(2.1 kg). There was no difference in daily feed intake between treatments. Litter weight gain was not different between treatments. Days return to estrus was smaller ($P < 0.05$) for the enzyme treatment (4.68 d) than control treatment (5.94 d). Two sows from each treatment did not return to estrus until d 25 post weaning. Supplementing enzyme improved sow lactation performance by reducing body weight loss and days return to estrus whereas it did not improve litter weight gain and sows' feed intake.

Key Words: Lactation, Sows, Enzyme

110 Effect of added soybean oil or full-fat canola meal on sow and litter performance. B.S. Zimprich*, T.E. Socha, and R.L. Harrold, *North Dakota State University.*

Seventy-six sows were used to evaluate sow and litter performance, sow body condition, days to estrous, and milk composition when sunflower oil (SA) or canola meal (CA) were added to a control (C) diet of corn and soybean meal. Sows were randomly assigned to a diet at day 100 of gestation. Sows were measured for body condition by using real-time ultrasound on days 100 of gestation, day of farrowing, day 7, and at weaning. The sows were also weighed at these times. Milk samples were randomly taken from three sows per treatment per farrowing. Milk samples were analyzed for solids, protein, and fat at day 0, and 14. Litter weights were taken on days 0, 2, 7, and weaning. SA sows returned to estrous earlier than C sows (4.94 vs. 5.57; P<.09). Sows on diet C lost less weight than CA sows between day 100 pre-farrow and farrowing (-6.26 vs. -11.65 kg; P<.01). Sows on the SA and CA diets weaned heavier litters than the sows on diet C (51.36, 52.02 vs. 45.25 kg; P<.03). Sows on diet C ate more feed pre-farrow than sows on diet CA (39.5 vs. 35.5 kg; P<.001). Sows on diet SA ate more than sows on diets C and CA between farrowing, and day 7 (36.42 vs. 31.82 and 31.75 kg; P<.06). Between day 7 and weaning sows on diets CA and SA ate more than the sows on diet C (59.71, 54.77 vs. 47.24 kg; P<.0008). Overall feed intake data indicated that sows on diet SA consumed more than sows on diet C (129.59 vs. 118.64 kg; P<.03). Milk composition on day zero showed no differences between treatments, however, sows on SA had a higher fat content than sows on diets C and CA at day 14 (9.33 vs. 7.02, and 8.01%;P<.004). There were no differences in survival rate between treatments (86.4, 90.3, and 88.9%). Backfat on the sows of all treatments between days 100 pre-farrow and farrowing decreased 1.78 mm. Supplementing a corn soybean meal ration with sunflower oil or canola meal was beneficial.

Key Words: Full-Fat Canola, Sow Performance, Milk Composition

111 Effects of dietary L-carnitine and chromium picolinate on sow reproductive performance. D. E. Real*[1], J. L. Nelssen[1], M. D. Tokach[1], R. D. Goodband[1], S. S. Dritz[1], and K. Q. Owen[2], [1]*Kansas State University, Manhattan,* [2]*Lonza Inc., Fairlawn, NJ.*

A total of 599 sows were used to determine the effects of dietary L-carnitine and/or chromium picolinate (Cr) on reproductive performance. Experimental treatments were arranged in a 2 X 2 factorial with main effects of L-carnitine (0 or 50 mg/kg) and Cr picolinate (0 or 200 mg/kg). Starting on the first day of breeding, all sows were provided a daily top dress containing the dietary treatments along with the normal diets. Dietary treatments were provided through the initial gestation, lactation, and through a second gestation period (2 parities). During the first parity, there was a carnitine X chromium interaction ($P < 0.01$) for first service farrowing rate with values of 82.9, 91.9, 95.5, and 92.2% for control, carnitine, Cr, and both, respectively. No differences ($P > 0.05$) were observed in number of pigs born alive, still born, mummies, or total born in the first parity. Added dietary L-carnitine decreased ($P < 0.05$) wean-to-estrus interval, and tended to increase ($P < 0.08$) the number of sows in estrus by d 7. In the second parity, a tendency ($P < 0.08$) for a carnitine X chromium interaction was found for first service farrowing rate. Adding carnitine and chromium together in the diet increased first service farrowing rate compared to the control or either product alone. Because of the change in wean-to-estrus interval and farrowing rate, feeding additional dietary carnitine and chromium increased ($P < 0.04$) the percentage of sows that were farrowed in parity 2. When calculating the total number of pigs born and born live based on all sows that were started on test, carnitine and chromium additively increased ($P < 0.02$) the number of pigs born and born alive (Total born: 15.3, 18.4. 18.8, and 19.7; born live: 13.9, 16.3, 16.2, and 17.0 for control, carnitine, Cr, and both, respectively). In conclusion, adding dietary carnitine and chromium improved wean-to-estrus interval and farrowing rate and, thus, total pigs born live over two parities.

