

**M199 Determining the relationships among milk urea nitrogen and milk production and milk components from lactating dairy cows in Texas.** G. M. Goodall<sup>\*1</sup>, M. A. Tomaszewski<sup>2</sup>, D. A. Knabe<sup>2</sup>, R. B. Schwartz<sup>2</sup>, J. W. Stuth<sup>2</sup>, and L. W. Greene<sup>3</sup>, <sup>1</sup>*Goodall's Consulting, College Station, TX/USA*, <sup>2</sup>*Texas A&M University, College Station, TX/USA*, <sup>3</sup>*Texas A&M Research and Extension Center, Amarillo, TX/USA*.

The objectives of this study were to determine the relationship between milk urea nitrogen (MUN) and milk production, milk protein, and milk fat of lactating cows and to determine the feed cost benefit of using best management practices (BMP) to reduce excessive nitrogen in the diet of dairy cows in Texas. The BMP were routine analysis of the formulated diet and MUN testing. There were two feeding systems evaluated, grazing herds and total mixed ration (TMR) fed herds. There were 16102 individual cow records that were evaluated. Milk fat did not impact MUN concentration ( $P \geq .05$ ) in either the grazing or the TMR fed herds. Milk production, lactation number, herd effects and test date significantly impacted ( $P \leq .05$ ) MUN concentration. The economic advantage of routine testing of MUN concentration and analyzing the diet was a daily feed cost savings of \$.22/cow.

**Key Words:** Milk urea nitrogen, Dairy cattle, Ration cost

**M200 Feedlot performance and carcass characteristics of feeder lambs implanted and re-implanted with zeranol implants.** S. J. Talley, M. W. Salisbury<sup>\*</sup>, B. J. May, M. A. Carr, C. B. Scott, and G. R. Engdahl, *Angelo State University, San Angelo, Texas*.

One hundred-twenty Rambouillet feeder lambs with a mean initial body weight of 29.5 kg were used to compare the effects of double and single implanting Zeranol hormonal implants and no-implanting on lamb performance (average daily gain and feed to gain ratio) and carcass characteristics. The lambs were blocked by sex and randomly assigned to three treatments: no implant (treatment 1), single implant (treatment 2), and double implant (treatment 3). Lambs had *ad libitum* access to feed and water. On d 0, lambs were weighed, vaccinated for overeating, dewormed, and those lambs in treatments 2 and 3 were implanted. Lambs in treatment 3 were re-implanted on d 56. On d 28, 56, 84, and 112, lambs were weighed and slaughtered when end weights of 54 kg were reached. Backfat thickness, leg circumference, hot carcass weight, United States Department of Agriculture (USDA) yield and quality grades were recorded, and dressing percentage and calculated yield grade (CYG) were calculated. Average daily gain (ADG) was higher ( $P < .05$ ) for treatments 2 and 3 versus non-implanted lambs on d 28, 56, 84, and overall. Days on feed for treatment 2 and 3 was lower ( $P < .05$ ) than non-implanted lambs, and feed to gain ratio was reduced ( $P < .05$ ) in both implanted lamb treatments on d 56, 84, and overall. No differences in hot carcass weight, backfat thickness, leg circumference, yield grade, and calculated yield grade were noted, but double implanted lambs had a lower ( $P < .05$ ) dressing percentage. Treatment 3 ewe lambs had a lower ( $P < .05$ ) percentage of choice grade carcasses and higher ( $P < .05$ ) percentage of no grades than other treatments. Also, treatment 2 and 3 wether lambs had a higher ( $P < .05$ ) value and profit margin than implanted ewes and control lambs based on actual purchase price, feed cost and carcass value.

**Key Words:** Lambs, Feedlot performance, Zeranol implants

**M201 An evaluation of rumen papillae in Holstein heifers during the transition period.** W. C. Stone<sup>\*</sup>, S. L. Bulkeley, D. J. Aneshansley, and A. L. Alcaraz, *Cornell University, Ithaca, NY*.

An experiment was conducted to attempt to determine the rate of rumen papillae change when dairy cattle are exposed to diets containing higher levels of grain. Rumen cannulas were placed into four Holstein heifers during their seventh month of gestation. Papillae absorption studies were conducted when heifers were fed the bred heifer ration, weekly for five weeks when fed the pre-freshening ration, and weekly for five weeks following freshening when fed the fresh cow ration. Papillae were biopsied at most of these same time periods. Biopsied rumen papillae were evaluated histologically; additionally, their size was determined with an image analyzer. A solution containing 1.9 g of Co-EDTA and 2 moles

of valeric acid, diluted to .8 l and with its pH raised to 6.0 with approximately 40 g of sodium hydroxide, was ruminally infused. Rumen fluid was then sampled at half-hour intervals over an 8 h time period. Valerate absorption was estimated by subtracting the ruminal clearance rate of cobalt from valerate.

