

registered parturitions during a 30 month period). Plasma  $\alpha$ -tocopherol levels obtained were higher than 3.0  $\mu\text{g/ml}$  (minimum suggested value for proper neutrophil function). Results of this study suggest that dairy cows grazing fresh grasses probably do not require vitamin E supplementation.

**Plasma a-tocopherol mean values and 95% Conf. Int. (CI) ( $\mu\text{g/ml}$ )**

	-8	Days -5	relative -2	to 0	calving +2	+5	+8
Average	6.39	6.16	6.49	5.56	5.13	5.72	6.24
95% CI	4.81- 8.17	4.44- 7.88	3.61- 9.17	3.42- 7.70	2.90- 7.37	4.16- 7.28	3.92- 8.56

**Key Words:**  $\alpha$ -Tocopherol, Grazing Cattle, Peripartum

**M214 Meta-analysis of dietary niacin supplementation trials in lactating dairy cows.** E. Schwab\*, D. Caraviello, and R. Shaver, *University of Wisconsin, Madison.*

Recent reviews regarding niacin supplementation of lactating dairy cow diets only report across-study means or percentage responses versus controls. A meta-analysis of literature data was conducted to statistically examine the response

of lactating dairy cows to supplemental dietary nicotinic acid (NA). The data set comprised 27 studies published between 1980 and 1998 where lactation performance responses to 6 and 12 g/d supplemental NA were reported. Data were analyzed with the MIXED procedure of SAS to evaluate animal response to NA, expressed as the difference from control. The linear model included NA supplementation level as the fixed effect and study as the random effect. Responses to NA supplementation were weighted by the number of animals used to test the response. Response variables evaluated were DMI, milk yield and composition, feed efficiency, and plasma BHBA, NEFA, and glucose concentrations. No efficacy of 6 g/d supplemental NA was found. Supplementation with 12 g/d NA did not affect DMI, milk fat or protein percentages, or plasma metabolites. Yields of 3.5% FCM, milk fat, and milk protein were increased ( $P \leq 0.10$ ) 0.5 kg/d, 25.8 g/d, and 17.4 g/d, respectively, and 3.5% FCM feed efficiency was increased ( $P \leq 0.10$ ) by 0.03 units. A Type I/Type II error economic analysis of 3.5% FCM yield response showed that frequencies of the observed response being greater than the break-even response were 54% and 57% when NA costs were \$0.01 and \$0.005/g, respectively. Although results of our meta-analysis show that 12 g/d NA improved lactation performance, tenuous economic benefits may dissuade routine inclusion in lactation diets. Results suggest that further research focusing on dairy cows in the transition period and metabolic disorders, higher NA dosage amounts, and ruminally-protected NA products may be warranted.

**Key Words:** Niacin, Dairy Cow, Milk Production

## Sheep Species

**M215 Estimation of the apparent digestibility of soybean hulls in diets containing increasing concentrations of soybean hulls to replace corn fed to growing lambs.** T. Johnson\*<sup>1</sup> and J. Rekhis<sup>2</sup>, <sup>1</sup>*Purdue University, West Lafayette, IN*, <sup>2</sup>*Manouba University, Sidi Thabet, Tunisia.*

The objective of this study was to determine apparent digestibility of organic matter, N, fiber, and efficiency of nutrient utilization of diets containing increasing levels of soy hulls in replacement of corn in diets fed to growing lambs. Basal diet contained 65% ground corn, 25% soybean hulls, and 10% hay crop silage (Diet D). Soy hulls replaced corn at 25%, 50%, 75% or 100% of the concentrate. All lambs were fed ad libitum concentrate (1450 - 1800 g DM/day). Twelve wether lambs (27-34 kg BW) were assigned to a 3-period switch-back. Period contained 21 d, 14 d adaptation, and 7 d total collection of urine and feces. Composition of diets A, B, C, D, and soy hulls were respectively, DM %: 84.1, 83.8, 84.9, 82.7, and 90.5; OM %: 90.5, 93.02, 93.9, 94.2, and 95.1; GE, Kcal/g: 3.95, 3.82, 3.85, 3.84, and 3.78; N %: 3.23, 3.16, 3.01, 2.68, and 2.57; ADF %: 39.9, 36.5, 27.6, 17.1, and 44.1. Intake of DM, GE, and DE were not different between treatments (Table 1). Apparent DMD of diet A with 100% replacement of corn by soy hulls was lower than the basal diet D ( $P < 0.05$ ). Intake of ADF was increased as soy hulls replaced corn ( $P < 0.01$ ). However, apparent digestibility of ADF was also increased as soy hulls replaced 75% of dietary corn (diet B) as compared to basal diet D ( $P < 0.05$ ). Although GE and DE consumed by lambs fed all diets were not different, fecal-E tended to be greater in lambs fed diet A (100% replacement of corn by soy hulls) as compared to fecal-E of lambs fed diet D. Presumably greater ADF digestibility of diet B as compared to basal diet D can be attributed to an improved rumen environment for fiber digestion in lambs fed this diet.

