Forages and Pastures III

828 An electronic rising plate meter improves ability to accurately determine cool-season annual forage availability: I. Calibration. C. Moffet,* J. Rogers, and R. Reuter, *The Samuel Roberts Noble Foundation Inc., Agriculture Division.*

A key component of managing grazing enterprises and conducting grazing research is accurate and timely forage availability determination. Hand clipping quadrats is labor intensive, typically resulting in too few samples collected to accurately estimate paddock forage mass. An electronic rising plate meter (Jenquip ECO9, Feilding, New Zealand) can quickly produce immediate, objective estimates of forage availability. Our objective was to develop a set of equations to convert plate height to dry forage mass and determine the accuracy and precision of the plate meter estimated forage mass in cool-season annual forage. The plate meter was calibrated by observing the plate meter reading (settled plate-height, cm) centered on a 1,452 cm^2 quadrat and subsequently hand clipping the forage in the quadrat to ground level. Forage was bagged, weighed wet, dried for 72-h in a forced air oven at 50°C, and reweighed. Twenty such samples were collected on 14 to 28-d intervals (Oct 25, 2011 to Jan 19, 2012) at 2 locations (total data sets = 15, total samples n = 300). The data sets included measurements of wheat and rye, each grazed and ungrazed. Forage dry weight measured on individual quadrats (range 234 to 8,557 kg/ha) was regressed (PROC MIXED) on linear and quadratic centered plate height (plate height range 0 to 43 cm) with data set as a random effect. The analysis revealed that the quadratic term was not significant so it was removed. The random effects of data set tended to cluster into 2 groups that could be associated with time of year. Adding a season fixed effect with 2 levels, fall and spring (defined as before and after Jan 1, respectively) significantly improved the model fit. The equations were fall: 92.07 × plate height (cm) + 352 kg/ha, and spring: 154.82 × plate height (cm) + 699 kg/ha. The model had an r^2 of 81% in a simple linear regression with dummy variables for season. The limit of agreement was 0 ± 1,323 kg/ha at 95% confidence. This indicates that a single plate height is an unbiased estimator of forage mass that will be within 1,323 kg/ha of the clipped forage mass measurement 95% of the time. To reliably estimate mean forage mass in a paddock, several plate height measurements are needed.

Key Words: plate meter, forage mass

829 An electronic rising plate meter improves ability to accurately determine cool-season annual forage availability: II. Application. R. Reuter,* J. Rogers, and C. Moffet, *The Samuel Roberts Noble Foundation Inc., Agriculture Division.*

A key component of managing grazing enterprises and conducting grazing research is accurate and timely forage availability determination. An electronic rising plate meter (Jenquip ECO9, Feilding, New Zealand) can produce immediate estimates of forage availability quickly and objectively. The plate meter was calibrated (method described in a companion abstract), and the resulting equation had an r^2 of 81% in a simple linear regression. A single plate height forage mass estimate is imprecise but unbiased. Therefore, many plate height samples will improve the precision of the forage mass estimate in a paddock. Further, spatial variation of forage availability is a major component of the error of estimating forage mass. To characterize spatial variation, multiple plate heights were collected from random locations in paddocks in 2 data sets (data set 1: 90 plate heights in each of 10 paddocks of ungrazed wheat; data set 2: 60 plate heights in each of 12 paddocks of grazed rye). Coefficient of variation of plate heights within a paddock ranged from 23% to 45%. Confidence in the paddock estimates was increased by sampling more heights in each paddock and taking the means of forage mass estimates. For example, in an paddock with low estimated forage mass (1,043 kg/ha), collecting 5, 10, 30, or 60 random plate heights per paddock produced estimates of paddock forage mass with 95% confidence limits of 202, 142, 78, and 61 kg/ha, respectively. In an example paddock with high estimated forage mass (4,115 kg/ha), collecting 5, 10, 30, or 60 random plate heights per paddock produced estimates of paddock forage mass with 95% confidence limits of 792, 568, 356, and 226 kg/ha, respectively. Practitioners and researchers can use this relationship to optimize the number of plate height measurements for each enterprise or experiment.

