

**M158 Genetic and phenotypic factors influencing milk, protein and fat yields of dairy cows in Tasmania, Australia.** S. A. Adediran<sup>1</sup>, P. Nish<sup>2</sup>, D. J. Donaghy<sup>1</sup>, J. R. Roche<sup>1</sup>, and A. E. O. Malau-Aduli\*<sup>1</sup>, <sup>1</sup>University of Tasmania, Hobart, Tasmania, Australia, <sup>2</sup>Tasherd Pty Ltd, Hadspen, Tasmania, Australia.

The Australian State of Tasmania enjoys a cool, temperate climate that remains the backbone of its pasture-based dairy production system. In this study, 330,366 lactation records from 428 Tasmanian dairy herds collected between 2000 and 2005 were analysed. The objective was to determine the influence of genetic and non-genetic factors on milk, protein and fat yields of pasture-based dairy cows. The data were statistically subjected to analyses of variance using general linear mixed model procedures with repeated measures. State-wide average milk yield per lactation over a standard 305-day lactation length was  $5200.7 \pm 1239.7$  litres (ranging from 1107 to 13256 litres), while fat and protein yields averaged  $205.5 \pm 47.0$  kg (ranging from 53 to 385 kg) and  $166.2 \pm 41.5$  kg (ranging from 47 to 297 kg), respectively. Highly significant ( $P < 0.001$ ) effects on milk, protein and fat yields attributable to variation in herd size, cow's parity, breed, season and year of calving were detected. Milk yield increased linearly with increase in parity (means of 3482.4, 4019.5, 4615.4, 4826.1 and 5018.8 litres per lactation for parities 1, 2, 3, 4 and  $>4$ , respectively). Milk, fat and protein yields were highest in cows calving during the spring season (4769.8 litres, 215.2kg and 168 kg respectively), Holstein-Friesian genotypes produced the most milk (5211 litres), protein (171 kg) and fat (210kg) yields per lactation. Herd sizes of more than 1110 cows produced the most milk, fat and protein. Productivity per cow increased with calving year except in 2003 when total milk yield was lower than in 2002. We conclude that herd size, breed, parity, season and year of calving were among the main factors driving production of dairy cows in Tasmania and adjustments for these factors would be mandatory for any unbiased comparison of lactation performance within and between pasture-based dairy production systems.

**Key Words:** Milk Protein, Fat, Tasmania

**M159 Impact of Warana Dairy Cooperative on the socio-economic status of farmers in Maharashtra, India.** R. A. Patil\*<sup>1</sup> and T. R. Dhiman<sup>2</sup>, <sup>1</sup>Warana Milk Cooperative, Warananagar, Maharashtra, India, <sup>2</sup>Utah State University, Logan.

Warananagar is a cooperative complex established in 1958 with the objective of socio-economic development of rural Warana, Maharashtra, India. A milk cooperative was established under this complex during 1969-70 with 200 employee and procurement of 4000 liters of milk per day from 36 nearby villages. The objective of this study was to quantify the changes in structure of a rural cooperative from 1970 to the present and its influence on the Socio-economic development of rural people in Maharashtra, India. During 2006 milk cooperative collected daily 280,000 liters of milk, has 57,000 members, 1750 employee, a milk processing and a dairy product manufacturing facility. The data related to socioeconomic status of members between 1970 and 2006 was statistically analyzed. The annual turnover of the cooperative has grown significantly from \$3 million in 1970 to \$50 million in 2006. Interestingly, the women membership in the cooperative has changed significantly from 16% in 1970 to 46% of

total members in 2006. Out of total 1250 societies in the cooperative, 161 are managed by women members. Milk cooperative in 1970 was selling milk locally and today exporting cheese, butter, ice cream and other dairy products to large cities in India and to Gulf, Africa and Asian countries. The cooperative currently has 126 full time artificial insemination technicians that perform 90,000 inseminations per year. Societies are connected with cooperative complex through an internet for procurement, payment and other record keeping. Cooperative supplies fodders seed and cattle feed to the members at non-profit basis and provides extension education. As a result of improved animal management and feeding, the milk yield of cows has increased significantly from 2.2 liters/d in 1970 to 4.0 liters/d in 2006. The present per capita income of cooperative members is \$360. Our study concluded that a high technology dairy cooperative is managed successfully by producers with a significant role of women and having a positive impact on the animal productivity and per capita income of members.

