Swine

Table 18
Composition of rations used in swine trials.

Ration no.	35-A[2]	47-A	61	67[3]	49-A
Ground sorghum grain, lbs.	1550	1450	1600	1466	....
Meat scraps (50% C.P.), lbs.	....	....	100	....	400
Soybean oil meal (44% C.P.), lbs.	400	345	192	400	1164
Dehydrated alfalfa meal (17% C.P.), lbs.	....	150	100	100	250
Dicalcium phosphate, lbs.	20	20	....	20	....
Steamed bonemeal, lbs.	....	....	....	....	50
Limestone, lbs.	20	20	....	20	50
Salt, lbs.	10	10	8	10	50
Trace mineral premix (5% Zn), lbs.	1	1	....	1	5
Vitamin A, I.U.	3,000,000	2,000,000	800,000	....	....
Vitamin D, I.U.	300,000	300,000	....	300,000	....
B-complex vitamin premix, lbs.[1]	0.5	0.5	0.5	0.5	1.5
Chlortetracycline (Aureomycin), gms.	10.8	10.8	10.0	....	50.0
Tylan (Tylosin), gms.	....	....	....	10.0	....
Vitamin B_{12}, mgs.	10.8	10.8	10.0	10.0	50.0

1. Contains 8.0 gms. riboflavin; 14.7 gms. D-pantothenic acid; 24.0 gms. niacin; and 80.0 gms. choline chloride per lb.

2. **35-B** contains 25 lbs. Peter Hand F.W. Premix per ton; **35-C** contains 2.5 lbs. of Mycostatin-20 per ton; **35-D** contains 10 gms. of Tylosin per ton; **35-E** contains 10 gms. of Tylosin plus 1 lb. of Mycostatin-20 per ton; **35-F** is ration 61 with Tylosin replacing Aureomycin; **35-G** contains 5 lbs. of Aureo S-P-250 premix per ton and **35-H** contains 30 lbs. of Vigofac per ton (the additive replaced grain in every case).

3. **67-A** contains 1.2% $NaNO_3$ per ton; **67-B** contains 4.0% urea per ton; **67-C** contains 4% NaCl per ton; **67-D** contains 4% K_2SO_4 per ton and **67-E** contains 4.0% $NaNO_3$ per ton. (The additive replaced sorghum grain in every case.)

NOTE: The Department of Animal Husbandry acknowledges the following donors of the products listed:

The Calcium Carbonate Company, Carthage, Mo., "CCC" trace mineral premix; Chas. Pfizer & Co., Inc., Brooklyn, N.Y., Vigofac-6—unidentified growth factors; E. R. Squibb & Sons, New York, N.Y., Mycostatin-20 (Squibb nystatin); Peter Hand Foundation, Chicago, Ill., F.W. Pig (with trace minerals and antibiotics plus octaferm); American Cyanamid Co., Princeton, N.J., (1) Aureomycin, (2) ASP-250; Eli Lilly & Co., Indianapolis, Ind., Tylan (Tylosin tartrate).

Additives in Growing-Finishing Rations (Project 110).

B. A. Koch and D. W. Loeppke

Specific additives are successfully incorporated into swine rations. Each year new ones are approved and each year the efficacy of the older ones is questioned. Recent feeding trial comparisons at this station are summarized here.

I. Aureomycin vs. Tylosin

The broad-spectrum antibiotic Aureomycin (chlortetracycline) is an older additive. Tylosin is one of the more recently approved broad-spectrum antibiotics.

Experimental Procedure

Pigs used were both barrows and gilts. They included Durocs, Poland Chinas, and crossbreds. Each weighed nearly 100 pounds going on test. Prior to the test the pigs had been together on brome-alfalfa pasture.

They were fed and housed on concrete and had access to an electrically heated automatic waterer. Pigs in each pen also had access to a three-hole fence-line self-feeder.

Ration formulations (pelleted) are listed in Table 18. Pigs were taken off test individually as they reached market weight.

Observations

Table 19 summarizes performance data of the pigs. Average daily gains were essentially the same in the two lots. Feed efficiency was better for pigs supplemented with Tylosin in this test.