Key Words: plate meter, forage mass

830 Evaluation of forage quality predictors in early- and late-maturing cultivars of annual ryegrass (*Lolium multiflorum* Lam.). W. B. Smith*[1,2], R. B. Muntifering[1], E. van Santen[2], S. L. Dillard[1], E. A. Guertal[2], and D. M. Ball[2,3], [1]*Dept of Animal Sciences, Auburn University, Auburn, AL,* [2]*Dept of Agronomy & Soils, Auburn University, Auburn, AL,* [3]*Alabama Cooperative Extension System, Auburn.*

Annual ryegrass (*Lolium multiflorum* Lam.) is a commonly utilized cool-season forage in the Southeast. Conventional laboratory predictors of forage quality (FQ) are based in large measure on the inverse relationship between cell wall constituents and digestibility with advancing forage maturity. However, total nonstructural carbohydrates (TNC) could have a more robust statistical relationship with digestibility than does fiber concentration in early-maturing cool-season annuals that exhibit significant growth with decreasing temperature and photoperiod. A field experiment was conducted to determine DM yield and FQ characteristics in an early-maturing Japanese (J) cultivar (Shiwasuaoba) and a conventional cultivar (Marshall; M) as influenced by planting date. Forty-eight plots were established at 2-wk planting-date (PD) intervals (8 plots/date) at the E.V. Smith Research Center in Tallassee, AL, from September through November 2008. The experimental design was a randomized complete block (n = 4) with split-plot restriction in which cultivars were subplots. Plots were harvested when forage canopy height reached 20 cm. Samples harvested from the first and second PD (PD1 and PD2, respectively) were analyzed for IVDMD and concentrations of NDF, ADF and TNC. Standard regression of TNC on IVDMD revealed adjusted r^2 values of 0.55, 0.18, 0.00 and 0.00 for M, and 0.00, 0.89, 0.19, and 0.00 for J from PD1 in successive regrowth harvests. For PD2, values for M were 0.00, 0.13, 0.79, and 0.00, and for J were 0.82, 0.70, 0.73, and 0.00. Standard regression of ADF on IVDMD from the same harvests revealed adjusted r^2 of 0.97, 0.59, 0.00, and 0.62 for M, and 0.00, 0.99, 0.99, and 0.85 for J from PD1. Harvests of M from PD2 had adjusted r^2 values of 0.39, 0.99, 0.80 and 0.76, and J had values of 0.91, 0.99, 0.95, and 0.00. Data are interpreted to mean that concentration of ADF was the superior predictor of forage quality across both cultivars and planting dates, but that concentration of TNC shows promise as a reliable predictor of FQ in early-season harvests of the early-maturing cultivar.

Key Words: annual ryegrass, total nonstructural carbohydrates, forage quality

831 Response of postpartum dairy cows to different grazing strategies: Effect of herbage allowance on milk and solids production. M. Sprunck[1,2], D. A. Mattiauda[1], G. Motta[1], M. Fajardo[1], and P. Chilibroste*[1], [1]*Facultad de Agronomía, Paysandú, Paysandú, Uruguay,* [2]*Agencia Nacional de Investigación e Innovación, Montevideo, Montevideo, Uruguay.*

The effect of contrasting herbage allowances on animal performance for early lactation Holstein dairy cows was under research. The experiment was carried out in autumn 2010 at the EEMAC, Research Station, Agronomy Faculty, Uruguay (30° S). Dairy cows (n = 36, LW = 572 ± 68 kg) were blocked by parity, expected calving date, LW and BCS, and randomly assigned to one of the following treatments: high (H: 14.5 kg DM day^{-1}/100 kg LW), medium (M: 9.6 kg DM day^{-1}/100 kg LW), and low (L: 8.3 kg DM day^{-1}/100 kg LW) herbage allowances (HA, n = 12 each). Grazed in individual plots of a 2nd year mix pasture (30% *Trifolium repens* and 70% *Festuca arundinacea*) between am and pm milking (7:30 to 14:30 h). After pm milking cows were supplemented with 8.5 kg DM of a TMR diet (CP = 171 ± 10 g/kg DM, NDF = 400 ± 20 g/kg DM). The chemical composition of herbage samples were: HHA (CP = 178 ± 34 g/kg DM, NDF = 449 ± 58 g/kg DM), MHA (CP = 170 ± 30 g/kg DM, NDF = 463 ± 62 g/kg DM) and LHA (CP = 169 ± 29 g/kg DM, NDF = 487 ± 69 g/kg DM). Dry matter intake from pasture was estimated with Diet Check approach (Heard, J. W. et al., 2004). The experimental design was randomized complete block. There were no significant differences in pasture DMI, but increased milk production and milk solids production (protein and fat, kg/cow/day) was observed for HHA and MHA treatment. This could be due to the lower NDF in the diet of these cows since herbage DMI did not differ between treatments. Increased of pasture allowance from low to medium and high herbage allowances per cow, increased milk solids production (protein and fat) resulting from a better quality of herbage intake.

