Graduate Student Competition: ADSA Production Division
Graduate Student Poster Competition - MS Division

M155 Chewing activities of dairy heifers precision-fed a low or high forage ration at four levels of dry distillers grain. F. X. Suarez-Mena*, G. J. Lascano, and A. J. Heinrichs, *The Pennsylvania State University, University Park.*

The objective of this study was to determine the effects of differing forage to concentrate ratios (F:C) and corn dry distillers grain with solubles (DDGS) inclusion rates on chewing behavior, rumen pH, and rumen fill in precision-fed dairy heifer rations. A split plot design with F:C as whole plot and DDGS inclusion level as sub-plot was administered in a 4-period (19 d) 4 × 4 Latin square. Eight rumen cannulated Holstein heifers (12.5 ± 0.5 mo and 344 ± 15 kg, age and BW respectively) housed in individual stalls were allocated to 2 F:C (50:50 LF or 75:25 HF; DM basis) and to a sequence of DDGS inclusion (0, 7, 14 and 21%; DM basis). Forage was a mix of 50% corn silage and 50% grass hay (DM basis). Diets were fed to provide equal amounts of nutrients to allow 800 g/d BW gain and fed 1X/d. Chewing behavior was visually monitored for 48 h at 5–min intervals. Rumen contents were sampled at –2, 0, 2, 4, 6, 8, 10, 12, and 20 h after feeding for pH determination. Total rumen evacuation was performed at –2 and 5 h after feeding. Statistical analysis was conducted using the MIXED procedure of SAS. DMI linearly decreased as DDGS increased (6.61to 6.11 ± 0.09 kg/d; $P < 0.01$). No differences were found for rumen pH. Time spent eating tended to be longer for HF (151 vs. 112 ± 14 min/d; $P = 0.09$) and was not different for DDGS inclusion. Ruminating time did not differ by F:C but linearly increased as DDGS increased (421 to 450 ± 15 min/d; $P = 0.03$). Total chewing time tended to be longer for HF (593 vs. 516 ± 28 min/d; $P = 0.10$) and to increase linearly as DDGS increased (553 to 579 ± 23 min/d; $P = 0.09$). Wet rumen digesta weight (46.6 vs. 37.6 ± 2.2 kg; $P = 0.03$) and volume (51.5 vs. 41.5 ± 2.5 L; $P = 0.03$) were greater for HF. Total chewing time increased by the addition of DDGS and higher F:C. DDGS influenced ruminating time with no effect on eating time while F:C affected eating time. Higher F:C increased rumen digesta weight and volume. F:C or DDGS levels in the ration did not affect rumen pH.

Key words: heifer, chewing, dry distillers grain with solubles

M156 Effect of one or two treatments of prostaglandin $F_{2\alpha}$ prior to Cosynch in lactating dairy cattle. K. D. Baldock*[1], M. E. Wilson[2], and D. L. Smith[1], [1]*Eastern New Mexico University, Portales,* [2]*West Virginia University, Morgantown.*

