Or3), Or3 showed higher ADFI ($P < 0.05$) at Phase 1, higher BW ($P < 0.01$), ADG ($P < 0.01$) and ADFI ($P < 0.05$) at Phase 2 and higher BW ($P < 0.05$) at Phase 3 than In3. For Zn, Cu and Fe concentrations in blood, no significant differences were observed among all treatments. Supplementation of Zn both from $ZnSO_4$ and Zn-Met did not affect the level of IgA and IgG among treatments during the overall period. Diarrhea incidence (average head/day) was highest in treatment In3 at Phase 2 ($P < 0.05$) and Phase 3 ($P < 0.10$) and lowest in treatments (In1, Or2 and Or3) at Phase 2 ($P < 0.05$) and Phase3 ($P < 0.10$). These results suggested that there were no effects on immune response and zinc concentration in pig fed Zn from $ZnSO_4$ and Zn-Met under pharmacological concentration but organic zinc showed positive effects for diarrhea incidence from Phase 2 to Phase 3.

Key Words: organic zinc, inorganic zinc, weaning pigs

226 Evaluation of feed budgeting, complete diet blending, and corn-supplement blending on finishing pig performance. R. C. Sulabo*[1], G. Papadopoulos[1], J. R. Bergstrom[1], J. M. DeRouchey[1], D. Ryder[2], M. D. Tokach[1], S. S. Dritz[1], R. D. Goodband[1], and J. L. Nelssen[1], [1]*Kansas State University*, *Manhattan*, [2]*Feedlogic Corp.*, *Willmar, MN*.

A total of 283 pigs (PIC TR4 × 1050; initially 35 kg BW) were used to compare phase feeding to blending finishing diets using the FEEDPro system (Feedlogic Corp., Willmar, MN). There were three experimental treatments: (1) a standard 4-phase complete feed program (Phase feeding), (2) blending a high and low lysine complete diet over entire experiment (Curve), and (3) blending ground corn and a separate complete supplement within each phase (Supplement). FEEDPro is an integrated feed dispensing system that can deliver and blend two separate diets while dispensing. The four phases were from 35 to 55, 55 to 80, 80 to 100, and 100 to 126 kg. Each treatment had 12 replicate pens and 8 pigs per pen. Overall (35 to 126 kg), ADG and ADFI were similar ($P > 0.24$) across treatments. However, pigs on the Curve and Phase feeding treatment had greater ($P < 0.01$) and tended to have greater ($P < 0.09$) G/F than the Supplement treatment, respectively. There were no differences ($P > 0.70$) in HCW, percentage yield, and loin depth across treatments. The Supplement treatment had greater ($P < 0.02$) percentage lean and lower ($P < 0.04$) fat depth than pigs on the Curve and Phase feeding treatment. There were no differences ($P > 0.28$) in income over feed costs (IOFC) across treatments. In conclusion, the FEEDPro system blended separate complete diets or a ground corn-supplement combination without affecting growth performance.

Table 1. Effects of feed blending using FEEDPro on overall finishing pig performance

	Phase Feeding	Curve	Supplement	SE
ADG, kg	0.95	0.94	0.94	0.01
ADFI, kg	2.79	2.71	2.79	0.03
G/F	0.342^{ax}	0.345^{a}	0.336^{by}	0.002
HCW, kg	94.0	93.7	92.6	1.2
Yield, %[1]	73.9	74.4	73.6	0.4
Lean, %[1]	52.1^{a}	52.2^{a}	52.9^{b}	0.2
Fat depth,[1] mm	21.2^{a}	20.6^{a}	19.2^{b}	0.5
Loin depth,[1] mm	60.8	60.7	60.5	0.9
IOFC, $/pig	55.29	56.86	54.91	1.03

$^{a,b}P < 0.05$; $^{x,y}P < 0.09$.
[1]Adjusted with HCW as covariate.