Table 1. Measurements

Item	Herbage allowance			*P*-value
	Low	Med	High	
Milk (L/cow/day)	24.3	27.3	25.9	0.003
% Milk fat	3.74	3.62	3.8	0.137
% Milk protein	3.12	3.19	3.21	0.008
Milk fat (kg/cow/day)	0.902	0.993	0.985	0.039
Milk protein (kg/cow/day)	0.757	0.871	0.829	< 0.001
LW (kg)	551	549	540	0.681
Pasture DMI (kg/DM)	15.6	15.7	15.4	0.275

Key Words: early lactation, grazing, herbage allowance

832 The effects of time of allocation of a ryegrass-based pasture on animal performance, nitrogen utilization and grazing behavior from late-lactation dairy cows. R. E. Vibart,* D. Pacheco, K. Lowe, and B. A. Barrett, *AgResearch Ltd., Grasslands Research Centre, Palmerston North, New Zealand.*

The consumption of a more balanced fermentable carbon to nitrogen (N) ratio from herbage can potentially enhance herbage dry matter intake (HDMI), milk production, and N utilization by dairy cows, particularly those in late lactation. Eighty lactating cows (225 ± 3.3 DIM) were used to examine the effects of allocating a morning (0730 h, AM; 2 herds) vs. an afternoon (1530 h, PM; 2 herds) fresh pasture strip of a ryegrass (*Lolium perenne* L.)-based pasture on milk production, N utilization, and grazing behavior during 4 weeks in autumn (April, 2010). Cows grazed on the same pasture strip for a 24-h period, and were offered similar daily herbage DM allowance. Herbage composition differed among treatments. Herbage from the PM treatment had greater DM (22.7 vs. 19.9%; $P < 0.01$), organic matter (OM; 89.5 vs. 88.9%; $P < 0.01$) and water soluble carbohydrate concentrations (WSC; 10.9 vs. 7.6%; $P < 0.01$), primarily at the expense of crude protein (CP; 20.5 vs. 22.2%; $P < 0.01$) and neutral detergent fiber (NDF; 48.8 vs. 50.4%; $P < 0.05$). Estimates of HDMI did not differ among treatments; mean values (±SE) were 12.8 ± 0.64 kg/d. Although milk yield was similar among treatments, trends toward greater milk fat, milk protein, and milksolids (MS) yields were observed for cows on the PM treatment (684 vs. 627 g milk fat, 545 vs. 505 g milk protein, and 1228 vs. 1132 g MS/cow, respectively; $P < 0.10$). Estimates of urinary N excretion (g/d) did not differ among treatments; mean values (±SE) were 219.6 ± 6.9 g N/d. Initial HM available (kg DM/ha) and instantaneous HM disappearance rates (kg DM/ha and per h) did not differ among treatments, but fractional disappearance rates (0.56 vs. 0.74%/h for AM vs. PM treatments, respectively) differed among treatments ($P < 0.05$). Despite similar partitioning of N toward urine, given similar amounts of herbage allocation, a simple change in management practice such as allocating a fresh strip later in the day resulted in moderate increases in N captured in milk and MS yields in late-lactation dairy cows.

Key Words: grazing, herbage allocation, nitrogen utilization

833 Effect of stocking rate and cow lactation stage on nitrogen balance of grazing dairy cows considering two periods of supplementation at pasture. A. I. Roca-Fernandez,* D. Baez-Bernal, and A. Gonzalez-Rodriguez, *Agrarian Research Centre of Mabegondo, La Coruna, Galicia, Spain.*

