# Animal Health: Intervention and Management Strategies

**419    Comparison of milk and blood test strips and Fossomatic milk analysis for measurement of β-hydroxybutyrate in periparturient dairy cattle.** D. J. Wilson*[1] and G. M. Goodell[2], [1]*Utah State University, Logan,* [2]*The Dairy Authority, Greeley, CO.*

β-Hydroxybutyrate (BHB) is a ketone measured in blood or milk of dairy cattle shortly after calving for detection of ketosis, usually associated with negative energy balance. Blood test strips (tested in Precision XTRA meter), milk test strips (Keto-Test), DHIA milk meter collected samples and hand stripped milk samples, both latter milks tested with Fossomatic milk analyzer, were compared for BHB measurement. All samples were collected on the same day from study cows. Preliminary study found almost no cows detected as ketotic after 14 DIM. Therefore, 304 Holstein cows from 1 – 14 DIM in 3 herds were blood and milk sampled for BHB testing described above (one 80 cow test and 28 other cows had no stripped samples). Most test methods had continuous results but one (milk strip) had categorical results (0, 50, 100, 200, 500, 1000 μmol BHB/L); analysis compared whether or not each pair of BHB tests categorized the same cows as ketotic or non-ketotic (concordant, C) or disagreed on their status (discordant, D). Blood strips detected 20 ketotic (K) (≥1200 μmol BHB /L), 284 non-ketotic (N); milk strips detected 21 K (BHB ≥200 μmol/L category on strip), 279 N; milk meter Foss detected 13 K (≥200 μmol/L), 273 N; stripped milk Foss detected 34 K (≥200 μmol/L), 162 N. Test comparisons: blood/milk strips 6 K/K, 266 N/N (91% C), 13 K/N, 15 N/K (9% D); blood/milk meter Foss 3 K/K, 257 N/N (91% C), 16 K/N, 10 N/K (9% D); blood/stripped milk Foss 4 K/K, 158 N/N (83% C), 4 K/N, 30 N/K (17% D); milk strips/milk meter Foss 4 K/K, 256 N/N (91% C), 17 K/N, 9 N/K (9% D); milk strips/stripped milk Foss 11 K/K, 160 N/N (87% C), 2 K/N, 23 N/K (13% D); milk meter Foss/stripped milk Foss 2 K/K, 152 N/N (81% C), 7 K/N, 30 N/K (19% D). Sensitivity (Se) and specificity (Sp) depend upon "gold standard" chosen; e.g., if blood strips are gold standard, Se of milk strips = 32%, Sp = 95%. Results show that the BHB test methods agreed well for most non-ketotic cows, but tests did not agree well on classification of ketotic cows. Calibration improvements are needed for Fossomatic testing of BHB in milk.

**Key Words:** BHB, ketosis, milk

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**420    Does every cow need antibiotic treatment at dry-off?** P. J. Rajala-Schultz*[1] and A. H. Torres[2], [1]*Department of Veterinary Preventive Medicine, The Ohio State University, Columbus,* [2]*Dpto Produccion Animal y Tecnologia, DCV- UCLA, Tarabana, Estado Lara, Venezuela.*