**Key Words:** Dairy, Milk, Extension

**M160 Metabolizable energy content and *in vitro* gas production characteristics of subtropical grasses of Northeastern Mexico.** H. Bernal-Barragán<sup>1</sup>, E. Gutiérrez-Ornelas<sup>1</sup>, E. M. Romero-Treviño<sup>2</sup>, J. Colin-Negrete<sup>1</sup>, M. A. Cerrillo-Soto\*<sup>3</sup>, and A. S. Juárez-Reyes<sup>3</sup>, <sup>1</sup>Universidad Autónoma de Nuevo León, Monterrey, Nuevo León, México, <sup>2</sup>Instituto Tecnológico, Altamira, Tamaulipas, México, <sup>3</sup>Universidad Juárez del Estado de Durango, Durango, Durango, México.

The objective of this study was to determine the *in vitro* gas parameters and to estimate the metabolizable energy (ME) content of subtropical grasses used for beef cattle production in Northeastern Mexico. Samples of Guinea (*Panicum maximum*), Pangola (*Digitaria decumbens*), Bermuda (*Cynodon dactylon*), Tanzania (*Panicum maximum* var Tanzania), Pretoria 90 (*Dichanthium annulatum*) and Buffel (*Cenchrus ciliaris*) were collected at bloom stage and analyzed. Triplicate samples (500 mg DM) were incubated in calibrated 100 ml glass syringes. Ruminant fluid, used as inoculum was obtained from two sheep fed alfalfa hay:concentrate (75:25). Gas production was recorded at 0, 3, 6, 9, 12, 24, 48, 72 and 96h. Data were fitted to the equation:  $p = a + b(1 - e^{-ct})$ . The ME content (Mcal kg<sup>-1</sup> DM) of samples was calculated by:  $ME = (2.20 + 0.136GP24h + 0.057CP + 0.0029CF2)/4.184$ . Statistical analysis was performed by ANOVA for a completely randomized design, and means were separated by the Tukey test. Content of ME was highest for Pangola, lowest for Buffel and intermediate for Guinea, Bermuda, Tanzania and Pretoria 90; extreme ME values were 3.2 for Pangola and 1.8 Mcal ME kg<sup>-1</sup> DM for Buffel ( $P < 0.05$ ). Pangola showed the highest value for the **b** fraction ( $P < 0.05$ ) and Guinea and Bermuda the lowest. The highest constant rate **c** was for Guinea, whereas the values were 30% and 45% lower for Pretoria and Buffel ( $P < 0.05$ ). The **a+b** fraction was highest for Pangola and Pretoria 90, intermediate for Tanzania and Buffel, and lowest for Guinea and Bermuda. Ranking of subtropical grasses using *in vitro* gas parameters (**b** and **a+b**) was similar to results obtained for ME content. Combinations of the studied variables allowed to recognize the potential of Pangola grass for grazing cattle in Northeastern Mexico.

**Table 1. ME content (Mcal/kg DM) and *in vitro* gas production parameters of subtropical grasses of Northeastern Mexico incubated in rumen fluid *in vitro* (ml/500 mg DM)**

	ME	b	c	a+b
Guin	2.3 <sup>b</sup>	109 <sup>d</sup>	0.04 <sup>a</sup>	102 <sup>d</sup>
Ber	2.0 <sup>c</sup>	102 <sup>d</sup>	0.04 <sup>ab</sup>	102 <sup>d</sup>
Pan	3.2 <sup>a</sup>	149 <sup>a</sup>	0.03 <sup>bc</sup>	143 <sup>a</sup>
Pret	2.3 <sup>b</sup>	142 <sup>ab</sup>	0.03 <sup>cd</sup>	138 <sup>ab</sup>
Buf	1.8 <sup>d</sup>	125 <sup>c</sup>	0.02 <sup>d</sup>	118 <sup>c</sup>
Tan	1.9 <sup>cd</sup>	137 <sup>b</sup>	0.03 <sup>bc</sup>	130 <sup>b</sup>
SEM	0.04	6.05	0.005	5.85

<sup>a,b</sup> Means within columns differ (P<0.05). b = Gas from the slowly degraded fraction and a+b = The potential gas production, in ml; c = The rate constant (%/h).

