

China, more systematic studies in this area are needed in order to utilize this valuable resource.

**Key Words:** Chinese yak milk, Gross composition, Nutrient profile

**W61 Development of a software program for goal oriented functional food formulation.** Y. Yang\*, S. Gokavi, X. Wu, and M. Guo, *University of Vermont, Burlington.*

Development of formulated functional foods is a complicated process that involves meeting many goals. Some of these goals may include matching the flavor and texture of other products of the same type, meeting regulatory requirements and compositional restrictions for appropriate quality and shelf-life, and meeting cost constraints. This process is referred to as goal oriented formulation. The objective of this study was to develop and test a computer program that uses a linear programming approach to aid in new product formulation to achieve required compositional goals. A computer program was designed to facilitate goal oriented formulation. The developed software has both formula and ingredient storage components. The entire USDA food composition database is available. The user entered formula specifications, such as amount of nutrients to be present in a particular formulation and the list of ingredients to be used in formulation. The user can also prepare a concise print out of the formulation that lists the amount of each ingredient to use plus any corresponding information and instructions. The software developed uses USDA data base for ingredients and their nutrient composition and can give several different recipes for one single product. One recipe can be selected based on its sensory qualities and cost of formulation. The developed software was found to be effective in determining the best recipe for a formulation, time saving, and easy to operate.

**Key Words:** Functional foods, Formulation, Software

**W62 Organic butter and cheese: Preference, acceptability and consumer attitudes.** M. Almena\* and A. Howard, *University of Vermont, Burlington.*

Food acceptability is highly dependent by the sensory quality of the food, as well as social, cultural and economic conditions of the consumer. Consumers are willing to pay more for organic foods based on a number of preferences; however, the role of the sensory component is unclear. This study evaluated consumer sensory preference and acceptability of organic butter and cheeses (cheddar and cream cheese) comparing to their non-organic version. For each of the three products evaluated, two commercial samples (organic and non-organic) were tested using a face-to-face survey with consumers. A total of 85 individuals evaluated the butter samples and 91 evaluated the cheeses. Consumers were enlisted at a local coffee/bagel shop, as well as students from the University of Vermont. Overall acceptability and flavor of the products were evaluated using an increasing intensity 9-pt scale. In addition, the group of consumers evaluating cheese also scored the texture and appearance of the 4 samples. All the questionnaires

included a section in which subjects were asked about demographic information and their purchase habits toward organic and dairy products. Data were statistically analyzed by paired t-tests, ANOVA and Chi-square tests using SPSS. There was a significant preference overall ( $P = 0.015$ ) for the organic butter (65%) vs. non-organic (35%). Vermonters especially showed a greater preference for the organic product, and they also indicated to purchase organic butter more often than non-Vermonters (31% vs. 14%). For the cheese, there was a significant preference overall ( $P = 0.001$ ) for the non-organic samples for both cheddar and cream cheeses. Only 20% of the individuals preferred the organic cheddar and 26 % the organic cream cheese. However, most of the individuals purchasing organic products noted that they rather would buy the organic cheeses even though they preferred the non-organic product. No significant differences were found between genders in terms of preference for any of the products evaluated.

**Key Words:** Organic dairy products, Sensory, Acceptability

**W63 Sensory evaluation of a novel ingredient produced from buttermilk.** S. Jinjarak<sup>1</sup>, P. Morin<sup>2</sup>, A. Olabi<sup>1</sup>, and R. Jimenez-Flores\*<sup>1</sup>, <sup>1</sup>*California Polytechnic State University, San Luis Obispo,* <sup>2</sup>*Laval University, Quebec City, Quebec, Canada.*

Buttermilk was concentrated by microfiltration (MF) and diafiltered (DF) to half its original volume, and the resulting retentate was subjected to super critical fluid extraction (SFE). This process was applied to concentrate the phospholipids of the milk fat globule membrane. Chemical analyses were performed to determine protein, fat, lactose, solid, and ash content. Two types of models and statistical analyses were performed, first to compare four types of buttermilks with and without SFE treatment, and second, to compare the treatments (DF-SFE, MF-SFE, SFE, none) for whey buttermilk (WBM) and sweet cream buttermilk (CBM) only. For the first model, attributes generally related to defects such as cardboard, sour, rancid and salty properties were significantly different along with some appearance properties. SFE enhanced the quality of the ingredients by reducing the level of several undesirable attributes with only yellowness, viscosity and cooked aroma presenting significant differences. Lactose and ash content were significantly different with  $p \leq 0.05$  and  $p \leq 0.001$  respectively. As for the second model, yellow color was significantly different while several flavors were found to have more significant differences than appearance. The four treatments increased intensities of flavor attributes. MF and DF combined with SFE yielded higher mean scores over the other two treatments on cardboard flavor. Lactose was significantly different for CBM and WBM. Replicate effect was not significant for most attributes in both models. Grain, sweet, and buttery flavors were desirable factors and noted in all samples. The resulting ingredient had significant higher phospholipids, in particular sphingomyelin.

