T99 Ruminal and intestinal crude protein digestibility of triticale dried distillers grains with solubles. K. T. Wierenga*, G. B. Penner, and M. Oba, *University of Alberta*, *Edmonton, Alberta, Canada*.

The objective of this study was to compare in situ ruminal CP and in vitro intestinal CP digestibility (IVID) of triticale dried distillers grains with solubles (TDDGS) to those of soybean meal (SBM), canola meal (CM) and corn DDGS (CDDGS). The feedstuffs were incubated using nylon bags (50 μm pore) in the rumen of three lactating dairy cows fed a diet containing 27.8% NDF and 16.6% CP. Samples were incubated in the rumen for 0, 1, 2, 4, 8, 16, 24, 48 and 72 h to determine ruminal CP degradation. To determine IVID, samples ruminally incubated for 16 h were digested with HCl/pepsin and pancreatin. The soluble protein (%CP) was higher ($P < 0.001$) for CDDGS and TDDGS (30.2 and 31.0%, respectively) compared to CM (15.1%) and SBM (9.0%). The rapidly degradable protein (< 1h, %CP) was highest ($P < 0.001$) for CDDGS (30.9%) followed by TDDGS (22.5%), CM (9.1%), and SBM (6.1%). Degradation rate of slowly degradable protein was faster ($P < 0.001$) for SBM and CM (4.50 and 4.10 %/h, respectively) than CDDGS and TDDGS (1.87 and 1.80 %/h, respectively). Rumen degradable protein after 16h of incubation was higher ($P < 0.001$) for CDDGS and TDDGS (69.3% and 64.5% respectively) than CM (62.2%) and SBM (53.0%). However, as IVID (%CP) was highest ($P < 0.001$) for SBM (33.9%), followed by CM (18.4%), TDDGS (14.0%), and CDDGS (8.5%), estimated total-tract digestibility of CP was higher for SBM (86.8%) compared to CM, TDDGS, and CDDGS (80.7, 78.5, and 77.8%, respectively). Although DDGS has been generally accepted as a high RUP feed, the high RDP and rapidly degradable protein in CDDGS and TDDGS reported herein suggest more degradation in the rumen. Therefore, further investigation is warranted to determine the extent of ruminal CP degradation variations among different types of DDGS.

Key Words: Dried Distillers Grains with Solubles, In Vitro Intestinal Digestibility, In Situ Ruminal Degradation

T100 Heat treatment of bovine colostrum: Effect on viscosity, bacterial count and immunoglobulin G levels. J. A. Elizondo-Salazar*, S. C. Donaldson, B. M. Jayarao, G. R. Ziegler, and A. J. Heinrichs, *The Pennsylvania State University*, *University Park*.

A study was conducted to identify the optimal temperature and time at which heat treatment of bovine colostrum would least change viscosity and IgG levels yet reduce bacterial count. First milking colostrum with IgG levels > 50 g/L (measured by colostrometer) was collected from 30 Holstein cows and frozen at -20°C. Each sample was thawed at 4°C, thoroughly mixed and ten 10-mL aliquots were taken in sterile 15-mL screw-cap centrifuge tubes. Samples were heat-treated for 0, 30, 60, and 90 min at 63, 60 and 57°C using a water bath. Samples were evaluated for standard plate count (SPC), preliminary incubation count (PIC), coagulase-negative staphylococci (CNS) count, environmental streptococci (ES) count, coliform (CC) count, gram-negative noncoliform (NC) count, *Streptococcus agalactiae* (SAG) count, and *Staphylococcus aureus* (SA) count. IgG_1 and IgG_2 levels were determined in all samples using radial immunodiffusion. Viscosity was also measured using a digital viscometer. All heat-treatments reduced SPC, CC, NC, ES, CNS, SA, and PIC ($P < 0.05$). Heat-treatment at 60°C and above resulted in significant denaturation of colostral IgG_1 . However, colostral IgG_2 levels were not reduced when the temperature was held at 60°C for less than 60 min. Viscosity was not affected when temperature was held at 60°C for less than 60 min. The findings of the study suggest that heat-treatment of bovine colostrum at 60°C for 30 to 60 min may be used as an optimal temperature and timing, at which heat treatment of bovine colostrum would produce no significant changes in viscosity, a small reduction in IgG levels, and a significant reduction in bacterial count.