Many dairies in the United States use $PGF_{2\alpha}$ treatment, as part of a presynchronization (Presynch) program. The objective of this experiment was to study the effects of one versus 2 $PGF_{2\alpha}$ Presynch treatments, before a Cosynch program. Analysis included: the effects on first service conception rates (FSCR), number of days open (DO), services per conception (SC), and days to first service (DFS). Lactating, Holstein cows (n = 748) were randomly assigned to the treatment group (n = 376; first treatment with $PGF_{2\alpha}$ between d 30 and 36 postpartum, second treatment with $PGF_{2\alpha}$ between d 44 and 50 postpartum) or the control group (n = 372; received one treatment with $PGF_{2\alpha}$ between d 44 and 50 postpartum). For both groups a cow found in estrous was bred and tracked for pregnancy. Data were further analyzed as bred before Cosynch treatment (n = 489) and completing Cosynch treatment (n = 259). Overall, there were no differences ($P > 0.05$) between the treatment and control groups in FSCR (0.43 ± 0.03 for both groups), DO (91.40 ± 1.96 and 91.67 ± 2.06), SC (2.00 ± 0.06 and 2.08 ± 0.06) and DFS (60.49 ± 0.51 and 59.77 ± 0.55). Of the cows removed from the experiment (n = 210) 47.9% were culled for reproduction and mastitis and 52.1% remained open, with no effect of treatment ($P > 0.05$). There was no difference ($P > 0.05$) between treatment and control for cows bred before completing Cosynch treatment (i.e., bred at observed estrus) including FSCR (0.45 ± 0.04 and 0.45 ± 0.03), DO (84.84 ± 0.2.33 and 85.13 ± 2.37), SC (2.00 ± 0.07 and 2.07 ± 0.08) and DFS (54.84 ± 0.47 and 54.30 ± 0.56), respectively. Further, no difference ($P > 0.05$) was found between treatment and control, among those completing Cosynch, in FSCR (0.38 ± 0.04 and 0.40 ± 0.04), DO (103.38 ± 3.33 and 104.41 ± 3.73), SC (2.02 ± 0.09 and 2.08 ± 0.11) and DFS (70.82 ± 0.24 and 70.46 ± 0.30). Finally, parity and day of Presynch treatment had no effect ($P > 0.05$) on any of the treatment groups. These results indicate, within the reproductive parameters studied, one $PGF_{2\alpha}$ Presynch was as effective as the 2 $PGF_{2\alpha}$ Presynch treatment.

Key words: prostaglandin $F_{2\alpha}$, presynchronization, Cosynch

M157 The effects of extruding wheat dried distillers grains with solubles with peas or canola meal on ruminal fermentation, nutrient digestion and milk production in lactating Holstein dairy cows. R. M. Claassen*, D. A. Christensen, and T. Mutsvangwa, *University of Saskatchewan, Saskatoon, Saskatchewan, Canada.*

The objective of this study was to examine the effects of feeding extruded and non-extruded mixtures of wheat dried distillers grains with solubles with peas (WP) or canola meal (WC) on ruminal fermentation, total tract nutrient digestion, and milk production in dairy cows. Eight Holstein cows (BW 712 ± 54 kg, 90 ± 31 DIM) were used in a replicated 4 × 4 Latin square design (28-d periods) with a 2 × 2 factorial arrangement of dietary treatments. Four cows in one Latin square were fitted with rumen cannulas for the measurement of ruminal fermentation characteristics. Treatment diets contained either WP or WC combinations fed in an extruded or non-extruded form (16% of DM intake). Diets were isonitrogenous (17.1% CP) and contained 50% concentrate and 50% forage (DM basis). DM intake was not affected ($P > 0.05$) by dietary treatment. Total tract digestibilities of ADF and NDF were not affected by dietary treatment; however, total tract digestibilities of crude protein ($P = 0.014$) and ether extract ($P = 0.002$) were higher, and that of DM tended ($P = 0.070$) to be higher for cows fed extruded when compared with those fed non-extruded diets. Total tract digestibility of ether extract tended to be higher ($P = 0.083$) in cows fed WC compared with those fed WP diets. Ruminal pH was higher in cows fed non-extruded WC compared with those fed extruded WC, but there was no difference in ruminal pH in cows fed WP diets (interaction; $P = 0.047$). Milk yield ($P = 0.021$) and milk protein yield ($P = 0.036$) were higher for cows fed WP compared with those fed WC diets. Milk contents of fat, protein and milk urea nitrogen, and milk fat yield were not affected by dietary treatment; however, milk lactose content was higher ($P = 0.013$) for cows fed the extruded compared with those fed non-extruded diets. In summary, these results indicate that the dietary inclusion of WP can potentially increase milk yield when compared with WC. Extrusion had positive effects on total tract nutrient digestion.

