

pound supplemental protein. There was no difference in size of follicular development or incidence of ovulation for the three different protein levels. Large follicle size averaged 12.3, 12.0, and 11.8 mm. in diameter for the 9% protein,  $\frac{1}{2}$  pound extra protein and 1 pound extra protein groups, respectively; while the incidence of cyclic ovulations was 100% for the three protein levels.

The following problems associated with estrus control in beef cattle remain: (1) Difficulty in detecting heat; (2) proper levels of hormone for maximum heat control, synchronization and conception rates post feeding; (3) differences in the response of cows (dry and nursing) compared with heifers; (4) an economical way of administering the hormone under range conditions.

# Swine

## Antibiotics in Swine Growing-Finishing Rations (Project 110).

B. A. Koch and Ju Tung Yu<sup>1</sup>

Antibiotics, both individually and in various combinations, are used quite extensively in swine rations. This test was designed to further determine the value of a mixture of antibiotics under specific conditions. At slaughter, stomachs of animals in this study were examined by Dr. William Griffing of the Veterinary School for evidence of gastric ulcers.

### Experimental Procedure

Pigs used were both barrows and gilts, either Duroc or Black Poland China breeds. All pigs used in the study were approximately the same age when they went on test. The heavier pigs were assigned to lots 1, 2 and 3. The slower growing pigs (runts) were assigned to lot 4. They were self-fed the basal ration listed in Table 22 while confined on a concrete floor. The ration was ground and pelleted. Water was available from automatic waterers at all times. Fog nozzles were used to keep the pigs cool during warm weather. Individual pigs were removed from the test pen when they weighed approximately 230 pounds.

### Observations

Adding a single antibiotic or a mixture of antibiotics apparently had no effect on rate of gain or feed efficiency of pigs in pens 1, 2 or 3.

1. Present address: Taipei, Taiwan, Republic of China.

Table 22

Basal ration fed to pigs receiving different amounts and different combinations of antibiotics.

Ground sorghum grain ..1544 lbs.	T.M. (5% zinc) .....	1 lb.
Soybean oil meal .....	Vit. A	
17% dehydrated alfalfa meal .....	(10,000 I.U./gm.) ....	200 gms.
60 lbs.	Vit. D	
Molasses .....	(15,000 I.U./gm.) ....	20 gms.
50 lbs.	Vit. E (20,000 I.U./lb.)..	1 lb.
Meat scraps .....	B-complex (Merck 58-A)	2-lbs.
60 lbs.	Methionine .....	2 lbs.
Fish meal .....	40 lbs.	Lyamine (20% lysine) ..
Dicalcium phosphate .....	15 lbs.	2 lbs.
Limestone .....	8 lbs.	
Salt .....	10 lbs.	

<sup>1</sup>Plus antibiotics as indicated in Table 23.

Table 23

Antibiotics in swine growing-finishing rations.

Treatment .....	No antibiotic	Aureomycin <sup>1</sup> 5 mgs./lb.	Combination <sup>2</sup> 30 mgs./lb.	Combination <sup>3</sup> 30 mgs./lb.
Ration number <sup>1</sup> .....	38	33	39	39
No. pigs .....	14	13 <sup>4</sup>	14	13 <sup>4</sup>
Av. initial wt., lbs. ....	77	77	79	59
Av. final wt., lbs. ....	226	236	234	223
Av. days on tests .....	74	78	74	81
Av. daily gain, lbs. ....	2.01	2.04	2.09	2.01
Av. feed efficiency, lbs. ....	309	312	318	303
Av. feed cost per cwt. gain ....	\$10.48	\$10.86	\$11.29	\$10.76

1. Antibiotics per lb. of feed: Aureomycin, 15 mgs.; Terramycin, 5 mgs.; Bacitracin, 5 mgs.; and Penicillin, 5 mgs.

2. Poor-going pigs (runts).

3. All rations were self-fed as 3/16-inch pellets.

4. One pig not used in calculating gain data.

Pigs in lot 4 gained as well and were as efficient as those in the other three lots even though they had grown more slowly before going on test. Under the conditions of this study, antibiotics did not improve the performance of healthy pigs, but slow-growing pigs apparently responded to antibiotics in their ration. Doctor Griffing found evidence of gastric ulcers in pigs from all groups.

**Corn vs. Sorghum, Pellets vs. Meal, and Soybean Oil Meal vs. a Mixed Protein for Growing-Finishing Pigs (Project 110).**

B. A. Koch

Growing-finishing pigs, confined and fed on concrete, were used in a factorial-type experiment designed to study several problems at one time.