Importance of dry cow management in maintaining good udder health has long been recognized and antibiotic dry cow therapy (DCT) is a cornerstone in most mastitis control programs. The objective of this study was to evaluate whether selective DCT can maintain udder health in US dairies. Routine antibiotic treatment of all quarters of all cows at the end of lactation (blanket DCT) has long been recommended and is practiced in majority of US dairies. In recent years, due to global concerns over agricultural use of antimicrobial drugs and development of antimicrobial resistance, selective DCT, which recommends treatment of infected cows only, has received increasing attention. To evaluate the need for treatment of healthy cows, 414 presumably uninfected, low SCC cows in 4 Ohio dairy herds were randomly assigned to receive or not to receive antibiotic DCT. Intramammary infection (IMI) status over the dry period (DP), clinical mastitis (CM) in early lactation and milk yield and SCC during the next lactation were used as outcomes in statistical analyses. The results suggested that dynamics of IMI over the DP varied considerably between groups, herds and across different causal agents of IMI. There was no significant difference in the risk and time to contract CM during the first 30 d between treated and untreated low-SCC cows (*P* = 0.550), based on survival analysis. Similarly, milk production during the following lactation did not significantly differ between the treated and untreated low SCC cows (*P* = 0.6672), using PROC MIXED in SAS (SAS Inst. Inc., Cary, NC). In general, also analyzing data with PROC MIXED in SAS, SCC was lower (by 16%, *P* = 0.0261) among treated than untreated cows, even though the opposite was also observed in some herds. Overall, herd was a significant confounder in all analyses, suggesting that outcome is highly dependent of the herd and some herds may benefit from blanket DCT while others can maintain good udder health with selective treatment. Therefore, advice to dairy producers regarding dry cow management and DCT should be herd-specific, considering individual situation in each herd.

**Key Words:** milk production, selective dry cow therapy, udder health

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**421    Effect of intrauterine dextrose therapy on reproductive performance of lactating dairy cows with clinical endometritis under certified organic management.** M. G. Maquivar*[1], A. Barragan[2], J. Velez[2], H. Bothe[2], and G. M. Schuenemann[1], [1]*Department of Veterinary Preventive Medicine, The Ohio State University, Columbus,* [2]*Aurora Organic Dairy, Platteville, CO.*

The objective was to assess the effect an intrauterine infusion of 50% dextrose in water (DEX) on clinical cure and pregnancy per AI (P/AI) of lactating dairy cows diagnosed with clinical endometritis (CE) compared with untreated control cows (CON). Cows (n = 2856) from 1 organic dairy herd were screened using vaginoscopy for CE at 26 ± 3 DIM and scored using a 0–3 scale (0 = clear mucus, 1 = flakes of purulent exudates, 2 = >50% purulent exudates, and 3 = hemorrhagic discharge mixed with purulent exudates). Cows scored as 2 or 3 were stratified by parity and randomly allocated into 1 of 2 treatment groups: (1) untreated control cows (CON, n = 460) or (2) 200 mL of DEX (n = 417). Fourteen days post-therapy (at 40 ± 3 DIM), CON and DEX cows were re-examined to assess the treatment responses (clinical cure = vaginoscopy score 0 and 1). All cows were subjected to the same reproductive program (estrus detection with tail chalking) and cows displaying signs of standing estrus any time after the voluntary waiting period (45 d) were AI. Body condition scores (BCS) were recorded at calving, 26 ± 3 and 40 ± 3 DIM. Pregnancy diagnosis was performed via ultrasonography at 39 ± 3 d post-AI. The proportion of cows that cured and P/AI were assessed using GLMMIX of SAS. DIM at first service, BCS at treatment, uterine health status, cervix diameter, and rectal temperature at treatment were not different between CON and DEX cows. Cows with CE had greater (*P* < 0.05) cervical diameters at the time of treatment compared with cows without CE. The proportion of cows that cured tended to be greater for DEX (56%) compared with CON cows (49.7%; *P* = 0.08). DIM to first service was shorter for cows without CE (74 d) compared with DEX (85 d) or CON cows (86 d). The proportion of P/AI for first services was greater (*P* < 0.05) for DEX (25.6%) compared with CON cows (19.7%). Cows without CE had greater (*P* < 0.05) P/AI for first services (35.6%) compared with DEX or CON cows. These findings provide evidence that the use of intrauterine DEX improved P/AI for lactating cows diagnosed with CE under organic management.