Key words: dairy cow, extrusion, wheat dried distillers grains with solubles

M158 Ruminal degradation and intestinal protein digestion of steam-flaked soybeans. H. R. Bruns*[1], K. J. Herrick[1], K. F. Kalscheur[1], D. J. Schingoethe[1], R. Rosenboom[2], G. Doppenberg[2], and A. R. Hippen[1], *[1]South Dakota State University, Brookings, [2]Deluxe Feeds, Sheldon, IA.*

This research used in situ and in vitro techniques to evaluate the rumen degradability and intestinal digestibility of steam-flaked soybeans (Deluxe Feeds – EnRG Flakes; Sheldon, IA) as well as investigate the effect of particle size on protein and dry matter degradability of steam-flaked soybeans (SFSB). In the first experiment, 3 cannulated, lactating Holstein cows were used to determine rumen protein degradability of SFSB, solvent extracted soybean meal (SSBM), expeller soybean meal (ESBM) and raw, whole soybeans (WSB). The WSB and SFSB were ground through a 2-mm screen and all feeds were ruminally incubated in Dacron bags for 0, 2, 4, 8, 16, 24 or 48 h. Rumen undegradable protein (RUP) was least for WSB, similar for SFSB and SSBM and greatest for ESBM (20.7, 28.3, 30.1, and 52.5%; $P < 0.01$). Intestinally absorbable dietary protein (IADP) ranged widely with WSB being the least absorbable followed by SFSB, SSBM and ESBM (12.6, 23.6, 29.0 and 51.5%; $P < 0.01$). Total digestibility of dietary protein (TDP) was least for WSB followed by SFSB and was greatest for SSBM and ESBM (92.0, 95.4, 98.9 and 99.3%; $P < 0.01$). These results indicated that SFSB are similar to SSBM with regards to ruminal degradability, and have greater overall digestibility than WSB. Previous in situ determinations suggested that particle size may influence rumen degradability parameters of SFSB, thus, a second in situ study evaluated the effects of particle size of SFSB on rumen degradability. In this study, 4 particle sizes (2mm grind, 4mm grind, coarsely chopped, or whole) were compared as described above. Rapidly and potentially degradable protein (fractions A and B) disappearance was similar for all treatments while acid detergent-insoluble protein (fraction C) was greatest in 2mm and 4mm particle sizes and least in chopped and whole SFSB (10.5, 9.9, 6.2, and 6.0%; $P < 0.01$). RUP increased with particle size (30.3, 30.8, 40.8 and 42.2%; $P < 0.01$). Overall, this research demonstrates that decreasing the particle size of SFSB also decreases RUP. Additionally, maintaining whole SFSB results in RUP values greater than that of SSBM and more similar to that of ESBM.

Key words: steam-flaked soybeans, degradability, particle size

M159 A simulation assessment of long-term nitrogen runoff reduction from dairy pastures. R. White* and J. L. Capper, *Washington State University, Pullman.*

A 20-yr assessment was run simulating a pasture on a dairy to determine the effect of various harvesting techniques on Nitrogen (N) removal from the system. The aim was to identify a treatment that resulted in the greatest uptake of N by plant matter thereby diminishing N loss through runoff. Grass, shrubs and trees were modeled to function as they would in a riparian system, grass diffused water to allow absorption by soil, whereas shrubs and trees functioned to absorb nutrients. The pasture was located next to a dairy from which runoff inputs were given as N, Carbon and water sources. Other inputs to the system were historical data for monthly rainfall, temperature and soil attributes. The output was expressed as N runoff from the soil profile. The model was run over 20 yrs to view the long-term consequences of treatments. Mowing, grazing and planting were hypothesized to stimulate a grass density increase inhibiting water flow from the system while pruning and burning plants were thought to stimulate growth and increase nutrient uptake from the soil. These hypotheses were tested via 5 treatments: mowing grass to a stubble height of 0.1 m^2, pruning 1 m^2 from trees and 0.5 m^2 from shrubs, planting 90 kg of grass/acre, grazing of 450 kg of cattle/acre, and burning 70% of the biomass. A total of 4.335 kg N per acre was calculated to runoff during the 20-yr time period. Annual planting in October, burning before yr 5 and pruning after yr 3 were all found to significantly decrease N runoff. When grazing during the spring N runoff increased to 5.16 kg; however, during the winter, runoff did not significantly increase. Mowing did not change N runoff. The most effective reduction resulted from annual fires in the first 5 yrs, pruning annually in August starting in yr 7, grazing cattle annually starting in yr 6 and annual planting of grass in October. This combination of treatments resulted in a runoff reduction to 1.09 kg N, nearly a 75% decrease. This reduction shows that good riparian area management, including use by cattle, can reduce N runoff from dairy pastures.