To achieve high levels of efficiency from dairy systems is important to make the best use of nutrients for feeding cows by setting appropriate grazing management strategies on farms. For this, a balance between offer and demand has to be established at cow level. The aim of our study was to investigate the effect of stocking rate (SR), low (L, 3.9 cows/ha) vs. high (H, 5.2 cows/ha), and cow lactation stage (LS), early (E, 30 DIM) vs. middle (M, 135 DIM), on nitrogen (N) balance of grazing dairy cows. Seventy-two Holstein-Friesian cows were randomized in a block design with a 2 × 2 factorial arrangement of 4 treatments (LE, LM, HE, and HM). ΣN inputs (grass, silage, and concentrate) and ΣN outputs (milk and live weight) were evaluated in dairy cows grazing on rotationally perennial ryegrass-white clover swards. Two periods of supplementation at pasture, with (P1, March–April) vs. without (P2, May–August), were considered. Data were analyzed using PROC MIXED in SAS. Pasture and silage intake were higher ($P < 0.001$) in cows at the middle LS (15.9 ± 1.5 and 7.8 ± 0.8 kg of DM/cow per day) than in cows at the early LS (12.6 ± 0.2 and 6.2 ± 0.2 kg DM/cow per day) while concentrate intake was higher ($P < 0.001$) in cows at the early LS (4.1 ± 0.1 kg DM/cow per day) than in cows at the middle LS (1.5 ± 0.2 kg DM/cow per day). ΣN inputs were higher ($P < 0.001$) in cows at the early LS (189 ± 14 g N/cow per day) than in cows at the middle LS (163 ± 2 g N/cow per day). ΣN outputs were higher ($P < 0.001$) in cows at the early LS (121 ± 9 g N/cow per day) than in cows at the middle LS (105 ± 5 g N/cow per day). No differences were found between the 2 LS for N excretion. Supplements intake was higher ($P < 0.05$) in the high SR groups (10.4 ± 0.2 kg DM/cow per day) than in the low SR groups (9.2 ± 0.9 kg DM/cow per day). No differences were found between the 2 SR for ΣN inputs, ΣN outputs and N excretion. ΣN inputs were higher ($P < 0.001$) in the P1 (237 ± 8 g N/cow per day) than in the P2 (114 ± 19 g N/cow per day). ΣN outputs were higher ($P < 0.001$) in the P1 (140 ± 10 g N/cow per day) than in the P2 (86 ± 8 g N/cow per day). N excretion was higher ($P < 0.001$) in the P1 (479 ± 67 g N cow/

ha) than in the P2 (68 ± 24 g N cow ha-1). Increasing supplementation at pasture produced lower efficiency of N utilization by dairy cows.

Key Words: nitrogen efficiency, grazing dairy systems, supplements

834 Milk performance of two dairy cow genotypes (Holstein-Friesian vs. Normande) at two levels of supplementation (low vs. high) in long residence time grazing paddocks. A. I. Roca-Fernandez*[1,2], L. Delaby[3], S. Leurent[4], M. E. Lopez-Mosquera[2], and A. Gonzalez-Rodriguez[1], [1]*Agrarian Research Centre of Mabegondo, La Coruna, Galicia, Spain,* [2]*University of Santiago de Compostela, Lugo, Galicia, Spain,* [3]*INRA Agro-Campus Ouest UMRPL, Saint Gilles-Rennes, Bretagne, France,* [4]*INRA Experimental Farm Le Pin au Haras, Borculo-Exmes, Normandy, France.*

Grazing long residence time paddocks is a way to reduce management practices, fencing and labor in dairy farm conditions. Milk performance response of 2 dairy cow genotypes, Holstein-Friesian (H) vs. Normande (N), managed at 2 levels of concentrate supplementation at pasture, low (0 kg DM/cow per day) vs. high (4 kg DM/cow per day), was investigated during 9 years (2001–2009) at Le Pin au Haras (Normandy, France) experimental farm using the simplified rotational grazing system. Cows (n = 72) were randomly assigned in a block design with a 2 × 2 factorial arrangement of 4 grazing treatments (H0, H4, N0 and N4). Animals were rotationally grazing on 3 large paddocks (2.3 ha) with a mean residence time per paddock of 10 d. The aim of this research was to study the maximum of milk yield (MY max., at d 4) and the subsequent drop of milk (Dm, at d 10) reached in each long residence time grazing paddocks for both cow genotypes managed at both feeding regimens. Daily milk yield (MY) was recorded and every 10 d the MY max. and Dm were calculated. Data were analyzed using PROC MIXED in SAS. On average, milk production was higher ($P < 0.001$) in the Holstein-Friesian cows than in the Normande cows (7,452 ± 483 over 6,067 ± 358 kg/cow per year). The highest milk performance was reached by the H4 group (8,407 ± 285 kg/cow per year) and the lowest by the N0 group (5,401 ± 587 kg/cow per year) with the other 2 groups (H0, 6,497 ± 680 and N4, 6,733 ± 120 kg/cow per year) in between. Supplemented cows produced more milk ($P < 0.001$) than unsupplemented cows (7,570 ± 207 over 5,949 ± 634 kg/cow per year). The MY max. and Dm were higher ($P < 0.001$) in the Holstein-Friesian cows (25.5 ± 2.3 and −6.2 ± 0.6 kg/cow) than in the Normande cows (21.3 ± 1.6 and −4.7 ± 0.5 kg/cow). The group of cows feeding concentrate at pasture showed higher ($P < 0.001$) MY max. and lower ($P < 0.001$) Dm (25.6 ± 1.6 and −5.3 ± 0.2 kg/cow) than unsupplemented cows (21.2 ± 1.9 and −5.7 ± 0.4 kg/cow). The results indicate the importance of controlling the MY max. and the Dm reached in each long residence time grazing paddocks for both cow genotypes at both levels of supplementation. In each paddock, a cyclic 10 d grazing sequence was observed for MY response without affecting milk performance of cows over the whole lactation.