**Table 1.**

Diet-replacement of corn by soy hulls	A-100%	B-75%	C-50%	D-25%	SE	Significance
DM-intake, g/d	1489.0	1514.3	1388.2	1436.5	63.5	ns
DMD, %	67.4	72.2	70.6	76.5	2.8	A vs. D, $P < 0.05$
OMD, %	69.2	73.7	75.3	74.9	3.0	ns
ADF-Dig., %	60.5	64.8	56.8	53.7	3.0	B vs. D, $P < 0.05$ ; B vs. C, $P = 0.10$
GE-intake, kcal/d	6.21	6.20	5.59	5.86	0.30	ns
Fecal-E., kcal/d	1.89	1.73	1.70	1.52	0.12	A vs. D, $P = 0.10$
DE, kcal/d	4.31	4.47	3.90	4.33	0.28	ns

**Acknowledgements:** Supported by Fulbright Scholars Program CIES, and Purdue International Programs in Agriculture

**Key Words:** Soyhulls, Lambs, Digestion

**M216 Effect of substitution of alfalfa hay with dehydrated pig manure on apparent digestibility of growing diets for sheep.** A. Estrada-Angulo\*, A. Terrazas, J. F. Obregon, A. B. Perez, C. H. Ramos, and E. Vazquez-Garcia, *FMVZ-Universidad Autonoma de Sinaloa, Culiacan, Sinaloa, Mexico.*

With the objective of determining the effect of substitution of alfalfa hay with dehydrated pig manure (DHPM) on apparent digestibility of growing diets for lambs, a total fecal collection experiment was conducted. Pelibuey lambs (n = 4 males; BW = 20.12 kg) were used in a crossover design experiment. The sheep were assigned to one of two diets: 1) 10% sudan grass hay, 30% alfalfa hay,

29.5% cracked corn, 13% soybean meal, 1% hydrolyzed animal fat, 14% sugar cane molasses, 2.5% mineral premix (Control; 18.0% CP and 3.10 Mcal of DE/kg) or, 2) Control diet substituting alfalfa hay with DHPM (18.1% of CP and 2.3 Mcal of DE/kg). Sheep were placed in individual metabolic crates (0.6 x 1.2 m). Experimental periods consisted of a 10 d of adaptation period and 4 d of sample collection. From each diet and period 1 kg of diet was taken as sample and all feces were collected for DM and CP analysis. Mean daily intake of DM and CP were 737 g and 125 g, respectively. Fecal DM (179.3 vs. 201.5 g/d) and organic matter (149.4 vs. 170.9 g/d) were affected by inclusion of DHPM ( $P = 0.01$ ) but CP excreted in feces (29.6 vs. 30.8 g/d) was not affected by diets ( $P = 0.36$ ). The inclusion of DHPM diminished ( $P = 0.01$ ) apparent DM digestibility (75.6 vs. 73.0%), organic matter (77.2 vs. 74.8%) and apparent digestibility of CP (78.3 vs. 73.2%). Diet DE was altered (3.23 vs. 3.12 Mcal/kg for Control and DHPM respectively,  $P = 0.01$ ). It is concluded that the inclusion of DHPM in complete diets for growing lambs compared with alfalfa hay decreased digestibility and DE content.

**Acknowledgements:** La fama swine farm

**Key Words:** Alfalfa Hay, Pig Manure, Apparent Digestibility

**M217 The effects of feeding dried poultry manure on weight gain, feed conversion rates and some blood values in lambs.** F. S. Hatipoğlu<sup>1</sup>, M. S. Gulay<sup>1</sup>, F. Karakas Oguz<sup>1</sup>, N. Oguz<sup>1</sup>, U. R. Fidancı<sup>2</sup>, and G. Yıldız<sup>2</sup>, <sup>1</sup>Akdeniz University, Antalya, Turkey, <sup>2</sup>University of Ankara, Ankara, Turkey.

The effects of feeding diets containing different concentrations of poultry manure (PM) on some blood parameters [red blood cells (RBC), packed cell volume (PCV), hemoglobin (Hb), white blood cells (WBC)], weight gain and feed conversion rates were examined in 5 to 6 month old Akkaraman male lambs for 90 d. Lambs were divided into control ( $n = 8$ ) and three treatment groups ( $n = 6$ /group). The dietary treatments included 0% (control; C), 10% (TRT-I), 20% (TRT-II) and 30% (TRT-III) dried poultry manure of total diet. All blood samples were collected from jugular vein prior to morning feeding. Lambs were weighed two consecutive days every other week before the morning feeding. No significant effects of PM concentration in the diet fed were observed for mean RBC count ( $C = 9.05 \pm 0.33$ , TRT-I =  $9.04 \pm 0.38$ , TRT-II =  $10.19 \pm 0.38$ , and TRT-III =  $9.8 \pm 0.38 \times 10^6/\mu\text{L}$ ), PCV ( $C = 29.20 \pm 0.82$ , TRT-I =  $28.06 \pm 0.95$ , TRT-II =  $31.30 \pm 0.95$ , and TRT-III =  $30.13 \pm 0.95\%$ ), Hb ( $C = 9.59 \pm 0.35$ , TRT-I =  $9.37 \pm 0.41$ , TRT-II =  $10.65 \pm 0.41$ , and TRT-III =  $10.37 \pm 0.41 \text{ g}\%$ ) or WBC count ( $C = 7.48 \pm 0.16$ , TRT-I =  $7.27 \pm 0.16$ , TRT-II =  $7.93 \pm 0.16$ , and TRT-III =  $7.77 \pm 0.16 \times 10^3/\mu\text{L}$ ). Mean daily weight gains did not differ and were  $0.160 \pm 0.02$ ,  $0.176 \pm 0.01$ ,  $0.168 \pm 0.01$ , and  $0.178 \pm 0.01 \text{ kg}$  for lambs in C, TRT-I, TRT-II, and TRT-III groups, respectively. Moreover, no differences were detected on average feed conversion rates ( $C = 7.97$ , TRT-I =  $7.40$ , TRT-II =  $7.70$ , and TRT-III =  $7.23 \text{ kg/kg}$  live weight gain). In conclusion feeding lambs up to 30% PM had no negative effects on the blood parameters, weight gain or feed conversion rates.

**Key Words:** Poultry Manure, Blood Parameters, Feed Conversion Rate

**M218 Effect of Zilpaterol clorhidrate on growth performance and carcass traits in finishing sheep.** A. Felix, A. Estrada-Angulo<sup>\*</sup>, F. G. Rios, C. H. Ramos, and A. B. Perez, FMVZ-Universidad Autonoma de Sinaloa, Culiacan, Sinaloa, Mexico.

