The study showed that Brazilian dairies need improvement to attend the new milk quality standards. Research, extension and experience of other countries that have already passed through this process are important to guide the Brazilian dairy industry.

Key Words: Milk Quality, Regulation

W67 HACCP and GMP paper free management. B. M. de O. Ramos[1], R. Ramos[2], V. C. Oliveira[2], and L.H. da S. Miglioranza*[1], [1]*Universidade Estadual de Londrina*, *Londrina, Paraná, Brazil*, [2]*VRSys*, *Londrina, Paraná, Brazil*.

Our work presents a software for HACCP/GMP management in the milk industry. The aim was the development of a diagnostic instrument to assess the performance of those food quality tools, based on the paper free management concept. It is easy to deal with the software, not requiring advanced computer knowledge. The GMP management is quite difficult because there is subjective element in the evaluation. Rules and scores attributed involves different environment, proposal and goals. They must be adapted to any situation before and inside the industry, respecting the particular characteristics presented by any critical points in the milk production. Moreover, the conventional HACPP management generates great amounts of paper archives, records and reports, becoming a non practical and suitable work. In the proposed software, the subjective variables are transformed in objective variables that can be measured, plotted and graphically registered. The system identifies the objective variables and develop procedures appropriated to monitor them as basis for any evaluation of strategy implementation in the milk quality control. The program uses mechanisms of scoring, divided in three levels: low risk (0 - 3), medium risk (4 - 6) and high risk (7 - 10). The input data and all the added information are managed by the MySQL database. The system permits also a visual description and generates a computational formula for a resultant graphic. The report and the statistical data are modeled according to the manufacturer needs. There is also an automatic backup tool, and is available the update for the internet. As a final result, a higher assurance of milk quality can be obtained, by the comparisons of graphic results in time intervals.

Key Words: Objective Variables, Quality Control, Performance of Quality

Forages and Pastures: Feeding and Management

W68 A quick test for estimating added water or feeding adjustments for corn silage and haylage. R. Norell*[1], J. Packham[2], and S. Parkinson[3], [1]*University of Idaho*, *Idaho Falls*, [2]*University of Idaho*, *Paris*, [3]*University of Idaho*, *Preston*.

A critical quality control point in TMR management is to monitor dry matter content of ensiled forages. TMR feeders need to adjust feed loading amounts when forage dry matter declines. The objectives of this study were to: 1) develop regression equations for predicting added water and feeding adjustments using silage density measurements and 2) evaluate repeatability of density determinations. Samples from 6 haylages (mean DM = 43%) and 6 corn silages (mean DM = 32%) were collected from commercial dairies. Samples were split into five sub-samples and water was added (wt/wt) in the following water to silage ratios: 0/100; 10/90; 20/80; 30/70, and 40/60. Density was determined by weighing a shallow, flat container (volume =1.18 l), filling with silage, weighing in grams, and converting to density (g/l). Dry matter contents were obtained from Utah State University feed testing laboratory. Percent added water can be modeled with a quadratic equation using sample density minus initial density as the independent variable ($P<0.0001$, $R^2=0.92$). Feeding adjustment can also be modeled with a quadratic equation using sample density minus initial density as the independent variable ($P<0.0001$, $R^2=0.86$). Feeding adjustment (Y variable) was initial dry matter divided by test sample dry matter. Slopes and intercept did not differ ($P>0.4$) between haylage and corn silage for either model. Repeatability was assessed with 5 technicians measuring silage density 10 times each for 3 corn silages and 3 haylages. CV was below 6% in all 30 test combinations. Variation within forage differed between technicians ($P<0.05$) in 4 out of 6 forages. Two technicians consistently averaged higher densities. Density determinations at the farm level should be conducted by the same person or each tester should establish their respective initial density measurement. Accuracy would be improved by weighing 3 or more samples and calculating mean density. Measuring silage density is a quick, easy test for estimating added water or estimating required feeding adjustments for corn silage and haylage at the farm level.

