mushroom (FTWS), 4) Untreated date palm leaf (UDPL), 5) Mycelial treated date palm leaf (MTDPL), and 6) Fungal treated date palm leaf after the first harvesting of mushroom (FTDPL).Total tract digestibility of DM and OM of the MTDPL (34.7 & 37.2% respectively) were significantly (P<0.05) increased in comparison with the UTDPL (27.8 & 31.8% respectively). The OM digestibility of the MTWS (38.8 %) was also significantly (P<0.05) higher when compared to UTWS (32.7%).The digestibility of DM and OM of the FTDPL (26.5 and 30.0% respectively) were lower (P<0.05) than those of MTDPL, But were not significantly (P>0.05) different from those found in the UTDPL. However no significant difference(p>0.05) in digestibility of OM and DM was observed when FTWS was compared with MTWS.

Key Words: Pleurotus Florida, Wheat stubble, Date palm leaf

Ruminant Nutrition: Forage & Fiber

W228 Ingestive behavior of dairy goats and feedlot lambs fed sugar cane silage. C. Q. Mendes, I. Susin*, A. V. Pires, L. G. Nussio, R. C. Araujo, L. V. Gerage, and M. F. Ribeiro, *Escola Superior de Agricultura Luiz de Queiroz (ESALQ)/University of São Paulo (USP)*, *Piracicaba, São Paulo, Brazil.*

A high concentration of ethanol, present in sugar cane silage, may reduce voluntary feed intake affecting animal performance. Two trials were performed to evaluate the ingestive behavior of dairy goats and feedlot lambs fed diets based on fresh sugar cane or sugar cane silage. Thirty-nine Saanen goats (Trial 1) and thirty Santa Ines ram lambs (Trial 2) were assigned to a complete randomized block design. Animals were fed 50:50 (concentrate:roughage ratio) TMR rations. Roughage source was fresh chopped sugar cane (FSC), sugar cane silage without additive (SCS) or sugar cane silage treated with *Lactobacillus buchneri* (SCS+Lb, $5x10^4$ cfu/g wet basis), corresponding to the experimental treatments FSC, SCS and SCS+Lb, respectively. During the feeding trial two sessions of 24 h were used to determine feeding behavior where eating and ruminating times were observed and recorded every 5 minutes. The parameters calculated were: dry matter intake (DMI, kg/day), NDF intake (kg/day), total time (min/day) and rate (min/g DM and min/g NDF) of eating, ruminating and chewing. In Trial 1, DMI was higher (P<0.01) for goats fed FSC diet (2.77 kg/d) when compared to silage diets (2.12 and 2.23 kg/d for SCS and SCS+Lb, respectively). There were no differences on eating, ruminating and chewing times. Eating and chewing rates were similar among diets. However, rumination rate (min/g DM) was higher (P<0.05) for goats fed silage diets (0.18, 0.25 and 0.25 min/g DM for FSC, SCS and SCS+Lb, respectively). In Trial 2, there was no difference on DMI among diets. Lambs spent similar time for ruminating and chewing activities. However, eating rate (min/g NDF) was lower for SCS and SCS+Lb diet when compared to FSC diet (0.43, 0.29 and 0.29 min/g DM for FSC, SCS and SCS+Lb, respectively). Sugar cane silages reduce DMI and increase rumination rate of dairy goats and decrease eating rate (min/g NDF) of feedlot lambs.

Key Words: Ethanol, Hair sheep, Silage additives

W229 Effects of dietary fiber from forage of advanced maturity on performance of lactating goats. R. H. Branco[1], M. T. Rodrigues*[2], M. M. C. da Silva[2], C. A. F. Rodrigues[3], V. Viana[2], F. D. O. Morbi[2], R. da Silva Matos[2], and M. de Souza Duarte[2], [1]*Instituto de Zootecnia*, *Sertãozinho, São Paulo, Brasil*, [2]*Universidade Federal de Viçosa*, *Viçosa, Minas Gerais, Brasil*, [3]*Sadia*, *Concórdia, Santa Catarina, Brasil*.