Ruminal valerate absorption rates significantly increased during the pre-freshening period, with rates increasing over the entire five week time period. Changes in papillae surface area during the pre-fresh period were less clear. Histologically, the epithelium became thinner during this time period. There was considerable variation in all measurements for all animals during the five week post-fresh period. This variation may have been caused by health problems associated with freshening and the transition period. The epithelium increased in keratinization, and had a reduction in keratinhyaline granules, during this time period. In conclusion, papillae absorptive capacity increased when animals were switched from the bred heifer to the pre-fresh ration. Both were balanced according to the 2001 Dairy NRC. The change in absorption rate occurred during the entire five week pre-fresh period. There were no clear trends in the measured papillae characteristics post-freshening, perhaps due to transition health problems. Progress made in increasing papillae size and absorptive capacity during the pre-fresh period can be rapidly undone during the post-fresh period.

**Key Words:** Rumen papillae, Dairy cattle

**M202 Nitrogen, phosphorus, and other minerals in Idaho dairy diets.** A. N. Hristov<sup>\*1</sup>, R. P. Etter<sup>1</sup>, A. Melgar<sup>1</sup>, J. I. Szasz<sup>1</sup>, K. L. Grandeen<sup>1</sup>, S. Abedi<sup>1</sup>, J. K. Ropp<sup>1</sup>, D. Falk<sup>1</sup>, W. Hazen<sup>2</sup>, and R. Ohlensehler<sup>2</sup>, <sup>1</sup>*Department of Animal and Veterinary Science*, <sup>2</sup>*Agricultural Cooperative Extension, University of Idaho, Moscow, ID*.

Rations from 21 dairies in South-Central Idaho were analyzed for mineral composition. Total number of cows fed in the participating dairies was approximately 31,000. Separate diets were fed to the fresh and lactating cows. Four samples per dairy were taken within a period of 4 months and analyzed for N, P, Ca, K, Mg, S, Na, Cu, Fe, Mn, and Zn. Bulk tank milk samples were analyzed for milk urea N (MUN) concentration. Average mineral content of the fresh cows diets was (DM basis, meanSE, min and max): 3.170.034%, 2.49 and 3.59% (N); 0.410.006%, 0.31 and 0.53% (P); 1.000.026%, 0.57 and 1.26% (Ca); 1.760.034%, 1.25 and 2.20% (K); 0.350.006%, 0.28 and 0.42% (Mg); 0.360.008%, 0.24 and 0.58 (S); 0.400.023%, 0.14 and 0.65% (Na); 21.70.90 ppm, 9.1 and 33.1 ppm (Cu); 224.010.3 ppm, 73.3 and 408.6 ppm (Fe); 60.12.46 ppm, 33.2 and 94.2 ppm (Mn); and 99.86.38 ppm, 19.5 and 245.8 ppm (Zn). Lactating cows TMR contained 3.000.022%, 2.38 and 3.66% (N); 0.430.005%, 0.31 and 0.65% (P); 0.910.016%, 0.53 and 1.34% (Ca); 1.790.040%, 0.90 and 3.27% (K); 0.350.005%, 0.25 and 0.45% (Mg); 0.340.006%, 0.23 and 0.71 (S); 0.350.019%, 0.07 and 0.86% (Na); 21.90.71 ppm, 9.9 and 57.2 ppm (Cu); 225.57.2 ppm, 74.7 and 465.2 ppm (Fe); 56.41.48 ppm, 20.0 and 102.8 ppm (Mn); and 103.26.25 ppm, 29.1 and 509.8 ppm (Zn). Except slight differences in N, Ca, and Na content, fresh and lactating cow diets had similar mineral composition. Average MUN concentration was 14.80.24 mg/dl (varying from 10.0 to 20.4 mg/dl) and did not correlate ( $r = 0.04$ ,  $P > 0.05$ ) to dietary N. Dietary concentrations of S, Na, and Mn were highly correlated to concentrations of K, Cu, and Zn, respectively ( $r = 0.62$ , 0.81, and 0.73, respectively,  $P < 0.05$ ). This survey showed that diets from the participating dairies exceeded NRC Dairy (2001) recommended levels for all macro and micro minerals studied.

**Key Words:** Phosphorus, Minerals, Dairy diets

**M203 Pasture performance, feedlot gain, and carcass traits of Romosinuano crossbred, F-1 (Hereford x Brahman), and Brahman steers.** F. M. Rouquette, Jr.<sup>\*1</sup>, R. D. Randel<sup>1</sup>, C. R. Long<sup>1</sup>, C. C. Chase, Jr.<sup>4</sup>, J. C. Paschal<sup>3</sup>, and R. K. Miller<sup>2</sup>, <sup>1</sup>*Texas A&M University Agricultural Research & Extension Center, Overton, TX/USA*, <sup>2</sup>*Texas A&M University, College Station, TX/USA*, <sup>3</sup>*Texas Cooperative Extension, Corpus Christi, TX/USA*, <sup>4</sup>*USDA-ARS Brooksville, FL/USA*.