Key Words: dairy cow breeds, simplified rotational grazing system, milk peaks and drops

835 Effect of daily herbage allowance (low vs. high) and cow lactation stage (early vs. middle) on sward quality and milk performance of grazing dairy cows. A. I. Roca-Fernandez,* A. Gonzalez-Rodriguez, and O. P. Vazquez-Yañez, *Agrarian Research Centre of Mabegondo, La Coruna, Galicia, Spain.*

Sward structural characteristics have been shown to influence grass nutritive value, sward quality, pasture dry matter (DM) intake and milk performance of cows at different stage of lactation. The aim of this study was to investigate the effect of 2 daily herbage allowances (DHA), low (L, 25 kg DM cow^{-1} day^{-1}) vs. high (H, 30 kg DM cow^{-1} day^{-1}), on sward quality and milk performance of cows at 2 lactation stages (LS), early (E, 30 DIM) vs. middle (M, 135 DIM). Seventy-two Holstein-Friesian cows were randomized in a block design with a 2 × 2 factorial arrangement of 4 treatments (LE, LM, HE and HM). Animals grazed rotationally perennial ryegrass-white clover swards from March to August using variable stocking rates to impose the fixed DHA treatments. Sward quality was determined by NIRS System 6500. Daily milk yield (MY) was recorded by Alprow System and weekly milk composition was measured by MilkoScan FT6000. Data were analyzed using PROC MIXED in SAS. The low DHA treatments had more rotations ($P < 0.05$, +1 rotation), lower rotation length ($P < 0.05$, −3.7 d) and more grazing days ($P < 0.05$, +13 d) in comparison to the high DHA treatments (4 rotations, 31.4 d per rotation and 126 grazing days). The low DHA treatments showed lower pre- and post-grazing sward heights ($P < 0.05$, −2.1 and −1.0 cm) than the high DHA treatments (16.4 and 6.4 cm, respectively). The low DHA treatments presented lower ($P < 0.05$) DM content (18.4%), acid (ADF, 284 g kg^{-1} DM) and neutral detergent fiber (NDF, 509 g kg^{-1} DM) while higher ($P < 0.05$) crude protein (CP, 149 g kg^{-1} DM), water soluble carbohydrates (WSC, 167 g kg^{-1} DM) and digestibility in vitro of organic matter (747 g kg^{-1} DM) in comparison to the high DHA treatments (DM, 20.3%; ADF, 312 g kg^{-1} DM; NDF, 546 g kg^{-1} DM; CP, 131 g kg^{-1} DM; WSC, 149 g kg^{-1} DM; digestibility, 730 g kg^{-1} DM). There were differences on sward quality between rotations for both DHA treatments. The highest ($P < 0.05$) DM (26.2%) and fiber levels (ADF, 369 g kg^{-1} DM and NDF, 626 g kg^{-1} DM) and the lowest ($P < 0.05$) crude potein (CP, 106 g kg^{-1} DM), carbohydrates (WSC, 93 g kg^{-1} DM) and digestibility levels (678 g kg^{-1} DM) were found in the last rotation compared with the first rotation (DM, 16.4%; ADF, 231 g kg^{-1} DM; NDF, 433 g kg^{-1} DM; CP, 160 g kg^{-1} DM; WSC, 226 g kg^{-1} DM; digestibility, 803 g kg^{-1} DM) due to higher sward quality deterioration when grazing season advanced (from rotation 1 to 5) in both DHA treatments. Cows managed at the early LS showed higher ($P < 0.05$) MY (+5.3 kg cow^{-1} day^{-1}), with the lowest ($P < 0.05$) milk protein (−2.4 g kg^{-1}) and fat (−2.2 g kg^{-1}), than cows managed at the middle LS (19.5 kg cow^{-1} day^{-1}), with the highest ($P < 0.05$) milk protein (31.3 g kg^{-1}) and fat (39.1 g kg^{-1}). No differences were found on MY between both DHA treatments (L, 22.4 vs. H, 22.1 kg cow^{-1} day^{-1}), but higher ($P < 0.05$) milk protein (+0.9 g kg^{-1}) and fat (+1.0 g kg^{-1}) were observed in the low DHA treatments compared with the high DHA treatments (milk protein, 29.7 and fat, 37.5 g kg^{-1}). Decreasing DHA resulted in higher sward quality and milk protein and fat without penalizing MY.