Key Words: Dry Matter, Corn Silage, Haylage

W69 Nutritive value and proper level of mixed feeding of *Atriplex cancsens* and *Panicum antidotale* in Balouchi sheep. V. Kashki* and H. Tavakoli, *Agriculture and Natural Resources Research Center of Khorasan*, *Mashhad, Khorasan, Iran*.

Atriplex cancsens is one plant species that is widely used for range reclamation but it does not satisfy total animal requirements; therefore, in this experiment it was used as a complement with *Panicum antidutale*. *Panicum* was replaced by *Atriplex* at levels of 0, 25, 50, 75 and 100 percent of dry matter. Apparent digestibility of feeds (In vivo), digestible dry matter (DDM) digestible organic matter (DOM) digestible crude protein (DCP) digestible cell wall content (DNDF) and digestible gross energy (DE) were determined by using 20 male Balouchi lambs. Animals were randomly assigned to 5 groups and studied in a complete randomized design with 5 treatments. Data were analyzed using the GLM procedure of SAS. Chemical characteristics of species were measured with AOAC methods. Crude protein, cell wall content and gross energy for *Atriplex* were 13.72 %, 32.75 %, 16.43 %, 3720 (kcal/kg), for Panicum they were 12.2 %, 62.03 %, 29.17 % and 3845(kcal/kg) respectively. Results showed that there were significant differences in digestibility of dry matter (DM), organic matter (OM), crude protein (CP), cell wall content (NDF) and Energy between treatments ($P<0.05$). Treatment with 75% *Atriplex* and 25% *Panicum* had greatest in DDM and DOM. Dry matter intake, water daily intake, urine daily excretion, rumen N-NH3 and rumen liquid pH were significant between treatments ($P<0.05$). There was no significant difference between blood glucose and sheep live weight changes. Mixed consumption of *Atriplex* and *Panicum* in the ratio of 50:50 increased dry matter intake relative to other treatments in sheep.

Table 1. Apparent nutrient digestibility of plants in sheep

A.ca/P.an	Treatment	DDM (%)	DOM (%)	DCP (%)	DNDF (%)	DE (%)
0:100	1	34.39^{d}	40.25^{c}	63.70^{b}	43.76^{bc}	29.73^{b}
25:75	2	45.46^{c}	46.59^{b}	70.76^{b}	43.33^{bc}	39.59^{b}
50:50	3	52.54^{b}	50.61^{ab}	84.97^{a}	48.25^{b}	46.92^{b}
75:25	4	57.99^{a}	54.47^{a}	86.63^{a}	57.21^{a}	53.97^{a}
100:0	5	56.43^{a}	49.10^{a}	91.79^{a}	40.39^{a}	52.49^{a}
SE		1.139	1.487	2.884	2.265	1.279
P		0.0001	0.0001	0.0001	0.0011	0.0001

Means in columns within a category with unlike superscripts differ significantly ($p<0.05$).

Key Words: Atriplex Cancsens, Panicume Antidotale, Balouchi Sheep

W70 Glyphosate spraying on forage accumulation and quality of a range of the Flooding Pampa (Argentina). M. J. Arzadun* and S. A. Mestelan, *Facultad Agronomia UNCPBA*, *Azul, Pcia. Buenos Aires, Argentina.*

Spraying glyphosate at the end of summer is a practice used to improve winter forage of some rangelands of Argentina to enhance the production of *Lolium multiflorum L.* developing from a natural seed bank. Nevertheless, the effect of this practice on forage accumulation and quality has not been evaluated. A 2-yr experiment evaluated the effects of glyphosate application (G) vs intense defoliation (D), applied at late summer in a randomized complete block design, with 4 replications, on a 250 m^2 area. Forage was evaluated on 3 clipping dates: June, October and December (produced in autumn, winter and spring, respectively). The components warm season grasses (WSG), cool season grasses (CSG), and legumes, were estimated by hand separation and samples of whole plots were analyzed for IVDMD and CP. Due to significant interactions between factors, results were analyzed for each clipping date. Accumulated DM in G was higher in autumn and winter, but lower in spring. CSG yields were higher in G for the 3 cuts in both years, but WSG decreased in winter and spring ($P < 0.05$). Legumes (mainly Lotus glaber L) were eliminated in G, but for D reached they 51% in December 2003. CP levels in G trend to be lower than in D probably due to the legume contribution and IVDMD was higher in G in June and October 2003. G improved quality during autumn and winter but was not effective to increase forage accumulation. The subsequent decrease in forage accumulation and quality, nevertheless, suggests a limited application of this practice.