Romosinuano (ROMO) are tropically-adapted, non *Bos indicus* which are native to Columbia, SA, and were imported into the US in the mid-1990s by USDA at Brooksville, FL (STARS). Three ROMO sires developed from STARS were bred to F-1 Angus x Brahman, (A x B) dams.

The fall-born, half-ROMO (ROMX) steers (n=43) were grazed on ryegrass and clover pre-weaning. Steers had average birth weight of 35 kg, birth-to-weaning ADG of 1.0 kg/d, and weaning weight of 290 kg at 258 days of age. During the post-weaning stocker phase, ROMX grazed bermudagrass (BG) with F-1 Hereford x Brahman (HXB) steers (n=11) from July through September. During the 84-d BG phase, ROMX steers had ADG of 0.44 kg/d and HXB steers had ADG of 0.81 kg/d (P<.0001). On Oct. 23, all ROMX and HXB steers as well as Brahman (BRM) n=10 steers were transported to a commercial feedlot and fed in pens according to breedtype to a visual backfat of 1cm. The HXB were lightest (P<.003) at feedlot entry (295 kg); whereas ROMX and BRM were similar at 323 and 345 kg, respectively. All three breedtypes had different (P<.001) feedlot ADG with ROMX at 1.46 kg/d, HXB at 1.75 kg/d, and BRM at 1.22 kg/d. Final weight of HXB steers (606 kg) was heavier (P<.01) than both ROMX (563 kg) and BRM steers (540 kg). Steers had similar dressing percent (63.7%), backfat (1.08 cm), marbling score (426), and ave quality grade (700). The ROMX steers tended (P<.08) to have better yield grade (2.53) compared to both HXB (2.90) and BRM (2.88) Warner-Bratzler shear values showed that ROMX at 3.33 kg were less (P<.02) than those of BRM (3.79 kg); whereas HXB steers were similar to both ROMX and BRM. Cooking loss was similar for ROMX (26.8%) and HXB (27.4%), and both were less than BRM (32.6%) steers.

**Key Words:** Romosinuano, Carcass, Feedlot

**M204**    **Urinary pH and mineral serum levels of periparturient Holstein and Jersey cows fed diets varying in dietary cation-anion difference.** E. Gutierrez-Ornelas, H. Bernal-Barragan, H. Solis-Medina, J. Colin-Negrete, and H. Morales-Treviño, *Universidad Autonoma de Nuevo Leon*.

Twenty five Holstein and 27 Jersey cows were assigned 21 days before parturition to a randomized complete block design (parity and expected calving date) in a 2 X 3 factorial arrangement to evaluate the influence of three dietary cation-anion differences (DACD = +21, -5 and -3 meq (Na + K)-(Cl + S) per 100 g diet DM) on urinary pH, serum Ca, K, Cl, and Na levels; milk yield in the first month of lactation and milk fever incidence. Prepartum basal diet (DACD = +21) contained (DM basis) 50.7 % corn silage, 8.4 % alfalfa hay, 8.2 % oat hay, and 32.9% protein, minerals and vitamins supplement. Two low DACD diets (DACD = -5 and DACD = -3) were evaluated including 0.93 % NH4Cl or 1.4% CaCl2 to the basal diet. Urine and blood samples were collected before treatments, within the 21 d before parturition and postpartum. There was no difference (P>.05) between breeds in urinary pH and mineral serum levels throughout the trial and results were pooled to analyze diet effects. Serum Na and K levels at parturition were 378, 346 and 348 mg/dL (P < 0.05) and 19.0, 16.8 and 21.3 mg/dL; respectively for cows receiving diets having DACD of +21, -5 and -3. Serum Cl level (mg/dL) reduced (P < 0.05) at parturition for cows receiving DACD of +21 (322) and -3 (394), but not for diets with DACD = -5 (456). Two Holstein cows presented milk fever on diet with DACD = - 3, and 4 cows (3 Holstein and 1 Jersey) fed with DACD = -5 diet retained placenta. There was a trend (P=.14) for higher milk yield during the first month of lactation for cows fed basal diet (34.6, 31.5 and 30.4 Kg/d, for DACD = +21, -5, and -3; respectively). Diets with low DACD lowered urinary pH but had high incidence of milk fever and placenta retention.