**Key Words:** Buttermilk, Sensory evaluation, Novel ingredient

## Forages and Pastures: Grazing

**W64 Effects of grazing management on pasture characteristics affecting sediment and nutrient loads in surface waters.** M. Haan\*<sup>1</sup>, J. Russell<sup>1</sup>, D. Morrical<sup>1</sup>, D. Strohhahn<sup>1</sup>, W. Powers<sup>1</sup>, J. Lawrence<sup>1</sup>, and J. Kovar<sup>2</sup>, <sup>1</sup>*Iowa State University, Ames,* <sup>2</sup>*USDA-ARS, Ames, IA.*

To evaluate cattle grazing effects on the potential for sediment and nutrient loading of surface waters, forage cover, sward height, and mass and manure cover were measured in pastures with different grazing management systems. Six 12.1-ha cool-season grass pastures were

assigned one of three treatments: continuous stocking with unrestricted stream access (CSU), continuous stocking with stream access only at a reinforced crossing (CSR), or rotational stocking (5 paddocks; RS). Pastures were stocked with 15 fall-calving Angus cows (650±72 kg) from May through October, 2005. Forage sward height, determined with a falling plate meter (4.8 kg/m<sup>2</sup>), and mass, determined by clipping a 0.25-m<sup>2</sup> area, and the proportions of bare and manure-covered ground, determined by a point line procedure over 16.1 m, were measured monthly from open and congregation sites on the stream banks and at distances of 0 to 33.5 m, 33.5 to 67 m, and greater than 67 m from the stream banks. The proportion of ground that was bare was greater ( $P<0.05$ ) in congregation than open areas in July through October. The proportion of ground covered with manure was greater ( $P<0.05$ ) in congregation than open areas in August through October. Forage mass was lower ( $P<0.05$ ) in congregation than open areas in June and August through October. Pastures with CSU had greater ( $P<0.05$ ) proportions of bare soil in October, greater ( $P<0.05$ ) manure cover on the banks and 0 to 33.5 m from the banks, lower ( $P<0.05$ ) sward heights on the banks in June and October and lower ( $P<0.05$ ) forage masses on the banks and 0 to 33.5 m from the banks in October than CSR pastures. In October, RS pastures had greater ( $P<0.05$ ) proportions of manure-covered ground and lower ( $P<0.05$ ) forage sward heights and masses on the banks and 0 to 33.5 m from the banks than CSR pastures. Results imply that limiting access to streams to stabilized crossings or using rotational grazing may decrease the potential for sediment and nutrient loading to surface waters.

**Key Words:** Grazing, Water quality

**W65 Milk yield from crossbred cows grazing hybrid sorghum during fall.** M. L. P. Lima\*, F. F. Simili, J. R. Nogueira, M. G. Pinheiro, L. El Faro, and V. L. Cardoso, *Agencia Paulista de Tecnologia dos Agronegocios, Ribeirao Preto, SP, Brazil.*

Sorghum is typically used for silage, but also can be used for grazing. Hybrid sorghum is often planted for fall pasture when the quality of tropical pasture decline. The objective of this trial was to compare the milk production of crossbred cows grazing a perennial tropical pasture composed of guineagrass (*Panicum maximum*) and sorghum x sudangrass (*Sorghum bicolor* x *Sorghum sudanense*) pastures in a rotational system during the fall. Eighteen crossbred cows (Holstein x Gir), from 30 to 90 days in milk (in each experimental period) were used during two consecutive years and two grazing cycles per year. The experimental design was a split-split plot (two cycles and two years), analysed with SAS program. The three treatments were sorghum x sudangrass only (negative control), sorghum x sudangrass plus 3 kg of concentrate/hd/d, and guineagrass plus 6 kg of concentrate/hd/d. A significant ( $P<0.01$ ) diet effect was observed on milk yield. Cows fed sorghum x sudangrass plus 3 kg of concentrate and guineagrass plus 6 kg of concentrate showed higher milk production than cows fed with sorghum x sudangrass pasture. However there were no differences ( $P>0.10$ ) in fat-corrected milk production. Treatments did not affect %fat, %protein, %lactose, or %total solids not fat. Year affected %fat ( $P<0.001$ ). No parameters were affected by grazing cycles. The authors concluded that concentrate supplementation improves the milk production for cows grazing sorghum x sudangrass pastures.

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**Table 1. Effect of treatments on milk yield, composition of milk**

	Sorghum	Sorghum +3kg of concentrate	Guineagrass +6kg of concentrate	SEM
Milk yield, kg/day	16.01 <sup>b</sup>	18.29 <sup>a</sup>	18.41 <sup>a</sup>	0.84
3.5% fat corrected milk, kg/day	15.48 <sup>a</sup>	17.21 <sup>a</sup>	17.87 <sup>a</sup>	0.92
Fat %	3.25 <sup>a</sup>	3.07 <sup>a</sup>	3.35 <sup>a</sup>	0.12
Protein %	2.99 <sup>a</sup>	2.98 <sup>a</sup>	3.08 <sup>a</sup>	0.06
Lactose %	4.44 <sup>a</sup>	4.44 <sup>a</sup>	4.47 <sup>a</sup>	0.04
Total solids %	11.34 <sup>a</sup>	11.41 <sup>a</sup>	11.23 <sup>a</sup>	0.07

Within a row, means with different superscripts differ significantly ( $P<0.05$ )

**Key Words:** Dairy cow, Hybrid sorghum, Tropical pasture

**W66 In situ dry matter degradation kinetics of the diet selected by grazing cattle in a grassland of Northern Mexico.** O. Reyes-Estrada, M. Murillo-Ortiz, E. Herrera-Torres, M. Guerrero-Cervantes, G. Nevarez-Carrasco, R. Montoya-Escalante, M. A. Cerrillo-Soto\*, and A. S. Juarez-Reyes, *Universidad Juárez del Estado de Durango, Durango, Dgo. Mexico.*