Table 19
Aureomycin vs. Tylosin for growing-finishing pigs. (Feeding period began September 28, 1963)

Ration no.[1]	S-35-F	S-61
Additive	Tylosin	Aureomycin
No. of pigs	10	8
Av. on-test wt., lbs.	110	114
Av. off-test wt., lbs.	193	212
Av. daily gain, lbs.	1.81	1.85
Standard error	±.06	±.08
Av. feed efficiency, lbs.	3.26	3.56

1. See Table 18 for ration formulation.

II. Aureomycin, F.W. Premix, and Aureomycin + Mycostatin Compared.

This trial was part of a swine-ulcer study with the College of Veterinary Medicine. Dr. William Griffing made all ulcer observations. Previous work by Dr. Griffing and others had suggested the possibility that a fungus, Candida albicans, was involved in the ulcer syndrome. The antifungal agent, Mycostatin, was included as an additive. Only performance data are reported here. Details of the ulcer study will be reported elsewhere by Dr. Griffing.

Experimental Procedure

Poland China, Duroc, and crossbred barrows and gilts were assigned to one of three groups of 18 each as uniformly as possible. Each group was then divided into two groups of four each and two groups of five each. Each group of four or five was housed and fed in a 6- x 18-foot pen, half of which was under roof.

All rations were pelleted and self-fed. The pigs were watered in

troughs three times per day. A measured amount of the fungus, Candida albicans, was added to the drinking water of half the pigs six times during the test period.

Observations

Table 20 summarizes performance data of the pigs. There was no difference in performance between control pigs and pigs that received the fungus, Candida albicans. Ulcer incidence was low in all groups. There were no ulcers in groups that received F.W. Premix as the feed additive. Groups receiving the various feed additives performed very similarly.

Table 20
Aureomycin, F.W. Premix, and Aureomycin + Mycostatin compared, March 2, 1963, to June 9, 1963—99 days.

Ration no.[1]	S-35-A	S-35-B	S-35-C
Additive	Aureomycin	F.W. Premix	Aureomycin + Mycostatin
No. of pigs	18	18	18
Av. on-test wt., lbs.	53	56	57
Av. off-test wt., lbs.	227	230	232
Av. daily gain, lbs.	1.75	1.75	1.76
Standard error	±.06	±.04	±.04
Av. feed efficiency, lbs.	3.16	3.25	3.21
Ulcers (at slaughter)	3	0	4

1. See Table 18 for ration formulation.

III. Aureomycin, F.W. Premix, Tylosin, ASP-250, and Vigofac Compared.

This feeding trial was designed to compare Aureomycin, one of the older antibiotics, with two sources of unidentified growth factors and with two newer antibiotics.

Experimental Procedure

Fifty feeder pigs, 10 Poland Chinas, 10 Durocs, and 30 crossbreds, both barrows and gilts, were divided by breed and sex into five groups. All pigs had been previously vaccinated for cholera and erysipelas and wormed with piperazine.

The pigs were fed and housed on concrete where each pig had 18 square feet of floor space. Each group of 10 pigs had access to an electrically heated automatic waterer and a three-hole fence-line self-feeder. Prior to going on test all pigs had been on alfalfa-brome pasture. Pigs were taken off test individually as they reached market weight.

All rations were formulated from the same lot of sorghum grain. Ration composition is shown in Table 18. All rations were pelleted.

Observations

Table 21 summarizes performance data of the pigs. Average daily gains in the various lots were not significantly different. Pigs receiving F.W. Premix or ASP-250 made the highest average daily gain with the best feed efficiency. Pigs receiving Tylosin required somewhat more feed per pound of gain than those receiving other additives.

Table 21
Aureomycin, F.W. Premix, Tylosin, ASP-250, and Vigofac compared. (Feeding period began November 29, 1963)

Ration no.[1]	35-A	35-B	35-D	35-G	35-H
Additive	Aureomycin	F.W. Premix	Tylosin	ASP-250	Vigofac
No. pigs	10	10	10[2]	10[3]	10
Av. on-test wt., lbs.	62	64	59	62	58
Av. off-test wt., lbs.	196	198	192	192	192
Av. daily gain, lbs.	1.63	1.70	1.53	1.68	1.53
Standard error	±0.09	±0.08	±0.06	±0.06	±0.07
Av. feed efficiency, lbs.	3.28	3.13	3.51	3.25	3.18

1. See Table 18 for ration formulation.
2. One pig died from a perforated ulcer.
3. One pig removed to hospital (blocked intestine).

IV. Aureomycin, Tylosin, and ASP-250 Compared (Progress Report).

These three additives are being critically compared in a factorial study, with performance of Poland Chinas, Durocs, and crossbreds also being measured.

Experimental Procedure

Seventy-two feeder pigs, 24 Poland Chinas, 24 Durocs, and 24 crossbreds, both barrows and gilts, were divided by breed and weight into 18 groups of four pigs each. Each group is housed and fed in a pen 6 x 18 feet, half of which is under roof. Each group has access to a two-hole self-feeder and each group is watered in a trough three times per day. Prior to being put on test the pigs had been weaned at four weeks and grown under complete confinement conditions.