Key Words: Feed blending, growth, carcass characteristics

227 Effects of lactose and milk-yeast on growth performance, fecal microbiota, and immune responses of nursery pigs. H. Tran*, J. W. Bundy, E. Hinkle, R. Moreno, J. Walter, T. E. Burkey, and P. S. Miller, *University of Nebraska*, *Lincoln*.

An experiment was conducted to evaluate the effects of dietary lactose alone or in combination with a milk-yeast product (50% near-dated milk; 50% dried yeast) on growth performance, fecal microbiota, and immune parameters in nursery pigs. A total of 108 pigs (age, 20 ± 1 d; initial BW, 6.07 ± 0.03 kg) was randomly allotted to 18 pens (6 pigs/pen; 6 pens/treatment). Dietary treatments were: 1) control (CTL, no lactose and milk-yeast), 2) CTL + lactose, or 3) CTL + lactose + 5% milk-yeast. Except for the CTL, diets in Phase 1 (wk 1 and 2), 2 (wk 3 and 4) and 3 (wk 5) contained 20, 15, and 5% total lactose, respectively. Blood samples were collected from all pigs at d 0, 14, 28, and 35 to determine circulating immunoglobulin (Ig) G, A, and tumor necrosis factor (TNF)-α concentrations. At d 0, 7, 14, fecal samples were collected (n = 18; 6 pigs/treatment) to evaluate fecal microbiota using PCR-DGGE. Compared to the CTL, pigs fed lactose and lactose with milk-yeast tended ($P = 0.07$) to have greater BW and ADFI and had greater ($P = 0.05$) ADG during Phase 1. There were no differences for BW, ADG, or ADFI during Phase 2, 3, or the overall experimental period. A main effect of treatment was observed for circulating IgA where CTL pigs had greater ($P < 0.01$) IgA compared to pigs fed lactose with or without milk-yeast; however, no effects of treatment were observed for circulating IgG or TNF-α. No differences in microbial diversity indices were observed on d 7 or 14 among treatments. However, a shift in microbial composition was observed on d 7 with lactose-fed pigs having greater ($P = 0.05$) putative *L. johnsonii* staining intensity compared to CTL pigs and pigs fed lactose plus milk-yeast. On d 14, *L. reuteri* tended ($P = 0.15$) to be enhanced, and *L. delbrueckii* was eliminated ($P = 0.04$) by feeding lactose with or without milk-yeast. This research indicates that growth performance, immune parameters, and fecal microbiota may be affected by dietary inclusion of lactose alone, or in combination with milk-yeast.

Key Words: lactose, pig, yeast

228 Effects of a yeast-derived protein source (NuPro) with and without whey powder on piglet performance post-weaning. D. Henman[1], A. Murphy[1], and K. Jacques*[2], [1]*Rivalea Australia*, *Corowa, NSW, Australia*, [2]*Alltech Inc.*, *Nicholasville, KY*.

The hypothesis of this experiment was that yeast protein (NuPro, Alltech Inc.) included in diets for 39 days post weaning will improve performance of weaner pigs against a standard weaner dietary program containing whey powder (60% lactose) in the first 19 days only. Eight hundred entire male piglets (Large White x Landrace), average weight 7.7 kg, were allotted by weight to four dietary treatment groups at weaning (28 d). For each of 4 replicate weeks 200 pigs allocated to (50 pigs/treatment/week). They were in groups of 10 pigs per pen (0.5 m^2/pig). The experiment was divided into two periods: 0-19 and 19-39 days after weaning, respectively. The diet program of treatment A involved diets of 14.9 MJ DE/kg and 13.4 g/kg available lysine containing 10% whey powder offered between weaning and day 19 (period 1) and diets of 14.5 MJ DE/kg and 12 g/kg of available lysine offered from day 19 to 39 post weaning (period 2). Treatment B was a similar program except whey powder was not formulated into the period 1 diet. Treatment C diets had included 10% whey powder in period 1 and 4% NuPro formulated into both periods. Treatment D diets contained no whey powder in period 1 and 4% NuPro formulated into both periods. All pigs were