The study was carried out to determine the *in situ* DM degradation kinetics of the diet selected by range cattle. Four esophageal cannulated steers (350 ± 5.0 kg BW) were used to obtain extrusa samples during Spring (Apr-Jun), Summer (Jul-Sep), Autumn (Oct- Dec) and Winter (Jan-Mar). To estimate the *in situ* degradation kinetics, 10g of sample were incubated in the rumen of two fistulated heifers (375 ± 4kg BW) fed alfalfa hay *ad lib*. The bags were withdrawn from the rumen at 0, 3, 6, 9, 15, 24, 36, 48, 72 and 96h. Data were fitted to the model:  $Y = a + b(1 - e^{-ct})$ , where  $a$  is the intercept;  $b$  is the slowly degradable fraction;  $c$  is the rate constant of disappearance of  $b$ ;  $t$  is the time of incubation and  $k$  is the estimated rate of out flow. The potential degradability (PD) was estimated as  $a + b$  and the effective degradability (ED) was calculated by:  $ED = a + (b * c)/(c + k)$ . The parameters  $a$ ,  $b$ ,  $c$ , PD and ED were analyzed using PROC GLM according to a completely randomized block design. The mean value for fraction ( $a$ ) was 20.6% and no differences were registered between seasons ( $P>0.05$ ). Regarding the fraction ( $b$ ), no differences were recorded in most parts of the year (Spring, Autumn and Winter) ( $P>0.05$ ) although higher values ( $P<0.05$ ) were observed during the rainy months (Summer; 68.0%). Similarly, the constant rate of degradation ( $c$ ) was 3.5 times higher in Summer (5.7%/h) than in the winter (1.6%/h). Values related to PD were similar between Autumn and Winter ( $P>0.05$ ), but lower ( $P<0.05$ ) than those obtained in Spring and Summer. The ED was also different among periods of sampling ( $P<0.05$ ). Regarding the *in situ* DM degradability, higher values ( $P<0.05$ ) were also obtained during the rainy months (24h; 76.1%, and 48h; 83.5%) compared with those obtained when forage in the field is dormant (Winter; 39.1%) and in the dry season (Spring; 62.8%). Results from this study indicate that the constant rate of degradation ( $c$ ) and the *in situ* DM degradation at 24 and 48h, may be adequate estimations to identify variations in nutrient availability among diets consumed by range cattle throughout the year.

**Table 1. *In situ* degradability parameters (%) of the forage selected by grazing cattle**

Item Parameters	Seasons				Mean	sem
	Spring	Summer	Autumn	Winter		
Soluble fraction (a)	23.0 <sup>a</sup>	20.9 <sup>a</sup>	19.4 <sup>a</sup>	19.2 <sup>a</sup>	20.6	0.010
Slowly degradable fraction (b)	59.3 <sup>b</sup>	68.0 <sup>a</sup>	57.9 <sup>b</sup>	59.9 <sup>b</sup>	61.2	0.043
Constant rate of degradation (c)	4.3 <sup>b</sup>	5.7 <sup>a</sup>	2.5 <sup>c</sup>	1.6 <sup>d</sup>	3.5	0.019
Potentially degradable fraction (a+b)	82.3 <sup>b</sup>	88.9 <sup>a</sup>	77.4 <sup>c</sup>	79.2 <sup>c</sup>	81.9	0.045
Effective degradability	41.1 <sup>b</sup>	47.1 <sup>a</sup>	35.1 <sup>c</sup>	26.3 <sup>d</sup>	37.4	0.023

Means between rows with different superscripts differ ( $P < 0.05$ )

**Key Words:** Degradation kinetics, Grazing cattle, Northern Mexico

**W67 Nutritional characteristics of native grasses used in a pasture system.** A. Loyd\*<sup>1</sup>, S. Smith<sup>2</sup>, J. D. Sampson<sup>1</sup>, and J. N. Spain<sup>1</sup>, <sup>1</sup>University of Missouri, Columbia, <sup>2</sup>Windrush Farm, Columbia, MO.

Sustainable livestock systems are being developed that support thriving wildlife populations alongside profitable agricultural systems. Grazing systems that better utilize native grass species (to provide an appropriate habitat for wild birds as well as forages for beef cattle) may provide one answer to help achieve this delicate balance. The objective of this study is to describe the nutritional qualities of native grasses produced during the summer in Missouri. 11 native Missouri grass species were analyzed: Bluejoint (BJ), Canada Wildrye (CWR), Cluster Fescue (CIF), Compass Plant (CmpP), Cordgrass (CRD), Indian Grass (IG), Little Bluestem (LB), Prairie Dock (PrDk), Prairie Dropseed (PDRP), Sawtoothed Sunflower (SS), and Virginia Wildrye (VW). Each species was sampled every 28 days beginning May 2004. Beginning in June 2004, regrowth samples were also collected from the previously sampled forage as allowed by forage regrowth. Samples were taken manually at the height of 15.2 cm to approximate the height grazed by cattle. Dried samples were analyzed for: DM, OM, NDF, ADF, CP. Samples were incubated *in situ* in the rumens of mature steers. Incubated times were 0, 24 and 48 hours. Data for 24h DMD were analyzed as a repeated measurement using the proc mixed procedures in SAS. The main plot contained effect of forage and the subplot contained the effect of month and forage by month. Crude protein decreased as season progressed for all forages with concurrent increases in NDF and ADF. DM digestibility differed significantly by forage and over the growing season. Compass plant and PrDk had the highest average DMD (63.30% and 69.66%, respectively) compared to CRD (31.72%) and PDRP (31.54%) ( $P < 0.001$ ). Differences in DMD was evident across the entire growing season with PrDk having the highest DMD in June (81.75%) while DMD of PDRP was 32.13%. The results of this study provide basic nutrient profiles of native grasses and digestibility values for changes over the grazing season and can be used to predict digestible forage dry matter for multicultural grazing systems.