**Key Words:** Grasses, Energy Content, *In vitro* Gas Production

**M161 Evaluation of the center costs methodology sensibility by technologies introduction in the cow-calf production system.**

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A bioeconomical simulation model was developed in a traditional production system in cow-calf (TPS) for the application of cost center methodology with the objective of evaluating its sensibility by the introduction of technologies of early weaning in primiparous cows (EWS), improved natural pasture for primiparous cows and half the lot of secundiparous cows (INP) and protein supplementation for replacement heifers in the first winter (PSS). All technologies were used to increasing the pregnancy rate in this system (TPS). Data on biological performance was obtained from a bibliographic review on production indicators and cost and economic values were obtained from market. The inputs of the model were: herd structure, production costs and production technology. The outputs of the model were: operational cost (OC); spent cost (SC); production costs per centers (PCC); unitary cost per calf (UCC); weaned kilo cost (WC/kg); annual cost per cow (ACC); financial break-even (FBE), operational margin (OM), pregnancy rate (PT), calf crop (CC), productivity/cow (P/C), number of weaned calves (NWC), calves break-even (CBE) and total production in kilos (TP/kg). The use of the methodology of cost centers was sensitive in identifying variations in the technical economic indicators and in the costs of each productive center. The introduction of EWS, INP and PSS showed in the increase of technical indicators and in the operational margin, presented a straight relation with the changing in the cost centers, proving the sensibility of the costs methodology in relation to the impact in TPS.

**Key Words:** Modeling, Cow-Calf, Production Cost

**M162 Quality of vetch lines for hay and spring grazing.**

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Vetches (*Vicia* spp) are important feed legumes for production of hay, grain and straw, and early spring grazing; but data on nutritive value of high-yielding and disease tolerant vetches (elite lines) selected by the International Center for Agricultural Research in the Dry Areas (ICARDA) to replace low-yielding local cultivars in the non-tropical dry areas is scanty. Two experiments were conducted in Syria to compare the nutritive value of elite lines of common vetch (*V. sativa*, line 2566) and bitter vetch (*V. ervilia*, line 2520) with a released cultivar of common vetch 'Baraka' as control. In Experiment 1, the vetches were grazed by weaned Awassi lambs for 31 and 42 days in 2005 and 2006 respectively to compare their potential for spring grazing. Forage-on-offer (FOF) and average daily gain (ADG) were monitored. Experiment 2 compared hay from the vetches as a protein supplement to low-quality cereal straw basal diets. Four adult Awassi rams were fed barley straw supplemented with hay from the vetches for 28 days. Voluntary dry matter intake of vetch, organic matter digestibility (OMD) were determined from data from the last 7 days of the trial. The vetches differed (P<0.05) in FOF, ADG, voluntary intake and OMD. Average values were - FOF:3.34, 4.31, 3.42 t/ha; ADG: 147, 116, 159 g/head; voluntary intake of vetch: 44.4, 48.4, 37.7 gDM/W<sup>0.75</sup>; and OMD: 696, 667, 747 g/kg for common vetch line 2556, bitter vetch line 2520 and the released common vetch cultivar 'Baraka' respectively. The study showed that common vetch line 2566 has similar forage potential as the released cultivar for spring grazing and hay production based on forage yield and ADG.