Key words: nitrogen, runoff, dairy

M160 Characterization of management practices utilized by low somatic cell count Kentucky dairy herds. A. E. Sterrett* and J. M. Bewley, *University of Kentucky, Lexington.*

Recent market changes have renewed interest in lowering bulk tank SCC, particularly in the southeastern United States where the highest SCC in the country is observed. The objective of this research was to summarize management practices utilized by Kentucky dairy herds with low SCC. Herds with an annual mean SCC < 250,000 cells per mL were identified from DHIA and milk cooperative records. A 54 question survey was mailed to 71 producers with 48 producers (67.6%) responding. Herd size ranged from 25 to 750 cows with a mean (±SD) of 144.96 ± 297.39. Mean (±SD) DHIA SCC and producer-reported SCC were 190,333 ± 36,281 (n = 27) and 223,475 ± 71,257 (n = 40) cells per mL, respectively. The most common management practices incorporated by these producers were post-dipping (100%, n = 47), drying teats before attaching milkers (95.8%, n = 46), pre-dipping (91.7%, n = 44), dry treating all quarters of all cows (85.4%, n = 41), incorporating DHIA as a SCC management tool (83.3%, n = 40), using individual towels to dry teats (77.1%, n = 37), receiving bulk tank SCC (77.1%, n = 37), trimming hooves at least annually (75.0%, n = 36), performing a milking system evaluation annually (72.9%, n = 35), and vaccinating for mastitis pathogens (68.8%, n = 33). Of the mastitis vaccines used, J-Vac (Merial Ltd., Duluth, GA) was most common (40.6%, n = 13), followed by J-5 Bacterin (Pfizer Inc., New York, NY) (25.0%, n = 8), Endovac-Bovi (Immvac Inc., Columbia, MO) (15.6%, n = 5), and Lysigin (Boehringer Ingelheim, St. Joseph, MO) (15.6%, n = 5). When asked to identify the management practice that contributed the most to their low SCC level, the most frequently cited practices were (1) keeping cows and facilities clean (n = 31), (2) maintaining dry, clean bedding (n = 14), (3) adhering to a consistent milking routine (n = 10), (4) forestripping (n = 7), and (5) pre- and post-dipping (n = 6). Producers with different housing strategies were represented in this study including freestalls, tie-stalls, compost bedded packs, bedded packs, and no housing. Results of this survey may be used to promote best management practices among other producers attempting to lower SCC.

Key words: best management practices, low SCC, dairy survey

M161 Evaluation of an electronic cow-side glucose meter for diagnosing insulin resistance in Holstein dairy cows. J. A. M. Wittrock*[1], T. F. Duffield[1], S. Riuzzi[2], and S. J. LeBlanc[1], *[1]University of Guelph, Guelph, Ontario, Canada, [2]University of Padua, Padova, Italy.*

