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Abstract

A total of 1,000 barrows were used in a 98-day trial conducted in a commercial research facility to determine the influence of a direct fed microbial with and without intermittent treatments of oxytetracycline (OTC) at 400 g/ton. The direct fed microbial was compared to a negative (no feed antimicrobial) and positive control (bacitracin methylene diasalicylate (BMD) at 30 g/ton, alternated with intermittent treatments of OTC at 400 g/ton). No significant differences between the four treatments were observed for any of the growth, efficiency, or carcass parameters evaluated. These results suggest that further work in quantifying the effects of routinely utilizing in-feed antimicrobials in the finishing period is warranted.; Swine Day, Manhattan, KS, November 15, 2001

Keywords

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EFFECTS OF A DIRECT FED MICROBIAL (DMF-4) AND IN-FEED ANTIMICROBIALS ON PIG PERFORMANCE IN A COMMERCIAL FINISHING FACILITY [1]

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Summary

A total of 1,000 barrows were used in a 98-day trial conducted in a commercial research facility to determine the influence of a direct fed microbial with and without intermittent treatments of oxytetracycline (OTC) at 400 g/ton. The direct fed microbial was compared to a negative (no feed antimicrobial) and positive control (bacitracin methylene diasalicylate (BMD) at 30 g/ton, alternated with intermittent treatments of OTC at 400 g/ton). No significant differences between the four treatments were observed for any of the growth, efficiency, or carcass parameters evaluated. These results suggest that further work in quantifying the effects of routinely utilizing in-feed antimicrobials in the finishing period is warranted.

(Key Words: Microbial, Antimicrobial, Finishing Pigs.)

Introduction

Routine use of in-feed antimicrobials in animal agriculture is currently being debated as a public health issue. This concern is due to documented transmission of antimicrobial resistant food-borne bacteria transmitted to humans. Because reduced usage of antimicrobials is known to reduce selection pressure for antimicrobial resistance, reducing usage of in-feed antimicrobials should lead to lower amounts of resistant bacteria, and theoretically a lower incidence of antimicrobial resistant food-borne bacteria transmitted to humans. Therefore, there has been growing interest in identifying non-antimicrobial alternatives for growth promotion in swine. The direct fed microbial used in this study has shown promise for promoting growth in poultry. Direct fed microbials are hypothesized to positively impact the bacterial flora of the gastrointestinal tract by the ongoing inoculation with microbes being fed. Additionally, previous research has indicated a greater growth rate response of in-feed antimicrobials in commercial farms compared to university research facilities. Therefore, our objective was to evaluate the effects of the direct fed microbial to finishing pigs in a commercial research facility.

Procedures

This experiment was conducted in a commercial finishing research facility. Forty pens (10 pens/treatment) of barrows (PIC C22 × 337) were allotted to each treatment in a randomized complete block design with an average pig weight of 99.3 lb. Pens had totally slatted floors, were 10 × 18 ft, and contained 25 pigs per pen. Each pen was equipped with a dry feeder (Staco, 50 inches in length) and a cup waterer in this double curtain sided, deep-pitted finishing barn.

The four treatments consisted of a negative control, positive control, and feeding the direct fed microbial product with and with-

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[2]Food Animal Health and Management Center.

out intermittent treatments of OTC. The negative controls (NEG) were not fed any feed antimicrobials. The positive controls (POS) were fed BMD 30 g/ton alternated with 3, 1-week doses of OTC at 400 g/ton during weeks 1, 5, and 9 of the finishing period. The direct fed microbial (DFM) product was fed continuously without any antimicrobial pulses (DFM1) at a rate of 2 lb/ton during first two phases (8 weeks) of the feeding period, and at 1 lb/ton for the last two phases of the evaluation. The direct fed microbial product also was fed continuously in conjunction with 3, 1-week intermittent doses of 0TC at 400 g/ton (DFM2). These four dietary treatments were fed in four phases (Table 1). The diets fed were corn-soybean meal diets with 6% added fat, and 3 lb of synthetic lysine in all diets. Dietary energy, lysine, mineral, and vitamin content were identical for all diets within each phase. Diets were formulated to include 1.05%, 0.85%, 0.70%, and 0.60% total dietary lysine, 0.62%, 0.61%, 0.52%, and 0.51% calcium, and 0.58%, 0.56%, 0.47%, and 0.47% phosphorus for phases 1, 2, 3, and 4 respectively.

Pigs were weighed and pen weights were obtained every 14 days. Feed delivery was recorded daily for each pen, and feed remaining at the end of each phase was removed from the feeder and weighed. This enabled feed intake and feed efficiency to be determined for each pen.

On day 84 of the trial, the four biggest pigs were removed from each pen. The weight of these pigs was used to calculate the ADG, ADFI, and F/G for each pen. However, the carcass data from these pigs was not used in the carcass analysis. The remaining pigs were weighed off-test and sold on day 98 of the trial. All pigs in each pen were identified with a unique tattoo and maintained by pen integrity through the packing plant. Thus, mean carcass characteristics were calculated for each pen. At slaughter, fat and loin depth were measured with an optical probe to calculate percent lean. Fat, loin depth, and percent lean were adjusted to a common carcass weight for statistical evaluation. Data were analyzed using GLM procedures of SAS in a randomized complete block design.