**Key Words:** Native grasses, Nutrient content, Dry Matter Degradation

**W68 Supplement level and stocking rate effects on stockers grazing rye-ryegrass pastures.** M. Rouquette\*<sup>1</sup> and J. Vendramini<sup>2</sup>, <sup>1</sup>Texas A&M University Agricultural Research & Extension Center, Overton, <sup>2</sup>Texas Cooperative Extension, Overton.

Level of supplement (SUP) has various associative effects on forage intake, total diet, and performance per animal and unit land area. The objective of this study was to quantify ADG and gain/ha of stockers grazing a mixture of 'Maton' rye and 'TAM-90' of annual ryegrass at 3 stocking rates (STK) and receiving 3 levels of SUP. Stocking rates in a fixed stocking design with two pasture replicates per treatment were 3.7, 5.2, and 7.2 hd/ha based on initial stocker weights of 270 kg/animal (half-Simmental steers and heifers). A ration containing 98% cracked corn plus Rumensin 80, salt, dicalcium phosphate, and dried molasses was group fed daily at 0 (PAS), 0.4% BW (.4BW), and 0.8% BW (.8BW). Stocking was continuous from Dec. 20 to May 17 (148 d). Average daily gain was greatest ( $P < 0.01$ ) at 1.5 kg/d from .8 BW, and similar for 0.4 BW and PAS at 1.28 and 1.15 kg/d, respectively. The ADG were similar for calves stocked at 3.7 and 5.2 hd/d, 1.37 and 1.47 kg/d respectively, and both were higher ( $P < 0.01$ ) than ADG of 1.05 kg/d at the highest STK of 7.2 hd/ha. The ADG among the nine treatments ranged from 0.51 kg/d from PAS when stocked at 7.2 hd/ha to 1.5 kg/d from .8 BW when stocked at 3.7 hd/ha. The .4 BW SUP level was more efficient ( $P < 0.01$ ) at each STK compared to cattle receiving .8 BW. The SUP:extra gain ratios for .4 BW were 4.7:1, 5.4:1, and 10.6:1 when stocked at 7.2, 5.2, and 3.7 hd/ha, respectively; whereas, ratios for .8 BW were 7.2:1, 7.8:1, and 15.9:1, respectively, when stocked at 7.2, 5.2, and 3.7 hd/ha. Gain per animal efficiencies of SUP were maximized at .4 BW at both high and medium stocking rates, and were minimized at .8 BW and low stocking rate. Gain per ha of 543 kg was least on PAS and 7.2 hd/ha, and greatest from .8 BW and medium stocking rate (5.2 hd/ha) at 1083 kg/ha ( $P < 0.01$ ). Management strategies for stocking rate and supplementation are uniquely linked to animal weight, animal prices, pasture and supplement costs, ADG, and selling margin.

**Key Words:** Stocking rate, Supplementation, Pasture

**W69 Feeding grazing dairy cows with soybean meal, sunflower meal or canola meal in winter.** M. R. Gallardo\*<sup>1</sup>, S. E. Valtorta<sup>2</sup>, H. C. Castro<sup>1</sup>, M. C. Gaggiotti<sup>1</sup>, and C. Arakaki<sup>3</sup>, <sup>1</sup>EEA Rafaela - National Institute of Agricultural Technology, Rafaela, Santa Fe, Argentina, <sup>2</sup>National Research Council (CONICET), Rafaela, Santa Fe, Argentina, <sup>3</sup>CICV - National Institute of Agricultural Technology, Castelar, Buenos Aires, Argentina.

In Argentine grazing systems, additional supply of energy and protein is needed to balance the diet during periods of pasture shortage in winter. Three protein meal sources were evaluated, in terms of milk yield and composition, for grazing dairy cows receiving a supplementary PMR. Thirty three multiparous cows, averaging  $75 \pm 15$  DIM, and over 7000 L/cow in previous lactations, were randomly assigned to 3 treatments: SM= soybean meal, L-SuM= sunflower meal-low-protein and CM= canola meal, in a continuous split-plot design with covariance analysis. The diets were isoenergetic (1.82 Mcal NEL) and isonitrogenous (17% CP), and were formulated (DM basis) with 17 % pasture and 83% of a PMR containing corn silage, alfalfa hay, corn grain, minerals and vitamins premix and the corresponding protein meal. The CP concentrations were 28, 35 and 41% for L-SuM, CM and SM, and represented 25, 20 and 15% total diet DM, respectively. Table 1 shows milk yield and composition for all treatments. The L-SM had the

lowest response in terms of milk yield, but the highest in milk fat percentage, thus suggesting concentration effects. On the other hand, CM produced the lowest protein concentrations, probably because of differences in dietary amino acid supply to the mammary gland. Milk urea concentration was lowest for CM.