**Key Words:** Vicia Hay, Sheep Grazing, Nutritive Value

**M163 Utilization of pruning waste of cactus pear orchards as a forage source for sheep in Temascalapa, Mexico.**

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An establish cactus pear orchard can produce as much as 10 ton of cladodes ha-1 year-1 of pruning waste in the Pyramid's Region of Mexico State, representing approximately 175,000 ton of succulent material suitable for use as fodder. The objective of the present study was to evaluate the inclusion of pruning waste in sheep diets during winter to improve sustainability and profitability of the agricultural production systems. Seventy five heads (4 rams, 48 ewes, and 23 lambs) of the local "Criollo" breed were used. They were divided into four groups (one ram, 12 ewes and their six lambs) and randomly assigned to one of the following treatments: T1, total confinement with a complete diet (diet 1, 2 kg hd-1 day-1), T2, total confinement with a complete diet (diet 2, 1.6 kg plus 4.0 kg of cactus pear hd-1 day-1) fed at 08:00 and 16:00 h, T3, sheep ranged from 10:00 to 16:00 h, confined overnight and supplemented with 0.8 kg of diet 2 plus 2.0 kg of cladodes hd-1 day-1, T4, sheep ranged as T3 but supplemented with 2.0 kg of corn stover head-1 day-1 (traditional system). The experiment lasted 124 days. Average initial live weight was 549.5 ± 7.1 kg, and final live weight varied from 680.0 to 943.0 kg, treatments 4 and 1, respectively. The change in live weight was due to the increase in live weight of the adults and lambs as well as the new borns. However, the lowest feed cost resulting in T3 and T2, where cactus pear was included. It was concluded that the inclusion of cactus pear may represent an important alternative to utilize agricultural resources and increase animal production.

**Key Words:** Cactus Pear, Pruning Waste, Sheep

**M164 Effects of the addition of *Saccharomyces cerevisiae* to sheep diets on productive performance and ruminal fermentation.** I. Mejia-Haro\*<sup>1</sup>, E. Ortega-Perez<sup>1</sup>, G. Tirado-Estrada<sup>1</sup>, J. Mejia-Haro<sup>2</sup>, and I. Castillo-Zuñiga<sup>1</sup>, <sup>1</sup>ITEL, AGUASCALIENTES, Aguascalientes, Ags. Mexico, <sup>2</sup>Universidad de Guanajuato, Irapuato, Gto. Mexico.

The objective of this study was to evaluate the effects of the addition of *Saccharomyces cerevisiae* to sheep diets on productive performance, and ruminal fermentation. The study was carried out in two experimental periods. In period I, average daily gain, and feed efficiency were evaluated in 15 wethers sheep assigned to a completely randomized design where *Saccharomyces cerevisiae* was added to diet in three concentration- treatments (T1, 0%; T2, 1% and T3, 1.5% DM). In period II, the effects of the addition of *Saccharomyces servisiae* to the experimental diet on in situ digestibility in six times of ruminal fermentation (0, 8, 12, 24, 48, and 72 h), free fatty acids, and NH<sub>3</sub>-N concentrations were evaluated. Data were analyzed by GLM procedure of SAS using ANOVA and Tukey test. In period I, T2 and T3 were higher (P<.05) than T1 in ADG (195, 226 and 115 for T2, T3, and T1, respectively, CV = 15%) and feed efficiency (kg of feed / kg BW of gain) was lower in T2 ( 4.7 ) than T1, and T3 (7.2 and 5.8, respectively). Values of in situ digestibility were higher in T2 and T3 (84, and 84%) than T1 (82%) at 72 h. The VFA and acetic and propionic concentration were higher (P<.05) in T3 (186, 124, and 33 mM for VFA, acetic, and propionic acid, respectively) than T1 (109, 69, and 20 mM, respectively) and T2 (115, 77, 20 mM, respectively); however, in the butyric acid concentration, the addition of *Saccharomyces c.* did not have any significant effect (20, 18, and 28 mM for T1, T2, and T3, respectively). In the NH<sub>3</sub>-N concentration, T3 was higher (53 mg/dL, P<.05) than T1 and T2 (22, and 30 mg/dL, respectively), which presented no differences. As a conclusion, the addition of *Saccharomyces cerevisiae* to sheep diets improved ADG and feed efficiency and produced changes in ruminal fermentation.

