CHLORTETRACYCLINE AND PROTEIN LEVEL IN RATIONS FOR MARKET HOGS

II. EFFECT ON CARCASS QUALITY¹

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ABSTRACT

Three trials, with a total of 20 pigs on each of eight treatments, were conducted to determine the effect, on carcass quality of Yorkshire pigs, of self-feeding rations of low, medium, standard, and high protein content, with and without chlortetracycline (aureomycin), from weaning to market weight. The approximate protein levels were 13, 15, 17, and 19 per cent from weaning to 70 lb.; 12, 13.5, 14.5, and 15.5 per cent from 70 to 130 lb.; and 11, 12, 12.5, and 13 per cent from 130 to 200 lb.

Aureomycin had no significant effect on length of carcass, or on the area of the eye of lean, at any of the four levels of protein tested. Aureomycin significantly increased the depth of backfat, but not shoulder or loin fat, at all protein levels. With the type of pigs used this increase did not have any adverse effect on grades.

Protein level had no significant effect on length of carcass, depth of shoulder fat, or depth of backfat. As protein level increased, increases in the area of the eye of lean occurred.

INTRODUCTION AND REVIEW OF LITERATURE

The thickness of backfat on bacon hogs is one of the most important factors determining carcass grade in Canada and any factor which might cause an increase in backfat thickness needs consideration. There is some evidence that antibiotics in swine rations indirectly cause an increase in backfat thickness.

Vestal (9) and Bowland *et al.* (2) reported that hogs fed aureomycin had thicker backfat than those not fed aureomycin. Beacom² reported less definite effects in trials with different levels of each of three kinds of antibiotics.

Some investigators have fed antibiotics during the first stages of the pig's growth (to approximately 125 pounds) and then eliminated them from the finishing ration. Vestal (10) found that in this way aureomycin-fed hogs slaughtered at 224 pounds showed only slightly increased backfat thickness over control pigs. Bowland and McElroy (3) also found no adverse effect on carcass quality when antibiotic feeding was stopped at 75 or 125 pounds.

Terrill *et al.* (8) feeding streptomycin, and Heidebrecht *et al.* (4) feeding penicillin, found no adverse effect on carcass quality due to antibiotic supplementation of the ration during the later stages of growth.

Wallace *et al.* (11) found that the removal of an antibiotic from rations of growing-fattening swine resulted in a significant slowing of gains and a reduction in feed efficiency, while a reduction of 50 per cent in aureomycin did not seriously interfere with the pig's performance.

¹ Contribution from Division of Animal and Poultry Science, Experimental Farms Service, Canada Department of Agriculture.

² Beacom, S. E. Animal Husbandry Annual Reports. Can. Dept. Agr. Experimental Farms Service, Melfort, Sask., 1953, 1954, and 1955.

Robinson *et al.* (6) found that increasing the protein content of the ration increased the percentage of primal and lean cuts while backfat thickness decreased. Wilson *et al.* (12) found that pigs receiving rations of higher protein content produced leaner carcasses. At the high protein level (18 per cent) the addition of aureomycin alone or in combination with vitamin B₁₂ did not increase carcass leanness. However, the addition of aureomycin to rations of medium and low protein content resulted in increased leanness.

The purpose of the experiment reported here was to determine the effects of protein level and chlortetracycline (aureomycin) supplementation on the carcass quality of purebred Yorkshire market hogs fed rations composed of typical Western Canada feeds.

MATERIALS AND METHODS

Rations based on oats and barley and fortified with minerals and vitamins were supplemented with varying amounts of meat meal and linseed oil meal, to give crude protein levels (per cent) as follows:

	Low	Medium	Standard	High
Weaning to 70 lb.	13.4	15.3	17.3	19.1
70 to 130 lb.	12.2	13.6	14.5	15.3
130 to 200 lb.	11.2	11.9	12.6	13.0

Each protein level was fed with and without aureomycin. The ration formulae and other details of the experiment have been reported (1).

All pigs were marketed individually upon reaching a weight of 200 pounds or as close to this weight as was possible. In addition to receiving a commercial grade, all carcasses were measured for length, backfat thickness, balance, and area of loin according to A.R. Standards (5) by the officers of the Production Service of the Canada Department of Agriculture.

Analysis of variance was carried out on the carcass data according to the method of Snedecor (7).

RESULTS AND DISCUSSION

Effects on Carcass Quality

The results of the various treatments on carcass characteristics are presented in Table 1. In order that comparisons may be made between rates of gain and carcass characteristics, the over-all average daily gain and feed efficiency figures are given at the bottom of the table. Differences necessary for statistical significance at $P = .05$ and $P = .01$ are shown for the more important carcass characteristics.