With the objective of determining the effect of Zilpaterol clorhidrate (Zilmax, Intervet Lab.) on growth performance and carcass traits in sheep, 48 Pelibuey sheep (males;  $BW = 23.5 \pm 1.5 \text{ kg}$ ) were used in a complete randomized block experimental design. The animals were weighed and blocked by weight in 12 groups of four, were placed in 12 ground floor pens (2x3 m), and assigned to consume a control diet for 28 d. On d 29 one of three diets was fed: 1) diet with 14.5% CP, 3.6 Mcal of DE/kg containing 6.5% corn straw, 51% ground corn, 11.5% polished rice, 15% canola meal, 12% sugarcane molasses, 1.5% hydrolyzed animal fat, 2.5% mineral premix, and no zilpaterol clorhidrate (Control); 2) Control with 45 ppm of Zilpaterol clorhidrate (45ppm) or, 3) Control with 67

ppm of Zilpaterol clorhidrate (67ppm). Animals were weighed on d 1, 28 and 56. Feed was offered twice daily free choice. On d 56 they were killed in a slaughterhouse; carcass traits were recorded and main carcass cuts were measured. Treatments did not affect live weight (36.92, 37.58 and 37.33 kg for Control, 45ppm and 67ppm, respectively,  $P = 0.45$ ), average daily gain (0.237, 0.217 and 0.237 kg/d, respectively), daily feed intake (1.307, 1.297 and 1.310 kg/day), and feed/gain (5.554, 6.030 and 5.560 kg of DM, respectively). Cold carcass weight, carcass length and width, carcass dressing percent, rib eye area, back fat, and leg circumference were similar ( $P = 0.64$ ) among treatments. Long loin, short loin, rib, leg, shoulder and neck cuts were not affected by treatments ( $P = 0.74$ ). In conclusion, the inclusion of Zilpaterol clorhidrate at 45 ppm or 67 ppm during the last 28 d of finishing did not affect growth performance, carcass traits, or carcass cutability of hair sheep.

**Acknowledgements:** Bonanza Beef Cattle Ranch

**Key Words:** Zilpaterol Clorhidrate, Carcass Sheep, Growth-Performance

**M219 Effect of joint chromium and zinc supplementation on performance of growing Pelibuey hair sheep.** L. Almeida and R. Barajas<sup>\*</sup>, FMVZ-Universidad Autonoma de Sinaloa, Culiacan, Sinaloa, Mexico.

The objective was to determine the effect of joint chromium and zinc supplementation on performance of growing Pelibuey hair sheep ( $n = 40$  males;  $BW = 20.05 \pm 0.03 \text{ kg}$ ). Animals were weighed, blocked by weight and placed in 12 ground floor pens (2 x 3 m). The design was a completely randomized block with a 2 x 2 factorial arrangement. Lambs received one of four treatments for 28 d. All diets were 16% CP and 1.8 Mcal of NEm/kg with no chromium methionine (Cr) or zinc methionine (Zn; Control), 1.0 ppm Cr, 60 ppm Zn, or both Cr and Zn (Cr+Zn). Animals were weighed on d 1, 14 and 28. During the first 28 d, Zn supplementation increased ( $P < 0.05$ ) BW, ADG, and DMI. Over 28 d, Cr increased ( $P < 0.05$ ) final weight by 3.2% (24.79 vs. 25.58 kg). Cr improved ( $P < 0.05$ ) ADG by 12% (0.173 vs. 0.194 kg/d). Cr supplementation tended ( $P = 0.06$ ) to increase DMI (0.708 vs. 0.807 kg/d). Zn increased ( $P < 0.05$ ) final weight by 3.7% (24.23 vs. 25.65 kg), and enhanced ( $P < 0.01$ ) ADG by 22% (0.164 vs. 0.202 kg/d). Zn improved ( $P < 0.05$ ) DMI (0.698 vs. 0.817 kg/d). Feed/gain ratio of the experiment (mean  $4.15 \pm 0.26 \text{ kg feed/kg gain}$ ) was not affected ( $P > 0.49$ ) by treatments. Interactions between Cr and Zn were not observed ( $P > 0.25$ ). It is concluded, that both chromium methionine and zinc methionine supplementation improved growth performance of growing hair sheep, but joint supplementation has no advantage over individual supplementation.

**Key Words:** Chromium, Zinc, Sheep

**M220 Carcass traits of hair breed ram and wether lambs on moderate or high level of supplement.** J. Burke<sup>\*1</sup> and J. Apple<sup>2</sup>, <sup>1</sup>USDA, Agricultural Research Service, Booneville, AR, <sup>2</sup>University of Arkansas, Fayetteville.

The objective was to determine growth and carcass traits of ram (R;  $n = 27$ ) and wether (W;  $n = 22$ ) hair breed lambs (Katahdin, KA,  $n = 15$  or Dorper, DO,  $n = 34$ ) on a moderate (M) or high (H) level of supplement. Lambs were weaned at 84 d of age (d 0), blocked by breed and sex and randomly assigned to a M ( $n = 24$ ) or H ( $n = 25$ ) level of corn-SBM supplement (15% CP) with free choice bermudagrass hay. Lambs were fed in three phases: d 0 to 42, 226 g/454 g; d 43 to 84, 226 g/680 g; d 85 to 126, 454 g/680 g for M/H groups. ADG was greater for H than M-fed lambs during phases 1 and 2, but not 3 ( $P < 0.001$ ) and greater for R than W lambs during phases 2 and 3 ( $P < 0.01$ ). Lambs were slaughtered at 210 d of age weighing 43.0 (R) and 36.4  $\pm$  1.2 kg (W;  $P < 0.001$ ) and 36.8 (M) and 42.5  $\pm$  1.2 kg (H;  $P < 0.002$ ). Pelt removal from R ( $P < 0.05$ ) and H-fed ( $P < 0.003$ ) was more difficult than W and M-fed lambs. Carcass quality and cutability data were collected after a 7 d aging period at 2°C. Carcass traits between DO and KA were similar. Carcasses from R lambs were heavier than W ( $P < 0.009$ ) and H-fed were heavier than M-fed carcasses ( $P < 0.001$ ), whereas, fat thickness and yield grades of H-fed were greater than M-fed lambs ( $P < 0.001$ ). Kidney fat weights and percentages were greater from H-fed than M-

