**M398 Neutral semi-purified glycerin in starting pigs feeding in Brazil.** I. Moreira*[1], A. G. Gallego[1,2], P. C. Pozza[1], P. L. O. Carvalho[1], L. M. Peñuela-Sierra[1,3], and L. M. Huepa[1,2], *[1]Universidade Estadual de Maringá, Maringá, Paraná, Brazil, [2]Universidad del Tolima, Ibagué, Tolima, Colombia, [3]Universidad Cooperativa de Colombia, Ibagué, Tolima, Colombia.*

Two experiments were carried out to investigate the use of neutral semi-purified glycerin - NSPG (obtained from soybean oil), in starting piglet diets. Chemical composition (as-fed-basis) of NSPG: DM = 88.11%; glycerol = 80.2%; CP = 0.90%; GE = 3,535 kcal/kg; Methanol = 0.01%; NaCl = 5.86% and Ash = 6.18%. A digestibility trial (Experiment I) was conducted using 30 crossbred barrows with an initial BW of 42.91 ± 1.58 kg. The digestible (DE) and metabolizable energy (ME) values of glycerin were estimated by regression of DE and ME intake vs. glycerol intake (Adeola, 2001). For concentrations (4%, 8%, 12% and 16%) of NSPG in a corn + soybean meal (CSM) basal diet were fed. The values (as-fed basis) of DE and ME (kcal/kg) obtained were 3,298 and 2,531, respectively. The results indicate that the glycerin is a highly available energy source for feeding starting pigs. In the performance trial (experiment II), 100 piglets (BW = 15.14 ± 0.06 to 30.28 ± 0.70 kg) were allotted in a completely randomized block design, with increasing levels (0, 3.5, 7.0, 10.5, and 14.0%) of NSPG in a CSM diet. There were 10 pens per diet with 2 pigs per pen. Experimental diets were formulated according to NRC (1998). No effects ($P \geq 0.05$) of NSPG inclusion on piglet performance (Table 1) were observed by regression analysis. It can be concluded that using up to 14% of NSPG (2,531 kcal of ME/kg) in diets for starting piglet is feasible, without impairing performance.

**Table 1.** Piglet performance fed on neutral semi-purified glycerin (NSPG)

| | Inclusion of NSPG ,% | | | | | | | *P*-value | |
|---|---|---|---|---|---|---|---|---|---|
| Item | 0 | 3.5 | 7.0 | 10.5 | 14.0 | Mean | ± SE | Linear | Quadratic |
| ADFI, kg | 1.314 | 1.248 | 1.331 | 1.241 | 1.305 | 1.287 | ±0.131 | 0.99 | 0.99 |
| ADG, kg | 0.729 | 0.683 | 0.727 | 0.706 | 0.711 | 0.711 | ±0.039 | 0.99 | 0.99 |
| Feed/gain ratio | 1.81 | 1.83 | 1.83 | 1.77 | 1.84 | 1.82 | ±0.021 | 0.99 | 0.99 |

**Key Words:** biodiesel, co-product, glycerol

**M399 Brazilian neutral semi-purified glycerin on growing and finishing pigs feeding.** I. Moreira*[1], A. G. Gallego[1,2], P. L. O. Carvalho[1], C. C. Filho[1], T. J. Pasquetti[1], and D. Perondi[1], *[1]Universidade Estadual de Maringá, Maringá, Paraná, Brazil, [2]Universidad del Tolima, Ibagué, Tolima, Colombia.*

This study was carried out to evaluate the use of Brazilian Neutral Semi-purified Glycerin - NSPG, on growing and finishing pigs performance. The chemical composition (as-fed-basis) of the NSPG was: DM = 88.11%; Glycerol = 80.2%; CP = 0.90%; GE = 3,535 kcal/kg; Methanol = 0.01%; NaCl = 5.86% and ash = 6.18%. Eighty growing (BW = 30.31 ± 0.47 to 60.41 ± 0.87 kg) and finishing (BW = 60.41 ± 0.87 to 90.99 ± 0.87 kg) pigs were used in the performance trial. Pigs (one per pen) were allotted in a completely randomized block design, with increasing levels (3.5, 7.0, 10.5, and 14%) of NSPG in a corn-soybean meal diet, resulting in 16 replicates per treatment. Additionally a control diet was formulated containing no glycerin (0%). Experimental diets were formulated according to NRC (1998). The regression analysis indicates no effects ($P \geq 0.05$) of NSPG inclusion on pigs performance and carcass traits (backfat thickness and loin depth) (Table 1). It can be concluded that using up to 14% of NSPG (2,531 kcal of ME/kg) on growing and finishing pig diet is feasible, without impairing performance and carcass traits.