Although the term quality is ambiguous when applied to the forage in ruminant nutrition it is highly correlated with intake and digestibility. Both chemical and physical changes occur in forage as a result of plant maturity affecting, as a consequence, the dynamics of digestion and passage of rumen digesta, resulting in filling effects, reduction of feed intake and decrease of milk production. The effect of the inclusion of neutral detergent fiber levels from forage (fNDF) with advanced maturity (86.24% NDF; 6.47% CP) was evaluated in goat diets. Feed intake, digestibility of dry matter and of nutrients, nitrogen balance, milk production, efficiency of use of metabolizable energy consumed (ME), and feeding behavior were used as dependent variables. Five dairy goats were assigned to a 5 x 5 Latin square design, using dietary fNDF levels of 20, 28, 35, 43 and 49% as independent variables. The intakes of dry matter (DMI), of nutrients, and of net energy (NEl) were reduced (p<.05) as fiber was added to ration. Conversely, intake of NDF increased (p<.01)suggesting ability for accommodation of fiber in the rumen despite the negative effect on intake. The fNDF level influenced (p<.05) the digestibility coefficients of dry matter, organic matter, crude protein and nonfibrous carbohydrates. Intake of nitrogen (g/day) was influenced in a quadratic manner with no effect on retained nitrogen. Quadratic effects were observed for the nitrogen excreted in the feces and urine, and a linear effect on nitrogen produced in the milk. No influence of fNDF levels was observed for milk constituents (fat, protein and lactose). A quadratic effect of fiber in diet was observed for milk yield with higher values obtained at 28% of fNDF. The levels of forage fiber studied did not influence values of efficiency of use of ME consumed for milk production. A variation on feeding behavior was noticed by increased time of rumination and mastication with a reduction on idle time as fiber from forage increase in diets.

Key Words: Dairy goats, Energy, Intake

W230 Influence of level of dietary forage fiber on intake and nutrient utilization of dairy goats. R. H. Branco*[1], M. T. Rodrigues[2], C. A. F. Rodrigues[2], M. M. C. da Silva[2], F. L. de Araújo[2], V. Viana[2], and V. R. Paiva[2], [1]*Instituto de Zootecnia*, *Sertãozinho, São Paulo, Brasil*, [2]*Universidade Feeral de Viçosa*, *Viçosa, Minas Gerais, Brasil*.

Forage is a major constituent in most ruminant diets and exerts an economic impact on diet formulation due to the fact of contributing to reduce cost of available energy. Tropical forages are known for presenting both high concentration of fiber and to undergo the process of lignification at early stages of development. As a consequence it is observed a significant reduction on feed intake caused by variation on kinetics of degradation and passage in the rumen determining the available energy for microbial growth and efficiency, affecting the host performance. The present study evaluated the effect of increasing levels of dietary fiber from forage (fNDF) on lactating goats by using Tifton hay (Cynodon spp.) as the forage source, containing 78.54% NDF and 11.44% CP. Five goats were assigned to a 5x5 Latin square design using the levels of 19, 27, 35, 42 and 48 % of fNDF as the independent variables. Intake of dry matter (DM), of crude protein (CP), ether extract (EE), non-fiber carbohydrate (NFC), total digestible nutrients (TDN), and net energy of lactation (NEL) altered (p<.05) by increasing levels of ration fNDF. Intake of NDF did not differ among

treatments as expressed as both kg/day or as a percentual of body weight, averaging 1.2% BW. Varying fNDF levels of diets did not influence apparent digestibility of DM, OM, NDF, CP and NFC (p>.05). A linear reduction was observed in milk yield as fiber level in ration was increased. Milk constituents did not alter by altering levels of fiber on ration. Similarly there was no influence of fDNF levels of diets on feeding behavior. The higher efficiency of using metabolizable energy consumed for milk yield was obtained by using 35% of fNDF.

Key Words: Forage, Goats, Fiber quality

W231 Evaluation of sorghum silage and grain with condensed tannin in the diet for ruminants. H. Carneiro*[1], S. Peregrino[2], and N. J. M. Matos[2], [1]*Empresa Brasileira de Pesquisa Agropecuária*, *Juiz de Fora, MG, Brazil*, [2]*Universidade Federal Rural do Rio de Janeiro*, *Soropédica, RJ, Brazil*.