Forage accumulation and quality in three periods after the treatments

		2002			2003		
		June	October	December	June	October	December
CP,							
% of DM	D	8.05	9.85	8.30	12.80	17.30	11.60
	P <	NS	0.033	NS	NS	0.096	0.080
	G	71.1	77.0	69.9	81.6	82.2	68.1
IVDMD,							
% of DM	D	64.0	73.5	68.8	79.2	79.3	71.9
	P <	0.092	0.082	NS	0.026	NS	NS
	G	71.1	77.0	69.9	81.6	82.2	68.1

Key Words: Rangeland, Glyphosate, Forage Production

W71 Afternoon harvest and greater ruminal degradability of supplemental protein interact to increase digestibility and voluntary intake of switchgrass (SG) hay fed to beef steers. G. Huntington*[1] and J. Burns[1,2], [1]*North Carolina State University*, *Raleigh*, [2]*USDA-ARS*, *Raleigh, NC*.

The objective was to interact AM (0600) vs PM (1800) harvest with ruminal degradability (HI or LO) of a protein supplement to change voluntary intake, apparent digestibility or N retention by steers fed SG (*Panicum virgatum L.* var. Alamo) hay. Black steers (255 ± 14kg BW) were blocked by BW, then randomly assigned (5 steers each) to AM /HI, PM /HI, AM /LO, or PM /LO. Steers were group-housed in covered, outdoor pens with individual feeding gates. After adaptation to the facility and 14 d standardization, ad libitum hay intake was measured for 21d (7-d adjustment and 14-d intake estimate) followed by a 5-d digestion trial in individual crates. Steers were fed 767 (LO) or 825 (HI) g/d supplement to provide 268 g CP/d. One steer in PM/HI was removed from the study. Concentrations are g/kg DM, and digestibilities are g/100g intake. Compared to AM, PM had greater DM concentrations of total nonstructural carbohydrate (TNC, 75 vs 60), and lower concentrations of NDF (760 vs 770), ADF (418 vs 427), and CP (55.6 vs. 58.6). Protein fractions A, B2, and B3 were similar for AM and PM, but HI contained more g/kg protein of A (694 vs 296) and less B2 fraction (174 vs 554) than LO. Harvest interacted with supplement to increase ($P < 0.07$) ad libitum digestible DM intake (kg/100kg BW) for steers fed PM/HI (1.14) than for steers fed PM/LO (1.02), but no difference for steers for AM/LO or AM/HI (1.07). Similarly, NDF ($P < 0.09$) and ADF ($P < 0.03$) digestibilities were greater for PM/HI (59.1, 59.7) than for PM/LO (57.5, 57.3), but greater for AM/LO (57.0, 57.5) than for AM/HI (55.5, 55.7). Digestibility of DM (59.4 vs 57.1), and N (65.1 vs 63.2) was greater ($P < 0.03$) for PM than AM. Digestibility of N was greater ($P < 0.02$) for HI (65.2) vs LO (63.1). Treatments did not affect hay intake (3.93 kg/d), N retained (15.8 g/d) or serum urea-N (5.25 mM). Increased TNC was not sufficient by itself to increase voluntary intake, but increased protein degradability interacted with PM harvest to increase ruminal fiber digestion and voluntary intake of beef steers.

Key Words: Switchgrass, Protein Supplement, Beef Steers

W72 Effects of eugenol, terpin-4-ol, α-terpineol, and methyl eugenol on consumption of alfalfa pellets by sheep. R. Estell*[1], E. Fredrickson[1], D. Anderson[1], and M. Remmenga[2], [1]*USDA ARS Jornada Experimental Range*, *Las Cruces, NM*, [2]*New Mexico State University*, *Las Cruces*.

