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Feed Additives in Swine Diets

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The use of antibiotics and synthetic antibacterial compounds for therapy and prevention of bacterial diseases as well as their use for growth promotion of swine is well known. There is a constant search for new compounds, particularly those not used for humans, that will satisfy the needs of the swine producer. This past year a new synthetic antibacterial agent has been approved by the Food and Drug Administration. This compound is carbadox and is marketed under the trade name of Mecadox. This compound has a withdrawal time of 10 weeks; therefore, it is recommended to be fed only to a weight of 75 pounds.

An experiment was conducted at the Cornbelt Research and Extension Center near Beresford, South Dakota, to determine the effectiveness of Mecadox and other feed additives fed for a 5-week period, to study the effect of withdrawal of feed additives at this time on future growth performance and to study the effect of the antibiotic tylosin when fed during the finishing period.

Experimental Procedure

Ninety pigs were allotted to three replications of five treatments for the initial 5-week study. Each of the 15 lots consisted of three barrows and three gilts. Initial weights varied among replicates and were approximately 33, 25 and 19 lb. for replicates 1, 2 and 3, respectively. The pigs were housed in a total confinement building in pens 5 feet by 16 feet.

The pigs were self-fed the basal diet shown in table 1. The feed additives that were included in the basal ration for the five treatments were as follows:

1. No additive (control)
2. 50 g Mecadox per ton
3. 100 g furazolidone (Furox) per ton
4. 100 g furazolidone, 100 g oxytetracycline and 90 g arsanilic acid (FOA) per ton
5. 100 g chlortetracycline, 100 g sulfamethazine and 50 g penicillin (ASP-250) per ton.

After 5 weeks on the above diets the pigs were reallocated within treatments from the three replicate lots of six pigs to two replicate lots of eight pigs each. One barrow and one gilt were removed from each of the five treatments in order to equalize numbers in all replicates due to the loss of four pigs during the previous 5-week treatment period. One lot of pigs from each of the five previous treatments was fed the basal diet and the other lot received the basal diet supplemented with 20 g of tylosin per ton of diet. This part of the experiment was conducted for 84 days. The average final weight of pigs was approximately 185 pounds.

## Results

Table 2 summarizes the growth performance of pigs during the initial 5-week period. The data are presented for each replicate to show differences observed due to differences in initial weights. There were significant ( $P < .01$ ) differences in average daily gains. All of the pigs fed the various feed additives grew at a faster rate than those fed the basal diet. Increases in gain were 9, 20, 20 and 27% when pigs were fed Furox, Mecadox, FOA or ASP-250, respectively. A significant difference in rates of gain was also observed between replicates as the heavier pigs grew at the fastest rate. Rate of gains for the 5-week period were 1.31, 1.09 and 0.94 lb. per day for pigs having initial weights of 33, 25 and 19 lb., respectively.

An average of about 0.3 lb. more feed was consumed daily by pigs fed the various feed additives than was consumed by pigs fed the basal diet. There also was a significant ( $P < .01$ ) difference in feed consumption between replicates. Feed/gain was not significantly different, although pigs fed FOA, ASP-250 or Mecadox were more efficient in feed conversion than those pigs fed the basal diet or the Furox-supplemented diet.

The results of the second phase of this experiment, involving feeding tylosin to pigs that had been fed the various feed additives for a 5-week period as discussed previously, is shown in table 3. There were no significant differences in daily gains, although pigs fed tylosin gained 0.07 lb. per day faster than those fed the basal diet. Pigs fed tylosin gained faster when they received a feed additive in their diet during the initial 5-week period than did pigs fed tylosin following a nonadditive diet. When the feed additive was removed from the diet after 5 weeks, there was no carry-over effect of the additive on rate of gain except for pigs that had received ASP-250 previously. These pigs gained about 0.15 lb. per day faster than the other pigs fed the basal diets from 66 to 186 pounds. Of the pigs receiving tylosin, the fastest gains were also by those pigs fed ASP-250 previously.

Previous treatment affected feed consumption during the final period. More feed was consumed daily by pigs that had previously been fed feed containing FOA or ASP-250. This might have been due, in part at least, to the fact that these pigs were heavier when placed on these diets and continued to gain faster. Thus, an increase in feed consumption would be expected. Significantly less feed per gain was required by pigs fed tylosin during the final 84-day period. Pigs fed tylosin required only 3.09 lb. of feed per lb. of gain compared to 3.33 lb. of feed for those pigs fed the basal diet.

## Summary

Ninety weanling pigs were used in an experiment to study the effects of feeding furazolidone, Mecadox, a furazolidone-oxytetracycline-arsanilic acid (FOA) mixture and a chlortetracycline-sulfamethazine-penicillin (ASP-250) mixture for 5 weeks. Eighty of these pigs were then reallocated to study the effect of the previous treatment on the response of pigs to tylosin. The experiment was terminated after 84 days on these diets when the pigs averaged 186 pounds.

A significant improvement in gain was observed during the initial 5-week period when feed additives were included in the diet. Pigs fed the diets containing additives consumed more feed daily and were more efficient in feed conversion except for the pigs fed Furox.