Plant breeding programs have produced hybrids with increased grain content to improve silage production and quality. One of the biggest problems in sorghum silage production is its grain content. Since the sorghum plant is prone to bird attack, the amount of grain can fall in the silage, compromising its nutritional quality. To reduce this negative impact, researchers have been producing cultivars with content of condensed tannin, which can reduce the palatability to birds of the grain. However, condensed tannins in the forage are thought to cause either adverse or beneficial effects on nutrient use, health and production. The ideal concentration of CT in forage ranges from 20-40 g/kg DM, and at this level it may bind with dietary proteins during mastication and protect it from microbial attack in the rumen. Superior value of the tannin mentioned will perhaps reduce the nutritional value and the biological availability of the dietary protein intake. To verify the interference of condensed tannin in the nutritional quality of sorghum silage, Embrapa Corn and Sorghum Research Center has developed the genotype CMSXS114(CT) and CMSXS165(WCT) without tannin lines exclusively to evaluate the CT in nutritional quality of diet. A completely randomized design, with two treatments and nine replications were submitted to analysis of variance and the means were grouped by using Tukey`s test. Animals around 200 kg, were carry out during 90 days. There were no differences ($P<0.05$) WCT = 0.395 kg and 0.417 kg for CT, among feed intake and weight gain during the experiment. Since the interference of condensed tannin was not shown in the nutritional quality of the sorghum silage and sorghum grain, it is necessary to disseminate its use to obtain other genotypes for commercialization, based on the fact that the CT interact with silage proteins, could protecting them against the action of the microorganisms in the rumen that release them for absorption in the intestine. In the conclusions, these results show that condensed tannin does not affect in vivo the dry-matter intake and weight gain and can be fed to ruminants the same way as sorghum without condensed tannin.

Key Words: Sorghum, Silage, Grain

W232 Development of an on-farm system to determine pef value of as fed forages and TMR. K. W. Cotanch*[1], R. J. Grant[1], C. S. Ballard[1], J. W. Darrah[1], H. M. Dann[1], and T. Takano[2], [1]*William H. Miner Agricultural Research Institute*, *Chazy, NY*, [2]*Zen-Noh National Federation of Agricultural Co-operative Associations*, *Tokyo, Japan*.

Physically effective neutral detergent fiber (peNDF) is a valuable means of evaluating forage and ration (TMR) particle length to ensure proper rumen function and animal health. Forage peNDF values are critical inputs in some ration balancing programs such as CPM 3.0 to predict microbial protein output. As defined by Mertens (1997), peNDF of a feed is the product of the NDF content and its physical effectiveness factor (pef; percentage of feed particles ≥1.18-mm as determined by dry sieving). Currently there is no means of accurately determining pef on farm with as fed forages. A particle size separation box (Z-Box) had been developed for assessing particle distribution of forages, TMR, grain, and manure on farm. The objective of this study was to modify the Z-Box to predict pef of as fed forages. A series of sieves (9.53, 4.76, 3.18, 2.38 or 1.14-mm hole diameter) and sieving methods were evaluated across a range of forage types, particle lengths, DM contents and operators and compared to pef determined by dry sieving using a Ro-Tap Sieve Shaker (Ro-Tap). A vigorous, vertical shaking method using a sample size of 150 g divided into three separate shakes was found to accurately assess pef for a variety of forages and TMR. For corn silage (CS) and CS-based TMR (n=102), a 3.18-mm sieve resulted in pef values ranging from 91-109% of Ro-Tap pef (X) (Z-Box pef=1.0018X; R^2=0.79). For hay crop silage (HCS) (n=30) the 4.76-mm sieve resulted in pef values ranging from 92-105% of Ro-Tap pef (Z-Box pef=1.0002X; R^2=0.93). The Z-box pef was repeatable among operators evaluating CS (CV=1.05%) and HCS (CV=2.44%). Although further evaluation of the Z-Box across a wider range of forages and TMR is warranted, this tool appears to provide an accurate and repeatable assessment of pef on the farm.

Key Words: Physically effective NDF, Particle separation, Z-Box

W233 Effect of physically effective fiber on digestion and milk production of dairy cows fed diets containing barley or corn grains. W. Z. Yang* and K. A. Beauchemin, *Research Center, Agriculture and Agri-Food Canada*, *Lethbridge, AB, Canada*.