fed ( $P < 0.01$ ) and W than R ( $P < 0.001$ ) carcasses, resulting in a greater cooler shrinkage in R carcasses ( $P < 0.01$ ). Lean maturity was similar among diet and sex groups; however, skeletal and overall maturities were greater from M-fed carcasses ( $P < 0.05$ ). Carcasses from M-fed ( $P < 0.001$ ) and R ( $P < 0.02$ ) lambs had lower flank streaking scores than H-fed and W lambs. Conformation scores from H compared with M-fed carcasses were higher ( $P < 0.01$ ), resulting in higher ( $P < 0.001$ ) quality grades. LM areas of H-fed were greater than that of M-fed lambs ( $P < 0.003$ ). Chops were more tender from W than R carcasses ( $P < 0.009$ ) and there was less cooking loss in chops from H than M-fed lambs ( $P < 0.04$ ). In summary, hair breed lambs benefit from a high level of supplement and carcass quality was improved by castration similar to that found in wool breeds.

**Key Words:** Carcass Traits, Growth, Hair sheep

**M221 Cholesterol, CLA and fat content of lamb loin chops by breed type.** S. Duckett<sup>\*1</sup>, S. Greiner<sup>2</sup>, and D. Notter<sup>2</sup>, <sup>1</sup>University of Georgia, Athens, <sup>2</sup>Virginia Polytechnic Institute and State University, Blacksburg.

Cholesterol, CLA and fatty acid content of loin chops were measured for 60 lambs of five breed groups (12 lambs/group). Lambs were straightbred Katahdin (KT), Barbados Blackbelly x St. Croix (HH), crosses of Dorper (DPX) or Dorset (DOX) rams to crossbred (1/2 Dorset, 1/4 Rambouillet, 1/4 Finnsheep) ewes, or crosses of Suffolk sires to KT, DPX, and DOX ewe lambs (SUX). Lambs were weaned at 90 d of age, grazed, and fed a high-concentrate diet prior to slaughter. One loin chop (13th rib) was used for cholesterol and fatty acid analyses via GLC. Data were analyzed by ANOVA and contrasts were used to test differences between SUX vs. others, DPX vs DOX, DPX and DOX vs. HH and KT, and HH vs. KT. Cholesterol content averaged 68.7 mg/100 g of fresh tissue and ranged from 57.5 to 80.2 mg/100 g. Cholesterol content did not differ ( $P = 0.29$ ) among breeds. Fatty acid content averaged 2.31 g/100 g of fresh tissue and ranged from 1.0 to 6.3 g/100 g. Total fatty acid content was greater ( $P = 0.05$ ) for SUX than for other breeds. Chops from DPX and DOX contained more ( $P = 0.04$ ) total fatty acids than chops from HH and KT. CLA (cis-9 trans-11 isomer) content was greater for KT than HH ( $P = 0.02$ ). DPX and DOX chops contained greater ( $P = 0.01$ ) amounts of saturated and monounsaturated fat than chops from HH and KT. Saturated and monounsaturated fat content was greater ( $P = 0.05$ ) for SUX than other breeds. Omega-6 fatty acid content did not differ ( $P > 0.14$ ) among breeds. Omega-3 fatty acid content was greater ( $P < 0.01$ ) for KT than HH. DPX chops tended ( $P = 0.09$ ) to have greater amounts of omega-3 fatty acids than DOX. Even though the total fatty acid content was higher, the ratio of omega-6 to omega-3 fatty acids was lower ( $P < 0.01$ ) and therefore more desirable from a human health standpoint for DPX and DOX than HH and KT and also lower ( $P < 0.01$ ) for KT than HH. Breeds did not differ in cholesterol content but did show variation in total fat and fatty acid content of lamb loin chops.

**Key Words:** Lamb, Cholesterol, Fatty Acid

**M222 Growth and parasite resistance of pasture-raised purebred Katahdin and Katahdin crossbred lambs.** D. J. Jackson<sup>\*1</sup>, N. C. Whitley<sup>1</sup>, J. W. Lemaster<sup>2</sup>, and S. Schoenian<sup>2,3</sup>, <sup>1</sup>University of Maryland Eastern Shore, Princess Anne, <sup>2</sup>Maryland Cooperative Extension, College Park, MD, <sup>3</sup>Western Maryland Research and Education Center, Keedysville, MD.

The objective of the study was to compare growth performance and parasite resistance of pasture-raised Katahdin and Katahdin crossbred lambs. Katahdin ewes were mated to a single White Dorper (n = 40), Texel (n = 37), Suffolk (n = 35) or Katahdin (n = 21) ram. Lamb body weights were measured at birth (d 0), d 33 ± 0.8, 62 ± 0.5, 84 ± 0.5, 120 ± 0.6, 144 ± 0.6 and 165 ± 0.6 (adjusted to d 30, 60, and 90, 120, 140 and 160, respectively). Fecal egg counts (FEC) were determined at days corresponding to adjusted d 60, 90, 120, 140, and 160 and all lambs were administered anthelmintics at weaning (d 90). There was no influence of sire breed on number of lambs born per ewe lambing (2.0 ± 0.05) or lamb birth weight (4.3 ± 0.2 kg). At all time points measured, Suffolk-sired