Results and Discussion

There were no significant differences ($P>0.10$) between treatments for any of the growth, intake, efficiency, or carcass parameters measured (Table 2). Performance improvements were not observed in pigs fed the DFM or the antimicrobial regimens compared to pigs fed the negative control diets without an antimicrobial.

It should be noted that this barn of pigs was diagnosed with clinical salmonellosis during phase 2 (d 29 to 56) of the experiment. *Salmonella choleraesuis* was isolated from affected pigs at necropsy. The pigs were orally vaccinated and recovered. The reduction in growth during phase 2 of this trial associated with this disease episode is evident. It appears that neither the direct fed microbial nor the antimicrobials being fed influenced the outcome of this challenge.

Intensifying pressures to reduce or eliminate the use of in-feed antimicrobials as growth promoters will continue to drive the need for the development of non-antimicrobial growth promoters. However, the direct fed microbial product did not demonstrate any impact on the growth or carcass performance measured in this trial. This trial also would suggest that further work in quantifying the effects of routinely utilizing in-feed antimicrobials in the finishing period might be warranted.

Table 1. Diet Feeding Regimen For Direct Fed Microbial Evaluation

	Treatment			
Item	Negative	Positive	DFM1	DFM2
Phase 1				
Day 0 to 7	Neg[b]	PosOTC[c]	DFM[d]	DFM & PosOTC[e]
Day 7 - 29	Neg	PosBMD[f]	DFM	DFM
Phase 2				
Day 29-36	Neg	PosOTC	DFM	DFM & PosOTC
Day 36 to 56	Neg	PosBMD	DFM	DFM
Phase 3				
Day 56 to 63	Neg	PosOTC	DFM	DFM & PosOTC
Day 63 to 84	Neg	PosBMD	DFM	DFM
Phase 4				
Day 84 to 98	Neg	BMD	DFM	DFM

[a]Three tons (24 lb/pig) of the OTC containing feed was fed at the beginning of Phase1, 2, and 3 for the POS and DFM2 treatments. This resulted in a 5 to 7 day dose of OTC containing diets being fed at the beginning of the phase. [b]Neg = No feed grade antibiotics or direct fed microbial. [c]PosOTC = Oxytetracyline at 400 g/ton. [d]DFM= Direct fed microbial. [e]DFM & PosOTC = Direct fed microbial and Oxytetracyline at 400 g/ton. [f]PosBMD = Bacitracin methylene diasalicylate (BMD) at 30 g/ton.

Table 2. Effects of a Direct Fed Microbial and Feed-Grade Antimicrobials on Growth, Efficiency, and Carcass Performance

	Treatment					
Item[a]	NEG	POS	DFM1	DFM2	SEM	P-Value
Average Weights, lb						
Day 0	99.4	99.1	99.2	99.5	0.39	0.84
Day 29	158.5	156.7	157	157.3	0.83	0.45
Day 56	205.1	202.8	202.3	200.9	1.53	0.3
Day 84	252.6	249.9	247.6	252.2	1.53	0.10
Day 98	270.8	266.3	268.5	266.4	2.25	0.46
Phase I, 0 to 29						
ADG, lb	2.03	1.98	1.99	1.99	0.02	0.42
ADFI, lb	4.45	4.45	4.45	4.45	0.11	0.99
F/G	2.21	2.26	2.25	2.26	0.05	0.88
Phase II, d 29 to 56						
ADG, lb	1.70	1.66	1.62	1.59	0.05	0.45
ADFI, lb	4.87	5.00	4.93	5.00	0.10	0.73
F/G	2.87	3.01	3.07	3.19	0.09	0.12
Phase 3 & 4, d 56 to 98[b]						
ADG, lb	1.64	1.61	1.65	1.69	0.02	0.11
ADFI, lb	5.54	5.37	5.40	5.38	0.09	0.54
F/G	3.38	3.34	3.29	3.18	0.06	0.18
Total (Day 0 - 98)						
ADG, lb	1.78	1.74	1.75	1.75	0.02	0.48
ADFI, lb	5.02	4.98	4.98	5.00	0.08	0.98
F/G	2.82	2.87	2.85	2.85	0.04	0.92
Carcass Data:						
% Yield[c]	75.5	74.7	75.2	75.0	0.3	0.32
Carcass wt, lb[d]	201.7	197	199.5	198.4	1.73	0.29
Backfat, in[d]	0.76	0.75	0.75	0.76	0.01	0.97
Loin depth, in[d]	2.15	2.17	2.17	2.14	0.02	0.61
% Lean[d]	53.6	53.8	53.8	53.6	0.2	0.84

[a]Each number is the mean of 10 pens (initially 25 barrows/pen). [b]Growth performance information for phases 3 and 4 were combined due to the short duration of the phase 4 feeding period. [c]Yield was calculated utilizing the live pen weights attained at the slaughter plant. [d]Backfat, loin depth, and percent lean were adjusted to a common carcass weight.