Two studies were conducted to determine the effects of physically effective (pe) NDF content of dairy cow diets on intake, digestibility and milk production with varying type of grains. Barley and corn grains were each used in separate feeding studies. Each study was designed as a replicated 4 x 4 Latin square using eight lactating dairy cows. Alfalfa silage, chopped short (5/16″) and long (3/4″), was the forage in both studies. In each study, four diets were formulated using the short and long silage combined with two forage:concentrate (F:C) ratios (35:65 or 60:40, DM basis), and TMR was offered ad libitum. The peNDF contents of the diets were determined using the Penn State Particle Separator with two sieves and a pan, and the NDF content of the diets. The peNDF contents ranged from 9.6 to 19.8% for barley diets, and from 10.7 to 17.5% for corn diets (DM basis). For diets containing barley, increasing peNDF of diets by increasing forage chop length did not affect ($P > 0.15$) DMI, milk yield or milk composition, but total tract NDF digestibility increased ($P < 0.05$) by 17%. In contrast, for diets containing corn, increased forage chop length had no effect ($P > 0.15$) on NDF digestion in the total tract, DMI, milk production or milk composition. Regardless of whether the diets contained barley or corn grains, increasing the peNDF content of the diet by increasing F:C ratio decreased ($P < 0.01$) DMI and milk yield by 10 and 7%, respectively, even though digestibility of NDF was increased ($P < 0.01$) by 21%. Increasing F:C ratio also reduced ($P < 0.01$) milk protein content (3.36 vs 3.14%) and milk protein yield (1.07 vs 0.94 kg/d), although milk fat content was increased (3.51 vs 3.83%; $P < 0.01$). The results suggest that increasing the peNDF content of the diet by increasing forage particle length or by increasing F:C ratio can improve total tract fiber digestion, but may not increase intake or milk production of cows in mid-lactation.

Key Words: Physically effective NDF, Grain source, Digestion

W234 Effects of feeding Roundup Ready® alfalfa on intake and milk production of dairy cows. D. K. Combs*[1] and G. F. Hartnell[2], [1]*University of Wisconsin*, *Madison*, [2]*Monsanto Company*, *St. Louis, MO*.

The objective of this experiment was to assess if feeding Roundup Ready® (RR) alfalfa (Medicago sativa) affects feed intake, milk composition or milk production of dairy cows. RR alfalfa is genetically modified to express the CP4 EPSPS protein, i.e., the same protein found in other widely-grown RR crop plants. The RR alfalfa was grown, harvested, baled and fed using practices typical for commercial dry hay and dairy production. Three commercially-available hay lots, each a different conventional cultivar, were fed as reference substances. The reference hays had been grown in the same region, season, and year as the RR alfalfa hay and all four lots had crude protein and neutral detergent fiber values of approximately 18% and 40% of dry matter (DM), respectively. Multiparous Holsteins (n=16) were fed diets containing RR or reference alfalfa hay (ca. 40% of diet DM). Diets were mixed daily and offered to each cow twice daily. Diets contained at least 15.7% CP, 29% NDF, 0.95% Ca, 0.39% P and met or exceeded National Research Council (2001) diet guidelines for CP, Ca, P, salt, and vitamins A, D and E for multiparous lactating dairy cattle producing 40.9 kg of 4% FCM per day. Cows were milked twice daily and two morning and two evening milk samples were collected each period and analyzed for fat, true protein, solids-not-fat (SNF), and lactose. The experiment was conducted as a replicated 4 x 4 Latin square. Periods were 28 d and feed intake, milk yield, and milk composition were summarized over the last 14 d of each period. Data were analyzed using the MIXED procedure in SAS, and reported as least squares means with standard errors. There were no significant treatment related effects (P>0.05) for milk yield (38.0 ± 2.0 kg/d), 4% FCM (34.7 ± 1.9 kg/d), milk fat percentage (3.44 ± 0.10 %), milk true protein percentage (2.98 ± 0.07 %), milk lactose (4.72 ± 0.07 %), SNF (8.52 ± 0.20 %), dry matter intake (24.4 ± 1.4 kg/d), and 4% FCM/DMI (1.42 ± 0.05). Milk production, milk composition, feed intake and feed efficiency were not different for lactating dairy cows fed RR and conventional alfalfa hays (P > 0.05).

Key Words: Dairy, Alfalfa, Forage

W235 Effects of supplying protein to primiparous beef heifers on forage intake and serum hormones and metabolites. J. L. Leupp*, G. P. Lardy, J. S. Caton, and M. L. Bauer, *North Dakota State University*, *Fargo*.