lambs (SK) were heavier ( $P < 0.01$ ) than Katahdin- (KA), Texel- (TK) and Dorper-sired lambs (DK). On d 60, 90, 120, 140 and 160, TK lambs were heavier ( $P < 0.05$ ) than KA lambs, while DK lambs were intermediate. At weaning and on d 160, SK, TK, DK and KA lambs weighed 34.7 ± 0.5 and 43.1 ± 0.6, 30.9 ± 0.6 and 39.7 ± 0.6, 30.0 ± 0.6 and 37.9 ± 0.6, and 28.4 ± 0.7 and 37.2 ± 0.7 kg, respectively. Overall, average daily gain was highest ( $P < 0.01$ ) in SK lambs (0.31 ± 0.01 kg/d), followed by DK (0.28 ± 0.01 kg/d) and TK (0.28 ± 0.01 kg/d) lambs, and was lowest in KA lambs (0.26 ± 0.01 kg/d). On d 60 and 90, FEC were similar among the breeds. On d 120, TK lambs had the highest ( $P < 0.02$ ) FEC, but on d 140 FEC were higher ( $P < 0.04$ ) for SK compared to KA and TK while DK lambs were intermediate. At d 160, both KA and DK lambs had lower ( $P < 0.04$ ) FEC than TK lambs while SK FEC was intermediate. Overall, in this study, SK lambs raised on pasture grew faster than KA, DK, and TK lambs but there seemed to be few biologically relevant differences in FEC.

**Key Words:** Sustainable, Parasite, Crossbred Lambs

**M223 Effects of deworming hair sheep, wool sheep and meat goats with avermectin and herbs.** H. Swartz<sup>\*1</sup>, F. Wulff<sup>1</sup>, A. Stewart<sup>1</sup>, and M. Ellersieck<sup>2</sup>, <sup>1</sup>Lincoln University, Jefferson City, MO, <sup>2</sup>University of Missouri, Columbia.

This study was carried out to investigate the effects of herbs as a dewormer on sheep and goats compared to the commercial dewormer, ivermectin (Ivomec). Katahdin hair sheep (K), Dorset wool sheep (D) and Boer/cross goats (B) were used to determine the effects of breed of sheep and Boer/cross goats on deworming agents. Fecal egg counts (FEC) using the modified McMaster procedure were measured as eggs/g on three treatments: control (n = 19), Ivomec (n = 20) and herbal (n = 20). The herbs were a blend of wormwood (*Artemisia sp.*), fennel (*Foeniculum vulgare*), gentian (*Gentian sp.*), psyllium (*Plantago sp.*), and quassia (*quassia sp.*). The K, D and B animals grazing at the Carver Farm were divided into the three treatment groups. Animals were weighed and dewormed on May 4, 2004 and FEC were performed on all sheep and goats on May 13, June 28, July 20, and August 9, 2004. FEC data were analyzed as a 3x3 factorial split/plot in time mixed model procedure of SAS and converted to a log10 to evaluate the effects of breed of sheep and goats to dewormers. The control groups of K, D and B on May 13, was 0.0, 0.19, and 0.28, respectively. The Ivomec groups of K, D, and B were 0.0, 0.0, 0.85 and the herbal groups of K, D, and B were 0.0, 0.0, 0.0. June 28, control groups of K, D and B were 0.43, 0.19, 2.62. Herbal groups of K, D and B were 0.46, 0.0, and 1.83. July 20, controls of K, D, B were 2.01, 0.49, 2.61; Ivomec groups K, D, B, 0.92, 2.14, 2.75; herbal groups K, D, B were 0.76, 0.34, 2.74, respectively. FEC data collected on August 9, control groups K, D, B were 2.42, 0.96, 2.62; Ivomec groups, K, D, B were 1.02, 0.60, 1.25; herbal groups, K, D, B were 0.40, 1.04, 2.64. A significant difference ( $P < 0.01$ ) was seen in the breeds of sheep and goats over time between the treatments. Breeds of sheep and goats, influenced by the commercial dewormer (Ivomec) compared to herbal treatment, exhibited a 3-way interaction. The data indicated that different breeds of sheep and goats are reacting differently to the commercial Ivomec and herbs over time.

**Key Words:** Anthelmintics, Herbs, Sheep and Goats

**M224 Survival analysis from birth to slaughter of Ripollesa lambs.** J. Casellas<sup>\*</sup>, J. Piedrafita, G. Caja, and A. Ferret, *Universitat Autònoma de Barcelona, Bellaterra, Spain.*

Ripollesa sheep produce a 'pascual' type light lamb (24 kg BW at slaughter) which is typically consumed in Catalonia (Spain). Lambs are intensively reared indoors with a short suckling period and fed ad libitum with concentrate and straw. Age of survivability (wk) up to slaughter of 1,487 Ripollesa lambs from a fall lambing flock mainly (Christmas harvesting), was studied under the proportional hazards framework, assuming a Weibull distribution for the baseline hazards function. A sire frailty model including the common environment received by the lamb as an additional random source of variation was fitted. The common environment was considered time dependent, characterized by the ewe

and the contemporary group during the pre-weaning and fattening periods, respectively. The significant fixed effects studied were: linear and quadratic effect of birth BW ( $P < 0.001$ ), relative position of the delivery within the birth distribution of the lambing season ( $P < 0.001$ ), and presence of stillbirths or mummified fetuses within litter ( $P < 0.05$ ). Birth type and parturition number of the ewe affected lamb survival only when birth BW was removed from the model ( $P < 0.001$  and  $P < 0.05$ , respectively). Notwithstanding, the model including birth BW was preferable, according to the Akaike's Information Criterion. The hazard ratio (HR) was greater for both small and large birth BW, although the survival variation was less than 2% within the 3.3 to 5.4 kg BW range, showing an optimum birth BW range for lamb survival. The HR increased for births which occurred during the last third of the lambing period (HR = 1.70;  $P < 0.05$ ), and increased more markedly for replacement ewe-lambs that lambed from December to January (HR = 5.36;  $P < 0.001$ ). Furthermore, survival probability decreased for lambs from litters with one or more stillbirths or mummified fetuses (HR = 1.61;  $P < 0.05$ ). The estimate of the sire variance (0.07) was markedly lower than that of the common environment (1.87).