**Table 1. Milk yield and composition for grazing dairy cows receiving soybean meal (SM), sunflower meal (L-SuM), or canola meal (CM) in the diet.**

Parameter	SM	L-SuM	CM	SEM	P<
Milk yield, L/cow/day	32.10 a	28.67 b	31.95 a	1.65	0.0003
Milk fat, %	3.41 a	3.59 b	3.37 a	0.35	0.0001
Milk fat yield, kg/cow/day	1.094	1.029	1.182	0.14	NS
Milk protein, %	3.62 a	3.79 a	3.08 b	0.11	0.0000
Milk protein yield, kg/cow/day	1.162	1.029	0.984	0.062	NS
Lactose, %	5.03	4.90	4.99	0.19	NS
MUN, mg%	15.83 a	14.32 a	10.03 b	3.86	0.0031

**Key Words:** Soybean meal, Sunflower meal, Canola meal

**W70 Effect of spring grazing date and subsequent stocking rate on dairy cow performance in the mid grazing season.** E. Kennedy<sup>1,2</sup>, M. O'Donovan<sup>1</sup>, J. P. Murphy<sup>1</sup>, F. O'Mara<sup>2</sup>, and L. Delaby<sup>3</sup>, <sup>1</sup>Dairy Production Research Centre, Teagasc Moorepark, Fermoy, Co. Cork, Ireland, <sup>2</sup>UCD, Dublin, Ireland, <sup>3</sup>INRA, St. Gilles, France.

Sixty-four spring calving Holstein Friesian dairy cows (32 primiparous and 32 multiparous) were randomly assigned to 4 grazing treatments (n=16). The objective was to compare the effect of initial spring grazing date and stocking rate on the production performance of spring calving cows. Two swards, early grazed (E) and late grazed (L), were created and 2 stocking rates (SR), high (H) and medium (M), were applied across them. Half of the area was grazed once between 16 February and 4 April, creating the early grazed sward. The rest of the area remained ungrazed from the previous October i.e. late grazed sward. The SRs imposed were 5.5 cows/ha (EH), 4.5 cows/ha (EM), 6.4 cows/ha (LH) and 5.5 cows/ha (LM). The study was completed over 4, 21-day rotations from 16 April to 3 July 2004. Herbage mass and sward density were measured twice weekly by taking 2 cuts per paddock with a power mower. Pre- and post-graze pasture heights were taken daily. Milk yield was recorded daily and milk composition determined weekly. All animal parameters were analysed using covariate analysis. Milk, SCM, protein, fat and lactose yield were significantly higher ( $P < 0.001$ ) for the EM animals. There was no significant difference in liveweight or body condition score between the treatments. The results suggest that an increased level of animal performance is achievable with early grazed swards stocked at a medium SR (EM treatment).

**Table 1. Effect of spring grazing date and stocking rate on milk production performance**

	EH	EM	LH	LM	SED	Sig
Milk yield (kg/day)	22.7 <sup>b</sup>	24.5 <sup>a</sup>	20.9 <sup>c</sup>	22.4 <sup>b</sup>	1.03	0.001
Fat yield (g/day)	872 <sup>b</sup>	918 <sup>a</sup>	830 <sup>b</sup>	846 <sup>b</sup>	38.9	0.01
Protein yield (g/day)	744 <sup>b</sup>	831 <sup>a</sup>	670 <sup>c</sup>	733 <sup>b</sup>	32.6	0.001
Lactose yield (g/day)	1068 <sup>b</sup>	1159 <sup>a</sup>	976 <sup>c</sup>	1052 <sup>b</sup>	53.3	0.001
Solids corrected						
milk yield (kg/day)	20.9 <sup>b</sup>	22.5 <sup>a</sup>	19.4 <sup>c</sup>	20.4 <sup>bc</sup>	0.86	0.001
Grass dry matter intake (kg DM/cow/day)	16.3 <sup>b</sup>	17.5 <sup>a</sup>	15.2 <sup>c</sup>	16.5 <sup>a</sup>	0.74	0.001

<sup>abc</sup>Values in the same row not sharing a common superscript are significantly different

**Key Words:** Grazing date, Stocking rate, Milk Production

**W71 Synchronous and asynchronous concentrate supplements to lactating dairy cows on pasture.** A. Konyali<sup>1,2</sup>, K.-H. Südekum<sup>1,3</sup>, W. Junge<sup>1</sup>, M. Lukas<sup>1</sup>, and E. Kalm<sup>1</sup>, <sup>1</sup>University of Kiel, Kiel, Germany, <sup>2</sup>Çanakkale Onsekiz Mart University, Çanakkale, Turkey, <sup>3</sup>University of Bonn, Bonn, Germany.