During last third of gestation, 35 primiparous Angus, Simmental, and Angus-crossbred heifers (526 ± 21 kg initial BW) were used in a completely randomized design to evaluate effects of supplying degradable intake protein (DIP) or undegradable intake protein (UIP) in diets based on low-quality grass hay (7.0% CP, DM basis). Heifers were assigned to one of four treatments and individually fed in Calan gates. Treatments were: negative control (CON; no supplement); positive control (POS; 100% beet pulp); DIP (77.6% beet pulp, 19.2% sunflower meal, and 3.2% urea); and UIP + DIP (UIP; 36.2% xylose-treated soybean meal, 30.8% beet pulp, 15.9% sunflower meal, 14.5% dried distillers grain, and 2.5% urea). Means were separated using orthogonal contrasts: CON vs. supplements, POS vs. DIP + UIP, and DIP vs. UIP. All treatments were balanced using the 1996 NRC computer model. Positive control, DIP, and UIP supplements provided similar NE_m (1.19 Mcal/kg$^{0.75}$) while DIP and UIP supplements provided similar DIP (0.10 g/kg$^{0.75}$). The UIP supplement provided 0.07 g/kg$^{0.75}$ of UIP. No differences were observed for OM, hay CP, NDF, or ADF intake ($P \geq 0.64$). By design, total CP intake (0.080 vs. 0.055 ± 0.011% of BW) tended to increase ($P = 0.06$) in supplemented heifers compared with CON. Protein supplemented heifers lost less ($P = 0.03$) weight than POS supplemented heifers (−38.8 vs. −15.5 ± 9.53 kg, respectively). Body condition score was not affected ($P \geq 0.15$) by treatment. Serum triiodothyronine and thyroxin were similar ($P \geq 0.61$) across treatments. Increased ($P < 0.001$) plasma urea N was observed with supplemented heifers compared with CON (3.51 vs. 2.30 ± 0.15 m*M*), DIP and UIP compared with POS (4.05 vs. 2.42 ± 0.15 m*M*), and UIP compared with DIP (4.56 vs. 3.54 ± 0.15 m*M*). Plasma NEFA concentration decreased (724 vs. 987 ± 85 μEq/L; $P = 0.01$) with supplemented heifers compared with CON heifers. Additional research is necessary to better understand DIP and UIP needs of primiparous beef heifers.

Key Words: Degradable intake protein, Primiparous heifers, Undegradable intake protein

W236 Fermentation, dry matter recovery, and aerobic stability of corn silage inoculated with *L. plantarum* or *L. buchneri*. V. Sewalt[1], A. Lamptey*[1], D. Sapienza[2], and D. Westerhaus[1], [1]*Kemin Industries*, *Des Moines, IA*, [2]*Sapienza Analytica*, *Slater, IA*.

The effect of different inoculants on corn silage fermentation and aerobic stability was assessed in small silos under environmentally controlled conditions (18°C, 45% relative humidity). *Lactobacillus plantarum* (Kem LAC® silage inoculant, Kemin Industries, Des Moines, Iowa - **LP**) and *L. buchneri* (Biotal Buchneri™ 500, Lallemand Animal Nutrition, Milwaukee, Wisconsin - **LB**) were each applied at recommended application rates and compared to control silage. Chopped whole plant corn was ensiled in 500-g vacuum-sealed bags or 15-kg airtight plastic cylinders. Quadruplicate silos were prepared for each treatment, silo type, and sampling time (n=4). Silo bags were sampled during a 28-d time course for pH and VFA; cylinders were opened at 49, 95, or 120 d to determine DM recovery, pH, VFA, and aerobic stability. Treatment effects at each opening were established by ANOVA and single-degree of freedom comparison. Aerobic stability was established by regression of time of air exposure on silage temperature with comparison of intercepts and slopes. **LP** inoculant resulted in lower pH, higher lactic acid, and higher lactic:acetic ratio (P<0.05) by d 4 than treatment with **LB** or control. The more rapid fermentation pattern with **LP** manifested itself in lower final pH, higher lactic:acetic ratio, and improved DM recovery (P<0.05) over **LB** when opening the larger silos. Upon exposure to air, **LP** treated silage maintained the lowest temperature, remaining at or below ambient temperature for 7-8 days, indicative of satisfactory aerobic stability. **LB** silage had a higher initial temperature than **LP** (P<0.05), but the rate of its temperature rise upon aerobic exposure was lower (P<0.05) than **LP** and control. Although aerobic stability is a widely acclaimed advantage of the heterofermentative *L. buchneri*, the homofermentative *L. plantarum* in this study resulted in a more rapid fermentation pattern, better DM recovery, and yet satisfactory aerobic stability.

Key Words: Corn silage, *Lactobacillus*, Aerobic stability

W237 Influence of a silage inoculant containing ferulate esterase producing *Lactobacillus buchneri* strain PTA6138 on aerobic stability and ruminal degradation of corn silage. V. L. Nsereko*, B. K. Smiley, G. H. Hettinger, A. J. Spielbauer, K. J. Forrester, B. R. Harman, E. K. Harman, and W. M. Rutherford, *Pioneer Hi-Bred Int.*, *Johnston, IA*.