**Table 1.** Pig performance fed on Brazilian neutral semi-purified glycerin (NSPG)

| | NSPG level, % | | | | | | |
|---|---|---|---|---|---|---|---|
| Item | 0 | 3.5 | 7.0 | 10.5 | 14.0 | Mean | ±SE |
| Growing | | | | | | | |
| ADFI, kg | 1.68 | 1.73 | 1.58 | 1.76 | 1.64 | 1.66 | ±0.028 |
| ADG, kg | 0.74 | 0.73 | 0.72 | 0.72 | 0.72 | 0.72 | ±0.035 |
| F:G | 2.25 | 2.25 | 2.37 | 2.40 | 2.32 | 2.32 | ±0.044 |
| Finishing | | | | | | | |
| ADFI, kg | 2.05 | 2.01 | 2.01 | 1.98 | 2.02 | 2.01 | ±0.026 |
| ADG, kg | 0.74 | 0.74 | 0.73 | 0.73 | 0.72 | 0.73 | ±0.067 |
| Feed/gain ratio | 2.78 | 2.75 | 2.78 | 2.75 | 2.82 | 2.78 | ±0.044 |
| BT-P2,[1] mm | 12.07 | 11.87 | 11.94 | 11.00 | 13.00 | 11.98 | ±0.334 |
| Loin depth, mm | 55.27 | 52.00 | 52.75 | 51.27 | 50.88 | 52.43 | ±0.817 |

[1]BT-P2 = backfat thickness.

**Key Words:** carcass traits, co-product, glycerol

**M400 Performance and carcass traits of finishing pigs fed on crude glycerin in Brazil.** I. Moreira*[1], P. L. O. Carvalho[1], L. M. Piano[1], J. B. Toledo[1], A. G. Gallego[1,2], and L. M. Peñuela-Sierra[1,3], *[1]Universidade Estadual de Maringá, Maringá, Paraná, Brazil, [2]Universidad del Tolima, Ibagué, Tolima, Colombia, [3]Universidad Cooperativa de Colombia, Ibagué, Tolima, Colombia.*

This experiment was carried out to investigate 2 types of crude glycerin which were obtained from soybean oil (CGS) and animal fat + soybean oil (CGA) on finishing pigs performance. Chemical composition (as-fed-basis): CGS (DM = 97.46%; Glycerol = 55.95%; CP = 0.06%; GE = 5,247 kcal/kg;Fatty acid = 23.3%; Methanol = 10.96% and Ash = 4.45%); NaCl = 3.52 and CGA (DM = 94.55%; Glycerol = 55.45%; CP = 0.05%; GE = 5,242 kcal/kg; Fatty acid = 21.5%; Methanol = 5.05%; NaCl = 3.01 and Ash = 4.26%). In the performance trial, 63 pigs (BW = 60.35 ± 2.25 to 89.91 ± 5.23 kg) were allotted (one per pen) in a completely randomized design in 2 × 4 factorial scheme, with increasing levels (3, 6, 9, and 12%) of 2 types of crude glycerin (CGS and CGA) in the diet. Additionally a control diet was formulated containing no glycerin (0%). Experimental diets were formulated according to NRC (1998). The regression analysis indicates no effects ($P \geq 0.05$) of CGS and CGA inclusion on pigs performance and carcass traits (Table 1). It can be concluded that using up to 12% of CGS and CGA (4.480 and 4.707 kcal of ME/kg, respectively) on finishing pigs diet is feasible, without impairing performance and carcass traits.

**Table 1.** Pig performance and carcass traits fed on crude glycerin (CGS and CGA)

| | Inclusion of crude glycerin, % | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | CGS | | | | | CGA | | | |
| | 0 | 3 | 6 | 9 | 12 | 3 | 6 | 9 | 12 |
| ADFI, kg | 2.31 | 2.28 | 2.47 | 2.40 | 2.50 | 2.27 | 2.15 | 2.58 | 2.30 |
| ADG, kg | 0,81 | 0.83 | 0.85 | 0.81 | 0.89 | 0.75 | 0.76 | 0.87 | 0.82 |
| F:G | 2.86 | 2.79 | 2.98 | 2.98 | 2.83 | 3.02 | 2.86 | 3.02 | 2.85 |
| BT, cm | 2.63 | 2.59 | 2.69 | 2.61 | 2.66 | 2.50 | 2.46 | 2.67 | 2.34 |
| LM area, $cm^2$ | 36.20 | 36.48 | 35.39 | 35.70 | 37.01 | 35.62 | 36.22 | 32.96 | 35.79 |
| Carcass lean,% | 75.29 | 75.54 | 73.08 | 75.05 | 74.63 | 76.46 | 76.15 | 71.14 | 76.22 |

CGS = made from soybean oil; CGA = made from animal fat + soybean oil; BT = backfat thickness.