**422    Effects of supplementation with tropical plants on the performance and parasite burden of goats.** M. A. Zarate[1], J. J. Romero*[1], J. A. Sapora[1], N. J. Forman[1], J. A. Grace[1], M. G. Taylor[1], J. M. Kivipelto[1], A. S. Edison[2], C. H. Courtney[3], and A. T. Adesogan[1], [1]*Department of Animal Sciences, IFAS, University of Florida, Gainesville,* [2]*Department of Biochemistry and Molecular Biology, University of Florida, Gainesville,* [3]*Department of Pathobiology, College of Veterinary Medicine, University of Florida, Gainesville.*

Experiment 1 determined the effect of supplementing bahiagrass hay (BH, *Paspalum* notatum Flügge) with perennial peanut (PP, *Arachis glabrata* Benth.) or sericea lespedeza (SL, *Lespedeza cuneata* Dum.-Cuors. G. don) hay or mucuna (MP, *Mucuna pruriens* cv. Mucuna ceniza) or papaya (PY, *Carica papaya* L.) seeds on intake, digestibility and N retention of goats. Thirty-eight Boer × Spanish × Kiko male goats with low fecal egg counts (FEC, <50 eggs/g; 27.4 ± 5.7 kg BW) were dewormed, blocked by BW and fed BH alone or supplemented with PP or SL hay (50% of diet DM), or MP (10% of diet DM) or PY seeds (10 g/day). Hays were fed ad libitum for 14 d of adaptation and 7 d of measurement. The experimental design was a randomized complete block and the statistical model included treatment, block and goat. All supplements increased N intake ($P = 0.07$) but only PP and SL increased DM intake ($P = 0.11$). Feeding MP reduced ($P < 0.01$) ruminal pH and in vivo DM digestibility ($P < 0.01$). MP and PP increased ($P < 0.01$) N digestibility, whereas SL reduced NDF digestibility ($P = 0.07$). Experiment 2 determined the effect of the diets on growth and parasite burden. On d 22, goats were randomly allocated to pens (3 pens per treatment, 2–3 goats per pen) and fed Experiment 1 diets with 150 g/head/day of a corn-soybean supplement for 42 d. Goats were naturally infected with gastrointestinal nematode (GIN) L-3 larvae and *Eimeria* (EIM) oocysts by grazing on bahiagrass pasture for 5 h daily. The experimental design was a randomized complete block and the statistical model included treatment, block, time (repeated) and pen. Feeding PY and PP reduced ($P < 0.05$) FEC of EIM. Feeding PY, SL, and PP reduced FEC of GIN by 72 ($P < 0.01$), 52 ($P < 0.01$), and 32% ($P > 0.1$), reduced ($P < 0.01$) abomasal adult GIN counts by 78, 52, and 42%, and decreased ($P < 0.01$) plasma haptoglobin concentrations by 42, 40, and 45% relative to feeding BH. Dry matter intake was increased ($P < 0.05$) by SL, PY and PP but ADG and gain to feed ratio were unaffected. Supplementation with PP, SL, and PY increased DMI of goats and decreased their parasite burdens.

**423    Effects of electromagnetic field on testes and semen characteristics in male New Zealand White rabbits.** O. Yildiz-Gulay*[1], M. S. Gulay[1], A. Ata[1], and A. Balic[2], [1]*Mehmet Akif Ersoy University, Faculty of Veterinary Medicine, Burdur, Turkey,* [2]*Sakarya Toyota Hospital, Sakarya, Turkey.*

Electrical magnetic fields (EMF) could be dangerous because it might affect free radical production, tumor formation and fertility. The number of constructions under or near the power lines increased greatly in recent years. Power lines near houses and work places became EMF for people that live and work in those buildings. Thus, the aim of the current study was to understand the effect of EMF on some testes and semen characteristics in male New Zealand White rabbits. After being trained for semen collection for 2 wk, rabbits were assigned randomly to 2 treatment groups of 8 each; treatment groups (T) were housed 6 m under high voltage power lines (380 kV, 32 µT), whereas controls (C) kept 500 m away from the power lines (0.21 µT) for 7 wk (1 spermatogenesis duration). During the experimental period semen samples were collected weekly from all rabbits. At the end of 7 wk, 10 mL of blood was withdrawn from the ear arteries of each rabbits and 4 rabbits per treatment were euthanized. Remaining rabbits were kept at normal laboratory condition for another 7 wk for recovery. During the experimental period, reproductive organs weights, testicular histology, semen quality, plasma testosterone concentrations and libido were evaluated. Semen quality and libido were also evaluated in the remaining animals during the recovery phase. Proc MİXED procedure of SAS was used to estimate weekly least squares means for sperm characteristics. Proc T-Test procedure was used to analyze remaining variables between groups. Decrease in the plasma testosterone concentrations, paired testes weight and the accessory sex glands weight were noted at the end of experimental period for T compared with C ($P < 0.05$). Libido remained normal for both groups. Although no histopathologic lesions were apparent, significant decrease was observed in seminiferous tubule diameters for T compared with C ($P < 0.05$). Moreover, there was a transient teratozoospermia and asthenozoospermia, which returned to normal by wk 7 of recovery period. Thus, data suggest that exposure to ambient EMF causes transient depression on semen quality in rabbits.