**Key Words:** Dietry cation-anion difference, Urinary pH, Periparturient cow

**M205**    **A field study of milk production and reproductive performance in dairy cows fed different levels of phosphorus.** J. Fiorini\*<sup>1</sup>, J. D. Ferguson<sup>1</sup>, S. Alexander<sup>1</sup>, R. A. Kohn<sup>2</sup>, L. D. Chase<sup>3</sup>, K. F. Knowlton<sup>4</sup>, Z. Wu<sup>5</sup>, and Z. Dou<sup>1</sup>, <sup>1</sup>*University of Pennsylvania*, <sup>2</sup>*University of Maryland*, <sup>3</sup>*Cornell University*, <sup>4</sup>*Virginia Polytechnic Institute and State University*, <sup>5</sup>*Penn State University*.

On many dairy farms, long-term manure application has led to phosphorus (P) buildup in soils with enriched P losses from these soils to waters. One cost-effective approach to reduce potential P loss and improve water quality is to minimize manure P excretion through manipulation of dietary P to a level that equates with the actual needs of the lactating cow. Currently, P is being fed on many farms at levels that exceed requirements necessary for optimal performance, due largely to concerns of possible negative impact on milk production and reproductive performance if dietary P is reduced. This USDA funded project was initiated

to collect and analyze data from commercial dairy operations in five states in the NE and Mid-Atlantic region (PA, NY, DE, MD, VA). A total of 100 herds were selected, these were visited on a quarterly basis. During each visit, feed and fecal samples were collected and subsequently analyzed in laboratories. Milk yields and reproductive parameters were also obtained quarterly from the respective DHIA records. Feed analysis results showed dietary P levels ranging from .35% to .64% dry matter (DM). The farms were sorted into three groups according to their dietary P concentrations: low (.35 to .40% P), medium (> .40 to .45), and high (>.45). Preliminary data analysis indicated that there were no statistically significant differences between any of the groups for the following reproductive parameters: conception rate, heat detection rate, pregnancy rate, days to first breeding, and days open. Also, milk production did not correlate with dietary P. In conclusion, results to date of this field project indicate that feeding dietary P in excess of .35% P does not enhance milk production or reproductive performance in lactating dairy cows.

**Key Words:** Phosphorus, Reproduction, Production

**M206**    **Conversion efficiencies of N and P to exportable product on Vermont dairy farms.** . G. W. Weber\*<sup>1</sup>, W. E. Jokela<sup>2</sup>, S. C. Bosworth<sup>2</sup>, and W. S. Burhans<sup>3</sup>, <sup>1</sup>*Vermont Dairy Farm Sustainability Project, Inc.*, <sup>2</sup>*University of Vermont*, <sup>3</sup>*Poulin Grain, Inc..*

A collaboration by academic and industry participants assessed whole farm nitrogen (N) and phosphorus (P) efficiencies on seven Vermont dairy farms. Whole farm efficiency was calculated as ((exported milk + livestock + forage N or P)/ (imported bedding + forage + livestock + N fixation + fertilizer + manure + concentrate N or P))\*100. Feed nutrient efficiency represents ((retained nutrients in milk + tissue) / nutrient intake)\*100. Crop N and P balance was calculated as (available nutrient supply from manure, soil, sod, and fertilizer) - (calculated requirement based on soil type, analysis and yield goal (where applicable)). Biweekly (weekly on one farm) data collection and diet evaluations by lactating group were made using Cornell Net Carbohydrate and Protein System v4.0.31 (CNCPS) with intakes determined by two-day measured fed minus refused amounts; pasture intakes were CNCPS predictions. Measured inputs for each CNCPS simulation included milk production and components (monthly DHIA), silage and pasture analyses (NIR, wet chemistry minerals, n= simulation frequency), and ingredient analyses (n=variable). Results, weighted by cow days per diet or field, are tabled below. Variation across and within farms suggests potential to improve efficiency of nutrient use.

Farm	1	2	3	4	5	6	7
Milk Yield Kg/head/d	34.8	35.7	29.0	27.5	28.2	25.1	34.6
Mean Diet CP %	17.8	17.3	18.4	17.4	17.2	18.3	18.3
Animal Units/ Hectare	2.0	2.5	1.8	2.1	2.5	0.9	1.5
Whole Farm Efficiency %							
N	37.9	39.8	21.2	36.5	29.7	49.2	20.1
P	47.0	49.1	33.4	39.2	22.6	75.6	20.5
Lactating Feed Efficiency %							
n	20	19	25	18	14	13	23
N	28.2	29.6	25.6	27.0	26.7	23.3	26.7
SD	1.9	1.0	2.1	2.3	1.3	2.1	1.5
P	34.9	34.4	28.8	28.4	29.7	33.3	31.4
SD	4.5	2.0	3.5	4.0	1.6	4.1	4.2
Crop Balance Kg/ Hectare							
n	64	35	65	18	16	N/A	40
N	30.2	15.4	63.5	20.3	-30.3	N/A	17.6
SD	66.3	71.5	75.1	102.9	103.5	N/A	68.0
n	60	35	62	18	16	N/A	40
P	15.2	23.2	-3.6	32.9	68.7	N/A	10.4
SD	26.0	24.0	20.4	17.7	101.3	N/A	45.6

**Key Words:** Nitrogen, Phosphorus, Efficiency

**M207** Supplementation of FEB-200<sup>TM</sup> to Alleviate Endophyte Toxicosis in Steers. V. Akay<sup>\*1</sup>, M. Foley<sup>1</sup>, J. A. Jackson<sup>2</sup>, M. Kudupuje<sup>1</sup>, and K. A. Dawson<sup>1</sup>, <sup>1</sup>Alltech Biotechnology, Inc., Nicholasville, KY, <sup>2</sup>University of Kentucky, Lexington, KY.