The objectives were to evaluate the effects of two isocaloric and isonitrogenous concentrates that differ in the rate of carbohydrate degradation in the rumen on lactational performance of dairy cows on pasture. Both concentrates were fed to lactating dairy cows grazing intensive (mineral fertilizer, 200 kg N/ha per year; slurry, 20 m<sup>3</sup>/ha per year; 100% perennial ryegrass) or extensive (mineral fertilizer, 0 kg N/ha per year; slurry, 20 m<sup>3</sup>/ha per year; white clover-dandelion-grasses) pastures such that ruminal degradation rate of carbohydrates was either synchronous or asynchronous to pasture crude protein degradation. The synchronous concentrate contained (as-fed basis) more than 50% of barley, tapioca, and beet pulp. The asynchronous concentrate was based on corn (39%) as the primary starch source. Degree of ruminal synchrony of carbohydrate and crude protein degradation was based upon table values. During two complete grazing periods (> 5 months each), 236 dairy cows, 127 (67 Red-Pied and 60 German Friesian) in 1997, and 109 (50 Red-Pied and 59 German Friesian) in 1998, were fed with combinations of one of the concentrates that were allocated according to milk yield and one of the pasture types that were offered for ad libitum intake and rotationally grazed. A 2 × 2 factorial arrangement of treatments was used in a randomized block design. Pasture dry matter intakes averaged 11.7 and 12.6 kg/day for the intensive and extensive pasture. Concentrate type did not affect ( $P > 0.10$ ) milk or milk component yield. Cows on the extensive pasture yielded more ( $P < 0.06$ ) milk than those on the intensive pasture (22.1 versus 21.1 kg/d). Cows on the intensive sward had higher ( $P < 0.001$ ) milk urea concentrations, indicating a lower efficiency of N conversion from feed into milk. Efficiency of N utilization was not affected by concentrate type. Higher ruminal carbohydrate degradability of the synchronous concentrate did not benefit cows in mid to late lactation grazing high-quality pasture.

**Key Words:** Protein, Carbohydrate, Rumen synchrony

**W72 Performance and urinary alkaloid excretion of stocker cattle grazing nontoxic or toxic tall fescue over-seeded with white clover.** J. Andrae\*<sup>1</sup>, N. Hill<sup>1</sup>, and J. Bouton<sup>2</sup>, <sup>1</sup>The University of Georgia, Athens, <sup>2</sup>The Samuel Roberts Noble Foundation, Ardmore, OK.

Eight paddocks (0.8 ha/paddock) were utilized near Eatonton, GA to determine the effects of tall fescue endophyte strain and white clover presence on urinary ergot alkaloid excretion and animal performance. Jesup tall fescue infected with a toxic endophyte or a nonergot alkaloid-producing endophyte (AR542; aka “MaxQ”) was planted in four paddocks respectively. Two paddocks of each endophyte type were also over-seeded with Durana white clover. Each paddock was grazed with a minimum of two tester steers (mean initial wt 311 kg) in spring of 2003 - 2005. Animal gain, botanical composition, forage availability, and urine alkaloid concentration was monitored at 28 d intervals. Paddocks were grazed for 125, 56, and 113 d in 2003, 2004, and 2005. Put-and-take grazing was utilized to maintain similar forage availability. Data were analyzed as a completely randomized design with a 2X2 factorial arrangement of treatments. Paddock was the experimental unit. Endophyte type and clover were main effects. Drought in 2004 shortened the grazing season and decreased ( $P<0.01$ ) gain/ha by approximately 50% for all treatments. Daily gain of cattle grazing toxic endophyte was similar ( $P=0.30$ ) to AR542 in 2003, but was lower ( $P<0.05$ ) in 2004 and 2005. Cattle grazing toxic endophyte had decreased gain/ha ( $P<0.01$ ) and increased urine alkaloid concentration ( $P<0.01$ ) regardless of year. White clover decreased carrying capacity ( $P<0.01$ ) but improved ADG ( $P<0.01$ ) and gain/ha ( $P<0.01$ ). No endophyte x clover interaction was detected for ADG ( $P = 0.38$ ). Cattle grazing white clover and toxic tall fescue had intermediate ( $P<0.05$ ) urine alkaloid concentrations compared to toxic fescue without clover or all nontoxic tall fescue treatments. The lack of a significant clover x endophyte type interaction for average daily gain suggests that the alkaloid dilution observed in this study was inadequate to completely offset tall fescue toxicosis and improved animal performance from clover was associated with increased nutrient density.

**Key Words:** Tall fescue toxicosis, Clover, Alkaloids

**W73 Removing seasonal affects from pasture plate meter calibrations.** E. B. Rayburn, W. L. Shockey\*, B. D. Smith, D. A. Seymore, and J. D. Lozier, *West Virginia University Extension Service, Morgantown.*

This study was conducted to develop a calibration for paddock mean falling plate meter height (PH), herbage density (HD) and herbage mass (HM) in rotationally stocked pastures under different fertility treatments and to determine if there was a seasonal or treatment effect on the calibration. Accurate, rapid measurement of HM is needed in pasture research and for on-farm pasture budgeting. Four rotationally stocked pastures were sampled for PH using a standardized falling plate meter. Pastures were predominantly orchardgrass, bluegrass, and white clover. Fertility treatments were poultry litter at 4,480 kg/ha/year, poultry litter at 8,960 kg/ha/year, lime and phosphorous as needed based on soil test, and lime only as needed based on soil test. Pastures were walked on established transects and 15 paired PH and HM samples were taken at random and clipped to ground level. For each data pair, HD was calculated by dividing HM by PH. Paddock means for PH, HD and HM were calculated for each paddock and sampling date. Paddocks were sampled just before grazing over a 3 year period as follows (month/number of sampling periods): May/16, June/8, July/5, August/7, September/4, October/11, and November/8. Regressions of

paddock mean HD and paddock mean HM as functions of PH were calculated using all paddock sampling dates and fertility treatments. The plate meter calibration regression for HD based on PH was:  $HD = 264 - 6.6 PH$ ;  $R^2 = 0.29$ ;  $SD_{reg} = 42$ . Regression coefficients were significant ( $P<0.001$ ). Estimating mean pasture HM as the product of PH times HD resulted in a second order function without an intercept and was:  $HM = 264 PH - 6.6 PH^2$ . Compared to the clipped HM measured this model had an  $R^2 = 0.93$ ;  $SD_{reg} = 687$ . Analysis of variance of regression residuals found no significant effect of season or treatment on the accuracy of HD and HM estimates. This method provides one calibration that applies across seasons and fertility treatment for pastures of similar botanical composition and under the same defoliation management.

