

EFFECTS OF FEEDING DIETS CONTAINING  
AVOPARCIN TO GROWING PIGS  
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The use of antibiotics to improve the growth rate and feed conversion of apparently healthy animals was pioneered by American Cyanamid Company over 30 years ago. The subsequent use of AUREOMYCIN\* chlortetracycline for low-level supplementation of livestock and poultry feeds has achieved remarkable success worldwide. Despite the success of this product, Cyanamid has continued to search for new ways to improve animal productivity to meet the changing needs of the livestock producers. This effort has led to the introduction of AVOTAN\* avoparcin, a growth promoting feed antibiotic with many characteristics that make it uniquely suitable for use in livestock and poultry feeds. Avoparcin is a glycopeptide antibiotic with a molecular weight of approximately 1900. It has demonstrated antibacterial activity against Gram-positive bacteria in *in vitro* studies, but was inactive against Gram-negative organisms when tested at levels up to 100 ug/ml. The results of *in vitro* and *in vivo* studies have shown that even transient resistance of microorganisms to avoparcin is acquired slowly and with difficulty, and it is not possible to demonstrate a significant degree of cross resistance between avoparcin and other major antibiotics used in animal or human medicine. Avoparcin exhibits a wide margin of safety and is virtually unabsorbed from the gastrointestinal tract so that residues do not occur in animal tissues. It has been developed solely for use in animals and will not be used in human medicine.

From this general background we want to move specifically to the use of avoparcin in growing pigs. Our research has shown that avoparcin over the dose range of 10 to 40 ppm is highly effective for improving the performance of starting-growing pigs up to approxima

tely 40 kg live weight. The results of seven preliminary dose titration trials comparing 0, 10 and 20 ppm avoparcin are summarized in table 1. These trials involved pigs with starting and finishing weights of approximately 18 and 40 kg, respectively, fed conventional starting/growing rations. There were a total of 59 replicates providing 434 pigs per treatment.

The results show that avoparcin at 10 ppm improves average daily gain and feed efficiency by 3.5 and 2.5%, respectively ( $P < 0.05$ ). The response at 20 ppm is even greater ( $P < 0.05$ ), giving 8.8 and 6.2% improvements in daily gain and feed efficiency, respectively, compared to control.

Further work has shown that the best performance improvements in young pigs is obtained with 40 ppm avoparcin. This is demonstrated by the results of five trials summarized in Table 2, utilizing 254 pigs in 54 replicates per treatment. These studies compared 0, 20 and 40 ppm avoparcin in the feed of pigs over the range of 15 to 30 kg live weight.

The data from these trials show that 40 ppm avoparcin provided significantly higher average daily gains than 20 ppm avoparcin (506 vs 488 g/day;  $P < 0.05$ ), and that pigs on these treatments gained 13.5 and 9.4% better, respectively, than controls. ( $P < 0.05$ ). The 40 and 20 ppm levels significantly improved feed conversion by 11.3 and 9.1%, respectively, compared to the control group, ( $P < 0.05$ ), but the difference between the two avoparcin levels was --

not significant ( $P > 0.10$ ).

The results of these studies show that avoparcin at 10 to 40 ppm in the ration will improve the performance of starting-growing pigs with the optimal response obtained at the 40 ppm level.

In addition to performance trials, studies have been conducted to determine the effect of avoparcin on nutrient utilization in swine. In a Swiss study, 16 pigs averaging 10 kg were divided into two uniform groups and individually fed an 18.8% protein grower feed. The diet of one group was medicated with 30 ppm avoparcin while the other group served as control. After an adaptation to treatment, total fecal collections were made to determine organic matter, energy and crude protein digestibilities. The results in Table 3 show that the apparent digestibility of crude protein was increased 5.3% with avoparcin ( $P < 0.05$ ). Both organic matter and energy digestibilities showed small but nonsignificant improvements.

A similar study in England provided measurements on nitrogen retention in addition to nutrient digestibility. Two similar groups of 12 pigs averaging 40 kg live weight were used in this study. The pigs were individually fed a 19% crude protein grower ration containing either 0 or 20 ppm avoparcin. As in the previous study protein (nitrogen) digestibility was significantly increased ( $P < 0.05$ ) in the pigs receiving avoparcin (Table 4). In addition, nitrogen retention was increased by 5.1%.

The effects of both protein quality and avoparcin on nitrogen utilization were evaluated in a study in Germany. The trial included two levels of lysine-0.68% and 0.86%-factorialized across two avoparcin treatments - 0 to 40 ppm. The rations contained approximately 18.2% total crude protein. Twenty pigs averaging 12 kg live weight were randomly allotted to the four dietary treatments and individually fed in balance pens. After a 13 day pre-treatment period, total collections were made for 10 days.

The results of this study are summarized by treatment main effects in Table 5. As expected, lysine level had a marked effect on nitrogen balance with nitrogen retention significantly reduced ( $P < 0.05$ ) by the low lysine ration. Fecal nitrogen excretion was not affected but urinary nitrogen losses were 37% higher with the low lysine level. Avoparcin at 40 ppm increased nitrogen by an average of 3.9%. There was no significant interaction between avoparcin and lysine levels although avoparcin tended to show a greater response on the low lysine ration. Avoparcin tended to reduce both fecal and urinary nitrogen losses in this trial.

The results of this research show that avoparcin is highly effective for improving the performance of growing pigs. While a level of 10 ppm has been shown to provide significant responses, the data show that optimal improvements in both average daily gain and feed efficiency are achieved with 40 ppm of avoparcin in the starting-growing rations.