**Key Words:** biodiesel, co-product, glycerol

**M401 Determination of optimal dose and time of administration of intravaginal triptorelin gel for synchronizing ovulation in weaned sows.** R. Knox[1], S. Breen[1], J. Taibl[1], M. Swanson[2], and S. Webel*[3], *[1]University of Illinois, Urbana, [2]Pennatek LLC, Radnor, PA, [3]JBS United Inc., Sheridan, IN.*

The effect of dose and time of administration of intravaginal triptorelin gel (TG) on synchronization of ovulation in weaned sows was evaluated in 3 experiments. Sows were weaned and treated intravaginally with TG. Estrus was detected twice daily and ultrasound performed to assess ovulation at 8-h intervals. Sows were inseminated each day during estrus. In expt. 1, sows (n = 131) received 0 (control), 25, 100, or 200 μg of TG at 96 h after weaning. Wean to estrus and duration of estrus were correlated ($P < 0.0001$) and wean to estrus was shorter and duration was longer in TG ($P < 0.05$) compared with controls. More sows ovulated ($P < 0.05$) by 48 h post-treatment with 200 (91%), 100 (70%) and 25 μg (68%) of TG compared with controls (35%). Farrowing rate and total born did not differ. In expt. 2, sows (n = 126) received 200 μg of TG at 72, 84, or 96 h after weaning or served as untreated controls. Wean to estrus and duration of estrus did not differ from controls but wean to ovulation interval was shortened ($P < 0.05$) by TG at 72 and 84 h compared with 96 h and controls. More sows ovulated by 48 h after treatment ($P < 0.05$) with TG at 96 h (73.1%) compared with 72 (32%) and 84 h (43%) while tending ($P = 0.10$) to differ from controls (50%). Farrowing rate was lower ($P < 0.05$) for sows assigned to TG at 72 and 84 h compared with 96 h and Controls, while liveborn did not differ. In expt.3, sows (n = 113) were assigned to OvuGel (200 μg TG given intravaginally at 96 h after weaning), no treatment (Controls) or placebo (Placebo). Wean to estrus did not differ but duration of estrus tended to be shorter following OvuGel compared with other treatments ($P < 0.10$). More sows ovulated ($P < 0.001$) by 48 h following OvuGel (80%) compared with Control (46%) and Placebo (37%). Farrowing rate and liveborn did not differ among treatments. The results of these studies indicate that 200 μg of TG given intravaginally at 96 h after weaning (OvuGel) synchronizes ovulation and results in fertility similar to controls. This methodology will aid in development of single and timed AI procedures for use in swine.

**Key Words:** OvuGel, sows, ovulation

**M402 The effects of arginine supplementation of weanling pig diets on growth performance and IGF expression.** **W. C. Wang*[1,3], R. J. Chen[1,2], J. Pan[4], T. J. Li[1], and Y. L. Yin[1],** *[1]Institute of Subtropical Agriculture, Chinese Academy of Sciences, Changsha, Hunan, China, [2]Rice Research Institute of Sichuan Agricultural University, Chengdu, Sichuan, China, [3]Guelph Food Research Center, Agriculture and Agri-Food Canada, Guelph, ON, Canada, [4]Department of Animal Science, Hunan Agricultural University, Changsha, Hunan, China.*