Twelve Holstein steers (240 to 324 kg) were blocked by body weight and assigned to one of four treatments to investigate the effects of FEB-200<sup>TM</sup> (modified glucomannan, Alltech, Inc., Nicholasville, KY) on the symptoms of fescue toxicosis in steers fed endophyte-infected (EI) or endophyte-free (EF) fescue seed during 27 d study. Treatments were: 1) EI fescue; 2) EI fescue plus FEB-200; 3) EF fescue; and 4) EF plus FEB-200. Diet consisted of cracked corn grain (24.2%), cottonseed hulls (24.6%), crimped oat grain (24.2%), fescue seed (12.1%, KY 31 or Jesup minus), soybean meal (12.1%), and vitamin and mineral supplementation (2.58%). The FEB-200 was added into Diet 2 and 4 at the level of 2 kg/tonne. Steers were kept in an environmentally-controlled room (30°C) and fed *ad libitum* once daily. Dry matter intake, serum prolactin and alkaline phosphatase levels were lower ( $P < 0.05$ ) for EI diet compared to EF diet. Addition of FEB-200 to EI diet increased ( $P < 0.05$ ) DM intake compared to EI diet without FEB-200 (8.46 vs 7.81 kg/d). Serum alkaline phosphatase levels were higher ( $P < 0.05$ ) for EI plus FEB-200 diet compared to EI diet without FEB-200 (43.88 vs 34.99 U/L). Endophyte-infected fescue diet with FEB-200 had numerically higher serum prolactin levels however, it was not statistically significant ( $P > 0.05$ ). Ear and shoulder skin temperatures were similar among EI, EI+FEB-200 and EF diets however, addition of FEB-200 to EF diet decreased ( $P < 0.05$ ) ear and shoulder skin temperatures compared to EI, EI+FEB-200 and EF diets. Rectal temperatures were higher ( $P < 0.05$ ) for EI diet compared to EF diet (40.11 vs 39.57°C). Addition of FEB-200 to EI diet decreased ( $P < 0.05$ ) rectal temperatures compared to EI diet without FEB-200 (39.56 vs 40.11°C). Rectal temperatures were similar ( $P > 0.05$ ) among EI+FE-200, EF and EF+FEB-200 diets. In conclusion, dietary supplementation of FEB-200 to cattle maintained on EI fescue may alleviate some of the endophyte toxicosis associated with consumption of EI fescue.

**Key Words:** Endophyte, Modified glucomannan, Steers

**M208** Influence of previous cattle and elk grazing on the subsequent quality and quantity of diets for cattle, deer and elk grazing late-summer mixed-conifer rangelands. D. Damiran<sup>\*1</sup>, T. DelCurto<sup>1</sup>, S. L. Findholt<sup>2</sup>, G. D. Pulsipher<sup>1</sup>, and B. K. Johnson<sup>2</sup>, <sup>1</sup>Eastern Oregon Agricultural Research Center, Oregon State University, Union, <sup>2</sup>Oregon Department of Fish and Wildlife, La Grande.

A study was conducted to determine foraging efficiency of cattle, mule deer, and elk in response to prior grazing by elk and cattle. Four enclosures, in previously logged mixed conifer (Grand Fir) rangelands were chosen, and within each enclosure, three 0.75 ha pastures were either: 1) ungrazed, 2) grazed by cattle, or 3) grazed by elk in mid-June and mid-July to remove approximately 40% of total forage yield. After grazing treatments, each pasture was subdivided into three 0.25 ha sub-pastures and 16 (4 animals and 4 bouts/animal) 20 min grazing trials were conducted in each sub-pasture using four steers, four tame mule deer, or four tame elk during August 1998 and 1999. A bite-count technique was used to determine foraging efficiency and composition of diet. Crude protein content of deer diets tended to be higher ( $P < 0.20$ ) in pastures previously grazed by cattle; whereas ADF was higher ( $P < 0.01$ ) and IVDMD was lower ( $P < 0.05$ ) in pastures previously grazed by elk. Crude protein content of elk diets were not influenced ( $P > 0.20$ ) by previous grazing, but diet ADF, NDF were lower ( $P < 0.01$ ) in pastures previously grazed by cattle. Prior grazing did not influence ( $P > 0.10$ ) intake rates of deer and elk. In response to cattle grazing, steer and elk diets shifted to more ( $P < 0.10$ ) forbs and shrub/trees. In response to elk grazing, cattle consumed more grasses and sedges; whereas elk consumed more ( $P < 0.10$ ) grasses and shrub/tree. Deer increased ( $P < 0.10$ ) shrub/tree intake in previously grazed pastures. This study suggests that previous grazing by cattle or elk has very little effect on the subsequent foraging efficiency of deer and elk. In addition, early summer grazing by cattle improve the quality of subsequent elk diets, but previous grazing by elk may reduce subsequent diet quality for cattle, deer, and elk.