The purpose of this study was to evaluate the diagnostic performance of a hand-held electronic glucometer (Precision Xtra; Abbott) for cow-side use in dairy cattle. This device has been validated for measuring blood concentrations of β-hydroxybutyrate in dairy cows. This study was designed to assess the accuracy of whole blood glucose measurements from the glucose meter relative to a reference chemical analyzer in a diagnostic lab. Additionally, the suitability of the glucometer to classify cows as insulin resistant with a glucose tolerance test (GTT) was evaluated with the ratio of (glucose concentration at 80 min after dextrose infusion/concentration before infusion) > 1.05 being defined as insulin resistant. Blood analyzed in the lab were duplicate samples taken from the same cows at the same time, from either serum with the preservative sodium fluoride (gray top tube, the gold standard for glucose analysis) or without any additives (red top tube). Blood samples were collected from cows at time points between 3 wk before and after calving, with the GTT being conducted at 1 or 3 wk before, or 1 week after parturition. There was a strong correlation in 366 samples from 65 cows between the Precision Xtra and serum from samples preserved with NaF ($R^2 = 0.84$, $P < 0.0001$), and in 746 samples from 89 cows between the Precision Xtra and blood without additives ($R^2 = 0.88$, $P < 0.0001$). In 284 glucose-tolerance tests, the Precision Xtra had a sensitivity of 64% and specificity of 92% ($P < 0.0001$) for correctly diagnosing insulin resistance. Dichotomizing at various cut points to identify the optimal test threshold, a cut point of 0.91 for the insulin resistant ratio yielded sensitivity of 90% and specificity of 87% relative to serum preserved with NaF and analyzed in a diagnostic lab. With the identification of a more suitable cut point, and the strong correlation between glucose concentrations obtained from whole blood by the Precision Xtra and serum glucose concentrations, the hand-held glucometer appears suitable for rapid measurement of glucose including glucose tolerance and insulin resistance under field conditions in dairy cattle.

M162 Effect of treatment with human chorionic gonadotropin (hCG) on day 5 after timed artificial insemination (TAI) on fertility in lactating Holstein cows. R. W. Bender*, A. B. Nascimento, A. H. Souza, H. Ayres, R. R. Araujo, J. N. Guenther, and M. C. Wiltbank, *Department of Dairy Science, University of Wisconsin - Madison, Madison.*

Reproductive management programs that synchronize ovulation can result in a smaller than normal follicle potentially resulting in inadequate progesterone (P4) concentrations after AI. The present analysis combining 5 field studies tested the hypothesis that an injection of hCG on d 5 after TAI will raise circulating P4 in diestrus, and consequently improve pregnancies per AI (P/AI). Lactating Holstein cows (n = 2979) from 6 commercial dairy herds in WI had synchronized ovulation and TAI after Presynch-Ovsynch or Double Ovsynch for first AI and Resynch-32 for later AIs, stratified by parity, and breeding number; and then randomly assigned to 2 groups: control (no further treatment, n = 1519) or hCG (Chorulon; 2,000 IU [in 4 of the herds] or 3,300 IU [in 2 herds]; n = 1460). In a subset of cows, blood samples were collected on d 5 and 12 after TAI for analysis of serum P4. Pregnancy was diagnosed by ultrasound at 35 ± 3d after AI. Binomial data were analyzed with Proc Glimmix of SAS with farm and cow treated as random effects. The Mixed procedure of SAS was used to evaluate P4. Circulating P4 concentrations were similar ($P > 0.05$) on d 5, but greater ($P = 0.001$) in hCG (5.3 ng/mL) compared with control cows (4.3 ng/mL) on d 12. Overall Pregnancies/AI (P/AI) was greater ($P = 0.01$) in cows treated with hCG (41.9%; 612/1460) than control cows (37.0%; 562/1519). Interestingly, a 3-way interaction among treatment, parity, and times bred was observed. In primiparous cows, there was greater ($P = 0.013$) P/AI in first service cows treated with hCG (56.2%; 176/313) than controls (46.3%; 152/328). In second service primiparous cows there was greater ($P = 0.012$) P/AI in hCG (40.5%; 90/222) than control (29.2%; 63/216) cows. However, multiparous cows treated with hCG (n = 925) had similar P/AI as controls (n = 975) for both first ($P = 0.26$; 40.5% vs. 37.1%) and later services ($P = 0.13$; 29.6% vs. 34.6%). Thus, targeted use of hCG on Day 5 after TAI increases the circulating P4 on d 12 post AI and enhanced fertility in primiparous cows at both first and later services, but did not increase fertility in older cows.