**Acknowledgements:** Conveni DARP-ANCRU-UAB

**Key Words:** Lamb Survival, Proportional Hazard, Ripollesa Breed

**M225 Analysis of associations between genotypes at codon 171 and 136 of the prion protein gene and production traits in a survey of market lambs.** J. M. Evoniuk<sup>\*1</sup>, P. T. Berg<sup>1</sup>, M. L. Johnson<sup>1</sup>, C. L. Stoltenow<sup>1</sup>, C. S. Schauer<sup>1</sup>, K. I. O'Rourke<sup>2</sup>, and D. A. Redmer<sup>1</sup>, <sup>1</sup>North Dakota State University, Fargo, <sup>2</sup>USDA, ARS, ADRU, Pullman, WA.

The objective of this study was to conduct a preliminary survey of Northern Plains market lambs (N=824) to analyze associations between prion protein genotypes and production traits. Trait parameters included age, live/carcass wt, dressing %, back fat thickness, body wall thickness, rib eye area (REA), flank streaking, and percent boneless closely trimmed retail cuts (BCTRC). Genotyping at codon 136 and 171 was done using commercially available testing or SNP assay. Lambs were slaughtered at a common location and one experienced evaluator collected carcass data without prior knowledge of genotype. Lambs were marketed for slaughter based on weight and condition. No differences ( $P > 0.2$ ) were observed between lambs with codon 136AA or 136AV for live wt, carcass wt, back fat, body wall thickness, REA, flank streaking, or BCTRC. However, 136AV lambs were older than 136AA lambs ( $195.9 \pm 5.7$  vs  $171.7 \pm 2.7$  days,  $P < 0.05$ ). Codon 171RR live lambs weighed less than 171QR ( $P < 0.01$ ) and 171QQ ( $P < 0.07$ ) lambs ( $51.7 \pm 0.7$ ,  $53.6 \pm 0.7$ , and  $53.6 \pm 1.0$  kg, respectively). 171RR lambs had lower carcass wt than 171QR ( $P < 0.001$ ) and 171QQ ( $P < 0.001$ ) lambs ( $26.0 \pm 0.4$ ,  $27.4 \pm 0.3$ , and  $28.1 \pm 0.4$  kg, respectively). No differences in dressing % were seen between 171RR and 171QQ ( $P = 0.74$ ) lambs. 171QQ lambs tended to have more back fat than either QR ( $P < 0.06$ ) or RR ( $P = 0.19$ ) lambs ( $0.48 \pm 0.03$ ,  $0.43 \pm 0.03$  and  $0.43 \pm 0.03$  cm, respectively). Body wall thickness was less in 171RR lambs vs 171QR ( $P < 0.01$ ) or 171QQ ( $P < 0.001$ ) lambs ( $1.78 \pm 0.05$ ,  $1.90 \pm 0.05$  and  $2.21 \pm 0.08$  cm, respectively). REA (square cm) was larger for 171QQ lambs as compared to 171QR ( $P < 0.002$ ) and 171RR ( $P < 0.001$ ) lambs ( $15.8 \pm 0.3$ ,  $15.0 \pm 0.2$  and  $14.5 \pm 0.2$ ). 171QR lambs also had larger REA than 171RR lambs ( $P < 0.01$ ). As expected, 171RR lambs had a larger ( $P < 0.03$ ) BCTRC ( $47.4 \pm 0.2$ ) as compared to 171QQ ( $47.0 \pm 0.2$ ). In conclusion, these data suggest associations between prion protein genotypes and production traits and a need for further study.

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**Key Words:** Sheep Scrapie, Prion Genotype, Production

**M226 Impact of nutrition and body condition score at conception on gestation length.** D. Brake<sup>\*</sup> and J. Daniel, *South Dakota State University, Brookings.*

To test the impact of nutritional status around conception on lamb survival, crossbred ewe lambs were assigned to be undernourished (U; n = 34) or well-fed (W; n = 34). At 30 days before breeding, U ewes were fasted for 2 days, and

then group fed 50% of requirements of replacement ewe lambs (NRC, 1985). W ewes were fed concentrates at 3 - 4% of body weight/day. Ewes were exposed to a teaser ram by fence-line contact for two weeks prior to exposure to semen-tested rams fitted with marking harnesses. Twenty-four hours after marking, one-half of the U ewes were switched to the W group, and one-half of the W ewes were switched to the U group and fed the restricted diet for 30 more days, for a total of four treatment groups: UU (U pre- and post-breeding), WU (W pre-breeding and U post-breeding), UW (U pre-breeding and W post-breeding), and WW (W pre- and post-breeding). Ewe's body condition score (BCS; scale 1 - 5) was recorded at the initiation of the study and at conception. Gestation length was calculated as the number of days from the ewe's breeding mark until the lamb's birth date. Gestation length and lamb birth weight were analyzed as a 2 X 2 factorial using GLM procedures for SAS. Effect of treatment on morbidity and mortality was tested by chi-square. U pre or post conception did not alter gestation length ( $P > 0.60$ ). Undernourishment before or after conception did not affect lamb birth weight ( $P > 0.38$ ). Mortality and morbidity were not affected by treatment ( $P > 0.15$ ). Since BCS at conception varied within treatment groups, effect of BCS at conception on gestation length was tested. Thin ewes (BCS < 3) had a shorter gestation length than good or fat condition ewes (BCS 3 and  $\geq 4$ , respectively;  $P = 0.0212$ ). There was a tendency for an interaction of BCS at conception with post conception nutrition ( $P = 0.0624$ ) such that thin U post conception ewes had shorter gestation lengths than all other groups. Lamb birth weight, morbidity or mortality was not affected by BCS at conception ( $P > 0.17$ ). These results indicate poor body condition at conception can result in shortened gestation length.

