa meal. Lot 3 received one of 4 parts tankage, 4 parts soybean meal, and 3 parts alfalfa meal; and Lot 4 received one of equal parts tankage and alfalfa meal.

Results are given in Table 25.

Table 25.—Maximum use of alfalfa meal in protein supplemental mixtures for fattening fall pigs in the dry lot.

(December 7, 1954, to March 15, 1955—98 days)

	Shelled corn, self-fed			
Protein mixed supplement fed	4 parts tankage, 4 parts S.B.M., 1 part C.S.M., 1 part alf. meal	4 parts tankage, 4 parts S.B.M., 2 parts alf. meal	4 parts tankage, 4 parts S.B.M., 3 parts alf. meal	5 parts tankage, 5 parts alf. meal
Lot number	1	2	3	4
Number pigs in lot	9	9	9	9
Av. initial wt. per pig	53.88	55.36	53.11	52.77
Av. final wt. per pig	205.88	208.37	198.33	203.66
Av. total gain per pig	152.00	153.01	145.22	150.89
Av. daily gain per pig	1.55	1.56	1.47	1.53
Av. daily ration per pig:				
Corn	5.49	5.13	4.75	5.76
Protein supplement	.95	.88	.78	.70
Feed per 100 lbs. gain per pig:				
Corn	354.53	369.66	373.94	374.44
Protein supplement	61.40	56.77	53.58	46.02

Observations

1. Daily gains varied little. Lot 3 had the smallest daily gain—1.47 pounds per day. Other daily gains were: Lot 1, 1.55 pounds; Lot 2, 1.56 pounds; and Lot 4, 1.53 pounds. This indicates that the rations were efficient.

2. Lot 4 pigs consumed the most corn and the least supplement. This probably was because the high percentage of alfalfa meal in the supplement made them prefer shelled corn. The Lot 1 pigs consumed both the most corn and the most supplement daily. The extra consumption of corn required more protein to balance it nutritionally.

3. Most efficient utilization of corn was in Lot 1, the lot that ate the most each day. Lot 1 required more protein supplement per 100 pounds gain. There was little difference in the corn requirements among the other three lots. Lot 4 used the least protein supplement.

4. Results of this test indicate that increased amounts of alfalfa meal in the ration of pigs being fattened in dry lot are desirable and tend to produce more profitable gains.

Metabolism of Carotenoid Pigments and Vitamin A in Swine

Relative Value of Vitamin A and Carotenoids of Alfalfa Meal and of Corn in Supplying Vitamin A Requirements of Swine for Reproduction.

PROJECT 311

D. B. Parrish and C. E. Aubel

Swine commonly obtain vitamin A from feed in the form of the provitamins—carotene and cryptoxanthin—of alfalfa and yellow corn. Swine are able to convert these provitamins to vitamin A, probably in their intestinal walls. Some commercial swine feeds contain true vitamin A, especially feeds recommended for young pigs.

Nearly all the information available on the relative effectiveness of the forms of provitamin A in natural feedstuffs to supply vitamin A requirements of swine was obtained on young growing pigs. The requirements for, and metabolism of, vitamin A may differ in growing pigs and sows. A study of this problem, therefore, was undertaken.

Duroc gilts were placed in dry lot late in the fall. Feeding of experimental rations was begun one month before the gilts were bred. The experimental diets were composed of white corn, soybean oil meal, brewer's yeast, skimmilk powder, iodized salt, bone meal, limestone, and vitamins. The amount of various vitamin A supplements that each gilt received daily is shown for the various experiments in Tables 26, 27, and 28.

The amounts of supplement given were such that the vitamin A intake would be near marginal levels so that if differences in the values of the supplements existed they would likely show up. The experiments continued varying lengths of time after farrowing. Since only a limited number of comparisons could be made at any one time, the studies were continued several years, using essentially the same experimental conditions each time, but varying the supplemental sources of vitamin A. Each test was made twice. The criteria used for judging relative effectiveness of the various sources of vitamin A were: vitamin A levels in blood serum and colostrum of the gilts at farrowing and vitamin A levels in blood serum and livers of new-born pigs. Other analyses and observations made varied somewhat from one study to another.

In the first trial, vitamin A or carotene was added to the diet so each gilt received 6500 units of vitamin A activity daily. In the second trial the work was repeated but the supplemental provitamin A was fed at 7100 units daily. In each trial, the results were compared with those obtained on another lot of gilts fed the common yellow corn-tankage diet, plus leafy alfalfa hay, **ad lib.** The data from Trials 1 and 2 are presented in Table 26.

In Trials 3 and 4, the relative vitamin A values of carotene in oil and