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## The effects of different feed-grade antibiotics on growth performance of weanling pigs in a research environment

### Abstract

A total of 168 weanling pigs (initially 13.8 lb and 21  $\pm$  3 d of age, PIC) were used to determine the effects of different feed-grade antibiotics on nursery-pig performance. Pigs were fed one of four experimental diets: control with no antibiotics; or the control diet with added Denagard/CTC (35 g/ton Denagard<sup>®</sup>, 400 g/ton Chlortetracycline); Neo-Terramycin<sup>®</sup> (140 g/ton Neomycin Sulfate, 140 g/ton Oxytetracycline HCl); or Mecadox<sup>®</sup> (Carbadox, 50 g/ton). Overall (d 0 to 28 after weaning), pigs fed diets containing Denagard/ CTC or Neo-Terramycin<sup>®</sup> had greater ADG and ADFI ( $P < 0.05$ ) than did pigs fed all other diets, and had improved F/G ( $P < 0.05$ ), compared with that of pigs fed the control diet. Also, pigs fed diets containing Mecadox<sup>®</sup> had improved ADG and F/G ( $P < 0.05$ ) compared with those of pigs fed the control diet. The addition of feed-grade antibiotics in swine diets resulted in improved growth performance, and pigs fed Denagard/CTC or Neo-Terramycin<sup>®</sup> had the greatest improvement in growth performance.; Swine Day, 2004, Kansas State University, Manhattan, KS, 2004

### Keywords

Swine day, 2004; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 940; Kansas Agricultural Experiment Station contribution ; no. 05-113-S; Swine; Nursery pigs; Antibiotics; Growth; Pigs

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## THE EFFECTS OF DIFFERENT FEED-GRADE ANTIBIOTICS ON GROWTH PERFORMANCE OF WEANLING PIGS IN A RESEARCH ENVIRONMENT

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### Summary

A total of 168 weanling pigs (initially 13.8 lb and  $21 \pm 3$  d of age, PIC) were used to determine the effects of different feed-grade antibiotics on nursery-pig performance. Pigs were fed one of four experimental diets: control with no antibiotics; or the control diet with added Denagard/CTC (35 g/ton Denagard™, 400 g/ton Chlortetracycline); Neo-Terramycin® (140 g/ton Neomycin Sulfate, 140 g/ton Oxytetracycline HCl); or Mecadox® (Carbadox, 50 g/ton). Overall (d 0 to 28 after weaning), pigs fed diets containing Denagard/CTC or Neo-Terramycin® had greater ADG and ADFI ( $P < 0.05$ ) than did pigs fed all other diets, and had improved F/G ( $P < 0.05$ ), compared with that of pigs fed the control diet. Also, pigs fed diets containing Mecadox® had improved ADG and F/G ( $P < 0.05$ ) compared with those of pigs fed the control diet. The addition of feed-grade antibiotics in swine diets resulted in improved growth performance, and pigs fed Denagard/CTC or Neo-Terramycin® had the greatest improvement in growth performance.

(Key Words: Nursery Pigs, Antibiotics, Growth, Pigs.)

### Introduction

The use of feed-grade antibiotics in nursery-pig diets has long been recognized as a

method to improve growth performance and health. For many years, the research facility at the Kansas State University Swine Teaching and Research Center has almost exclusively used Mecadox® (Carbadox, 50 g/ton) in all nursery pig diets. But data published in the Swine Day 2003 report indicated that pigs fed Mecadox® in a commercial research facility did not have improved growth performance, compared with performance of those fed a diet without feed-grade antibiotics. This commercial research facility had almost exclusively used Mecadox® in nursery diets for several years. Therefore, we conducted this trial to evaluate the effectiveness of our current feed-medication protocol and compare the effects of different antibiotic feed additives on nursery-pig growth performance.