Secondary compounds present in shrubs on rangelands in the western United States are often aversive to livestock. However, effects of many of these compounds on intake have not been individually tested. Four experiments were conducted to examine effects of individual terpenes on alfalfa pellet intake by lambs. Forty-five lambs (9 lambs/treatment) were individually fed alfalfa pellets sprayed with either eugenol, terpin-4-ol, α-terpineol, or methyl eugenol at one of five concentrations in an ethanol carrier. Treatments (0, 0.5, 1, 2, and 10X) were multiples of the concentration (X) of a specific terpene on the leaf surface of *Flourensia cernua*. Terpenes were applied to alfalfa pellets (0.64 kg $lamb^{-1}$ d^{-1}, DM basis), and consumption was measured during a 20-min interval for 5 d. Lambs were adapted to handling and individual pen feeding for 10 d and were maintained and fed alfalfa pellets in one group (except during 20-min tests) at a mean total daily intake of 3.9% of BW (DM basis). A day effect ($P < 0.0001$) was detected for intakes in all four experiments, but no day x treatment interactions were observed ($P > 0.05$). The day effect was generally due to lower intake of alfalfa pellets on day 1, except for the methyl eugenol experiment, in which lambs consumed more pellets on day 1. No treatment effects were observed ($P > 0.05$) for any of the four chemicals tested; thus, none of these chemicals were strongly related to intake of alfalfa pellets by lambs under the conditions of this study.

Key Words: Herbivory, Intake, Terpene

W73 Conserved whole-crop wheat and forage maize feeding value relative to grass silage and *adlibitum* concentrates for beef cattle. K. Walsh*[1,2], P. O'Kiely[1], and F. O'Mara[2], [1]*Teagasc, Grange Research Centre*, *Dunsany, Co. Meath, Ireland*, [2]*University College Dublin*, *Belfield, Dublin, Ireland*.

Seventy beef steers, mean initial BW 424 (s.d. 33.0) kg, were blocked for liveweight and breed and allocated to one of 5 dietary treatments in a randomized complete block design. Treatments were grass silage (GS), maize silage (MS), fermented whole-crop wheat (FWCW), whole-crop wheat alkalage (ALK) and *ad libitum* concentrates (ALC). The GS was produced from a permanent temperate sward. The ALK grain was cracked and ensiled with a urea plus urease based additive. Forages were individually offered *ad libitum* and were supplemented with 3kg concentrates/steer/day throughout the 160-day trial. The mean DM (g/kg) of GS, MS, FWCW and ALK was 161, 303, 391 and 705 respectively. Ad-libitum concentrate composition was 830g rolled barley, 100g soya-bean meal, 50g molasses and 20g minerals & vitamins /kg and the concentrate supplement was 650g rolled barley, 280g soya-bean meal, 50g molasses and 20g minerals & vitamins /kg. The model for analysis of variance accounted for diet and block. Total DM intake and carcass growth were lowest for GS ($p<0.001$). Relative to ALC, GS, FWCW and ALK had a poorer ($p<0.05$) FCE (Feed Conversion Efficiency), lower BW ($p<0.05$) and carcass weight gains and a lower dressing percentage ($P<0.05$). The FCE of MS was better than the ALK ($p<0.001$) or the FWCW ($p<0.05$). Forage maize and whole crop wheat silages supported superior levels of growth by cattle compared to grass silage (IVDMD 698g/kg). There was no animal productivity advantage with alkalage compared to fermented whole-crop wheat. High quality forage maize or whole crop wheat can give superior levels of animal production compared to grass silage.

	GS	MS	FWCW	ALK	ALC	s.e.m.
Forage DM intake (kg/d)	4.54[a]	6.75[b]	7.07[b]	7.56[c]	0.95[d]	0.166
Total DM intake (kg/d)	7.07[a]	9.27[c]	9.59[bc]	10.06[bd]	9.86[b]	0.194
Liveweight gain (g/d)	802[a]	1200[bc]	1149[c]	1132[c]	1302[b]	48.3
Carcass gain (g/d)	479[a]	776[bc]	723[cd]	686[d]	851[b]	30.9
Carcass weight (kg)	290[a]	335[bc]	329[c]	321[c]	348[b]	5.2
FCE[1]	15.2[a]	12.1[b]	13.5[c]	14.8[ac]	11.9[b]	0.5

[1] (Feed Conversion Efficiency - kg DM intake/kg carcass gain), Within row, means with the same superscripts are not significantly different (p>0.05)

Key Words: Cattle, Maize, Whole-Crop Wheat

W74 Cool-season grasses for dry cow forage. J. H. Cherney* and D. J. R. Cherney, *Cornell University*, *Ithaca, NY*.