**Experimental Procedure**

One hundred forty feeder pigs weighing approximately 60 to 80 pounds each and averaging 12 weeks of age were randomly divided by weight into groups of 14 pigs each. The pigs had been vaccinated previously for hog cholera and had been wormed with piperazine. All pigs had been on concrete from birth and they had been raised under complete confinement.

Each group of 14 pigs was placed in a pen 7 feet wide by 28 feet long with 16 feet of the pen under roof. Complete rations, either meal or pellets, were self-fed. An all-steel three-hole self-feeder was used in each pen. Water was always available from automatic waterers. Fog

Table 24

Basal rations fed to growing-finishing pigs in comparing corn vs. sorghum grain, pelleted vs. meal rations, and soybean oil meal vs. a mixture of proteins.<sup>1,2</sup>

Ration no. ....	30, 31, 32, 33	39, 40	34, 35	36, 37
Corn or sorghum, lbs. ....	1,544	1,544	1,522	1,824
Soybean oil meal, lbs. ....	202	202	403	318
Dehydrated alfalfa meal, lbs. ....	60	60		
Molasses, lbs. ....	50	50		
Meat scraps, lbs. ....	60	60		
Fish meal, lbs. ....	40	40		
Dicalcium phosphate, lbs.	15	15	20	24
Limestone, lbs. ....	8	8	20	16
Salt, lbs. ....	10	10	10	10
Trace-mineral (5% zn.), lbs. ....	1	1	1	1
Vitamin A, I.U. ....	2,000,000	2,000,000	3,000,000	3,680,000
Vitamin D, I.U. ....	300,000	300,000	300,000	150,000
Vitamin E, I.U. ....	20,000	20,000		20,000
B-complex supplement, lbs. <sup>2</sup> .....	2	2	2	2
D-L Methionine, lbs. ....	2	2		
Lysine (20% lysine), lbs. ....	2	2		
Aurofac 1.8-1.8, lbs. ....	6		6	6
Anreomycin, gms. ....		30		
Terramycin, gms. ....		10		
Bacitracin, gms. ....		10		
Penicillin, gms. ....		10		

1. All rations prepared by the Department of Flour and Feed Milling Industries.

2. All rations fed as 3/16-inch pellets.

3. Monek 58-A: 2.0 gms. riboflavin; 6.0 gms. niacin; 3.68 gms. D-pantothenic acid; and 20.0 gms. choline chloride per pound of supplement.

Table 25  
Data from comparisons of corn vs. sorghum, pellets vs. meal, and soybean oil meal vs. mixed protein for growing-finishing pigs.

Ration no. ....	30	31	32	33	34	35	36	37	39	40
Crude protein level, % .....	16.6	16.1	16.1	16.2	17.5	17.7	15.4	14.8	16.4	16.0
Pen no. ....	1	2	3	4	5	6	7	8	12	13
Grain Preparation .....	Corn Pellet	Corn Meal	Sorghum Meal	Sorghum Pellet	Corn Meal	Sorghum Meal	Corn Pellet	Sorghum Pellet	Sorghum Pellet	Sorghum Meal
No. of pigs .....	13 <sup>1</sup>	14	14	14	13 <sup>1</sup>	13 <sup>1</sup>	13 <sup>1</sup>	14	13 <sup>1</sup>	14
Av. on-test wt., lbs. ....	69	69	75	74	71	76	75	82	59	58
Av. off-test wt., lbs. ....	226	231	229	225	236	227	231	230	223	217
Av. days on test .....	79	85	81	77	79	80	74	73	81	88
Av. daily gain, lbs. ...	1.99	1.90	1.91	1.97	2.01	1.89	2.11	2.12	2.01	1.81
Standard error of mean .....	±0.04	±0.06	±0.05	±0.06	±0.06	±0.07	±0.08	±0.08	±0.04	±0.06
Av. feed efficiency, lbs. ....	325	353	363	326	330	341	311	302	333	351
Av. cost per cwt. gain .....	\$11.02	\$11.58	\$12.27	\$11.34	\$ 9.90	\$10.50	\$ 9.67	\$ 9.63	\$10.76	\$12.11
Feed cost per ton ....	67.60	65.60	67.60	69.60	60.00	61.60	62.20	63.80	71.00	69.00

1. One pig not used in calculating gain data.