Key Words: rotational grazing, grass nutritive value, pasture-based dairy system

836 Rearing of dairy heifers at pasture from temperate regions (Galicia, NW Spain). A. I. Roca-Fernandez,* A. Gonzalez-Rodriguez, and O. P. Vazquez-Yañez, *Agrarian Research Centre of Mabegondo, La Coruna, Galicia, Spain.*

To reduce rearing costs, some Galician dairy farmers have considered use of pasture as the main source of nutrients for heifers for 8 mo per year (5 mo, spring grazing + 3 mo, autumn grazing) and use of grass and maize silages to supplement heifers the remaining 4 mo. A study was carried at CIAM (NW Spain) experimental farm during 2 consecutive years to evaluate sward and animal responses of dairy heifers within different age and managed at different stocking rate. The aim of this research was to identify appropriate grazing management strategies capable of being implemented on farms for reaching acceptable daily body weight (BW) gains of dairy heifers. The trial involved spring-calving Holstein-Friesian

heifers (n = 40) rotationally grazing perennial ryegrass and white clover pastures from March to July and supplemented with mixed silage (grass and maize), when grass production and/or sward quality was not appropriate to achieve desirable daily BW gains at pasture, due to summer drought in August and September and cold winter season in January and February. Sward variables related to grassland management as SR, herbage utilization and grass quality were determined and animal variables related to animal performance as BW, body condition score (BCS), rump height and daily BW gains were weekly controlled in 2 groups of dairy heifers at different age (young, 11 mo vs. old, 13 mo). Data were compared using Tukey′s test. On average SR was of 3.85 animals/ha, herbage utilization of 65%, sward crude protein content of 145 g/kg of DM and digestibility in vitro of organic matter of 783 g/kg of DM. Despite the seasonality observed in Galician grass production and quality across the year (higher grass nutritive value was found in spring grazing than in autumn grazing), daily BW gains in both dairy heifer groups ranged from 0.620 to 0.980 kg/d during the experimental period. Average daily BW gain at pasture was of 0.770 kg/d in both dairy heifer groups, with higher ($P > 0.05$) BW gains observed in young heifers (0.828 kg/d) than in old heifers (0.717 kg/d) due to young heifers were managed at lower SR ($P < 0.05$; 3.17 animals/ha) than old heifers (4.69 animals/ha). Average BCS in both dairy heifer groups was of 2.86 (over 5) reaching 440 kg of BW per animal with a rump height of 137 cm to insemination. Animals in both dairy heifer groups were inseminated within 15 mo of age while on pasture. Average pregnancy rate was of 80% and calving was programmed at 24 mo in both dairy heifer groups. Results from this trial show that rearing of dairy heifers at pasture is influenced by sward (SR) and animal (age) factors. Higher daily BW gains were observed in young heifers than in old heifers due to lower SR was applied in young heifers than in old heifers.

Key Words: dairy replacement, daily body weight gain, grazing system

837 Milk urea concentration test as a quick response of the energy/protein balance in dairy cattle ration. A. I. Roca-Fernandez,* A. Gonzalez-Rodriguez, and O. P. Vazquez-Yañez, *Agrarian Research Centre of Mabegondo, La Coruna, Galicia, Spain.*