**424    Weights of abdominal fat depots in dairy cows.** C. Raschka[1], L. Locher[1], A. Kinoshita[1], U. Meyer[2], S. Daenicke[2], K. Huber[3], and J. Rehage*[1], [1]*Clinic for Cattle, University of Veterinary Medicine Hannover, Hannover, Germany,* [2]*Dep. of Animal Nutrition, Friedrich-Loeffler-Institute, Braunschweig, Germany,* [3]*Dep. of Physiology, University of Veterinary Medicine Hannover, Hannover, Germany.*

Regular control of body condition by scoring (BCS) or sonography (back fat thickness, BFT) is frequently part of herd health management programs in dairy cows although BCS and BFT consider only the subcutaneous (sc) adipose depot. Because fat from abdominal depots appears to be more easily mobilized than fat from the sc depot aim of this study was to measure and to compare weights of different adipose depots in dairy cows. Fourteen German Holstein cows were slaughtered and body weight, withers height and weight of subcutaneous and other fat depots were assessed. Abdominal fat depots were differentiated in retroperitoneal, perirenal, mesenterial, and omental depots. Also fat in the thoracic cavity was weighted. Means, standard deviation and range of weights as well as Pearson correlations between weights of different fat depots were calculated using the SAS statistical package. Body weight of studied cows ranged between 615 and 902 kg, withers height between 138 and 158 cm, and total weight of assessed body fat between 27 and 145 kg (4–17% of body weight). In average from total body fat the percentage of sc fat was 29% ± 6 (mean ± SD; range 21 - 44%), of abdominal fat 65% ± 5 (range 51 - 74%), and of thoracic fat 6% ± 2 (range 5 - 10%). Related to total abdominal fat the proportion of omental fat was 37% ± 5 (range 25 - 45%), of mesenterial 36% ± 6 (range 25 - 53%), of retroperitoneal 18% ± 5 (range 12 - 30%), and of perirenal fat 9% ± 2 (range 5 - 14%). Weight of abdominal and sc fat depots correlated significantly with total fat weight (r = 0.99, $P < 0.001$ and r = 0.93, $P < 0.001$, resp.). Correlation between sc and abdominal fat weight was r = 0.86 ($P < 0.01$). In dairy cows the weight of abdominal fat depots is about 100% higher than of sc fat depots. Omental and mesenterial fat weights account for about 75% of total weight of abdominal fat. Since the correlation between weights of sc and abdominal fat depots was only moderate it may be necessary to reconsider if BCS and BFT reflect sufficiently body condition in dairy cows.

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**425 Effects of hops (*Humulus lupulus* L.) β-acid extract on inulin fermentation and growth of *Streptococcus bovis*.** B. E. Harlow*[1], L. M. Lawrence[1], and M. D. Flythe[2,1], [1]*University of Kentucky, Lexington*, [2]*United States Department of Agriculture, Agricultural Research Service, Forage-Animal Production Research Unit, Lexington, KY.*