**Key Words:** ADG, Feed Efficiency, Digestibility

**M165 Ruminal fermentation parameters in sheep fed oat and bean straw-based diets.** C. A. Anderson-Huerta, G. Nevarez-Carrasco, R. Montoya-Escalante, A. S. Juárez-Reyes, and M. A. Cerrillo-Soto\*, *Universidad Juárez del Estado de Durango, Durango, Durango, México.*

Sheep represent an important potential for meat production in the semiarid regions of North Mexico. Common agricultural by-products in such areas are oat and bean straw which are utilized after prolonged dry periods. Thus, a study was conducted to estimate the effect of oat and bean straw-based diets on rumen VFA, Ammonia-N and pH. Five rumen cannulated criollo sheep (45 ±4.5 kg BW) were used to obtain rumen fluid samples at 0, 2, 4, 6, 8 and 10 h after feeding. Treatments consisted of 70% oat straw (T1); 40% oat straw (T2), 70% bean straw (T3); 40% bean straw (T4); and a control with 50% oat straw and 50% bean straw (T5). Other ingredients were alfalfa hay, ground corn and cotton seed meal. Diets were isonitrogenous (11% CP). Each period of the trial consisted of a 14-day adjustment and a 5-day collection phases. Ammonia-N concentrations were determined by the hypochlorite procedure using spectrophotometry. Volatile fatty acid concentrations were estimated by gas chromatography. Data were analyzed using Proc GLM for a Latin Square Split-Plot Design. Ammonia-N concentrations ranged from 5.38 to 7.61 mg/dl for T3 and T5, respectively and were similar between treatments (P>0.05). Values for pH were also similar in animals fed the treatments (mean 6.56: P>0.05). Treatments resulted

in marginal differences in VFA concentrations among treatments (P=0.056). A numerical increment (P<0.10) in acetate concentrations was registered in sheep fed T5 which produced 27.5% more acetate than their counterparts fed T1. No differences in propionate concentrations were registered between treatments (P>0.05), although animals fed T5 produced 32.5% more propionate than the animals receiving T1. Butyrate levels followed the same trend (P>0.05). Data indicated that the diets produced enough ammonia-N to ensure an adequate microbial synthesis. Mean pH concentrations might not jeopardize ruminal cellulolysis. Volatile fatty acid concentrations in diets containing equal proportions of oat and bean straws, might evidence the importance of such by products when other source of food are scarce for sheep production.

**Rumen fermentation parameters of sheep fed oat and bean straw-based diets.**

Item	Treatments					Mean	sem	Significance
	1	2	3	4	5			
NH <sub>3</sub> -N (mg/dl)	6.14	6.83	7.64	6.14	5.38	6.43	2.19	0.66
pH	6.59	6.55	6.61	6.47	6.46	6.56	0.13	0.54
Total VFA (mM <sup>-1</sup> )	31.2	33.7	40.2	36.9	44.1	37.2	8.72	0.05
Acetate (mM <sup>-1</sup> )	25.0	25.8	32.7	28.8	34.5	29.4	7.28	0.06
Propionate (mM <sup>-1</sup> )	2.38	3.28	2.62	2.89	3.53	2.90	0.95	0.30
Butyrate (mM <sup>-1</sup> )	1.92	2.32	2.61	2.17	3.12	2.43	0.57	0.24

**Key Words:** Fermentation Parameters, Sheep, Straw diets

**M166 Effects of supplementation of two selenium sources in productive performance of growing sheep.** I. Mejia-Haro\*<sup>1</sup>, A. R. Rodriguez-Murillo<sup>1</sup>, G. Tirado-Estrada<sup>1</sup>, R. Bañuelos-Valenzuela<sup>2</sup>, J. Mejia-Haro<sup>3</sup>, and J. A. Nungaray-Ornelas<sup>1</sup>, <sup>1</sup>ITEL, Ags., Aguascalientes, Ags., Mexico, <sup>2</sup>Unidad Academica de Medicina veterinaria y Zoot., UAZ, Calera, Zac., Mexico, <sup>3</sup>Universidad de Guanajuato, Irapuato, Gto., Mexico.