Key Words: Sows, Carnitine, Chromium

112 A regional evaluation of chromium tripicolinate supplementation in sows. M. D. Lindemann*, S. D. Carter, L. I. Chiba, C. R. Dove, and L. L. Southern, *S-288 Regional Research Committee on Nutrition and Management of Swine for Increased Reproduction.*

Supplementation of sows with chromium tripicolinate has provided promising increases in litter size. However, varied levels of supplementation have not been examined with sows. This study was conducted to evaluate multiple levels of supplementation across a variety of conditions at five universities. Supplemental Cr levels of 0, 200, 600, and 1000 ppb from chromium tripicolinate were used. The rate of 600 ppb provides the mature animal with similar Cr supply per kg BW as a growing pig fed 200 ppb; the rate of 1000 ppb is 5X to the standard rate of 200 ppb. Participants were required to use at least three of the four levels, including 0 and 200 ppb. A total of 285 gilts and sows were allotted to treatment on the day of breeding. A common corn-soy diet formulation was used that met or exceeded NRC (1988) requirement estimates for reproduction. Only those sows completing at least two parities were considered in the data analysis. A total of 439 litters (litter was the experimental unit) were included in the analysis. The model included terms for station, treatment, study parity, and all possible interactions. There were significant station effects for all measured responses but no meaningful station X treatment interactions. With regard to litter size, the response of primary interest, a tendency for an increase in total pigs born/litter with increasing Cr supplementation was observed (10.17, 10.86, 11.09, and 10.53, respectively; P=.14). The litter size responses in live born (9.27, 9.59, 10.12, 9.71) and weaned (8.30, 8.47, 9.00, and 8.83) followed the same pattern but were not significant. In summation, supplementation of 200 ppb Cr from chromium tripicolinate yielded mean litter size increases similar to published literature. Numerical increases in litter size beyond that observed at 200 ppb may suggest merit to continued research to evaluate higher supplementation rates. Levels of 5X current supplementation rates, though they were fed for up to three parities in sows, were not detrimental.

Key Words: Sows, Chromium, Litter Size

113 Comparison of International Protein Corporation 740 and Super Select ^{TM} Menhaden fish meals in nursery pig diets. M. G. Young*, M. D. Tokach, R. D. Goodband, J. L. Nelssen, S. S. Dritz, and M. Cici[1], *Kansas State University, Manhattan,* [1]*International Protein Corporation, St. Paul, MN.*

One hundred and seventy five pigs (6.42 kg and 17 ± 2 d) were used in a 21 d growth assay to compare two menhaden fish meals (IPC 740, International Proteins Corp, St. Paul, MN or Special Select ^{TM} , Omega Proteins, Hammond, LA) on growth performance of nursery pigs. All pigs were fed a common diet for four days after weaning before allotment to dietary treatments. Dietary treatments were fed in meal form. Diets were formulated to contain 1.40% lysine, 0.84% Ca and 0.49% available P. In addition, 10% dried whey, 3% soybean oil and 0.13% L-lysine HCl was added to all diets. There were 5 experimental diets with a control diet (no added fish meal) and 2.5 and 5% fish meal from the two sources (IPC or Omega). From d 0 to 14, ADG improved linearly ($P< 0.05$) with increasing fish meal from either source (see Table below). No differences in performance were observed between the two fish meal sources. During the third week (d 14 to 21), there was no benefit to adding fish meal to the diet. For the overall trial, there were no differences in ADG, ADFI, or gain/feed. The best response to adding fish meal to the diet was obtained for the first 14 d of the test, coinciding with the time when fish meal would be fed in commercial production. These results indicate that IPC 740 and Special Select ^{TM} can be used interchangeably as Menhaden fish meal sources in starter diet formulation.

Fish Meal Source:		IPC		Special Select ^{TM}	
Level, %:	0	2.5	5	2.5	5
ADG, g	193	217	228	203	227
Gain/Feed	0.67	0.67	0.73	0.68	0.70

Key Words: Weanling Pig, Fish Meal