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COMPARISION OF ANTIBIOTICS ON GROWTH PERFORMANCE OF WEANLING PIGS IN A COMMERICAL ENVIRONMENT[1]

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Summary

A total of 320 weanling pigs (10.7 lb and 14 ± 3 d of age, PIC) was used to determine the effects of antibiotics and an antibiotic alternative on nursery pig performance. Pigs were fed one of 5 experimental diets: 1) control with no antimicrobials; 2) carbadox (50 g/ton); 3) Denagard/CTC (35 g/ton Denagard™, 400 g/ton Chlortetracycline); 4) Neo-Terramycin® (140 g/ton Neomycin Sulfate, 140 g/ton Oxytetracycline HCl); 5) Bio Mos (0.3%, mannanoligosaccharide). Overall (d 0 to 31 post-weaning), pigs fed the diet containing Denagard/CTC had the greatest (P<0.05) ADG and ADFI compared to pigs fed all other treatment diets. Pigs fed the diet containing Neo-Terramycin had greater (P<0.05) ADG compared to pigs fed the control diet or diets containing Carbadox or Bio Mos. In addition, pigs fed the diet containing Neo-Terramycin had greater (P<0.05) ADFI compared to pigs fed the control diet or the diet containing Bio Mos. In conclusion, the addition of carbadox and Bio Mos did not result in improved growth performance compared to pigs fed the control diet. However, improvements were seen in average daily gain and daily feed intake with the addition of Denagard/CTC and Neo-Terramycin. Commercial operations need to determine which feed additives improve nursery pig performance in their individual production systems.

(Key Words: Nursery Pig, Antibiotics, Feed Additive)

Introduction

The use of feed grade antibiotics in nursery pig diets has long been recognized as a method to improve growth performance and health. Due to recent concerns with the use of subtherapeutic antibiotics, research is being conducted on different options. Current research at Kansas State University has looked at viable options with the use of yeasts, direct fed microbials and mannanoligosaccharides. Results from these trials have not shown growth performance benefits to antibiotic alternatives. Also, these same trials found inconsistent responses to the continued use of certain antibiotics in a commercial setting. Therefore, the objective of this trial was to evaluate different antibiotics and antibiotic alternatives on nursery pig performance.

Procedures

A total of 320 weanling pigs (10.7 lb and 14 ± 3 d of age, PIC) were blocked by weight and allotted to one of five dietary treatments.

[1]Appreciation is expressed to Eichman Brothers Farm (St. George, Kansas) for the use of pigs and facilities.

[2]Food Animal Health and Management Center.

There were eight pigs per pen and eight pens per treatment. The trial was conducted in an environmentally controlled nursery facility on a commercial farm in northeast Kansas. Each pen was 4 x 6 ft and contained one self-feeder and two nipple waterers to provide ad libitum access to feed and water.

All pigs were fed treatment diets from weaning to d 31. There were five experimental diets, with a control diet with no antimicrobials, or the control diet with added: carbadox (50 g/ton); Denagard/CTC (35 g/ton Denagard™, 400 g/ton Chlortetracycline); Neo-Terramycin® (140 g/ton Neomycin Sulfate, 140 g/ton Oxytetracycline HCl); Bio Mos (0.3% mannanoligosaccharide). All products were added at the manufacturers' recommended inclusion rates. Dietary treatments were fed in meal form (Table 1). Segregated Early Wean (SEW) diets, which were fed based on a feed budget of one pound per pig, were formulated to contain 1.70% lysine, 0.81% Ca, and 0.60% available phosphorus. Transition diets were fed following completion of SEW diet until d 9 post-weaning. The transition diets were formulated to contain 1.60% lysine, 0.92% Ca, and 0.59% available phosphorus. Phase II diets (d 9 to 31 post-weaning) were formulated to contain 1.51% lysine, 0.81% Ca, and 0.47% available phosphorus. These diets were formulated to similar specifications that were fed at the commercial operation. Average daily gain (ADG), ADFI, and F/G were determined by weighing pigs and measuring feed disappearance on d 9, 22, and 31 post-weaning.

Data were analyzed as a randomized complete block design with pen as the experimental unit. Pigs were blocked based on weaning weight, and analysis of variance was performed using the MIXED procedure of SAS.

Results and Discussion

From d 0 to 9, pigs fed the diet containing Denagard/CTC tended to have greater ($P<0.10$) ADG compared to pigs fed the control diet or pigs fed the diet containing Bio Mos.

From d 9 to 31 when pigs were fed phase two diets, pigs fed the diet containing Denagard/CTC had the greatest ($P<0.05$) ADG and ADFI compared to pigs fed all other diets. Also, pigs fed the diet containing Neo-Terramycin had greater ($P<0.05$) ADG and ADFI compared to pigs fed the control diet or diets containing carbadox or Bio Mos. No difference in feed efficiency was observed from d 9 to 31.

Overall (d 0 to 31 post-weaning), pigs fed the diet containing Denagard/CTC had the greatest ($P<0.05$) ADG and ADFI compared to pigs fed all other treatment diets. Pigs fed the diet containing Neo-Terramycin had greater ($P<0.05$) ADG compared to pigs fed the control diet or pigs fed diets containing carbadox or Bio Mos. In addition, pigs fed the diet containing Neo-Terramycin had greater ($P<0.05$) ADFI compared to pigs fed the control diet and pigs fed the diet containing Bio Mos. There was no difference in F/G between the dietary treatments.