The ingestion of large quantities of rapidly fermentable carbohydrates (e.g., fructan or starch) has been associated with the development of equine laminitis. The fermentation of these compounds in the equine hindgut can lead to an overgrowth of gram-positive bacteria (*Streptococcus bovis*), increased lactic acid production and decreased hindgut pH. Antibiotics that inhibit gram-positive bacteria (e.g., virginiamycin) can mitigate microbial disturbances associated with carbohydrate overload. However, natural products, such as plant-derived antimicrobials may also be effective. Hops contains antimicrobial β-acids that inhibit gram-positive bacteria. This study was designed to determine if hops β-acids could inhibit fructan fermentation by *S. bovis*. Growth experiments were conducted in anaerobic media with 0.1 or 0.6% inulin (model fructan). Hops β-acid extract was added (0.45, 4.5, 9.0 ppm final concentration) to triplicate bottles, which were inoculated (1% vol/vol) with stationary phase *S. bovis* and incubated (39°C) for 24 h. Optical density (OD) was determined by spectrophotometry (600nm) every 30 min for 9 h. Growth rates were determined by linear regression (0–3 h). The pH, OD and lactate concentrations (HPLC; ion exchange chromatography, refractive index) were determined at 0 and 24 h. Data were analyzed using the PROC ANOVA procedure of SAS (9.3) with post hoc Fishers LSD test. The maximum specific growth rate of *S. bovis* on 0.1 and 0.6% inulin was inhibited by β-acid extract ($P < 0.0001$). In 0.6% samples, 4.5 ppm β-acid decreased the growth rate from 0.27 to 0.06/h ($P < 0.05$). Compared with inulin-only controls, final OD was lower with treatment indicating a decrease in *S. bovis* growth ($P < 0.0001$). Also, β-acids mitigated pH disturbances ($P < 0.0001$). In 0.6% inulin samples, the 4.5 ppm treatment had a higher pH than the control (5.92 vs. 5.70; $P < 0.05$). Likewise, less lactate was produced with increasing β-acid concentration in 0.6 and 0.1% samples ($P < 0.0001$). These results indicate that, hops β-acid extract could inhibit the growth of *S. bovis* and mitigate disturbances associated with the pathogenesis of laminitis.

**Key Words:** horse, microflora, streptococci

**426 Clinical ketosis and standing behavior in transition cows.** A. J. Itle*, J. M. Huzzey, D. M. Weary, and M. A. G. von Keyserlingk, *Animal Welfare Program, Faculty of Land and Food Systems, University of British Columbia, 2357 Main Mall, Vancouver, BC, Canada.*

Changes in behavior can be useful in the early identification of sick animals; changes in standing behavior are now far easier to monitor with the availability of electronic data loggers. Ketosis is an important disease, especially in the days after calving. The objective of this study was to compare the standing behavior of dairy cows with and without clinical ketosis during the days around calving. Serum BHBA was measured in 150 cows twice weekly, from 3 to 21 d after calving. Standing behavior was measured from 1d before calving (d −1) to 21 d after calving using data loggers. Retrospectively, 10 cows with clinical ketosis (BHBA >2.9 μmol/L) were randomly selected and matched by parity with 10 control cows (BHBA <1.2 μmol/L). Data were stratified into periods around calving as behavioral responses were expected to change depending on day relative to calving and stage of illness as it developed over time. Five periods were defined: d −1, d 0, wk +1 (d 1–7 postpartum), wk +2 (d 8–14) and wk +3 (d 15–21). Differences in standing behavior between ketotic and control cows were analyzed by period using the mixed procedure of SAS; cow was considered the experimental unit. The average (±SD) DIM until first signs of clinical ketosis were observed was 11.7 ± 5.6 DIM. Ketotic cows had fewer standing bouts on d −1 (10.3 ± 1.3 vs. 15.8 ± 1.9 bouts/d; $P = 0.03$) and d 0 (13.7 ± 1.0 vs. 20.0 ± 1.3; $P = 0.003$) relative to calving, compared with control cows; the number of standing bouts was not affected by health status after calving. Average standing bout duration was longer for ketotic cows on d 0 (1.3 ± 0.1 vs. 0.7 ± 0.1 h/d; $P = 0.009$) but no different than control cows during the other periods. The total daily standing time of ketotic cows was longer than control cows on d 0 (17.0 ± 0.8 vs. 13.9 ± 1.0 h/d; $P = 0.003$) but not during the other periods. These results suggest that differences in standing behavior before calving may be useful for the early detection of ketosis in dairy cows.