Relatively low potassium (K) concentration in non-lactating dairy cow diets is critical to animal health. Species selection, fertilization and harvest management can have a major impact on forage K concentration. Our objective was to evaluate five grass species for forage nutritive value and yield under two-harvest management and differing availability of soil K. Three K fertilizer treatments were applied to reed canarygrass (*Phalaris arundinaceae* L.), timothy (*Phleum Pratense* L.), orchardgrass (*Dactylis glomerata* L.), smooth bromegrass (*Bromus inermis* L.), and tall fescue (*Festuca arundinacea* L.) for six years on a Williamson silt loam (coarse-silty, mixed, active, mesic Typic Fragiudepts) soil type in Ithaca, NY. All grass species persisted through the completion of the experiment, without visible K deficiency symptoms. Yield of DM was significantly ($P < 0.05$) higher (5.6% higher) under split application of K fertilizer than the 0 K fertilizer treatment. Annual K uptake was increased 17.2% with split application of K fertilizer, although apparent recovery of K averaged less than 20%. Forage quality was not greatly impacted by K fertilization, although the K concentration of forage increased by 12% due to K fertilization. Fertilization with K tended to reduce the forage concentration of P, Ca, Mg, Bo and Na. Application of K fertilizer to 0 K fertilizer plots at the conclusion of the experiment overcame any negative effects on DM yield due to prolonged absence of K fertilization. It was possible to achieve low forage K concentrations in cool-season grasses and maintain stand persistence, with lowest forage K concentrations in timothy.

K concentration of forage, g/kg Dry Matter

Grass species	Spring	Fall
Timothy	14.5d	9.11c
Orchardgrass	15.9bc	14.1a
Reed canarygrass	16.3b	10.7b
Smooth bromegrass	17.8a	11.7b
Tall fescue	15.1cd	13.2a
SED	0.54	0.55
K fertilizer rate (kg K/ha, annually)		
0	14.7c	10.9b
112	16.3b	12.4a
112 split-applied	16.8a	12.0a
SED	0.23	0.30

Means followed by different letters within a column differ. SED=standard error of the difference.

Key Words: Potassium, Dry-Cow, Perennial Grasses

W75 Effects of winter stocker growth rate and finishing diet on beef longissimus vitamin and mineral composition. R. N. Sonon, Jr.*[1], S. K. Duckett[1], J. Neel[2], S. Sellappan[1], J. Fontenot[3], and W. Clapham[2], [1]*University of Georgia*, *Athens*, [2]*USDA-ARS*, *Beaver, WV*, [3]*Virginia Polytechnic Institute and State University*, *Blacksburg*.

Longissimus muscle (LM) of Angus-cross steers (n=68, year 1; n=63, year 2) was assayed to determine the effects of winter stocker growth rate (LOW, MED, or HIGH) and finishing diet (corn silage-concentrate, CONC or pasture, PAST) on the fat-soluble vitamins (retinol, â-carotene and á-tocopherol), water-soluble vitamins (thiamine and riboflavin), and mineral (Ca, Mg, K, Zn and Fe) content of this tissue. Retinol content of LM did not differ between years (P = 0.132), stocker growth rates (P = 0.727) and finishing diets (P = 0.286). However, β-carotene content of LM was higher (P < 0.01) in year 2 whereas, α-tocopherol content was greater (P = 0.033) in the LM from year 1. The LM of PAST had about 1.4 and 3.3 times greater (P < 0.01) β-carotene and α-tocopherol contents, respectively than that of CONC. A year by growth rate by finishing diet interaction occurred for LM thiamine content (P = 0.060). In year 1, thiamine content was greater (P < 0.05) for MED than LOW finished on CONC and greater (P < 0.05) for HIGH than MED or LOW among PAST steers with no observed differences between stocker growth rates in year 2. Regardless of year, thiamine content was about 105% greater (P < 0.05) for PAST than CONC. Riboflavin content of LM from PAST was 193% greater (P < 0.01) than that of CONC. Mineral composition of LM varied between years (P < 0.05) with year 1 showing higher content for Ca whereas, year 2 exhibiting greater contents for Mg, Zn, and Fe. PAST LM Ca content was greater (P < 0.01) compared with that of CONC (7.89 vs 5.72 mg/100 g tissue) with LM Mg content showing a similar trend (P = 0.076). On LM K content, PAST was greater (P < 0.01) than CONC when steers were grown at HIGH but no differences between diets were observed from those grown at LOW and MED. PAST appears to support greater storage of β-carotene, α-tocopherol, thiamine and riboflavin, and Ca and Mg in beef longissimus tissue.