As expected, no differences in pig weight variation were seen at the start of the trial due to allotment and randomization methods. However, pigs fed the diet containing Bio Mos tended to have greater ($P<0.05$) weight variation at trial completion (d 31) compared to pigs fed the control diet or diets containing Denagard/CTC or Neo-Terramycin.

In conclusion, similar to previous trials conducted at Kansas State University, the addition of a mannanoligosaccharide did not improve growth performance. Also, the use of Carbadox in this commercial operation did not improve growth performance, which agrees with previous research conducted in this facility. However, improvement in growth performance was seen in with the addition of Denagard/CTC and Neo-Terramycin. These data

confirm the importance of monitoring performance when using antibiotics or antibiotic alternatives in determining which additives are the most effective in individual operations.

Table 1. Diet Composition (As-fed Basis)

Item, %	SEW[a]	Transition[b]	Phase II[c]
Corn	40.26	41.22	50.75
Soybean meal, 46.5%	12.09	21.56	27.68
Spray died whey	25.00	25.00	10.00
Spray-dried animal plasma	6.70	2.50	-
Select menhaden fishmeal	6.00	6.00	4.50
Lactose	5.00	-	-
Spray-dried blood meal	1.65	-	-
Soy oil	-	-	3.00
Test ingredient or starch[d]	1.00	1.00	1.00
Monocalcium phosphate, 21% P	0.50	0.75	1.00
Limestone	0.40	0.50	0.55
Zinc oxide	0.38	0.38	0.25
Salt	0.25	0.30	0.30
Vitamin premix	0.25	0.25	0.25
Lysine HCl	0.15	0.20	0.30
DL-methionine	0.15	0.13	0.15
Trace mineral premix	0.15	0.15	0.15
L-threonine	0.08	0.08	0.13
	100.00	100.00	100.00
Calculated Analysis			
Lysine, %	1.70	1.60	1.51
Isoleucine:lysine ratio, %	51	60	61
Leucine:lysine ratio, %	124	121	121
Methionine:lysine ratio, %	30	32	34
Met & cys:lysine ratio, %	56	57	58
Threonine:lysine ratio, %	66	66	64
Tryptophan:lysine ratio, %	18	18	17
Valine:lysine ratio, %	73	69	68
ME, kcal/lb	1,489	1,476	1,545
CP, %	22.59	22.28	21.22
Ca, %	0.81	0.92	0.81
P, %	0.78	0.83	0.75
Available P, %	0.60	0.59	0.47

[a]One pound fed per pig. [b]Diets fed following SEW to d 9 post-weaning. [c]Diets fed from d 9 to 31 post-weaning. [d]Test ingredients replaced cornstarch at the following inclusion rates: carbadox (50 g/ton); Denagard/CTC (35 g/ton Denagard™, 400 g/ton Chlortetracycline); Neo-Terramycin® (140 g/ton Neomycin Sulfate, 140 g/ton Oxytetracycline HCl); Bio Mos (0.3% mannanoligosaccharide).

Table 2. Effects of Antibiotics and an Antimicrobial Alternative on Growth Performance of Weanling Pigs[a]

		Feed Additives[b]					
Item	Control	Carbadox	Denagard/ CTC	Neo-Terramycin	Bio Mos	SE	TRT[c]
D 0 to 9[d]							
ADG, lb	0.31[x]	0.35[xy]	0.36[y]	0.35[xy]	0.30[x]	0.024	0.070
ADFI, lb	0.40	0.45	0.46	0.42	0.41	0.025	0.110
F/G	1.32	1.31	1.30	1.23	1.35	0.060	0.317
D 9 to 31[e]							
ADG, lb	0.86[f]	0.87[f]	1.02[h]	0.95[g]	0.82[f]	0.031	0.001
ADFI, lb	1.17[f]	1.17[f]	1.38[h]	1.27[g]	1.11[f]	0.038	0.001
F/G	1.35	1.35	1.35	1.33	1.37	0.020	0.513
D 0 to 31							
ADG, lb	0.70[f]	0.71[f]	0.83[h]	0.77[g]	0.67[f]	0.025	0.001
ADFI, lb	0.95[f]	0.96[fg]	1.11[h]	1.01[g]	0.91[f]	0.032	0.001
F/G	1.35	1.34	1.34	1.32	1.36	0.019	0.196
CV, %							
D 0	0.069	0.069	0.070	0.071	0.072	0.002	0.265
D 31	0.127[y]	0.141[xy]	0.126[y]	0.117[y]	0.169[x]	0.021	0.120

[a]A total of 320 pigs initially 10.7 lb and 14 ± 3 d of age with eight pigs/ pen and eight pens/ treatment.

[b]Test ingredients replaced cornstarch at the following inclusion rates: carbadox (50 g/ton); Denagard/CTC (35 g/ton Denagard™, 400 g/ton Chlortetracycline); Neo-Terramycin® (140 g/ton Neomycin Sulfate, 140 g/ton Oxytetracycline HCl); Bio Mos (0.3% mannano-ligosaccharide).

[c]P-value represents overall treatment means.

[d]One pound of SEW budgeted per pig with transition diet then fed until d 9 post-weaning.

[e]From d 9 to 31 pigs fed phase two diet.

[fgh]Means in the same row with different superscripts differ (P<0.05).

[xy]Means in the same row with different superscripts differ (P<0.10).