Lactobacillus buchneri strain PTA6138 produces ferulate esterase (FE) and FE enhances enzymatic hydrolysis of plant fiber. Furthermore, *L. buchneri* inoculants improve aerobic stability of silage. First, we determined effects of our inoculant (X11C38) containing *L. buchneri* PTA6138 and *L. paracasei tolerans* PTA6135 on aerobic stability of whole plant corn silage (WPCS). Forage from four different hybrids (38.4, 32.1, 39.5, and 31.8 % DM) was harvested; each was ensiled with (X11C38; 1.2 x10^5cfu/g) or without inoculation, in quadruplicate laboratory silos (10 by 35cm) which were stored for 50 to 57d. Aerobic stability was determined by recording silage temp in a thermostable environment as described by Honig (1986; Das Wirtschaftseigene Futter. 21: 25-32.). Secondly, we investigated the influence of X11C38 on NDF digestibility (NDFD) of WPCS. Forage (DM, 33.7%) was harvested, treated as described above and ensiled in two separate 2-ton silos for 180 days. Silage samples were collected, dried and ground (6 mm). Fresh silage from each silo was fed to 3 ruminally cannulated steers in a cross-over experiment with 2 periods of 14d that included 10d for adaptation. The dried ground WPCS was incubated in situ in Dacron bags (50 micron pore size) for 48h in the rumens of all 6 steers in a split plot experiment with diet as the main plot and inoculation of in situ silage being the subplot. Inoculation with X11C38 extended the duration of aerobic stability for all 4 hybrids by 42 to 128h (P<0.05). Feeding inoculated silage did not influence 48h in situ NDFD (P=0.84) and no interaction between feeding and source of silage incubated in situ was detected (P=0.73). However, inoculation with X11C38 improved 48h in situ ruminal NDFD by 6.9% units (P=0.019). Inoculation of whole plant corn with X11C38 enhanced aerobic stability and NDFD of WPCS; NDFD was enhanced due to changes in the forage during ensiling.

Key Words: *Lactobacillus Buchneri*, NDFD, Ferulate esterase

W238 Influence of inoculating forage with ferulate esterase producing lactic acid bacteria on ensilage and ruminal degradation of fiber. V. L. Nsereko, B. K. Smiley*, W. M. Rutherford, A. J. Spielbauer, E. K. Harman, B. R. Harman, K. J. Forrester, and G. H. Hettinger, *Pioneer Hi-Bred Int.*, *Johnston, IA*.

Ferulic acid (FA) cross-links restrict enzymatic degradation of cell wall polysaccharides in grasses (*Graminaceae*). By releasing FA from cell wall arabinoxylans, microbial ferulate esterases (FE) increase the susceptibility of plant cell walls to further enzymatic hydrolysis and increase the nutritive value of the forage. Because some lactic acid bacteria (LAB) produce FE, we investigated the effect of inoculating forage with FE producing LAB at ensiling on ruminal NDF degradation (NDFD). Among the 10000 LAB screened, approximately 500 produced FE; 8 of these were studied in more detail. The inoculants were *Lactobacillus buchneri* PTA6138 and NRRL B-30866; *L. crispatus* NRRL B-30868, 30869 and 30870; *L. reuteri* NRRL B-30867, *L. brevis* NRRL B-30865 and an unidentified *Lactobacillus* strain NRRLB-30871. Perennial ryegrass (*Lolium perenne*) was harvested and ensiled with or without (control) inoculation with each individual LAB, in triplicate laboratory silos. After a 30d fermentation period, silages were analyzed for fermentation characteristics, and incubated in situ (6mm) in Dacron bags (50µ pore size) for 48h in the rumens of 3 ruminally fistulated steers adapted to a diet of grass silage. Ruminal residues were composited across steers but within silo. Results were analyzed by oneway ANOVA, with treatment means compared by Dunnett's test. Compared with uninoculated silage, inoculating with *L. buchneri* strains PTA6138 and NRRL B-30866 increased silage pH and acetate (P<0.05) and reduced lactate concentration (P<0.05). Inoculation with NRRLB-30871 reduced silage pH (P<0.05), but other LAB had no significant effect on fermentation. With the exception of NRRLB-30871, all inoculants improved (P<0.05) NDFD by 5 to 7 units (9 to 11%). We conclude that inoculating forage with FE producing LAB at ensiling can improve ruminal NDFD. Because FE producing *L. buchneri* enhanced acetate concentrations, which increases aerobic stability, some FE producing LAB should enhance both the conservation and feeding value of ensiled crops.