**Key Words:** Mixed species grazing, Forested rangelands, Forage quality

**M209** Changes in Forage Quantity and Quality with Continued Cattle Grazing in a Mountain Riparian Pasture. E. Darambazar<sup>\*1</sup>, T. DelCurto<sup>1</sup>, C. J. Ackerman<sup>2</sup>, G. D. Pulsipher<sup>1</sup>, and D. Damiran<sup>1</sup>, <sup>1</sup>Eastern Oregon Agricultural Research Center, Oregon State University, Union, <sup>2</sup>Department of Animal Sciences, Oregon State University, Corvallis.

The objective of this study was to evaluate changes in the quantity, quality, and moisture of available forage in a riparian pasture, and shrub utilization by cattle during a 30-d late summer grazing period. A riparian pasture (44.7 ha) in northeast of Oregon was grazed with 30 yearlings (419 kg, BCS = 5.05) and 30 mature cows with calves (499 kg, BCS = 4.65) from early August to early September in 2001, and from late July to late August in 2002. Sampling dates were d0, d10, d20, and d30. The forage availability before grazing was 1058 kg/ha and declined to 323 kg/ha at the end of the grazing period ( $P < 0.10$ ). Grasses dominated the pasture, followed by forbs, grass-like (sedges and/or rushes), and shrubs. Kentucky bluegrass was the most prevalent forage species followed by timothy, sedges, and common snowberry. The highest percent disappearances of forage species was (83.7 - 92.7%) observed with quackgrass, western fescue, California brome, redbud, and heartleaf arnica, though their initial contributions to the available forage were less than 5%. Timothy, elk sedge, red clover, and common snowberry were also preferred species and major components of the available vegetation. High levels of shrub utilization were observed from d 20 through the end of the grazing period (45% for willow and 59% for alder). Forbs and shrubs did not vary in moisture content over the 30 d grazing period and across the years averaging 59% and 61%, respectively ( $P > 0.10$ ). In contrast, the moisture content of grasses were over 50% at the beginning of the grazing period and declined to 34% by d 20. Likewise, forbs and shrubs were higher than grasses in CP (11, 14, and 6%, respectively) and IVDMD (58, 49, and 42% respectively). In summary, our results suggest that cattle grazing late summer riparian pastures will switch to intensive shrub utilization when grasses decline in quality and quantity, and forbs decline in quantity.

**Key Words:** Riparian areas, Cattle, Utilization

**M210** Effects of whole corn versus cracked corn on performance of growing-finishing Angus bulls. S. M. Emberson, B. J. May<sup>\*</sup>, M. W. Salisbury, M. A. Carr, G. R. Engdahl, G. G. Hilton, C. B. Scott, and R. L. Reed, Angelo State University, San Angelo, Texas, USA.

Effects of whole corn versus cracked corn on the performance of growing-finishing Angus bulls in a 112-d growth study was conducted at the Angelo State University, Management, Instruction and Research Center in San Angelo, Texas. Forty spring-born Angus bull calves with an average weight of 317 kg were used. Bulls were blocked by live weight and divided into 8 pens (4 pens/treatment). Bulls were fed nutritionally identical diets containing either cracked or whole corn by hand to provide *ad libitum* consumption throughout the trial. Rations were formulated to meet or exceed nutritional requirements of growing finishing bulls. Chromium oxide was added to the rations as a marker for DM digestibility estimates. Bull weights and fecal samples were collected every 28 d. All feeds fed and refusals were weighed and recorded daily. Ration DM digestibility of cracked and whole corn diets was similar. Average daily gain and intake over the entire trial were similar for bulls fed whole or cracked corn. However, feed efficiency over the entire trial was improved with the whole corn diet. Data from this study indicate that cracked corn processing will not improve performance of growing bulls fed nutritionally similar diets with whole corn.

**Key Words:** Bulls, Performance, Corn

**M211** Validation of a prediction equation for energy balance in Holstein cows and heifers. J. D. Brixey<sup>\*1</sup>, M. A. McGuire, and W. J. Price, <sup>1</sup>University of Idaho.