Table 1. Changes in viscosity, bacterial count and IgG levels in bovine colostrum after heat-treatment.

Temp. (°C)	Time (min)	IgG_1 (g/L)	IgG_2 (g/L)	Viscosity (Pa•s)	SPC (CFU/mL)
Control	Control	71.6^{a}	3.2^{a}	388^{ab}	$39{,}753^{a}$
57	30	66.8^{ab}	3.0^{ab}	95^{a}	$7{,}019^{bc}$
57	60	66.7^{ab}	3.0^{ab}	68^{a}	$10{,}443^{b}$
57	90	62.6^{ab}	2.9^{ab}	168^{a}	$3{,}816^{bc}$
60	30	56.7^{bc}	2.7^{abc}	106^{a}	$4{,}283^{cd}$
60	60	47.9^{dc}	2.6^{abc}	655^{b}	$3{,}553^{bc}$
60	90	40.5^{d}	2.4^{bcd}	$7{,}139^{c}$	230^{d}
63	30	27.7^{e}	2.2^{cd}	$6{,}310^{c}$	679^{de}
63	60	22.8^{f}	1.9^{de}	$41{,}207^{d}$	204^{e}
63	90	12.9^{g}	1.5^{e}	$83{,}056^{e}$	2^{e}

$P < 0.05$

Key Words: Colostrum, Immunoglobulins, Bacteria

T101 The effects of increased milking frequency during early lactation on milk yield and milk composition on commercial dairy farms. F. Soberon*, C. M. Ryan, D. M. Galton, and T. R. Overton, *Cornell University*, *Ithaca, NY*.

Holstein cows (n=398) entering either first or later lactation on four commercial farms were used to determine the effects of increased milking frequency (IMF) during the first 21 d postpartum. Cows were assigned randomly at calving within farms either to a control treatment (2× milking) or to an IMF group in which cows were milked 4× during the first 21 d postpartum followed by 2×. Cows assigned to the IMF group were milked at the beginning and again at the end of the normal milking routine during the 4× period. This resulted in minimum milking intervals for the 4× cows of 3.5, 4.5, 5.5, and 6 h for each farm. Results from the analysis of data from the three farms from which 7 monthly test days of production data were available indicated that early lactation IMF increased milk yield by 2.1 kg/d during the first 7 months of lactation (33.9 vs. 31.8 kg/d; $P < 0.01$). Interactions of treatment with lactation group were not significant. Overall percentages of milk fat (3.62 vs. 3.73; $P = 0.02$) and true protein (2.97 vs. 3.03; $P = 0.05$) were decreased by early lactation IMF; however, overall yields of milk fat (1.21 vs. 1.17 kg/d; $P = 0.04$) and true protein (1.00 vs. 0.95 kg/d; $P < 0.01$) were increased by early lactation IMF. Within-farm analysis using all the available test day information for each farm (7, 10, 7, and 5 test days, respectively) indicated that the magnitude of the milk yield response varied from 4 to 10% (3.1, 1.5, 1.8, and 1.8 kg/d for each farm). Early lactation IMF did not affect somatic cell linear score and did not affect body fat mobilization as assessed by BCS; however,

there was a tendency for serum NEFA to increase (485 vs. 427 μEq/L; P = 0.08) and an increase in serum BHBA (12.2 vs. 10.4 mg/dl; P = 0.03) during the first 21 d postpartum for cows subjected to IMF. The number of cows diagnosed with subclinical ketosis (BHBA > 14 mg/dL) did not differ among treatments (P = 0.87). Results suggest that early lactation IMF has the potential to consistently increase milk yield on commercial dairy farms.

Key Words: Milking Frequency, Transition Cow

T102 Effect of abomasal infusion of butterfat, long chain fatty acids or CLA on milk fatty acid composition and mammary tissue lipogenic gene expression in lactating cows. A. K. G. Kadegowda*[1], J. J. Loor[2], L. S. Piperova[1], P. Delmonte[3], and R. A. Erdman[1], [1]*University of Maryland*, *College Park*, [2]*University of Illinois*, *Urbana*, [3]*FDA*, *College Park, MD*.