**Key Words:** BHBA, dairy cattle, health

**427 Lactipro improves performance and health of calves after feedlot arrival.** K. A. Miller*, C. L. Van Bibber-Krueger, and J. S. Drouillard, *Kansas State University, Manhattan.*

Two experiments were conducted to determine effects of Lactipro, administered as a 100-mL oral drench at initial processing, on health and performance of calves following arrival in the feedlot. Lactipro is a probiotic containing a live culture of *Megasphaera elsdenii* ($10^9$ cfu/mL) a lactate-utilizing bacteria. In Exp. 1, 1294 crossbred steers (BW = 119 ± 0.59 kg) were received from Mexico over a 13-d period. Calves were placed into feedlot pens and given free access to long-stemmed grass hay, and then processed 24 h later. At processing steers were assigned to Control and Lactipro (100-mL oral dose) groups based on alternating order through the processing chute. Cattle were housed in 38 pens (5 pens/treatment with 15 to 16 steers/pen and 14 pens/treatment with 39 to 42 steers/pen) and fed a 55% concentrate diet ad libitum. Steers were observed daily for signs of undifferentiated bovine respiratory disease (BRD). Steers diagnosed as morbid were taken to the processing area for treatment (1st therapy, tilmicosin; 2nd therapy, enrofloxacin; 3rd therapy, long-acting oxytetracycline). There were no differences in DMI, ADG, and gain efficiency ($P > 0.5$); overall incidence of BRD was 3.25% and not different for Control and Lactipro groups ($P > 0.15$); but Lactipro steers tended to require fewer 2nd-time antibiotic therapies ($P = 0.06$). In Exp. 2, crossbred calves (504 bulls, 141 steers; BW = 201 ± 4.9 kg) from Texas were housed in 24 pens with 25 to 30 calves/pen. Allocation to treatments, feeding, and daily evaluations were as in Exp. 1. Calves dosed with Lactipro had greater DMI, ADG, and gain efficiency ($P ≤ 0.05$) compared with Control calves. Incidences of 1st and 2nd therapeutic treatments were 31% and 33% less, respectively, for Lactipro compared with Control calves ($P < 0.05$), but third-time antibiotic therapies and mortalities were not different ($P > 0.10$). Total cost/calf for therapeutic treatment was 13% less ($P < 0.05$) for Lactipro calves compared with Control cattle. Dosing calves with Lactipro at processing was effective as a method for improving performance and decreasing clinical signs of BRD.

**Key Words:** bovine respiratory disease, Lactipro, *Megasphaera elsdenii*

**428 Relationship between post-milking standing time, lameness, milking order, and incidence of intramammary infection in dairy cows.** M. E. A. Watters*[1], H. W. Barkema[2], K. E. Leslie[3], M. A. G. von Keyserlingk[4], and T. J. DeVries[1], [1]*Dept. of Animal and Poultry Science, University of Guelph, Kemptville Campus, Kemptville, ON, Canada,* [2]*Production Animal Health, University of Calgary, Calgary, AB, Canada,* [3]*Dept. Population Medicine, University of Guelph, Guelph, ON, Canada,* [4]*Animal Welfare Program, University of British Columbia, Vancouver, BC, Canada.*