The objective of this study was to compare the supplementation of two sources of selenium in response to sheep performance. Twenty-four Pelibuey sheep (X= 20.5 kg of body weight), after the adaptation period were assigned in a completely randomized design to 1 of 3 treatments for a three-month study; T1, basal diet without selenium supplementation; T2, basal diet plus 1 ppm of organic selenium (Sel-Plex of All Tech lab) and T3, basal diet plus 1 ppm of selenium- yeast (Vitamin World, used in human nutrition). The evaluated variables were average daily gain, feed conversion and selenium content in hair samples. Data were analyzed by GLM procedure of SAS using ANOVA and comparison of means by tukey test. The treatment containing the diet supplemented with Selenium-yeast (T3) had higher (p<.05) daily gain (211 g) than the control group (162 g) and T2 (193 g). Feed conversion was lower (P<.05) in T3 (4.9 kg of feed/ kg gain of weight) than T2 and T1 (5.3 and 6.3 kg of feed/kg BW, respectively). Selenium content of hair was higher (P <.05) in T3 (.83 ppm) than T2 and T1 (.65 and .56 ppm, respectively). It was concluded that source of selenium supplementation influences average daily gain and feed conversion and supplementing selenium-yeast produced a better response in these parameters than not supplementing or supplementing Sel-Plex.

**Key Words:** Selenium, Minerals, Deficiency

**M167 Toxicological study of gandul forage (*Cajanus cajan*).** M. Duron-Velazquez<sup>1</sup>, G. Tirado-Estrada\*<sup>1</sup>, I. Mejia-Haro<sup>1</sup>, F. Jaramillo-Juarez<sup>2</sup>, R. Larios-Gonzalez<sup>1</sup>, H. Silos-Espino<sup>1</sup>, and F. Nieto-Muñoz<sup>1</sup>, <sup>1</sup>ITEL, Ags., El Llano, Ags. Mexico, <sup>2</sup>Universidad Autonoma de Aguascalientes, Aguascalientes, Ags., Mexico.

The objective of this study was to evaluate the toxicological content of gandul forage in vitro and in vivo in wethers sheep, two stages were carried out, the first one consisted in the in vitro evaluation of gandul forage, in which tannins (colorimetric method of Folin-Dennis and saponines (level of color intensity, method of thin layer chromatography) were analyzed in four sampling sites (S1, S2, S3 and S4) dividing the plant in three vegetative strata in each site (bottom = EB, medium = EM, top = EA), and three different ages (young plants = PJ, medium = PM and mature = PA). The saponines analysis also was carried out in flowers of the sites 2, 3 and 4 (FS2, FS3 and FS4). The second stage consisted in observe signs of toxicity in 20 sheep (18 kg BW) fed diets with different concentrations of gandul (0, 15, 30, 45 and 60 % of DM for T1, T2, T3, T4 and T5, respectively) and assigned to one of five treatments in a completely randomized design and evaluated by GLM of SAS using ANOVA and tukey tests. Blood samples were collected to determine albumin and transaminases concentrations (aspartate aminotransferase = GOT, and alanine aminotransferase = GTP). Also, liver samples were collected to carry out a histological study, for which, five wethers, one of each treatment were sacrificed. The results indicated no toxicity. In the first stage, the highest value of tannins (gTA equivalents) was for PM (12.52), followed by S1EB (11.86) and the lowest value for PJ (2.71), the average value (7.9) was below 8, which is considered a marginal value of toxicity. For saponines, the highest value was for S1EB and S1EM, otherwise, in FS4 and PJ, saponine presence was not observed. T5 obtained the highest serum albumin concentration (7.084 u/l). For GOT, T3 obtained the highest value (38.72 u/l) and the lowest value for T4 (25.4 u/l), likewise, for GTP, the highest value was obtained by T3 (61.7 units) and the lowest by T2 (21.1 units). In liver, all samples presented a normal histological organization. In the in vivo study, no toxicity was present; ADG, and feed intake were adequate for all treatments. Gandul forage did not present toxicity in in vivo and in vitro studies.

**Key Words:** Saponines, Tannins

**M168 Characterization of a negative halothane gene commercial multibreed swine population for growth and conformation traits in tropical western Thailand.** S. Koonawootrittriron<sup>1</sup>, M. A. Elzo\*<sup>2</sup>, and T. Suwanasopee<sup>1</sup>, <sup>1</sup>Kasetsart University, Bangkok, Thailand, <sup>2</sup>University of Florida, Gainesville.