Key Words: Stocker Growth Rate, Finishing Diet, Vitamins and Minerals

W76 Near infrared (NIRS) analysis of forages: challenges and opportunities in the application of the Dairy NRC 2001. P. Berzaghi*[1], N. P. Martin[2], and D. J. Undersander[3], [1]*University of Padova*, *Italy*, [2]*Dairy Forage Research Center USDA-ARS*, *Madison, WI*, [3]*University of Wisconsin*, *Madison*.

The Dairy NRC 2001 has created a demand for new analytical assays, some relatively simple others like NDF digestibility requires sources of ruminal fluid not available in the vast majority of commercial labs. The NIRS Consortium has been providing calibration equations for forage prediction used in several laboratories, with performances (standard error of cross validation and R^2) that averaged across forages 1.0%, 0.89 for Ash, 0.7%, 0.95 for CP, 0.2%, 0.86 for fat, 2.2%, 0.94 for NDF and 1.8%, 0.91 for ADF. Commercial laboratories using NIRS calibrations can return accurate predictions to farmers within one day. The need to determine in vitro digestible NDF (dNDF) after 48 hour of incubation, used in the summative equation of the Dairy NRC has been a challenge for labs using NIRS. The lack of standardized in vitro methods across commercial and research laboratories creates confusion. The development of calibrations for digestible NDF using a reference method coming from a single laboratory creates the opportunity to reduce differences in results coming from different labs. However, the development of such a calibration equation has been a challenge. The NIRS Consortium calibrations performance for dNDF has on average a 2.4 % standard error of cross validation and $R^2 = 0.84$. The performance of calibration on NDF digestibility (NDFD), however has been disappointing, standard error of cross validation around 5% and R^2 below 0.4. Analysing data from 70 samples of corn silage with quadruplicate runs per sample has shown that standard deviation among replicates for NDFD was more than double that of dNDF (2.04 vs 0.94 %), partially explaining the lower NIRS performances on NDFD. Despite the lower accuracy compared to reference methods and in particular with in vitro techniques, NIRS can provide timely responses which combined with frequent testing can help farmers and nutritionists manage continuous changes in forage quality.

Key Words: NIRS, NDF Digestibility, Forage Quality

W77 Effect of level oil supplementation and carcass cooling temperature on beef tenderness of pasture-finished steers. E. Pavan*[1,2] and S. Duckett[1], [1]*University of Georgia*, *Athens*, [2]*Instituto Nacional de Tecnología Agropecuaria*, *Balcarce, Bs. As., Argentina.*