Key Words: Ferulate esterase, Silage inoculant, NDFD

W239 Monitoring the fate of red clover and Alfalfa proteins during wilting, drying, ensiling and ruminal fermentation. A. A. Sadeghi[1], P. Shawrang[2], and A. Nikkhah*[2], [1]*Islamic Azad University*, *Tehran, Iran*, [2]*Tehran University*, *Karaj, Iran*.

Effects of wilting, drying, and ensiling on protein degradation pattern in red clover (*Trifolium pratense* L.) and Alfalfa (*Medicago sativa* L.) were studied using sodium dodecyl sulphate-polyacrylamide gel electrophoresis (SDS-PAGE) technique. Red clover and Alfalfa were grown in field plots, clipped by hand (at the early bloom stage), and allotted to one of four treatments: wilting, semi-drying, drying and ensiling. Three 450-kg Holstein steers fitted with rumen fistulas were used for *in situ* incubations. Data were analysed using GLM proc of SAS (1996) as CRD design. The effective CP degradability values of red clover hay at rumen outflow rates of 0.02, 0.05 and 0.08/h were 791, 713 and 662 g/kg, and for Alfalfa hay were 827, 761 and 713 g/kg, respectively. Eight proteins were identified in the fresh samples of red clover and Alfalfa. We also found proteins with molecular weights of 18, 20, 25, 30, 38 and 42 kDa. From densitometrical scanning, in red clover and Alfalfa, total photosynthetic enzyme, RUBISCO (15 and 54 kDa) comprised 55 and 51% of total electrophoretically identified protein (TEIP) in the fresh sample, and the 54 kDa protein made up 12 and 14% of TEIP, respectively. Wilting had no effect (P>0.05) on the relative amounts of forage proteins. Drying for 140 h in laboratory bench resulted in a 35 to 50% loss (P<0.05) in the amount of individual proteins. The 25 and 30 kDa proteins were more (P<0.05) susceptible, but 15 and 54 kDa proteins were least (P<0.05) susceptible to hydrolysis during drying than were most other proteins. After 120 days ensiling, less than 35 and 15% of major proteins in fresh red clover and Alfalfa remained, respectively. Red clover proteins were less (P<0.05) susceptible to proteases than Alfalfa proteins during ensiling. All protein subunits of red clover and Alfalfa hay and silage were extremely susceptible to hydrolysis during ruminal exposure. SDS-PAGE technique and densitometrical scanning could monitor and detect minor differences in the amounts of individual proteins during drying, ensiling and ruminal fermentation.

Key Words: Red clover and Alfalfa, Ruminal degradability, Electrophoresis

W240 Effect of regrowth interval in spring and autumn on intake

and rumen fermentation in beef cattle offered zero-grazed grass. D. Owens*[1,2], M. McGee[1], and F. P. O'Mara[2], [1]*Teagasc, Grange Beef Research Centre*, *Dunsany, Co. Meath*, [2]*School of Agriculture, Food Science and Veterinary Medicine, University College Dublin*, *Belfield, Dublin 4, Ireland*.

Six ruminally fistulated Holstein-Friesian steers (initial BW 435 ± 13.0kg) were used in two, 2 (treatment) x 2 (17d period) crossover design experiments to examine the effects of regrowth interval (RI), of a predominantly perennial ryegrass sward in spring (Experiment 1) and autumn (Experiment 2) on intake and rumen fermentation characteristics. Regrowth intervals were 38 (long) and 28 (short) days in spring and 45 (long) and 35 (short) days in autumn. Experimental periods consisted of 6d diet adaptation and 11d sampling. Grass was harvested daily in the morning and stored at 4ºC prior to feeding. Grass was offered *ad libitum* at 08:30 h and 20:30 h until d 6 and at 0.95 *ad libitum* for the remainder of each period. Rumen fluid was collected on d 9 of each period at 0, 2, 4, 6, 8 and 10 h post morning feed, to assess rumen fermentation characteristics. Analysis of variance procedures were carried out on the data using the PROC GLM procedure of SAS 9.1. *In vitro* dry matter digestibility (DMD) (g/kg) and crude protein (CP) (g/kg DM) values were 849 and 99 for the long and 849 and 116 for the short RI in spring. Corresponding values in autumn were 826, 165, 819 and 191. Total dry matter intake and rumen pH did not differ ($p>0.05$) due to treatment in either experiment. There was no effect of RI on volatile fatty acid (VFA) concentrations with spring grass ($p>0.05$) whereas in autumn the short RI had higher ($p<0.01$) levels of valeric acid. Rumen ammonia levles were significantly higher for the short RI than the long RI for both spring and autumn grass. Results indicate that allowing grass to grow for an additional 10 days in spring and autumn has little effect on feed intake or rumen VFA proportions but lowers rumen ammonia levels, potentially reducing nitrogen excretion to the environment.