Cows undergo substantial changes in energy balance (EB) during the transition from dry to lactating. An understanding of EB on animal health and production requires the ability to predict EB in animals without individual feeding. The aim of this study was to validate a theoretical prediction equation for EB in early lactating dairy cows. Fourteen cows and five heifers were assigned at random to Calan<sup>®</sup> gates for individual feeding from 21 d prepartum until 70 d postpartum. Daily intakes and milk yields, biweekly composition, weekly body weights and

blood samples were collected. Blood was analyzed for NEFA concentrations. Energy balance was determined by the cows  $NE_L$  intake minus the sum of  $NE_L$  for maintenance and the  $NE_L$  for milk output (NRC, 2001). The model ( $EB = -3.14 - 0.009 \cdot NEFA + 0.341 \cdot DIM - 0.002 \cdot DIM^2$ ) was developed previously in multiparous cows and subsequently used to predict EB in both cows and heifers. Cows and heifers reached nadir EB 5 to 10 DIM and reached positive EB by 18 to 23 DIM while increasing in DMI and milk yield. Cows reached peak milk production of 56 kg at 44 DIM, where heifers peaked at 57 DIM yielding 45 kg. For both cows and heifers, the model validation followed observed EB trends well. However, for cows the model did under predict EB over DIM and NEFA values. Clearly there is a demand for energy in early lactation where the cow is mobilizing body reserves. Understanding the significance of EB on animal health requires large animal numbers such that an indirect estimation of EB is needed. The prediction equation for EB after more extensive validation may provide the tool.

**Key Words:** transition, energy balance

**M212 Incidence of *Escherichia coli* O157:H7 contamination in fecal, wool, and carcass samples from feedlot lambs.** M. Long<sup>\*1</sup>, T. T. Ross<sup>1</sup>, T. Edrington<sup>2</sup>, J. D. Thomas<sup>1</sup>, and K. Christensen<sup>1</sup>, <sup>1</sup>New Mexico State University, <sup>2</sup>USDA ARS.

The present study examined the incidence of *E. coli* O157:H7 in feedlot lambs on the farm and at slaughter. We hypothesize that *E. coli* O157:H7 is prevalent in feces and on the pelt of feedlot lambs and the feces and pelt pose a potential source of carcass contamination. Fecal,

wool, and carcass samples were examined for *E. coli* O157:H7 to evaluate potential carcass contamination sources. All fecal samples were enriched in a gram-negative broth prior to immunomagnetic separation and enrichment using anti-*E. coli* O157 antibody-labeled paramagnetic beads (Dynabead anti-*E. coli* O157, Dynal Inc., Lake Success, N.Y.). Wool and carcass swab specimens were enriched with sterile brilliant green bile 2% broth. Enrichments were plated onto a sorbitol MacConkey plate containing cefixime and potassium tellurite. Three sorbitol-negative colonies exhibiting typical *E. coli* colony phenotype were selected and cultured in MacConkey broth and trypticase soy broth. Broth cultures were heat killed at 100 C and tested with an enzyme immunoassay for reactivity with anti-*E. coli* O157 monoclonal antibody. A greater number of wool samples tested positive for *E. coli* O157:H7 than fecal samples. Of the eighteen wool samples, ten samples (56%) tested positive for *E. coli* O157:H7, of the thirty fecal samples, twelve (40%) were positive for *E. coli* O157:H7. However, all carcass samples were negative for *E. coli* O157:H7 contamination. In conclusion, wool and fecal samples tested positive for *E. coli* O157:H7 and may be a potential source of carcass contamination. Furthermore, a positive wool sample did not always correlate with a positive fecal sample. This indicates that one animal shedding *E. coli* O157:H7 in its feces could contaminate the wool of multiple animals in the same pen and thereby increase the chance for carcass contamination. Additional research is needed to determine if *E. coli* O157:H7 was not transferred to the carcasses or if current techniques are unable to recover *E. coli* O157:H7 from the carcass.

**Key Words:** *E. coli* O157:H7, Feedlot lambs, Carcass

## Forages & Pastures: Silages, forage supplementation

**M213 In vitro dry matter digestibility and fermentation characteristics of sawdust-wheat bran mixtures fermented by *Aspergillus oryzae*, *Formitella fraxinea*, and *Sarcodon aspratus*.** Y. K. Kim<sup>1</sup> and D. J. Schingoethe<sup>2</sup>, <sup>1</sup>Chungnam National University, Chungnam, Republic of Korea, <sup>2</sup>South Dakota State University, Brookings.