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The objective of this study was to determine the relationship between post-milking standing time, lameness, milking order, and the risk of intramammary infection (IMI) in dairy cows milked 3×/d. Forty Holstein cows (<200 d DIM with SCC < 100,000 cells/mL) from each of 4 freestall dairy herds, milking 3×/d, were enrolled for a total of 160 cows in a longitudinal study. Cows were 80 ± 43 DIM at the study start and were followed for three 28-d periods. Data loggers were utilized to record lying behavior in cows for 5 d at the start of each period. Quarter-level milk samples were collected for bacteriological culture on d 1 of each period. A new IMI was defined as a positive culture sample following a negative culture. Cows were lameness scored (scale of 1 = sound to 5 = severely lame) at the end of each 5-d recording period. Time of milking, milk production, and feed delivery times were also recorded. A multivariable logistic regression model was used to determine the risk factors for IMI. Across the study, cows spent 9.9 ± 2.2 h/d lying down and had an average post-milking standing duration of 88.3 ± 48.6 min. Over the study, 12.4% of focal cows were identified as being lame (score ≥ 3). Post-milking standing duration was 7.5 min shorter in lame cows ($P = 0.05$). A total of 240 new IMI were detected from 1214 quarters at risk for an incidence rate of 2.58 IMI/quarter-year at risk. Coagulase-negative staphylococcus (CNS) and *Corynebacterium bovis* were responsible for 47% and 38%, respectively, of detected IMI. The relationship between post-milking standing duration and IMI incidence was non-linear. Cows that stood for >90 but <120 min post-milking tended ($P = 0.08$) to be at reduced risk for an IMI compared with those cows which stood for < 60 min post-milking (OR = 0.67, 95% CI = 0.37, 1.22). Cows milked in the latter half of the milking order were at an increased ($P = 0.009$) risk for IMI (OR = 1.88, 95% CI = 1.17, 3.02). These results suggests that reduced IMI incidence in freestall-housed cows milked 3×/d can be achieved by encouraging cows to remain standing for 90–120 min post-milking and minimizing the time cows wait to be milked.

**Key Words:** behavior, freestall, mastitis

**429    Milk components as predictors for ruminal indigestion/ acidosis in lactating dairy cows.** S. Kirchman[1], P. J. Pinedo*[2], F. P. Maunsell[1], C. A. Risco[1], and G. A. Donovan[1], *[1]Department of Large Animal Clinical Sciences, College of Veterinary Medicine, University of Florida, Gainesville, [2]Texas A&M AgriLife Research & Extension Center-College of Veterinary Medicine & Biomedical Sciences, Texas A&M University System, Amarillo.*

The objective was to investigate biological markers in milk that could be used to detect rumen indigestion before overt clinical signs. Milk component data from 23 Holstein cows (>30 DIM) diagnosed with rumen indigestion were evaluated. Variables were measured using the AfiFarm system and included milk yield, body weight, percentage milk fat, milk protein and lactose, fat:protein and fat:lactose ratios measured in the 16 milkings before and after diagnosis of indigestion. For each case of rumen indigestion, 2 control cows were selected for comparison. Diagnostic criteria for rumen indigestion included deviation of ≤ −20% in milk yield at the AM (morning) milking, reduced rumen motility and no detectable abnormalities in other organ systems. At time of diagnosis, a sample of rumen fluid was collected from all cows using an oro-ruminal probe and the rumen pH was measured. Deviations between values around the time of diagnosis and the mean for the previous 10 d were calculated for all the variables in cases and matched controls. Comparisons between cases and controls were made by ANOVA. Statistical significance was set at $P \leq 0.05$. Average pH was slightly higher in case cows (pH 6.47) than in control cows (pH 6.29). Case average milk deviation was −30%, at 0 milking (at diagnosis). Control cows did not show any significant deviations in variables studied. In case cows, there was a significant deviation in milk fat percentage (+11%, +10%, +8%) and fat:protein ratio (+7%, +10%,+7%) around diagnosis (−1, 0, +1 milking) compared with control cows. Milk protein showed no significant changes while lactose deviations decreased (<−1% deviation) from −2 to +3 milking ($P < 0.10$). The fat:lactose ratio showed the most significant change in deviations (+13%, +13%, +12%) at −2 to +1 milkings. Results suggest that changes in percent milk fat and milk fat:protein ratio, in combination with a decrease in milk yield may serve as possible biochemical markers to detect rumen indigestion. Changes in milk fat:lactose ratio alone occurred 12 to 24 h before milk yield deviation and may be a good screening test for rumen acidosis in lactating dairy cows

**Key Words:** ruminal indigestion/acidosis, biological markers

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