Twenty-four pigs, eight of each breeding, receive their respective additive in a complete pelleted ration. Ration formulations are listed in Table 18. All rations are made from the same lot of sorghum grain. Pigs that received ASP-250 the first 28 days will receive either Tylosin or Aureomycin for the rest of the feeding period.

Observations

Pigs receiving ASP-250 made the greatest average daily gain during the first 28 days. They also appear more thrifty. Pigs receiving Aureomycin and Tylosin made similar gains. Both were somewhat lower than the ASP-250 gains.

Poland Chinas weighed somewhat less than Durocs or crossbreds when they went on test. They gained at a slower rate than the others during the first 28 days on test.

Table 22 (progress report)
Aureomycin, Tylosin, and ASP-250 compared using Poland China, Duroc, and crossbred pigs. (Feeding period began February 25, 1964)

	Ration no.	Additive	No. pigs	Av. on test wt.	28 day wt.	Av. D. gain
Aureomycin	35-A	Aureomycin	24	48	84	1.30
Tylosin	35-D	Tylosin	24	50	88	1.32
ASP-250	35-G	ASP-250	24	51	93	1.48
Poland China	.....	.....	24	42	77	1.25
Duroc	.....	.....	24	53	93	1.43
Crossbred	.....	.....	24	54	95	1.46

General Observations Concerning Additives

All trials reported here were conducted under somewhat ideal conditions. Pens were always cleaned and disinfected before pigs went into them. All pigs were from the same background and were approximately the same age and size when they went on test. Pigs were always fed in small groups. Care and management were at a rather high level.

A zero additive or control was not included in any of the above trials. The Aureomycin-fed group was considered as a control, since Aureomycin has been fed at low levels at this station for a number of years.

Under actual field conditions any or all of the additives may perform differently. One should not plan to substitute an additive for good management, good sanitation procedures, or good housing. With field conditions where it is virtually impossible to maintain ideal conditions, the proper additive may help improve animal performance. That every additive increases feed costs must be considered when evaluating additive response under any set of conditions.

Dietary $NaNO_2$, NaCl, K_2SO_4 or Urea for Growing-finishing Pigs (Project 311).

B. A. Koch and D. B. Parrish[1]

Nitrates are known to harm animals when ingested under certain conditions. Previous work here indicated that a high level of dietary nitrate might interfere with carotene conversion to vitamin A. This trial attempted to determine whether such interference does exist and also whether other dietary additives might interfere in carotene conversion.

Experimental Procedure

Twenty-four weanling pigs, 12 Duroc and 12 three-way crossbreds, six barrows and six gilts from each breed, were divided into six treatment groups of four pigs each. Each group was further divided so each pen contained one Duroc and one crossbred pig and one gilt and one barrow.

The pigs had been vaccinated for cholera and erysipelas before going on test. They also had been wormed with liquid piperazine. They had access to a heated automatic waterer and a two-hole self-feeder. Each ration was freshly mixed and pelleted every two or three weeks. Composition of the rations is listed in Table 18.

Observations

Results are reported here primarily to show that growing-finishing pigs can tolerate rather high levels of these materials without serious effects. None of the additives had an apparent effect on the blood serum vitamin A level. Pigs consuming 4 percent urea in their diet made the highest average daily gain.

1. Department of Biochemistry, K.S.U.

Table 23

Dietary $NaNO_2$, NaCl, K_2SO_4 and urea for growing-finishing pigs. (Feeding period started December 10, 1963, and ended February 27 or March 3, 1964.)

Treatment[2]	Control	+1.3% $NaNO_2$	+4% $NaNO_2$	+4% NaCl	+1% K_2SO_4	+1% urea
Ration No.	67	67-A	67-E	67-C	67-D	67-B
No. of pigs	3[3]	4	4	3[3]	4	4
Av. on-test wt., lbs.	82	87	87	76	93	85
Av. off-test wt., lbs.	207	221	201	190	226	224
Av. daily gain, lbs.	1.50	1.63	1.39	1.39	1.58	1.68
Standard error	±.05	±.20	±.13	±.16	±.22	±.02
Feed efficiency, lbs.	3.94	3.83	4.01	4.14	3.80	3.78
Serum vitamin A, units per 100 ml. (at slaughter)	38.2	37.2	40.9	33.5	34.8	35.2

1. The additive replaced sorghum grain in the ration.
2. One pig died in each group. Cause of death was not related to the ration being fed.