Key words: hCG, cow, Ovsynch

M163 Evaluation of three-dimensional accelerometers to monitor motion changes relative to estrus behavior. W. A. Smith*, J. M. Bewley, and W. J. Silvia, *University of Kentucky, Lexington.*

Three-dimensional (3D) accelerometers may be used as an estrus detection aid by monitoring changes in cow leg or neck movement. Limited research has been conducted to characterize the changes in movement captured by accelerometers for monitoring estrus behavior. The objective of this study was to utilize a motion index (MI), provided by a commercially available accelerometer, to describe estrus behavior. IceTag (IceRobotics Ltd., Edinburgh, Scotland, UK) accelerometers were attached to 15 Holstein or crossbred cows (DIM 40 to 90) at the University of Kentucky Coldstream Dairy Research Farm. Three IceTags were attached to each cow with high grade Velcro (right rear leg, left front leg, and neck). Cows were synchronized using an OVSYNCH protocol preceded by G6G. The first injection of prostaglandin F2α (PGF) was administered 40 to 90 days postpartum. The OVSYNCH protocol was modified by omitting the last injection of GnRH, allowing for the synchronized expression of estrus. Transrectal ultrasonography was utilized to track follicular development. Beginning 72 h after PGF, behavior observations were recorded. Human observers recorded times when cows were mounting (MG, n=116) other cows and being mounted (MD, n=167), for an 8 h period or until estrus ended. The MI was used to describe the degree of motion (0= no motion), and is defined as total 3D acceleration. A rolling mean (± 2 min) MI was calculated for each estrus event (RME). The GLM procedure of SAS was used to compare RME to the motion index during periods where no estrus behavior (NE) was observed. Least Square Means (LSM ± SE) RME for MD events were significantly higher than LSM for NE (0.847 ± 0.043 ($P < 0.01$), 0.733 ± .038 ($P < 0.01$), 0.05 ± 0.004 ($P < 0.01$) for front leg, hind leg, and neck, respectively). The LSM (± SE) RME for MT events were significantly higher than LSM for NE (0.748 ± 0.043 ($P < 0.01$), 0.727 ± 0.048 ($P < 0.01$), 0.055 ± 0.005 ($P < 0.01$), respectively). Motion index is a useful indicator of estrus behavior.

Key words: estrus behavior, accelerometers, estrus detection

M164 Effects of hutches and fortified waste milk on growth and health in preweaned Holstein dairy calves. . K. L. Machado*[1], R. E. James[1], M. L. McGilliard[1], and T. J. Earleywine[2], *[1]Department of Dairy Science, Virginia Polytechnic Institute and State University, Blacksburg, [2]Land O Lakes Animal Milk Products, Shoreview, MN.*

Large California dairies often find it economical to feed pasteurized waste milk and house calves in elevated wooden crates. The objective of this field study in 2 herds was to evaluate the influence of diet and housing type on growth and morbidity in 84 Holstein heifer calves