Eighteen Angus steers grazing a tall fescue pasture were randomly assigned to three levels of corn oil supplementation (LO: 0, 0.075 and 0.15% BW) and slaughtered after 117 d of grazing. For the first 12 h postmortem, the left side of each carcass was hung in a 2.2°C cooler with forced air circulation (LOW); whereas the right side was hung in a 2.2°C cooler with no air circulation (HIGH). HIGH sides were moved into the -2.2°C after 12 h. LM temperature and pH were evaluated during the first 24 h in both sides. Steaks were removed from LM and aged for 1, 3, 7, 14 or 28 d to evaluate tenderness, sarcomere length, free calcium and troponin-T degradation. Data were analyzed as a split-plot design using LO as whole-plot and cooler temperature (CT) as sub-plot, and repeated measures used for time effects. Temperature of the LM was influenced ($P < 0.01$) by CT; however LO did not alter temperature decline even though differences in carcass s.c. fat levels were observed. Ultimate pH was reached faster in 0.075 and 0.15 than in 0 ($P = 0.10$). Free calcium concentration and troponin-T degradation increased ($P<0.01$) with postmortem aging, but did not differ ($P > 0.10$) by CT. Oil supplementation had no effect ($P > 0.10$) on free calcium concentration, but decreased ($P = 0.02$) troponin-T degradation ($P < 0.01$). The effect of aging on initial ($P < 0.01$) and overall ($P = 0.03$) sensory tenderness or on Warner-Bratzler shear force values (WBS; $P=0.09$) varied with LO. Aging 28 d instead of 7 d increased ($P < 0.05$) initial and overall sensory tenderness in 0 and 0.15, but not ($P > 0.05$) in 0.075. These results show that oil supplementation of pasture finished steers alters the rate of postmortem aging. Cooler temperature alters temperature decline in LM but did not influence tenderness or interact with LO supplementation.

Key Words: Beef, Forage, Tenderness

W78 Effect of feeding eastern gamagrass on growth of meat goats. A. Faucette*, J. Bartlett, and E. Rhoden, *Tuskegee University*, *Tuskegee, AL.*

Eastern gamagrass (*Tripsacum dactyloides* L.) is a warm-season forage grass which has high energy and moderate crude protein. Bermuda grass (*Cynodon dactylon* L.) is a common forage in the South and is used as a standard for measuring the quality of other grasses. Goat production is becoming an important source of income on small-scale farms in the southeast. Coupled with this fact, there is limited research on the performance of goats fed eastern gamagrass. Therefore, the objective of this study was to evaluate weight gain, feed intake and carcass weight of meat goats fed eastern gamagrass (EGG) and Bermuda grass (BG). The study utilized 24 Boer cross goats (4-5 months old), housed in individual pens and fed one of four dietary treatments: 80:20 (A); 70:30 (B); and 60:40 (C) (EGG: concentrate); and 60:40 (D) (BG: concentrate) for 12 weeks. Forages were 12.38% CP and 50.31% TDN (BG) and 12.63% CP and 52.66% TDN (EGG). Concentrate was Sweet Stuff™ containing 12% Cp and 36.5% TDN. Water and mineral blocks were provided. Goats were fed at 5% of their body weight. Feed intake and refusals were monitored daily and feed offered was adjusted on a weekly basis. Body weights were recorded weekly after an overnight fast. Animals were slaughtered at the end of 12 weeks and hot and cold carcass weights recorded. Average daily intake did not differ significantly among the diets with 1020.2 g, 1178.3 g, 1112.6 g, and 1196.1 g for diets A, B, C, and D, respectively. There were no significant differences in overall weight gain among the diets. Animals fed diet C had the highest average daily gain of 94.71 g/day while the animals on diet B had the lowest (64.97 g/day). Gain: feed was 0.068, 0.055, 0.085 and 0.056 for diets A, B, C, and D, respectively. There was no significant difference in either hot or cold carcass weights among animals fed the various diets. However, the percent shrinkage was minimal for the various diets ranging from 0.26% for diet D to 1.45% for diet C. Eastern gamagrass compares well with BG and shows significant potential as a high quality feed for goats.

Key Words: Eastern Gamagrass, Bermuda Grass, Goats

W79 Enhancing conjugated linoleic acids (CLA) and omega-3 fatty acids in milk from cows fed green chopped forage. T. R. Dhiman*[1], S. A. Hagos[1], J. L. Walters[1], and S. Tamminga[2], [1]*Utah State University*, *Logan*, [2]*Wageningen University*, *Wageningen, The Netherlands*.