**Key Words:** Sheep, Undernourishment, Gestation

**M227 The effect of Bio-Mos supplementation on the performance of ewes in late pregnancy and on subsequent lamb performance.** M. Foley<sup>1</sup>, T. M. Boland<sup>1</sup>, M. Guinan<sup>1</sup>, S. Andrieu<sup>\*2</sup>, and T. F. Crosby<sup>1</sup>, <sup>1</sup>University College Dublin, Belfield, Dublin, Ireland, <sup>2</sup>Alltech Ireland, Dunboyne, Co. Meath, Ireland.

Twenty-four individually fed, twin bearing ewes were used to determine the effects of Bio-Mos (Alltech Ltd) supplementation of the ewe diet for the final seven weeks of pregnancy on colostrum yield, lamb serum immunoglobulin (IgG) levels and lamb growth rate to weaning. All ewes were offered a grass silage diet ad libitum which was supplemented with 500-700 g of concentrates in the final seven weeks of pregnancy. The concentrate supplement was fortified with 0 (T1, control) or Bio-Mos (T2) at the rate of 1g/ewe/day. The ewes were hand milked completely at 1, 10 and 18 h post-partum to evaluate colostrum yield and immunoglobulin (IgG) concentration. Blood samples were taken from lambs at 24 h post-partum to determine serum IgG levels. Lamb growth rate to weaning was recorded. There was no effect of treatment on forage or total DM intakes, crude protein intake, ewe weight change, gestation length or litter birth weight ( $P > 0.05$ ). Total colostrum yield to 18 h tended to be higher in the Bio-Mos treatment (2193 ml vs. 1694 ml, SEM 183;  $P = 0.053$ ). There was no treatment effect in colostrum yield at 1 h or 18 h; however, T2 ewes had a higher colostrum yield at 10 h (571 vs. 831 ml, SEM 70;  $P < 0.05$ ) which was reflected in a higher IgG yield at this time (28.4 g vs. 42.0 g, SEM 4.70;  $P = 0.052$ ). Lambs in the Bio-Mos treatment (T2) had higher serum IgG levels than T1 lambs (16.9 vs. 13.8 g/l; SEM 0.89;  $P < 0.05$ ). Similarly, lambs from T2 absorbed a higher percentage of colostrum IgG than lambs from T1 (17.4% vs. 14.7%, SEM 0.94;  $P < 0.05$ ). There was a tendency for lambs in the bio-Mos treatment to have higher growth rates from birth to weaning at 105 days (262g vs. 233g, SEM 12.4;  $P = 0.098$ ). We conclude that the addition of Bio-Mos to the pregnant ewe diet results in increased lamb serum IgG status, with a likelihood for increased colostrum yield and lamb growth.

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**Key Words:** Sheep, Bio-Mos, Immunoglobulin

**M228 The effects of dietary inclusion of organic selenium (Sel-Plex) on ewe milk selenium level and lamb growth.** M. Foley<sup>1</sup>, T. M. Boland<sup>1</sup>, S. Andrieu<sup>\*2</sup>, M. Guinan<sup>1</sup>, and T. F. Crosby<sup>1</sup>, <sup>1</sup>University College Dublin, Belfield, Dublin, Ireland, <sup>2</sup>Alltech Ireland, Dunboyno, Co. Meath, Ireland.

Fifty ewes were used to determine the effects of the inclusion of organic selenium (Sel-Plex; Alltech, Inc.) in the concentrate supplement during the final seven weeks of pregnancy on ewe performance, milk selenium level and lamb growth rate to weaning. The ewes were estrus synchronized and randomly allocated to one of the two treatments at 98 d post-mating. All ewes were offered a grass silage diet ad libitum which was supplemented with 500 g (98 - 133 d) or 700 g (134 d - 24 h post-partum) of concentrate. The concentrate supplement was fortified with either 0.875 mg/kg sodium selenite (T1) or 0.875 mg/kg Sel-Plex (T2). Ten ewes from each treatment were kept indoors for 10 d post-partum and offered the same experimental concentrates as given prior to lambing. These ewes were hand milked at 10 d and the milk selenium content determined. Ewe liveweight was recorded at the beginning of the trial and 24 h post-partum and lamb growth rate was measured up to weaning at 105 d. Ewe liveweight loss from 98 d of gestation to 24 h post-partum was higher in T1 (-5.5 vs. -3.4 kg; SEM 0.8;  $P = 0.07$ ). Sel-Plex supplementation increased the level of selenium in the milk at 10 d (60 vs 98 µg/l; SEM 4.9;  $P < 0.001$ ). There was no treatment effect on mean lamb birth weight ( $P > 0.05$ ), with birth weights of 4.9 kg (T1) and 5.0 kg (T2) recorded. Lambs from the Sel-Plex treatment had a higher growth rate in the first 35 d post-partum (292 vs. 326 g/d; SEM 9.9;  $P < 0.05$ ). Overall lamb growth rate from birth to weaning tended to be higher in T2 (231 vs. 249 g/d, SEM 7.0;  $P = 0.08$ ) and this was reflected in lambs on the Sel-Plex treatment being 2 kg heavier at weaning (29.1 vs 31.1 kg; SEM 0.77;  $P = 0.07$ ). We conclude that Sel-Plex supplementation of the pregnant-lactating ewe diet will result in higher milk selenium levels, improved ewe performance and a positive effect on lamb growth and weaning weight relative to inorganic selenium.