in a 2 by 2 factorial experiment. Calves were housed in either plastic hutches or elevated wooden crates with slatted floors. Diets consisted of pasteurized waste milk or the same waste milk supplemented to provide approximately 454 g of additional milk replacer solids containing 25% protein and 10% fat (LOL Balancer) twice daily. Calves were randomly placed in 1 of 4 treatment groups 48 h after birth and were monitored until weaning (60 d of age). Body weights and hip heights were measured at time of enrollment and weaning. Milk samples of pasteurized waste milk were obtained to measure standard plate count 332,171 ± 733,487 cfu/ mL, percent of fat 3.51 ± 0.59, protein 3.13 ± 0.30, and total solids 11.64 ± 1.05. All calves were fed 3.12 L via bottle at 0730 and 1530 h. Calves were monitored daily for respiratory and digestive illness and treated according to protocols. Origin of dairy had no impact on weight gain or hip height. Housing ($P = 0.05$) and diet ($P = 0.01$) affected weight gain, but there was no interaction. Least squares weight gain means for crate and hutches were 0.52 ± 0.024 and 0.59 ± 0.024 kg/d, respectively. Least squares weight gain means for waste milk and balancer were 0.52 ± 0.024 and 0.60 ± 0.024 kg/d, respectively. Calves housed in crates fed balancer had similar gain to calves housed in hutches fed waste milk. Housing or diet did not affect hip height (0.196 ± 0.007). A nonparametric test of maximum fecal score showed no effect due to housing or diet. Calves fed pasteurized waste milk supplemented with balancer or calves housed in plastic hutches had more rapid daily weight gain than calves housed in crates or fed waste milk. The importance of this advantage warrants economic evaluation.

Key words: calves, diet, housing

M165 Effect of postpartum diseases on reproduction of grazing dairy cows. E. S. Ribeiro*, F. S. Lima, H. Ayres, L. F. Greco, R. S. Bisinotto, M. Favoreto, R. S. Marsola, A. P. A. Monteiro, W. W. Thatcher, and J. E. P. Santos, *University of Florida, Gainesville.*

Objectives were to determine the incidence of postpartum diseases and their impact on reproduction of grazing dairy cows subjected to timed AI at the beginning of the breeding season. A total of 957 cows were evaluated in the postpartum period and incidence of diseases recorded. At calving, dystocia, twin birth, stillbirth, and retained placenta were recorded and grouped as calving problem. On d 7 ± 3 and 14 ± 3 postpartum, cows were evaluated for metritis and blood was sampled and analyzed for concentrations of NEFA and BHBA. Cows were considered in severe negative energy balance if NEFA >0.70 mEq/L, and with subclinical ketosis if BHBA >10 mg/dL in at least one of the 2 samples. Clinical endometritis was evaluated on d 28 ± 3 postpartum by scoring the vaginal mucus, and uterine cytology was collected on d 49 ± 3 for detection of subclinical endometritis. Ovaries were scanned on d 35 ± 3 and 49 ± 3 postpartum. Other diseases were also recorded. Cows were then categorized as healthy, when no clinical or subclinical disease was diagnosed, or as having a single or multiple disease events. The body condition was scored on d 7 ± 3, 35 ± 3, 85 ± 3 and 115 ± 3. Cows received timed AI at d 85 ± 3. Pregnancy per AI (P/AI) was determined 30 and 65 d after AI. Data were analyzed using PROC Logistic of SAS with either individual or categories of diseases. Incidence of disease was high and it was associated with reductions in the proportion of cyclic cows and pregnancy per AI. Calving problems and uterine diseases reduced maintenance of pregnancy in grazing dairy cows.

Table 1. Incidence of health problems and their impact on reproduction at first AI

Category	Incidence	Cyclic	Pregnant d 30	Pregnancy loss
Health	41.8	91.6[a]	70.9[a]	10.4
1 case of disease	31.1	90.8[a]	61.4[b]	9.0
> 1 case of disease	27.1	82.2[b]	48.5[c]	15.0
Disease				
Calving problem	8.2	83.6	44.8*	26.9*
Metritis	5.7	73.9*	38.6*	31.2*
Clinical endometritis	14.7	90.2	54.1	20.6*
NEFA > 0.7mEq/L	20.0	82.5*	45.6*	6.6
Subclinical ketosis	35.4	88.1	56.8*	8.3

[a,b,c]Different superscripts differ within a column ($P < 0.05$). *Different from health cows ($P < 0.05$).

Key words: disease, grazing, fertility