COMPARISION OF ANTIBIOTICS AND ANTIMICROBIAL ALTERNATIVES ON GROWTH PERFORMANCE OF WEANLING PIGS IN A COMMERCIAL ENVIRONMENT[1]

T.P. Keegan, J.M. DeRouchey, J.L Nelssen, M.D. Tokach
R.D. Goodband, and S.S. Dritz[2]

Summary

A total of 320 weanling pigs (11.7 lb and 14 ± 3 d of age, PIC) was used to determine the effects of antibiotics and antimicrobial alternatives in diets for nursery pigs reared in a commercial environment. Pigs were fed one of 5 experimental diets: 1) control with no antimicrobials; 2) carbadox (50 g/ton); 3) Lacto-Sacc® (0.2%); 4) Bio-Plus® 2B (0.05%); or 5) Bio-Mos™(0.3%). Lacto Sacc® is a concentrated form of selected live yeast cells while Bio Plus® 2B contains two bacillus strains. Bio-Mos™ is a mannanoligosaccharide derived from yeast. Overall (d 0 to 31 post-weaning), pigs fed the control diet or diets containing Bio Mos had greater (P<0.05) ADG compared to pigs fed the diet containing Bio Plus 2B. Pigs fed the diet containing Bio Plus 2B had lower (P<0.05) daily feed intake compared to pigs fed the control diet or diets containing carbadox or Bio Mos with Lacto Sacc being intermediate in performance. There was no difference in feed efficiency among pigs fed various dietary treatments. In conclusion, in this commercial environment, the additions of carbadox or antimicrobial alternatives to the control diet were not effective in improving nursery pig performance.

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

Introduction

The effectiveness of antibiotics in improving growth rate and feed efficiency in pigs has long been recognized. However, public concern has increased in regard to the use of subtherapeutic antibiotics. Research evaluating different antimicrobial alternatives has yielded mixed results. Data on the use of yeast, direct-fed microbials (probiotic), and mannanoligosaccharides have been conflicting with some trials showing little to no improvement and others showing benefits in growth performance. Recent trials conducted at a Kansas State University research facility have shown little improvement with the use of antimicrobial alternatives in a research setting. Studying the effects on pig performance with the addition of these products in a commercial environment might be more applicable in understanding potential industry use.

Procedures

A total of 320 weanling pigs (11.7 lb and 14 ± 2 d of age, PIC) was blocked by weight

[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.

and allotted to one of five dietary treatments. 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 × 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); LactoSacc® (0.2%); Bio-Plus® 2B (0.05%); or Bio-Mos™ (0.3%). Bio Plus® 2B contains two bacillus strains, Lacto Sacc® is a concentrated form of selected live yeast, and Bio-Mos™ is a mannanoligosaccharide derived from yeast. All products were added to meet 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 to d 10 after weaning. The transition diets were formulated to contain 1.60% lysine, 0.92% Ca, and 0.59% available phosphorus. Phase II diets (d 10 to 31 post-weaning) were formulated to contain 1.51% lysine, 0.81% Ca, and 0.47% available phosphorus. These diets were formulated to match diets currently being fed at the commercial unit. Average daily gain (ADG), average daily feed intake (ADFI), and feed efficiency (F/G) were determined by weighing pigs and measuring feed disappearance on d 10, 16, 23, 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 10, there was no difference in growth parameters between pigs fed the control diet or diets containing carbadox, Lacto Sacc, Bio Plus 2B, or Bio Mos.

From d 10 to 31, pigs fed the diet containing Bio Plus 2B had lower ($P<0.05$) ADG and ADFI compared to pigs fed the control diet and pigs fed diets containing carbadox or Bio Mos. There were no differences in feed efficiency.

Overall (d 0 to 31 post-weaning), pigs fed the control diet or Bio Mos had greater ($P<0.05$) ADG compared to pigs fed the diet containing Bio Plus 2B. Pigs fed the diet containing Bio Plus 2B had lower ($P<0.05$) feed intake compared to pigs fed all other diets except pigs fed the diet containing Lacto Sacc. There were no differences in feed efficiency across all treatments.

In conclusion, the addition of antimicrobial alternatives in nursery pig diets did not result in consistent improvement in growth performance compared to the control diet. In addition, the feed additive Bio Plus 2B, resulted in poorer performance compared to the control diet. In this commercial environment, the additions of carbadox or antimicrobial alternatives to the control diet were not effective in improving nursery pig performance. Further research needs to be done to evaluate the effects of different antibiotic sources in this commercial setting.

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 10.
[c]Diets fed from d 10 to 31.
[d]Test ingredients replaced cornstarch at the following inclusion rates; carbadox (50 g/ton); LactoSacc® (0.2%); Bio-Plus® 2B (0.05%); or Bio-Mos™(0.3%).

Table 2. Effects of Antimicrobial Alternatives on Growth Performance in a Commercial Environment[a]

		Feed Additive[b]					
Item	Control	Carbadox	Lacto Sacc	Bio-Plus 2B	Bio Mos	SE	TRT[c]
D 0 to 10[d]							
ADG, lb	0.28	0.27	0.25	0.27	0.31	0.025	0.175
ADFI, lb	0.40	0.41	0.39	0.39	0.44	0.023	0.179
F/G	1.45	1.55	1.64	1.52	1.46	0.080	0.128
D 10 to 31[e]							
ADG, lb	0.90[g]	0.88[g]	0.87[fg]	0.81[f]	0.90[g]	0.032	0.045
ADFI, lb	1.19[g]	1.18[g]	1.16[fg]	1.09[f]	1.20[g]	0.036	0.035
F/G	1.32	1.35	1.32	1.35	1.33	0.022	0.606
D 0 to 31							
ADG, lb	0.70[g]	0.68[fg]	0.67[fg]	0.63[f]	0.71[g]	0.026	0.050
ADFI, lb	0.93[g]	0.93[g]	0.91[fg]	0.86[f]	0.95[g]	0.029	0.039
F/G	1.33	1.37	1.36	1.37	1.35	0.023	0.481

[a]A total of 320 pigs initially 11.7 lb. and 14 ± 3 d of age with eight pigs per pen and eight replications per treatment.

[b]Test ingredients replaced cornstarch at the following inclusion rates: carbadox (50 g/ton); LactoSacc® (0.2%); Bio-Plus® 2B (0.05%); or Bio-Mos™(0.3%).

[c]P-value represents overall treatment effect.

[d]One pound of SEW budgeted per pig with transition diet then fed until d 10.

[e]Phase two diets fed from d 10 to 31 and formulated to contain 1.51% lysine, 0.81% Ca, and 0.47% available P.

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