The Thai market demands lean pork. Producers are attempting to meet this demand by breeding pigs of larger size and lean content. Pietrain is one of the major breeds used to achieve this goal. Unfortunately, Pietrain has a high frequency of halothane (i.e., porcine stress syndrome) genes that can produce low quality meat and death by heat stress under conditions of high temperature and humidity. The objective of this research was to evaluate a large commercial negative halothane gene multibreed swine population in western Thailand for growth and conformation traits. Breeds represented were Pietrain (P), Large White (LW), and Landrace (L). Boars from all breeds were mated to P sows. LW females were only used to produce replacement boars. This mating strategy resulted in 4 breed groups of piglets: P, L, F1 LW×P, and F1 L×P. Pigs were kept in open barns, and received the same nutrition, management, and health care. Data consisted of 37,628 birth weights (BW) and 12,404 weaning weights (WW), and 2,980 body lengths (BL), shoulder widths (SW), hip widths (HW) and ages at first estrus (AE) from pigs born from 2003 to 2006. Genetic parameters and estimated breeding values were computed using multivariate animal models (BW-WW and BL-SW-HW-AE). Fixed effects were contemporary group (year-month), sex, parity of dam, direct heterosis, and animal genetic group. Random effects were animal, dam (BW-WW only), and residual. Computations were performed using ASREML. All fixed effects were important for all traits ( $P < 0.001$ ). Estimates of heritabilities for direct genetic effects were  $0.09 \pm 0.02$  for BW,  $0.08 \pm 0.02$  for WW,  $0.13 \pm 0.03$  for BL,  $0.18 \pm 0.04$  for SW,  $0.15 \pm 0.04$  for HW, and  $0.33 \pm 0.06$  for AE. Maternal heritabilities were  $0.22 \pm 0.01$  for BW and  $0.20 \pm 0.01$  for WW. Monthly phenotypic means tended to increase for BW, BL, and HW, and to decrease for AE. Monthly genetic means tended to increase for HW and to decrease for AE.

**Key Words:** Halothane, Pig, Tropical

## Lactation Biology: Mechanisms Regulating Lactation and Mammary Function

**M169 Effects of dietary supplementation with flax during prepuberty on mammary development and circulating prolactin and estradiol concentrations.** C. Farmer\*<sup>1</sup>, H. V. Petit<sup>1</sup>, and A. V. Capuco<sup>2</sup>, <sup>1</sup>Agriculture and Agri-Food Canada, Sherbrooke, QC, Canada, <sup>2</sup>USDA-ARS, Beltsville, MD.

The possible role of dietary flax on mammary development of prepubertal gilts was investigated. Fifty-seven gilts were fed one of four diets from 88 d of age until slaughter (day 212 ± 1). Diets were: standard, CTL (n=14); 10% flaxseed supplementation, FS (n=13); 6.5% flaxseed meal supplementation, FSM (n=15); and 3.5% flaxseed oil supplementation, FSO (n=15). All diets were isonitrogenous, isolipidic and isocaloric. Jugular blood samples were obtained on days 78 and 210 and assayed for prolactin and estradiol. At slaughter, mammary glands were excised, parenchymal and extraparenchymal tissues were dissected and composition of parenchymal tissue was determined. Histochemical analyses of mammary parenchyma were performed and fatty acid profiles in extraparenchymal tissue were

evaluated. Dietary flax increased ( $P \leq 0.001$ ) the concentrations of polyunsaturated fatty acids (PUFA) and decreased those of saturated (SFA,  $P < 0.01$ ) and monounsaturated (MUFA,  $P < 0.001$ ) fatty acids in mammary extraparenchymal tissue. This was largely due to the inclusion of FS or FSO ( $P < 0.01$ ), but not FSM. Circulating concentrations of prolactin and estradiol were unaltered by treatments ( $P > 0.1$ ). Dry matter content of parenchymal tissue was the only mammary compositional value affected, showing an increase with flax addition ( $P < 0.05$ ). Diet did not alter ( $P \geq 0.1$ ) BrdU labelling index or estrogen receptor localization. Within mammary parenchyma, estrogen receptors were present in epithelial cells but not adipocytes, a novel demonstration of potential estrogen targets in gilt mammary gland. Dietary supplementation with flax as seed, meal or oil, brought about expected changes in fatty acid profile in mammary extraparenchymal tissue but neither the alteration in fatty acid profile nor the presence of lignans had beneficial effects on hormone concentrations or mammary development.

**Key Words:** Flax, Mammary Development, Swine