Key Words: Cattle, Rumen fermentation, Grass maturity

Sheep Species

W241 Small Ruminant Nutrition System: A computer model to develop feeding programs for sheep and goats. A. Cannas*[1], L. O. Tedeschi[2], and D. G. Fox[3], [1]*University of Sassari*, *Sassari, Italy*, [2]*Texas A & M University*, *College Station*, [3]*Cornell University*, *Ithaca, NY*.

A computer model to predict site specific nutrient requirements and feed biological values for sheep and goats was developed, based on the structure of the CNCPS for Sheep. This model, called Small Ruminant Nutrition System, uses animal factors (body weight, age, animal insulation, movement, milk production and composition, body reserves, mature weight, pregnancy) and environmental factors (current and previous temperature, wind, rainfall) to predict energy, protein, calcium and phosphorus requirements. Feed biological values are predicted based on carbohydrate and protein fractions and their digestion rates, forage, concentrate and liquid passage rates, microbial growth, and physically effective fiber. Dry matter intake is predicted separately for different sheep categories based on equations developed for sheep fed indoors and on pasture. Based on this information, the Small Ruminant Nutrition System predicts energy balance, which is used to predict body condition score and body weight variations in adult sheep and the amount of milk produced from mobilized body reserves in lactating sheep. In growing sheep, live weight gain, empty body gain, and the composition of the gain (fat, protein, water + minerals) are predicted based on the energy balance and on the relative size of the lambs. The Small Ruminant Nutrition System predicts rumen pH based on dietary effective fiber, rumen N and peptide balance, rumen and whole digestive tract digestibility of each nutrient, microbial and feed undegraded protein, metabolizable protein, and the energetic cost of urea production and excretion. Fecal and urinary excretions for each nutrient are predicted as well. Based on model evaluations, the Small Ruminant Nutrition System can be used to accurately predict growth, milk production, body condition score changes, and nutrient excretion in each unique production situation.

Key Words: Sheep, Goats, Nutrition model

W242 The effect of chicory, burr medic and safflower forages on milk fatty acid composition, especially conjugated linoleic acid cis9, trans11. A. Cabiddu*[1], M. Addis[1], M. Decandia[1], G. Piredda[1], S. Spada[1], M. Fiori[1], M. Sitzia[1], N. Fois[1], G. Molle[1], S. Landau[2], and A. Pirisi[1], [1]*Istituto Zootecnico e Caseario per la Sardegna*, *Olmedo, Italy*, [2]*Gilat Research Center*, *Mobile Post Negev 2, Israel*.

The aim of this study was to evaluate the effect of feeding fresh forages on the fatty acid composition of sheep milk, with special emphasis on the content of conjugated linoleic acid (CLA) and its precursors. Three forage species were compared during flowering phase: chicory (CH, Cichorium intybus), burr medic (BM, Medicago polymorpha) and safflower (SA, Carthamus tinctorius). Thirty-six mature Sarda ewes in late-lactation (157±4 DIM) were blocked into three homogeneous groups (CH, BM and SA) by milk yield (1930±60 ml) and body weight (49.6±0.9 kg) and randomly allocated to the three experimental paddocks. Each paddock was divided into two plots that were rotationally grazed (grazing period 14 d). Sward height and standing biomass were evaluated at the beginning and the end of each grazing period. The botanical and chemical composition of the herbage at the beginning and the end of the grazing period were evaluated. Individual milk yield and composition were measured fortnightly from 28 April to 4 June. Milk yield and milk protein were not influenced by forage species. Fat content was significantly lower for SA than the other forages (5.78% vs 6.37% and 6.75% for SA, CH and BM respectively, $P<0.05$). Milk fatty acid composition was affected by the forage species. CLA content (mg/g of fat) was significantly higher in milk from SA (20.69 vs 15.98 and 15.17 for SA, CH and BM respectively, $P<0.01$). CLA content significantly decreased at the end of the season ($P<0.01$) probably due to the decrease of linoleic and linolenic acid in the forages. On the basis of these results, we conclude that it is possible to manipulate the milk fatty acid composition and in particular to enhance the content of beneficial fatty acids by the use of appropriate fresh forage-based regimens.

Key Words: Pasture, Sheep milk, Conjugated linoleic acid