**Key Words:** Pasture, Plate meter height, Yield calibration

**W74 Effect of high and low residual herbage mass of a tropical pasture grazed by goats. 1. Grazing behaviour<sup>a</sup>.** J. S. Fernandes Jr.<sup>1</sup>, K. T. Resende<sup>1</sup>, J. J. R. Fernandes\*<sup>3</sup>, L. O. Tedeschi<sup>2</sup>, R. A. Reis<sup>1</sup>, M. H. M. R. Fernandes<sup>1</sup>, and H. M. Silva<sup>1</sup>, <sup>1</sup>Universidade Estadual Paulista/FCAV, Jaboticabal, SP, Brazil, <sup>2</sup>Texas A&M University, College Station, <sup>3</sup>Universidade Federal de Goias, Goiania, GO, Brazil.

The objective of this study was to determine the grazing behaviour of F1 Boer x Saanen goats maintained in a tropical pasture (*Panicum maximum* Jacq), under rotational grazing system in different sward structure. The area was divided into 12 paddocks of 990 m<sup>2</sup> each, allocated in six blocks. Each paddock was divided into two identical plots (treatments, TRT) with high residual (HR, 3.1 t/ha of green herbage mass; GHM) and low residual (LR, 2.0 t/ha GHM). Each plot was grazed for three consecutive d (D1, D2 and D3) before animals were rotated. Grazing time (GT, min) was recorded during daytime (0700 to 1900 h) and behavior was observed every 10 min, with four animals per TRT. Bite rate (BR, bites/min) was the total number of bites during three minutes, and bite mass (BM, g/bite) was estimated with esophageally fistulated animals. Measurements were conducted during three consecutive grazing cycles of 36 d. The mean stocking rate for HR was 33 goats/ha (or 6.6 animal unity (AU)/ha) and for LR was 43 goats/ha (or 8.4 AU/ha). The GT increased from D1 to D3 (468, 491 and 535 min for D1, D2, D3) in the LR, but did not differ in the HR (468 min). BR did not differ between treatments ( $P=0.12$ ) or among days ( $P=0.42$ ), and averaged 80.3 bites/min. In contrast, BM was higher ( $P=0.01$ ) in HR (0.18 g/bite) than in LR (0.15 g/bite), and decreased from D1 to D3 (0.22; 0.16 and 0.11 g/bite). These differences can be explained by the low herbage allowances in the LR. We observed the functional relationship between BM and GT, in which the animal increased the grazing time to offset the lower BM. Our findings are consistent with the general assumption that BM are greatest during the first day, as a result of the trade-off between quantity and quality of the herbage mass. <sup>a</sup> Sponsored by FAPESP and CNPq, Brazil

**Key Words:** Ingestive behaviour, Panicum, Residual mass

**W75 Effect of high and low residual herbage mass of a tropical pasture grazed by goats. 2. Sward structure<sup>a</sup>.** J. S. Fernandes Jr.\*<sup>1</sup>, K. T. Resende<sup>1</sup>, M. H. M. R. Fernandes<sup>1</sup>, L. O. Tedeschi<sup>2</sup>, R. A. Reis<sup>1</sup>, J. J. R. Fernandes<sup>3</sup>, and F. G. Souza<sup>1</sup>, <sup>1</sup>Universidade Estadual Paulista/FCAV, Jaboticabal, SP, Brazil, <sup>2</sup>Texas A&M University, College Station, <sup>3</sup>Universidade Federal de Goias, Goiania, GO, Brazil.

The objective of this study was to evaluate the residual herbage mass on the sward structure of a rotational tropical pasture (*Panicum maximum* Jacq), grazed by F1 Boer x Saanen goats. The area was divided into 12 paddocks of 990 m<sup>2</sup> each, allocated in six blocks. Each paddock was divided into two identical plots (treatments, TRT) with high residual (HR) and low residual (LR) green mass (GM). Each plot was grazed for three consecutive d before animals were rotated. Sward height and herbage samples were taken in the morning on day 1, 2, 3 of grazing and on residual mass (D1, D2, D3 and D4). For each sampling, two quadrates of 50 x 50 cm were randomly cast within the plot. Herbage mass (HM) was cut down to the ground level within the quadrates, weighed, divided into three parts: green leaves mass, stem mass and dead herbage mass, and dried at 65°C. Measurements were conducted during three consecutive grazing cycles of 36 d. The HM, GM, leaf proportion and sward height decreased from D1 to R. In contrast stem:leaf ratio (S:L) increased from D1 to R (Table). Sward height was higher for HR than in LR, even though both treatments had similar HM, GM and S:L values in the first grazing day (D1) of the paddock. Our findings suggested that green leaf might be the principal component that dictates intake in tropical pastures, even when herbage allowances are low. <sup>a</sup>Sponsored by FAPESP and CNPq, Brazil