When management decisions need to be taken at farm level, it is important to have an appropriate diagnosis tool as the milk urea concentration (MUC) test to get a quick response of the energy-protein balance in dairy cattle ration under different feeding conditions. The aim of this trial, carried out from March to August in 2007 at CIAM (NW Spain), was to investigate the MUC response on Holstein-Friesian dairy cows (n = 90) under 2 feeding regimens, grazing (G) vs. confinement (C), for milk production. Animals at different lactation stages, early (E) vs. late (L) calving cows, were randomly assigned to 3 treatments (GE, GL, and CE). Daily milk yield (MY) was recorded by Alprow System and weekly milk composition was measured by MilkoScan FT6000. Sward, silage and concentrate chemical composition were determined by NIRS System 6500. Data were analyzed using PROC MIXED in SAS. Silage and concentrate intake were higher ($P < 0.05$) in confined cows (9.3 ± 1.5 and 6.8 ± 1.2 kg DM/cow per day) compared with grazing cows (1.4 ± 1.0 and 2.3 ± 0.7 kg DM/cow per day). There were no differences ($P > 0.05$) between grazing treatments for pasture intake (GE, 13.6 ± 1.0 vs. GL, 13.0 ± 0.9 kg DM/cow per day) and grass crude protein content (GE, 133 ± 10 vs. GL, 146 ± 12 g/kg of DM). MY (25.6 ± 0.4 kg/cow per day) and body weight (644 ± 11 kg) were higher ($P < 0.05$) in confined cows compared with grazing cows with lower MY (GE, 24.3 ± 0.7 and GL, 18.4 ± 1.2 kg/cow per day) and body weight (GE, 569 ± 9 and GL, 601 ± 10 kg). The levels of MUC were higher ($P < 0.05$) in confined cows (CE, 251 ± 10 mg/kg) than in grazing cows (GE, 192 ± 9 and GL, 222 ± 8 mg/kg). Cows at E lactation stage showed the lowest ($P < 0.05$) values of MUC during the first month of lactation (GE, 141 ± 8 and CE, 107 ± 9 mg/kg) due to animals being in a negative energy balance situation attributed to the inability for ingesting sufficient amount of nutrients from grass and/or supplements (silage and concentrate). The highest levels ($P < 0.05$) of MUC in grazing cows were reached at 2 mo after calving (GE, 269 ± 5 and CE, 282 ± 6 mg/kg) when pastures contained highly degradable protein content and had high protein-energy ratio. The MUC test was an effective quick response diagnostic tool for detecting an imbalanced ration and correcting protein-energy levels in dairy cows at different lactation stage and feeding regimens.

Key Words: cow lactation stage, feeding regimens, milk urea content

838 Effect of calving date (spring vs. autumn) and parity (primiparous vs. multiparous) on milk performance of Holstein-Friesian grazing dairy cows from Galician conditions. A. I. Roca-Fernandez,* A. Gonzalez-Rodriguez, and O. P. Vazquez-Yañez, *Agrarian Research Centre of Mabegondo, La Coruna, Galicia, Spain.*

High inputs systems are currently applied by dairy farmers using higher productivity cows (9–10 t of milk/cow per year), with shorter life persistency (2–3 lactations), higher annual replacement (40–50%) and higher rates of concentrate (3–4 t/cow per year). Nevertheless, increase on inputs costs are now driving Galician farmers to thrust on grazing systems using lower productivity cows (6–7 t of milk/cow per year), with longer life persistency (5–6 lactations), lower annual replacement (20–25%) and lower rates of concentrate (1–2 t/cow per year). Questions about cow efficiency in terms of milk production according to calving date and parity are also in farmers minds when these 2 dairy systems are compared. The aim of our study was to evaluate the effect of calving date, spring (S, 23 ± 5 DIM) vs. autumn (A, 135 ± 7 DIM), and parity, primiparous (P, 1.2 ± 0.2 lactation) vs. multiparous (M, 2.9 ± 0.4), on milk performance response of Holstein-Friesian dairy cows on spring-summer grazing conditions. Animals (n = 72) were randomized in a block design with a 2 × 2 factorial arrangement of 4 treatments (SP, SM, AP and AM) grazing rotationally perennial ryegrass-white clover pastures. Sward chemical composition was measured by NIRS System 6500. Daily milk yield (MY) was recorded by Alprow System and weekly milk composition was determined by MilkoScan FT6000. Data were analyzed using PROC MIXED in SAS. The S groups were supplemented at pasture with 6 kg/cow per day of concentrate while the A groups only received 3 kg/cow per day of concentrate. The grazing season in 2009 was divided into 3 periods according to pasture quality: (1) March–April, (2) May–July, and (3) August–September. The S groups were yielding a 32% and 22% more milk ($P < 0.001$) than the A groups (AM, 24.8 ± 1.2 and AP, 22.3 ± 0.9 kg cow-1). The MY was a 18% and 12% higher ($P < 0.001$) in the M groups than in the P groups (SP, 26.7 ± 1.5 and AP, 21.9 ± 0.7 kg/cow). The highest ($P < 0.001$) milk peak was reached by the S groups (SM, 38.8 ± 2.1 and SP, 24.9 ± 1.7 kg/cow). MY and pasture quality were progressively decreasing accross grazing season advanced. Higher ($P < 0.001$) crude protein content (160 ± 6 g/kg of DM), water soluble carbohydrates (226 ± 8 g/kg of DM) and digestibility (803 ± 18 g/kg of DM) while lower neutral detergent fiber (433 ± 11 g/kg of DM) were observed in the (1) grazing period than in the (2) and (3). The lowest ($P < 0.001$) milk protein and the highest ($P < 0.001$) fat content were reached by the A groups. The results obtained from this trial point that calving date and parity are very important factors on dairy farms conditioning cow needs and milk performance at pasture. The group of spring calving multiparous cows showed the highest milk response on spring-summer grazing while the autumn calving primiparous cows showed the lowest milk response.