Young piglets have a high requirement of arginine for growth and metabolic function, but the sow milk or endogenous synthesis cannot provide enough arginine for maximal growth. Dietary arginine supplementation can improve the immunity of early-weaned piglets and enhance the skeletal muscle synthesis for growth. The insulin-like growth factor (IGF) signaling pathway is an important regulatory factor in regulating fetal and placental growth, proliferation, differentiation, migration and aggregation, and inhibits apoptosis of mammalian cells. However, the role of arginine in altering IGF expression in newly weaned pigs is not clear. This study was conducted to investigate the effect of dietary arginine supplementation in modulation of the IGF system of weanling piglets. Twelve, 21-d-old healthy piglets (Landrace × Yorkshire) with a mean body weight (BW) were assigned randomly to 2 treatments representing diets supplemented with 0.6% L-arginine or 1.23% L-alanine (isonitrogenous control). At 28 d of age, 12 piglets were killed and samples were collected. In arginine group, ADG was increased significantly, and Gain: Feed obviously decreased compared with control group ($P < 0.05$). However, ADFI were not different ($P > 0.05$). The liver, kidney, heart, spleen and lung weight relative to body weight were lower in arginine group than in control, but not significant ($P > 0.05$). The weight of small intestine in arginine group was 33.4% heavier than that in control ($P < 0.001$).Components of IGF signaling pathway (IGF1, IGF1R, IGF2, IGF2R and IGFBP5) mRNA expression were examined in 3 tissues by RT- PCR method. IGF1 was increased in muscle, liver and kidney tissues of arginine group ($P < 0.05$). IGF2 was significantly increased in muscle of arginine group ($P < 0.01$). Both muscle and liver had a higher concentration of IGFBP5 with arginine supplementation ($P < 0.05$). These data suggest an important role of arginine in modulating the IGF signal pathway and the involvement in improving growth performance.

**Table 1.** Performance of weanling piglets fed diets containing 0.6% l-arginine or 1.23% l-alanine (control)[1]

| Item | Control | l-Arginine |
|---|---|---|
| Initial weight(g) | 5370 ± 53 | 5230 ± 203 |
| Finish weight (g) | 5870 ± 210 | 6503 ± 208* |
| ADG (g/d) | 70 ± 23 | 167 ± 31* |
| ADFI (g/d) | 183 ± 12 | 187 ± 21 |
| Gain: Feed | 2.61 ± 0.47 | 1.07 ± 0.18* |

[1]Data are means ± SEM, n = 6.

**Key Words:** arginine, early-weaned piglets, IGF

**M403 Assessment of zero-tannin faba bean and co-fermented corn and wheat DDGS in diets of growing-finishing pigs.** C. Furedi*[1], P. Lopez[1], M. Licayu[1], D. Gurney[1], E. Kiarie[2], and C. M. Nyachoti[2], *[1]The Puratone Corporation, Niverville, MB, Canada, [2]University of Manitoba, Winnipeg, MB, Canada.*

A grow-finish feed trial was conducted to determine the impact on growth performance and carcass characteristics of feeding diets containing co-fermented corn and wheat DDGS (cwDDGS) from and zero-tannin fava beans (ZTFB) as substitutes for corn DDGS (cDDGS) and some soybean meal. A total of 16 diets were tested containing one of 2 DDGS Sources (cDDGS or cwDDGS) at 2 levels (10% or 30%) of inclusion, with either 0% or 15% ZTFB and with 0 ppm or 62.5 p.m. of

yucca extract (YE) in a full factorial design. Feed was delivered 3 times daily to 120 pens of 21 pigs to provide ad libitum feeding by robotic feeders (FeedLogic Corporation; Willmar, MN, USA). Diets, formulated to meet NRC (1998) recommendations, were provided in 5 phases and were not split-sex fed. Pigs were tagged, weighed individually on wk 1, 4, 8, 12, 14 and 16 and were shipped to Maple Leaf Foods (Brandon, MB, Canada) at 123–129 kg BW. Slaughtered pigs were tattooed by pen and data for carcass weight, fat and loin thickness, carcass index, and lean yield was recorded and used to calculate carcass value. There was an interaction effect between DDGS source and DDGS level on days to market (DTM) ($P < 0.05$), standardized feed cost per kg BW gain (SFC/kg) ($P < 0.05$), carcass weight ($P < 0.05$) and a trend for carcass value ($P < 0.10$). The DDGS level only affected responses in cwDDGS and not cDDGS in which case 30% cwDDGS resulted in 3 more DTM, $0.036 lower SFC/kg, 2.15 kg lower carcass weight and $3/hog reduced carcass value. Pigs fed diets containing 15% ZTFB had ($P < 0.05$) lower ADG, and higher FCR, SFC and DTM than pigs fed diets without ZTFB. However, when 62.5ppm of YE was added to the diet, performance was similar to pigs fed diets without ZTFB. These results suggest that ZTFB can be used in grow-finishing swine diets as long as YE is also included and that cwDDGS, when compared with cDDGS, has a negative effect on growth when used at 30% inclusion.

**Key Words:** zero-tannin faba beans, grow-finish pigs, DDGS