### Procedures

A total of 168 weanling pigs (initially 13.8 lb and  $21 \pm 3$  d of age, PIC L326 x C22) were blocked by initial weight and randomly allotted to one of four dietary treatments. There were six pigs per pen and seven pens per treatment. All pigs were fed treatment diets for 28 d after weaning. There were four experimental diets: a control diet with no added feed grade antibiotics, or the control diet with added Denagard/CTC (35 g/ton Denagard™, 400 g/ton Chlortetracycline); Neo-Terramycin® (140 g/ton Neomycin Sulfate, 140

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<sup>1</sup>Food Animal Health and Management Center.

g/ton Oxytetracycline HCl); or Mecadox<sup>®</sup> (Carbadox, 50 g/ton).

Dietary treatments were fed in meal form (Table 1). Phase 1 (d 0 to 14 after weaning) diets were formulated to contain 1.41% true-ileal-digestible (TID) lysine, 0.90% Ca, and 0.52% available phosphorus. Phase 2 (d 14 to 28 post weaning) diets were formulated to contain 1.31% TID lysine, 0.85% Ca, and 0.42% available phosphorus. The trial was conducted in an environmentally controlled nursery facility at the Kansas State University Swine Teaching and Research Center. Each pen was 5 × 5 ft and contained one self-feeder and one nipple waterer to provide ad libitum access to feed and water. Average daily gain (ADG), average daily feed intake (ADFI), and feed efficiency (F/G) were determined by weighing pigs and feeders on d 7, 14, and 28 after weaning. Data were analyzed as a randomized complete-block design with pen as the experimental unit. Analysis of variance was performed by using the MIXED procedure of SAS.

### Results and Discussion

From d 0 to 14, pigs fed diets containing Denagard/CTC or Neo-Terramycin had greater ADG ( $P<0.05$ ) than did pigs fed the non-antibiotic control diet (Table 2). Pigs fed diets containing Denagard/CTC had greater ADFI ( $P<0.05$ ), compared with that of pigs fed Mecadox<sup>®</sup>. Pigs fed diets containing Neo-Terramycin had improved F/G ( $P<0.05$ ),

compared with that of pigs fed the non-antibiotic control diet.

From d 14 to 28, pigs fed the diet containing Neo-Terramycin had the greatest ADG ( $P<0.05$ ), compared with that of pigs fed all other diets and had greater ADFI ( $P<0.05$ ) than did pigs fed diets containing Mecadox<sup>®</sup> or the non-antibiotic control diet. Also, pigs fed diets containing Neo-Terramycin had improved F/G ( $P<0.05$ ), compared with that of pigs fed diets containing Denagard/CTC or the non-antibiotic control diet.

For the overall treatment period (d 0 to 28 after weaning), pigs fed diets containing Denagard/CTC or Neo-Terramycin<sup>®</sup> had greater ADG and ADFI ( $P<0.05$ ) than did pigs fed all other diets and had improved F/G compared with that of pigs fed the non-antibiotic control diet. Pigs fed diets containing Mecadox<sup>®</sup> were intermediate in performance, and had greater ADG ( $P<0.05$ ) and improved F/G ( $P<0.05$ ), compared with that of pigs fed the non-antibiotic control diet. Numerically, pigs fed Neo-Terramycin had the greatest ADG and best F/G, compared with those of pigs fed all other diets.

The addition of antibiotics to swine diets resulted in improved growth performance, with pigs fed Denagard/CTC or Neo-Terramycin<sup>®</sup> having the greatest improvement in growth performance. On the basis of results, producers should periodically evaluate the effectiveness of their feed-additive protocol.