The data show that the length of carcass was unaffected by either protein level or aureomycin supplementation. Depth of shoulder, back, and loin fat was not significantly affected by protein level of the ration. While not significantly affecting depth of either shoulder or loin fat aureo-

TABLE 1.—THE EFFECT OF PROTEIN LEVEL AND AUREOMYCIN SUPPLEMENTATION ON CARCASS QUALITY OF MARKET HOGS

Treatment	Low protein	Low protein + Aureomycin	Medium protein	Medium protein + Aureomycin	Standard protein	Standard protein + Aureomycin	High protein	High protein + Aureomycin	Necessary difference	
									P = .05	P = .01
Number of carcasses	20	20	20	20	20	20	20	19*		
Av. final liveweight (lb.)	200	200	199	200	201	201	202	200		
Hot dressed weight (lb.)	152	153	153	154	153	154	153	154		
Dressing percentage	76.0	76.5	76.9	77.0	76.1	76.6	75.7	77.0		
Av. length of side (in.)	31.1	30.8	31.3	31.0	31.2	31.1	31.0	30.9		
Depth of backfat (in.)										
Shoulder	1.69	1.68	1.59	1.71	1.66	1.69	1.65	1.69		
Back	.76	.83	.74	.84	.73	.80	.77	.84		
Loin	1.35	1.31	1.25	1.32	1.23	1.36	1.34	1.33	.07	.09
Total ("Fat Index")	3.80	3.82	3.58	3.87	3.62	3.85	3.76	3.86	.20	.25
Area of eye of lean (sq. in.)	3.21	3.37	3.63	3.56	3.76	3.62	3.76	3.71	.23	.28
Hams (% of cuts)	25.0	24.6	25.2	25.1	25.2	25.2	25.2	24.9		
Market Grade										
A	14	16	19	13	16	15	18	16		
B ₁	6	4	1	7	4	5	2	3		
Over-all av. daily gain (lb.)	1.29	1.40	1.26	1.41	1.27	1.50	1.41	1.48		
Over-all feed req d/lb. gain (lb.)	4.45	4.06	4.27	3.93	4.11	3.92	4.13	3.96		

* One barrow died during shipment.

mycin did significantly (and consistently) increase the depth of back fat at all protein levels tested. However, with the type of pigs used in this experiment, this increase (about 9 per cent) was not sufficient to have any adverse effect on grades.

Protein level was found to have a highly significant effect on the cross-sectional area of the "eye" of lean. On aureomycin supplemented rations areas of loin were 3.37, 3.56, 3.62 and 3.71 square inches, for carcasses of pigs fed the low, medium, standard, and high protein rations respectively. "Standard" and "high" carcasses had significantly greater loin area than the "low" carcasses, while the difference between "low" and "medium" carcasses approached significance.

Corresponding loin areas on the carcasses of pigs fed no aureomycin were 3.21, 3.63, 3.76 and 3.76 square inches. "Medium", "standard", and "high" carcasses did not differ significantly from each other in area of loin, but all were significantly greater than the "low protein" carcasses.

The data show that increasing protein level produced leaner carcasses, but the addition of aureomycin at any of the protein levels tested did not result in leaner carcasses. These results do not agree entirely with the findings of Wilson *et al.* (12), but the low protein ration (13.4-12.1-11.2) in this experiment would average somewhat higher in protein content than the lowest protein ration (14-11-9.5) used by Wilson.

Under the economic conditions existing during these experiments the use of aureomycin resulted in greater net market returns per pig at all protein levels. The greatest net returns per pig were from pigs fed the low protein ration plus aureomycin.

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REFERENCES

1. Beacom, S. E. Chlortetracycline and protein level in rations for market hogs. I. Effect on rate of gain and efficiency of feed utilization. *Can. J. Animal Sci.* 39: 71-78. 1959.
2. Bowland, J. P., S. E. Beacom, and L. W. McElroy. Animal protein factor and antibiotic supplementation of small grain rations for swine. *J. Animal Sci.* 10: 629-639. 1951.
3. Bowland, J. P., and L. W. McElroy. Antibiotic feed supplement and carcass quality in Yorkshire pigs. Rept., 31st Annual Feeder's Day, Dept. of Animal Sci., University of Alberta, Edmonton, Alta. 1952.
4. Heidebrecht, A. A., O. B. Ross, C. K. Whitehair, and R. W. McVicar. The effect of various levels of penicillin upon growth of pigs. *Oklahoma Agr. Expt. Sta. Misc. Pub. M.P. 2272.* 1951.
5. National Bacon Hog Policy. Record of Performance and Advanced Registry for Purebred Swine. Production Service, Can. Dept. Agr., Ottawa. 1954.
6. Robinson, W. L., L. E. Kunkle, and V. R. Cahill. The influence or relation of various factors on or to the yields of pork cuts. *Ohio Agr. Expt. Sta. Dept. of Animal Sci. Mimeo.* 78. 1952.

7. Snedecor, G. W. Statistical methods. 4th ed. Iowa State College Press, Ames, Iowa. 1946.
8. Terrill, S. W., R. O. Nesheim, and J. L. Krider. Comparison of solvent soybean oil meals and the effect of dried whey products and antibiotics in drylot ration for pigs. *J. Animal Sci.* 10:828-836. 1951.
9. Vestal, C. M. The effect of an APF-aureomycin supplement in swine rations. Purdue Univ. Agr. Expt. Sta. Mimeo. 51. 1950.
10. Vestal, C. M. Effect of a vitamin B₁₂ antibiotic supplement on the fattening of hogs. Purdue Univ. Agr. Expt. Sta. Mimeo. AH. 65. 1951.
11. Wallace, H. D., L. T. Albert, W. A. Mey, G. E. Combs, and T. J. Cunha. Effects of reducing and discontinuing aureomycin supplementation during the growing-fattening period of pigs fed corn-peanut meal, corn-soybean meal, and corn-cottonseed meal ration. *J. Animal Sci.* 12:316-321. 1953.
12. Wilson, S. D., J. E. Burnside, R. W. Bray, P. H. Phillips, and R. H. Grummer. Pork carcass value as affected by protein level and supplementation with aureomycin and vitamin B₁₂. *J. Animal Sci.* 12:291-296. 1953.