Pigs fed tylosin gained slightly faster and required significantly less feed/gain than pigs fed the basal diet during the period from 66 to 186 pounds. Pigs fed ASP-250 during the initial 5-week period continued to gain faster during the final 84-day period even when fed the basal diet, indicating a carry-over effect of this additive.

Table 1. Composition of Basal Diets (Percent)

|                                | First 5 weeks | 5 wk. to 125 lb. | 125 to 200 lb. |
|--------------------------------|---------------|------------------|----------------|
| Ground yellow corn             | 76.5          | 82.5             | 88.7           |
| Soybean meal (44%)             | 20.7          | 14.8             | 8.9            |
| Dicalcium phosphate            | 1.6           | 1.5              | 1.2            |
| Ground limestone               | 0.5           | 0.5              | 0.5            |
| Trace mineral salt (0.8% zinc) | 0.5           | 0.5              | 0.5            |
| Vitamin premix <sup>a</sup>    | 0.2           | 0.2              | 0.2            |

<sup>a</sup> Provided per lb. of diet: vitamin A, 1500 IU; vitamin D, 200 IU; riboflavin, 1.25 mg; pantothenic acid, 5 mg; niacin, 10 mg; choline, 50 mg and vitamin B<sub>12</sub>, 7.5 mcg.

Table 2. Growth Performance of Pigs Fed Feed Additives for a Five Week Period<sup>a</sup>

|       | Control  | Mecadox | Furox | FOA  | ASP-250 | Replicate average |
|-------|--|---------|-------|------|---------|-------------------|
|       | <u>Average daily gain, lb.<sup>b</sup></u>       |         |       |      |         |                   |
| Rep 1 | 1.09   | 1.36    | 1.34  | 1.36 | 1.40    | 1.31              |
| Rep 2 | 0.95   | 1.15    | 0.97  | 1.12 | 1.29    | 1.09              |
| Rep 3 | 0.87   | 0.96    | 0.87  | 1.02 | 1.00    | 0.94              |
| Avg.  | 0.97   | 1.16    | 1.06  | 1.16 | 1.23    |                   |
|       | <u>Avg. daily feed consumed, lb.<sup>c</sup></u> |         |       |      |         |                   |
| Rep 1 | 2.95   | 3.22    | 3.38  | 3.28 | 3.18    | 3.20              |
| Rep 2 | 2.39   | 3.03    | 2.47  | 2.80 | 2.92    | 2.72              |
| Rep 3 | 2.08   | 2.07    | 2.45  | 2.16 | 2.33    | 2.22              |
| Avg.  | 2.47   | 2.77    | 2.77  | 2.74 | 2.81    |                   |
|       | <u>Feed/gain</u>                                 |         |       |      |         |                   |
| Rep 1 | 2.71   | 2.36    | 2.53  | 2.41 | 2.27    | 2.46              |
| Rep 2 | 2.50   | 2.66    | 2.53  | 2.50 | 2.27    | 2.49              |
| Rep 3 | 2.39   | 2.15    | 2.79  | 2.14 | 2.32    | 2.36              |
| Avg.  | 2.53   | 2.39    | 2.62  | 2.35 | 2.29    |                   |

<sup>a</sup>Six pigs per lot, avg. initial wt., 33, 25 and 19 lb. for replicates 1, 2 and 3, respectively.

<sup>b</sup>Significant treatment and replicate differences (P<.01).

<sup>c</sup>Significant replicate differences (P<.01).

Table 3. Effect of Tylosin on Growth Performance of Pigs<sup>a</sup>

| Previous treatment                               | Control | Mecadox | Furox | FOA  | ASP-250 | Replicate average |
|--|---------|---------|-------|------|---------|-------------------|
| <u>Average daily gain, lb.</u>                   |         |         |       |      |         |                   |
| Basal diet                                       | 1.36    | 1.35    | 1.33  | 1.40 | 1.53    | 1.39              |
| Tylosin (20 g/ton)                               | 1.38    | 1.46    | 1.43  | 1.50 | 1.54    | 1.46              |
| Avg.   | 1.37    | 1.40    | 1.38  | 1.45 | 1.53    |                   |
| <u>Avg. daily feed consumed, lb.<sup>b</sup></u> |         |         |       |      |         |                   |
| Basal diet                                       | 4.51    | 4.46    | 4.37  | 4.90 | 5.04    | 4.66              |
| Tylosin (20 g/ton)                               | 4.26    | 4.39    | 4.29  | 4.93 | 4.72    | 4.52              |
| Avg.   | 4.38    | 4.45    | 4.33  | 4.92 | 4.88    |                   |
| <u>Feed/gain<sup>c</sup></u>                     |         |         |       |      |         |                   |
| Basal diet                                       | 3.34    | 3.24    | 3.28  | 3.50 | 3.30    | 3.33              |
| Tylosin (20 g/ton)                               | 3.09    | 3.00    | 3.01  | 3.27 | 3.08    | 3.09              |
| Avg.   | 3.20    | 3.17    | 3.15  | 3.39 | 3.19    |                   |

<sup>a</sup>Eight pigs per lot, avg. initial wt., 66 lb., avg. final wt., 186 lb.  
<sup>b</sup>Significant (P<.01) difference due to previous treatment.  
<sup>c</sup>Significant (P<.01) difference due to tylosin.