Key Words: dairy cattle, stage of lactation, pasture-based milk production systems

839 Effect of oilseed concentrate source (cottonseed vs. linseed) on milk composition and fatty acids profile of dairy cows (grazing vs. silage + grazing) from NW Spain humid region. A. I. Roca-Fernandez*[1], A. Gonzalez-Rodriguez[1], O. P. Vazquez-Yañez[1], and J. A. Fernández-Casado[2], [1]*Agrarian Research Centre of Mabegondo, La Coruna, Galicia, Spain,* [2]*Agrarian and Fitopathologic Laboratory of Galicia, La Coruna, Galicia, Spain.*

Diet of dairy cows influences milk composition and fatty acid (FA) profile. The highest concentrations of conjugated linoleic acid (CLA) and unsaturated fatty acids (UFA) are usually found in pasture-based milk production systems feeding lipid supplements. The objective of this study was to investigate the effect of forage source (G, grazing vs. S, silage+grazing) on milk composition and FA profile of autumn calving Holstein-Friesian cows supplemented with different oilseed concentrates (C, cottonseed vs. L, linseed). Four groups of cows (GC, GL, SC and SL) grazed separately in 4 farmlets at CIAM (NW Spain) from spring to summer in 2008. The G groups (GC, n = 12 and GL, n = 11) were all day grazing while the S groups (SC, n = 14 and SL, n = 13) were grazing half day and received 20 kg/cow per day of grass:maize (50:50) silage (33% DM). Daily milk yield (MY) was recorded by Alprow System and weekly milk composition was measured by MilkoScan FT6000 and FA profile by gas chromatography-mass spectrometry. Short (SCFA), medium (MCFA) and long chain FA (LCFA) were determined. Mono- (MUFA) and polyunsaturated (PUFA) were calculated. Data were analyzed using PROC MIXED in SAS. Average MY was higher ($P < 0.05$) in the G groups (GC, 22.3 and GL, 21.1 kg/cow per day) than in the S groups (SC, 20.9 and SL, 20.6 kg/cow per day). Milk protein was lower ($P < 0.001$) in the G groups (GC, 30.1 and GL, 31.3 g/kg) than in the S groups (SC, 32.3 and SL, 32.0 g/kg). Milk fat was lower ($P < 0.001$) in the G groups (GC, 35.7 and GL, 37.0 g/kg) than in the S groups (SC, 38.6 and SL, 39.9 g/kg). SCFA and MCFA were lower ($P < 0.001$) in the G groups (10.7 and 40.4 g/100 g of FA) than in the S groups (12.1 and 43.4 g/100 g of FA). LCFA were higher ($P < 0.001$) in the G groups (MUFA, 23.8 and PUFA, 3.7 g/100 g of FA) than in the S groups (MUFA, 21.5 and PUFA, 3.2 g/100 g of FA). CLA content was higher ($P < 0.001$) in the G groups (1.1 g/100 g of FA) than in the S groups (0.8 g/100 g of FA). LCFA and MUFA were higher ($P < 0.05$) in the cows feeding cottonseed concentrate (37.1 and 23.4 g/100 g of FA) than in the cows feeding linseed concentrate (35.2 and 21.5 g/100 g of FA). Farmers with high reliance on grazing and cottonseed concentrate would get higher LCFA and MUFA levels in milk fat.

Key Words: grazing dairy cattle, milk fatty acids composition, lipid feed supplements