The objective of this research was to determine the effect of fermentation by the mycelia of fungal species *Aspergillus oryzae*, *Formitella fraxinea* and *Sarcodon aspratus* on the in vitro dry matter digestibility and fermentation characteristics of mixtures containing sawdust plus 20% wheat bran w/w, on a dry matter basis, as a means to recycle sawdust including fungal mycelium into a feedstuff. The mixtures were unfermented (UFM) and fermented by *Aspergillus oryzae* (AOM) for 3 d and by *Formitella fraxinea* (FFM) and *Sarcodon aspratus* (SAM) for 2 wk at 29 C in an incubator. Neutral detergent fiber (NDF) contents in mixtures were lower for SAM and UFM (80.4 and 82.2%) than for FFM and AOM (88.3 and 86.9%) ( $P < 0.05$ ). In vitro DM digestibility after 48 h was higher for SAM (21.2%) than for UFM, AOM and FFM (17.9, 14.9, and 12.2%) ( $P < 0.05$ ). The average pH was lower for SAM (6.44) than for UFM, AOM and FFM (6.87, 7.01, and 7.34) after 48 h of fermentation ( $P < 0.01$ ). Concentrations of sugar in fermented fluid after 48 h were higher for SAM (0.71%) than for AOM, FFM and UFM (0.34, 0.31 and 0.27%) ( $P < 0.01$ ). Concentrations of acetate and propionate (mole/100 mole) were higher for SAM (54.21 and 19.04) than for AOM (34.06 and 11.08), UFM (17.94 and 7.96) and FFM (10.31 and 4.96) ( $P < 0.05$ ). Concentrations of butyrate were not different between SAM and UFM. It was concluded that the sawdust-wheat bran mixture fermented by *Sarcodon aspratus* (SAM) increased the DM digestibility of the mixture and improved the production of VFA in fermented fluid of the mixture compared with unfermented and fermented mixtures by other fungal species.

**Key Words:** Fungal fermentation, In vitro DM digestibility, In vitro fermentation characteristics

**M214 Nutrient content and protein quality in grass silages.** W. Heimbeck<sup>\*1</sup>, M. Coenen<sup>2</sup>, K. Suedekum<sup>3</sup>, L. Hogeback<sup>2</sup>, S. Hoepken<sup>2</sup>, and K. Eicken<sup>4</sup>, <sup>1</sup>Degussa AG, Feed Additives, Hanau, Germany, <sup>2</sup>School of Veterinary Medicine, Hannover, Germany, <sup>3</sup>Christian-Albrechts University, Kiel, Germany, <sup>4</sup>Veterinarian Practice, Ovelgoenne, Germany.

The quality of grass silage varies depending on botanical composition, harvesting conditions and the ensiling process. The protein fraction of

grass silages may be subject to deterioration during storage. The goal of the present investigation was to study changes in the protein quality of grass silages during a complete winter season (October through March). Samples of grass silages, produced according to common practice, were obtained from 11 farms in Northern Germany in four week intervals and analyzed for major nutrients. Furthermore, the N-fraction was differentiated into true protein, amino acids, and soluble and insoluble nitrogen. On average, pH of silages was 5.2, lactic acid varied between 1.2 and 133 mmol/kg, while acetic acid averaged 95 mmol/kg. The range for dry matter (DM) contents of the silages was between 232 and 788 g/kg, while crude fiber varied between 227 and 330 g/kg DM. Mean crude protein was 203 (130-282) g/kg DM. True protein was on average only 50% of CP (39-163 g/kg DM). In some samples, the percentage of crude protein that was true protein was less than 30%. This corresponds to the analyzed total amount of protein-bound amino acids in the silages. The low proportion of true protein in crude protein, and the corresponding lower amino acid content, mean that the real protein supply arriving at the intestine can be quite low for cows eating high quantities of such grass silages. Because of the variation in true protein and amino acids in grass silages, the non-differentiated data for rumen degradability (UDP) in feeding tables, as well as assumptions about degradability for dynamic models, seems to be questionable and may not reflect the real quantity of protein which is available at the small intestinal level.

**Key Words:** Grass silage, Protein quality, True protein

**M215 The effect of *Lactobacillus buchneri* 40788 on the fermentation of alfalfa silage ensiled for an extended period of time.** M. P. Lynch, D. H. Kleinschmit\*, J. M. Neylon, T. E. Ebling, M. Reddish, J. M. Ladd, J. E. Lynch, M. Steifel, T. Gassert, and L. Kung, Jr., University of Delaware, Newark, DE.

Treating silages with *Lactobacillus buchneri* are more stable when exposed to air because lactic acid is converted to acetic via a novel pathway. However, excessive production of acetic acid in silage could be detrimental and thus the objective of this study was to determine the effect of time of ensiling and effect of *L. buchneri* on fermentation profile of alfalfa silage. Wilted alfalfa (40% DM) was either untreated (U) or treated with *L. buchneri* 40788 (Lallemand Animal Nutrition, Milwaukee, WI, 400,000 cfu/g of fresh forage) (T) and ensiled in triplicate 0.4-L laboratory silos for 4 mo, 1 y, and 1.5 y. Changes in silage fermentation caused by T, were similar at all times of ensiling. On average, the pH of U (4.29) was less than T (4.63) ( $P < 0.05$ ), due to the greater