The objective of this research was to enhance the proportions of healthful fatty acids (FA), such as conjugated linoleic acid (CLA), *trans*-11 $C_{18:1}$ (trans vaccenic acid; TVA) and omega-3 FA, in milk from cows fed fresh green chopped alfalfa forage. Twenty Holstein dairy cows were randomly assigned to four treatments. The experimental design was completely randomized with five replicates. Experimental duration was 60 d. First 40 d were considered as an adaptation to the diets, and measurements were made during the last 20 d of the experiment. Cows in four treatments were fed 98% fresh green chopped alfalfa forage with either 2% calcium-salts of palm oil FA (Megalac®; CTL), 0.7% menhaden fish oil plus 1.3% Megalac®® (FO), 1.3% linseed oil plus 0.7% Megalac® (LO), or 0.7% fish oil plus 1.3% linseed oil (FLO) on DM basis. Daily feed intake and milk yield were recorded. Milk samples were collected from two consecutive a.m. and p.m. milkings every 4 d during the measurement period and analyzed for composition and FA profile. Dietary FA contents were 4.9, 5.1, 5.2, and 5.3% in CTL, FO, LO and FLO treatments, respectively. Daily feed intakes were: 22.7, 23.9, 23.3, 23.8 kg/d and total FA intakes were: 1.18^{b}, 1.27^{a}, 1.28^{a}, 1.35^{a} kg/d ($P < 0.01$) in CTL, FO, LO and FLO treatments, respectively. Cows produced 19.9, 20.7, 20.6, and 23.6 kg/d of energy corrected milk in CTL, FO, LO and FOL treatments, respectively. Milk fat and protein contents did not differ among treatments. The proportions of CLA were: 1.28^{c}, 1.67^{b}, 1.44^{bc}, and 2.07^{a} % and TVA was: 3.05^{c}, 3.83^{b}, 3.55^{b} and 4.83^{a} % in milk FA of CTL, FO, LO and FOL treatments, respectively. Supplementation of linseed oil (LO) increased the proportions of total omega-3 FA in milk compared to CTL. The ratio between omega-3:6 FA was 0.59^{b}, 0.78^{a}, 0.86^{a} and 0.89^{a} in CTL, FO, LO and FLO treatments, respectively. The results from this study suggest that CLA and TVA contents of milk from cows fed fresh green chopped alfalfa forage can be enhanced up to 60% by feeding 475 g/d of linseed oil plus menhaden fish oil at a 65:35 ratio without any negative effects on feed intake, milk yield or milk composition.

Key Words: Milk, Fatty Acid, Forage

Goat Species: Nutrition Grazing, and Forages

W80 Grazing behavior and energy expenditure by sheep and goats co-grazing grass/forb pastures at three stocking rates. G. Animut*[1,2], A. L. Goetsch[1], G. E. Aiken[3], R. Puchala[1], G. Detweiler[1], C. R. Krehbiel[2], R. C. Merkel[1], T. Sahlu[1], L. J. Dawson[4], and Z. B. Johnson[5], [1]*Langston University*, *Langston, OK*, [2]*Oklahoma State University*, *Stillwater*, [3]*USDA ARS Dale Bumpers Small Farms Research Center*, *Booneville, AR*, [4]*Oklahoma State University*, *Stillwater*, [5]*University of Arkansas*, *Fayetteville*.

This study examined the effects of stocking rate (SR) on grazing behavior and energy expenditure (EE) by growing sheep and goat wethers co-grazing grass/forb pastures. Grazing was for 16-wk periods in 2002 and 2003. Pastures consisted of various grasses, primarily bermudagrass and johnsongrass, and forbs such as ragweed. Sheep (Katahdin) and goats (≥ 75% Boer) averaged 21 ± 0.7 and 21 ± 0.5 kg initial BW, respectively, and were 4 to 5 mo of age when grazing began. Stocking rates were four (SR4), six, (SR6), and eight (SR8) animals per 0.4-ha pasture, with equal numbers of sheep and goats. The nine pastures (three/treatment) were divided into four paddocks that were rotationally grazed in 2-wk periods. In wk 3, 8, and 13 of both years, EE was determined for one goat and one sheep in each pasture via heart rate. Grazing behavior using IGER Grazing Behavior monitoring system units was measured over 24-h peri-