Table 184.

Item	Control	RAC	ZnO, ppm Zn			Availa-Zn, ppm Zn			SEM
			75	150	225	75	150	225	
ADG, kg	1.04	1.15	1.16	1.17	1.17	1.15	1.14	1.12	0.03
G:F	0.311	0.365	0.373	0.371	0.369	0.373	0.365	0.367	0.014
HCW, kg	99.0	101.7	102.5	101.7	102.8	101.9	101.7	101.0	1.3

20 pens per treatment. Treatments included a corn-soybean meal diet (0.66% SID Lys), a diet (0.92% SID Lys) with 10 ppm RAC, or the RAC diet plus 75, 150, and 225 ppm added Zn from ZnO or Availa-Zn (Zinpro, Eden Prairie, MN). All diets contained 55 ppm Zn from $ZnSO_4$. Mucosal swabs were collected (16 pigs/treatment) to determine mRNA expression of inflammatory cytokines. Pigs fed the RAC diet had increased ($P < 0.05$) ADG, G:F, HCW, loin depth, percentage lean, and liver weights compared with pigs fed the control diet. No Zn level or source effects or level × source interactions were observed for growth performance. However, pigs fed RAC diets with added Zn from ZnO had numerically heavier ($P = 0.09$) liver weights than pigs fed added Zn from Availa-Zn. A Zn level × source interaction (quadratic, $P = 0.02$) was observed in liver Zn concentrations, resulting from liver Zn concentrations plateauing at 150 ppm of added Zn from ZnO, but a linear increase when adding Zn from Availa-Zn. There was no difference in Zn concentrations in the loin. The only difference for plasma Zn was that pigs fed RAC diets with added Zn had increased (linear, $P < 0.02$) plasma Zn levels on d 18 and 32. The expression of *IL-1β* was increased ($P = 0.01$) in mucosa of pigs fed the RAC diet compared to those fed the control diet. Expression of *IL-1β* decreased (linear; $P = 0.03$) in the mucosa of pigs fed increasing levels of added Zn. There were no differences in *IL-8* or *TNF*-α relative expression. In conclusion, additional Zn increased plasma Zn and reduced *IL-1β* but did not improve growth performance of pigs fed diets containing RAC.

Key Words: finishing pigs, ractopamine HCl, zinc

185 **The effects of copper source (tribasic copper chloride or copper sulfate) on growth performance, carcass characteristics, and pen cleanliness in finishing pigs.** K. F. Coble[1,*], S. S. Dritz[1], M. D. Tokach[1], J. M. DeRouchey[1], J. L. Usry[2], R. D. Goodband[1], *[1]Kansas State University, Manhattan, [2]Micronutrients, Social Circle, GA.*

A total of 1143 pigs (initial BW 25.1 kg) were used in a 111-d study to determine the effects of tribasic copper chloride (TBCC, IntelliBond C; Micronutrients, Indianapolis, IN) or copper sulfate ($CuSO_4$) on growth performance, carcass characteristics, and pen cleanliness. Pens of pigs were allotted to 1 of 6 dietary treatments, balanced on average pen weight in a completely randomized design with 25 to 28 pigs per pen and 7 replications per treatment. Treatments included a corn-soybean meal positive control diet, a high by-product diet with 30% dried distillers grain with solubles (DDGS) and 15% bakery meal (negative control), or the negative control diet with 75 or 150 ppm added Cu from $CuSO_4$ or TBCC. All diets were formulated at 0.05% below the SID Lys requirement. Pigs fed the negative control diet had decreased ($P < 0.01$) G:F and tended to have increased ($P < 0.08$) ADFI compared to those fed the positive control. No Cu source × level interactions were observed. Pigs fed increasing $CuSO_4$ had increased (linear; $P < 0.05$) ADFI and final BW with a tendency (linear; $P < 0.10$) for increased ADG and lower G:F. Pigs fed increasing TBCC had increased (linear; $P < 0.01$) ADG, ADFI, final BW, and HCW. Wash time (s/pen) increased ($P < 0.01$) by 64% for negative control pens compared to positive control pens; however, wash time was not influenced by Cu. In summary, increasing dietary $CuSO_4$ or TBCC in high by-product diets increased growth and feed intake, resulting in increased final BW for pigs fed both copper sources and HCW for pigs fed TBCC without influencing pen wash time.

Key Words: copper, finishing pig, wash time

Table 185. Effects of CuSO4 and TBCC on growth, carcass characteristics, and wash time

Item	Positive Control	Negative Control	$CuSO_4$		TBCC		Probability, $P <$ [1]		
			75	150	75	150	Pos. vs. Neg.	$CuSO_4$ linear	TBCC[2] linear
d 111 BW, kg	124.5	124.2	127.6	127.5	128.4	130.0	0.87	0.05	0.01
ADG, kg	0.90	0.91	0.94	0.93	0.94	0.95	0.76	0.08	0.01
ADFI, kg	2.28	2.34	2.44	2.44	2.46	2.45	0.08	0.02	0.01
G:F	0.40	0.39	0.39	0.38	0.38	0.39	0.01	0.10	0.99
HCW, kg	92.5	91.8	93.3	93.1	93.6	95.3	0.59	0.29	0.01
Wash time, s/pen	268	417	413	383	373	389	0.01	0.27	0.36

[1]SEM was 2.04, 0.011, 0.043, 0.004, 1.19, and 21.5 for d 111 BW, ADG, ADFI, G:F, HCW, and wash time, respectively.
[2]Quadratic response ($P < 0.05$) for ADFI.