**Table 1. Diet Composition (As-fed Basis)**

Ingredient, %	Phase 1 <sup>a</sup>	Phase 2 <sup>b</sup>
Corn	48.14	60.00
Soybean meal, 46.5% CP	28.99	35.00
Spray dried whey	15.00	---
Select menhaden fish meal	3.75	---
Monocalcium phosphate, 21% P	1.15	1.60
Limestone	0.70	1.10
Salt	0.30	0.35
Vitamin premix	0.25	0.25
Trace mineral premix	0.15	0.15
L-Threonine	0.12	0.13
Lysine HCl	0.30	0.30
DL-Methionine	0.15	0.13
Test ingredient <sup>c</sup>	1.00	1.00
<b>TOTAL</b>	<b>100.00</b>	<b>100.00</b>
<b>Calculated Analysis</b>		
Total lysine, %	1.55	1.45
True Digestible Amino Acids		
Lysine	1.41	1.31
Isoleucine:lysine ratio, %	61	63
Leucine:lysine ratio, %	120	129
Methionine:lysine ratio, %	33	33
Met & cys:lysine ratio, %	57	57
Threonine:lysine ratio, %	65	63
Tryptophan:lysine ratio, %	17	18
Valine:lysine ratio, %	68	69
ME, kcal/lb	1,477	1,479
CP, %	21.7	21.4
Ca, %	0.90	0.85
P, %	0.80	0.75
Available P, %	0.52	0.42

<sup>a</sup>Phase 1 fed from d 0 to 14 post weaning.

<sup>b</sup>Phase 2 fed from d 14 to 28 post weaning.

<sup>c</sup>Corn starch; Denagard/CTC (35 g/ton Denagard™, 400 g/ton Chlortetracycline); Neo-Terramycin® (140 g/ton Neomycin Sulfate, 140 g/ton Oxytetracycline HCl); or Mecadox® (Carbadox 50 g/ton).

**Table 2. Effects of Different Feed-grade Antibiotics on Growth Performance of Weanling Pigs<sup>a</sup>**

Item	Dietary Treatment <sup>f</sup>				SE
	Control	Denagard/CTC	Neo-Terramycin	Mecadox <sup>®</sup>	
Day 0 to 14					
ADG, lb	0.39 <sup>c</sup>	0.48 <sup>b</sup>	0.48 <sup>b</sup>	0.42 <sup>bc</sup>	0.03
ADFI, lb	0.47 <sup>bc</sup>	0.52 <sup>b</sup>	0.50 <sup>bc</sup>	0.46 <sup>c</sup>	0.02
F/G	1.27 <sup>b</sup>	1.11 <sup>bc</sup>	1.04 <sup>c</sup>	1.10 <sup>bc</sup>	0.07
Day 14 to 28					
ADG, lb	1.06 <sup>e</sup>	1.20 <sup>c</sup>	1.28 <sup>b</sup>	1.15 <sup>d</sup>	0.02
ADFI, lb	1.43 <sup>c</sup>	1.56 <sup>b</sup>	1.58 <sup>b</sup>	1.48 <sup>c</sup>	0.04
F/G	1.35 <sup>b</sup>	1.30 <sup>c</sup>	1.24 <sup>d</sup>	1.28 <sup>cd</sup>	0.02
Day 0 to 28					
ADG, lb	0.72 <sup>d</sup>	0.84 <sup>b</sup>	0.88 <sup>b</sup>	0.79 <sup>c</sup>	0.02
ADFI, lb	0.94 <sup>c</sup>	1.04 <sup>b</sup>	1.04 <sup>b</sup>	0.97 <sup>c</sup>	0.03
F/G	1.32 <sup>b</sup>	1.24 <sup>c</sup>	1.18 <sup>c</sup>	1.23 <sup>c</sup>	0.03

<sup>a</sup>A total of 168 pigs with initial average BW of 13.8 lb.

<sup>b,c,d,e</sup>Means in the same row with different superscripts differ (P<0.05).

<sup>f</sup>Corn starch; Denagard/CTC (35 g/ton Denagard<sup>™</sup>, 400 g/ton Chlortetracycline); Neo-Terramycin<sup>®</sup> (140 g/ton Neomycin Sulfate, 140 g/ton Oxytetracycline HCl); or Mecadox<sup>®</sup> (Carbadox 50 g/ton).