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**Key Words:** Sel-Plex, Sheep, Milk Selenium

**M229 Milk yield and milk composition of Santa Ines ewes.** I. Susin\*, A. V. Pires, C. Q. Mendes, I. U. Packer, and R. C. Araujo, *ESALQ/University of São Paulo, Piracicaba, SP, Brazil.*

Milk yield estimates for the Brazilian, non seasonal, hair sheep called Santa Ines are scarce. One hundred and thirty lactating Santa Ines ewes (55 kg BW) were used to estimate milk production and composition. Data were collected using the same protocol in three lambing seasons (years). All ewes were confined and had free access to a TMR to meet or exceed nutrient requirements for lactation. Milk yield was determined once a week (test-day), from second to eighth week of lactation. Ewes were milked twice in a 3 h interval using i.v. oxytocin for stimulation. Milk produced at second milking was weighed, recorded and sampled for composition determination by infrared analysis. A total of 910 test-day records were divided in five groups: G1- ewes rearing twin lambs (ERTL) in 2002; G2- ewes rearing single lamb (ERSL) in 2002; G3- ERSL in 2003; G4- ERTL in 2004 and G5- ERSL in 2004. Data of repeated measurement were analyzed with Proc Mixed of SAS, by a model including fixed effects of the contemporary groups above (year and type of rearing), parity, test-day, group x test-day, and random effect of ewe within group. Covariance structure used was the AR (1) type. There was a significant interaction between group and test-day for milk production, milk fat, protein and total solids. Milk production increased linearly from first to fifth lactation (1.26, 1.23, 1.35, 1.41 and 1.5 kg/d, respectively). Differences in milk production were observed for ERTL compared to ERSL only in early lactation. Milk yield of ERTL was 28% and 23% higher ( $P < 0.05$ ) at second and third week of lactation, respectively in 2004 and 2002. Milk yield was adjusted as a quadratic equation in relation to days in milking, which indicated maximum production (peak) at 23, 26, 25, 16 and 34 d of lactation for G1, G2, G3, G4 and G5, respectively. Daily milk production using all data was 1.3 kg, and the average composition was 8.0% fat, 4.4% protein, 5.1% lactose and 18.6% total solids. These results indicate the importance of research efforts to increase milk production in this breed adapted to tropical conditions.

**Key Words:** Hair Sheep, Lactation, Performance

## Swine Species: Swine Nutrition and Management

**M230 The use of a modified farrowing pen: Effects on lactation performance of heat-stressed sows.** C. Farmer<sup>\*1</sup>, T. Widowski<sup>2</sup>, and D. Massé<sup>1</sup>, <sup>1</sup>Agriculture and Agri-Food Canada, Lennoxville, QC, Canada, <sup>2</sup>University of Guelph, Guelph, ON, Canada.

The impact of using a modified farrowing pen (MOD) allowing evaporative cooling on lactation performance of heat-stressed sows was evaluated. Primiparous Yorkshire x Landrace sows were housed at 21 or 29°C from farrowing until the end of lactation (day 22). Animals from each group were assigned to a standard farrowing crate (STD; 21°C = 17, 29°C = 16) or a MOD pen (21°C = 19, 29°C = 19). The MOD pen consisted of a STD crate with a 1.5 x 1.6 m comfort zone in the back, equipped with rubber floor mats, a feeder and a nipple waterer. Litter size was standardized to 10 or 11. No creep feed was provided and piglets were weighed weekly. Sows were weighed on days 2 and 22. Feed intake of sows was monitored daily, a milk sample was obtained on day 21 (to measure DM) and jugular blood samples were collected on days 2 and 21 to measure prolactin, IGF-I and urea. Heat-stressed sows consumed less feed (3.4 vs 4.7 ± 0.1 kg/d,  $P < 0.001$ ) than control sows and, at 29°C, sows in MOD pens consumed more feed (3.9 vs 3.0 ± 0.2 kg/d,  $P < 0.01$ ) than sows in STD pens. Lactation weight loss was greater (-26.4 vs -19.1 ± 1.9 kg,  $P < 0.05$ ) for sows in STD than MOD pens at 29°C. The reduction in prolactin concentrations from days 2 to 22 of lactation tended to be greater ( $P = 0.08$ ) at 29°C for sows in STD pens. Concentrations of urea and IGF-I increased as lactation advanced ( $P < 0.01$ ) and IGF-I was lower at 29°C than at 21°C on both days ( $P < 0.01$ ) whereas urea was greater at 29°C on day 2 only ( $P < 0.01$ ). Milk DM was less at 29 than at 21°C ( $P < 0.01$ ). Average piglet weight gain was reduced at 29°C compared to 21°C during the second week of lactation ( $P < 0.05$ ) and this reduction was less in MOD than STD pens during the third week of lactation ( $P < 0.01$ ). From

days 2 to 21 of lactation, heat stress reduced average piglet weight gain by 6.0% in MOD pens compared to 9.7% in STD pens.

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**Key Words:** Farrowing Pen, Heat Stress, Lactation

**M231 Effect of low energy diets fed to high lean pigs slaughtered at 115 kg of body weight.** I. Moreira\*, T. Voorsluys, D. Paiano, I. M. Sartori, M. A. A. Silva, and G. Jacob, *Universidade Estadual de Maringá, Maringá, Paraná, Brazil.*

An experiment was carried out to study the effect of low energy diets on performance and carcass traits of pigs slaughtered at 115 kg of BW. Thirty-six high lean pigs (1/2 female and 1/2 male) with 69.18 ± 6.44 kg initial BW were used. Treatments consisted of three diets (3,200, 2,900 and 2,720 kcal of ME/kg). The reduction of diet energy level was obtained by adding rice hulls (bran). Pigs, with free access to water and diets during experimental period, were allotted in treatments with four replicates of three pigs per replicate, in a completely randomized block design. Performance variables (feed intake, weight gain and feed: gain ratio), carcass traits (carcass yield, ham yield, loin muscle area and meat: fat ratio) and plasma urea nitrogen (PUN) were analyzed. When pigs reached 115.41 ± 6.20 kg BW, five pigs per treatment were slaughtered for carcass traits. Data were analyzed as a polynomial regression and performance data were estimated taking a pen with three pigs as experimental unit. In the