Mammary tissue lipogenic gene expression and milk fatty acid composition were studied during abomasal infusion of butterfat, long chain fatty acids or CLA mixture in lactating cows. Eight rumen fistulated Holstein cows (49±20 DIM) were used in a replicated 4×4 Latin square design. Treatments were: 1) Control (no infusion); or abomasal infusion of; 2) 400 g/d Butterfat; 3) 245 g/d LCFA (blend of 59% cocoa butter, 36% olive oil, and 5% palm oil) providing 50% of the 16:0 and the amounts of C18 FA, equivalent to that found in 400 g of butterfat (LCFA); and 4) 100 g/d conjugated linoleic acid (CLA, negative control), providing 10 g of t10c12 CLA. Lipid supplements were infused in equal portions 3× daily during the last 2 wk of each 3 wk experimental period. Compared with Controls, Butterfat infusion increased milk fat yield by 21% (P < 0.02), CLA decreased milk fat yield by 43% (P < 0.001), and LCFA had no effect on fat yield. Infusion of Butterfat increased (21%, P<0.05) the yield of FA with ≤16:0-carbons. Milk yield of mono- and poly-unsaturated FA was greater in cows infused with Butterfat (by 33% and 29%) or LCFA (by 25% and 24%), compared to Control. Infusion of CLA reduced yield of all FA synthesized de novo (56%, P<0.001) and reduced FA desaturation index (40%, P<0.001). Expression of genes involved in FA uptake (LPL, CD36), intracellular FA activation and transport (FABP3, ACSS2, ACSL1), de novo FA synthesis (ACACA, FASN), desaturation (SCD), and trigacylglycerol synthesis (AGPAT6, GPAM) tended to increase by 30% to 40% due to Butterfat, while LCFA showed opposite effects. The expression of lipogenic genes were not modified by CLA. Results suggest that supply of short and medium chain FA with Butterfat infusion might potentially up-regulate mammary lipogenic gene expression and increase milk fat yield in lactating cows.

Key Words: Lactating Cows, Fat Supplements, Gene Expression

T103 Production of Holstein and Jersey × Holstein cattle grazing annual ryegrass/white clover pasture. J. C. Lopes*, A. P. Vilela, K. A. Weigel, K. A. Albrecht, and D. K. Combs, *University of Wisconsin*, *Madison*.

The objective of this trial was to compare milk production, milk composition and pasture intake of Holstein (H) and Jersey-Holstein crossbred (JH) cattle grazing high quality annual pasture. Fourteen primiparous 1/4 Jersey × ¾ Holstein cows (112 DIM, 495 kg BW) and fourteen primiparous Holstein cows (89 DIM and, 535 kg BW), were randomly assigned by breed to one of four-2.4 hectare paddocks. The four pastures were seeded in the spring of 2007 with a mixture of white clover (Trifolium repens L.) and Italian ryegrass (Lolium perenne ssp. Multiflorum.). All pastures were managed to offer cows approximately 30 kg of forage DM per day. The daily grazing area was estimated according to the pasture availability and the number of cows in each paddock. Cows were allowed to graze approximately 20 h/d and were milked twice daily. Supplemental concentrate was provided daily after each milking (7.2 kg/cow/d). Pastures were initially stocked with 7 cows per paddock, but as the summer progressed and pasture growth declined, one cow from each of the paddocks was removed to keep pasture availability constant and assure adequate supply of pasture. Pasture intake was estimated by difference in yield estimates from pasture quadrats clipped at a 5 cm stubble height before and after grazing. Pastures quality was high throughout the trial (41 ± 1.6%, NDF, and 18 ± 0.5%, CP). Milk yield/cow/d tended lower for JH than H (27.0, 29.8 kg/d, respectively p < 0.07) and 3.5% FCM was lower for JH than H (28.0, 30.0 kg/d respectively, p < 0.01). Milk fat percentage was similar for JH and H (3.6 ± 0.1%). Fat corrected milk yield by paddock was higher for H than JH (1349, 1187 kg 3.5%FCM/paddock/week respectively, p<0.05). Pasture DMI did not differ by breed (1133 kg DM/paddock/d). Grazing Holstein primiparous cows produced more milk from high quality pasture than Jersey-Holstein crossbreds. Breed did not affect pasture intake, the advantage was due to higher production per cow of the Holsteins than the Jersey-Holstein crossbreds.

Key Words: Dairy, Pasture, Grazing