**Table 1.**

Item	TRT	D1	D2	D3	D4
Herbage mass (t/ha)	HR	7.0 <sup>a</sup>	6.4 <sup>ab</sup>	5.8 <sup>bc</sup>	5.2 <sup>c</sup>
	LR	6.8 <sup>a</sup>	5.8 <sup>b</sup>	5.1 <sup>b</sup>	4.1 <sup>c</sup>
Green mass (t/ha)	HR	4.5 <sup>a</sup>	4.0 <sup>b</sup>	3.5 <sup>c</sup>	3.1 <sup>d</sup>
	LR	4.3 <sup>a</sup>	3.3 <sup>b</sup>	2.7 <sup>c</sup>	2.0 <sup>d</sup>
Stem:Leaf	HR	0.6 <sup>c</sup>	0.7 <sup>c</sup>	1.0 <sup>b</sup>	1.2 <sup>a</sup>
	LR	0.6 <sup>d</sup>	0.9 <sup>c</sup>	1.4 <sup>b</sup>	2.2 <sup>a</sup>
Leaf proportion (%)	HR	43.6 <sup>a</sup>	37.2 <sup>b</sup>	29.5 <sup>c</sup>	26.2 <sup>c</sup>
	LR	40.2 <sup>a</sup>	30.4 <sup>b</sup>	21.2 <sup>c</sup>	14.2 <sup>d</sup>
Sward height (cm)	HR	61.7 <sup>a</sup>	50.9 <sup>b</sup>	40.7 <sup>c</sup>	36.8 <sup>d</sup>
	LR	57.1 <sup>a</sup>	40.0 <sup>b</sup>	29.7 <sup>c</sup>	25.8 <sup>d</sup>

<sup>A,B</sup>Distinct letters in the same row differ at P < 0.05 by least square means. <sup>a,b</sup>Distinct letters in the same column differ at P < 0.05 by least square means

**Key Words:** Plant structure, *Panicum*, Residual mass

## Goat Species: Product Quality and Reproductive Performance of Goats

**W77 Comparison of quality characteristics of chevon and lamb.** K. R. Eega\*, J. H. Lee, G. Kannan, B. Kouakou, and W. R. Getz, *Fort Valley State University, Fort Valley, GA.*

Chevon (goat meat) has been reported to be inferior in palatability compared to other traditional red meats, although it has lower fat and healthier fatty acid profiles compared to lamb. The objective of this study was to determine whether the quality characteristics of chevon differ from those of lamb. Sheep (n = 16) and goats (n = 16) raised under similar situations were slaughtered using standard procedures. After 24 h of cooler storage (4°C), the carcasses were fabricated into primal cuts. Loin chops *Longissimus dorsi* were used for color (CIE L\* a\* b\*), Warner-Bratzler shear force values, cooking loss, percent metmyoglobin, and thiobarbituric acid reactive substances (TBARS) determination at 24 h postmortem. The chops were placed on aluminum pans and covered with aluminum foil, cooked in a convection oven to an internal temperature on 71 °C, cooled at 2 °C for 24 h, and then 1 cm cores were removed for shear value determinations. Analysis of

**W76 Defoliation effects on root and rhizome development of kura clover.** B. W. Kim\*<sup>1</sup> and K. A. Albrecht<sup>2</sup>, <sup>1</sup>*Kangwon National University, Chunchon, Kangwon-Do, South-Korea,* <sup>2</sup>*University of Wisconsin, Madison.*

There is limited information on relationship between defoliation and root and rhizome development of kura clover (*Trifolium ambiguum* M. Bieb.). To determine the effects of defoliation severity on root and rhizome growth of young kura clover plant (seedling about 8 wk old), this research was conducted in 2002 (Experiment 1) and 2003 (Experiment 2) in a glasshouse on the University of Wisconsin-Madison. Four kura clover entries were used in this experiment: two were started from seed materials (ARS-2678 and 'Rhizo') and two were clones from mature, field grown Rhizo kura clover plant. Three defoliation frequencies (2-, 4- and 6-wk intervals) and two defoliation intensities (complete and partial defoliation) were imposed on each of the four kura clover entries. Root, rhizome, and leaf dry matter (DM) generally increased with less frequent defoliation, however, the increase in rhizome DM was not significant between 4- or 6-wk defoliation periods. The root and leaf DM under complete defoliation (CD) were significantly lower than under partial defoliation (PD). In Exp. 1, rhizome DM was not significantly different between CD and PD; it was significantly lower under CD in Exp. 2. ARS-2678 showed excellent root development characteristics, however, its rhizome DM was significantly lower than Rhizo clones. The rhizome development from Rhizo clones was greater than that from seed materials. If maximum root and rhizome growth are expected from young kura clover plant, the intensity and frequency of defoliation should be minimized or defoliation should be avoided.

**Key Words:** Kura clover, Defoliation, Rhizome

data as a Completely Randomized Design showed that Warner-Bratzler shear force values were significantly lower (P ≤ 0.01) in lamb chops compared with chevon chops. The mean (± SEM) shear values were 2.12 ± 0.21 and 1.3 ± 0.21 kg in chevon and lamb chops, respectively. The L\* values (lightness) were not different between chevon and lamb chops; however, a\* values (redness) of lamb chops were higher (P ≤ 0.01) compared with chevon chops. The mean (± SEM) a\* values were 12.2 ± 0.37 and 14.2 ± 0.37, respectively, in chevon and lamb chops. Percent metmyoglobin and TBARS were not different among the chops, indicating that levels of pigment and lipid oxidation were not different between lamb and chevon at 24 h postmortem. Cooking loss was also not influenced by species. The results indicate that lamb may have better tenderness properties compared with chevon, although several other quality characteristics studied were not different.

**Key Words:** Chevon, Lamb, Tenderness