

**STUDENT
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ABSTRACTS

Early Identification of Cows at Risk of Metritis Using Calving Factors and Activity Monitors

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The aim of this study was to identify cows at risk of metritis using calving factors and changes in activity. Initially healthy Holstein cows (N=542) were followed from 3wk before to 3wk after calving. Cows were monitored continuously by a leg-mounted pedometer (AfiMilk®, Afitag™) and cameras in the prepartum and calving pens were used to record calving duration. Calving assistance was recorded. Metritis was diagnosed based on vaginal discharge and body temperature was measured at 6 and 12 DIM. Body condition score (BCS) and gait score (GS) were measured 3wk before calving, 6DIM, and 12DIM. Duration of labour was estimated as time from the appearance of the amniotic sac until the calf was expelled (minutes; min). Cows diagnosed with lameness, milk fever, retained placenta, or displaced abomasum were excluded from analysis. Cows assisted during labour had a higher odds of developing metritis (OR=2.5; P<0.02). As duration of labour increased, the odds of developing metritis increased (OR=1.0; P<0.01). The duration of labour ranged from 11min to 173min (mean±SE = 57.5±2.4) in unassisted cows and 49min to 232min (mean±SE = 118.6±5.5) in assisted cows. Probability of metritis in unassisted cows was not impacted by duration of labour (slope=0.12%; P=0.14). The probability of metritis was greatest at the shortest (49min; 84.5%) and longest (232min; 100%) durations of labour, but the lowest probability was found at 128min (28.2%; P=0.02). Parity, BCS, GS, days dry, gestation length, and calving location were not significant. During the first 5DIM, cows later diagnosed with metritis had lower a duration of lying bouts (56.9±1.6 vs. 67.5±2.9 min; P<0.001). Activity, restlessness, and rest time were not significant. Assisting cows too early or too late during parturition can increase the probability of developing metritis. Measuring lying behaviour during the transition period could contribute to early identification of cows at risk of metritis. Implications: Appropriate timing of calving assistance can reduce the impact of calving on metritis. Changes in lying behaviour could contribute to early identification of cows at risk of metritis.

Effects of Feeding Hay and Calf Starter as a Mixture or as Separate Components to Holstein Calves on Intake and Growth

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Hay consumption in dairy calves fed a high plane of milk can increase average daily gain (ADG), gut development, and starter intake, but the optimum way to present hay to young calves has not been evaluated. We hypothesized that feeding hay and calf starter as a mixture would promote solid feed intake and increase ADG. To evaluate the effects of providing hay mixed with calf starter on dry matter intake (DMI), growth, and hormone concentrations, 40 Holstein heifer calves were fed calf starter and chopped grass hay as separate components (CONT) or mixed at a 90:10 ratio on an as-fed basis (MIX) ad libitum from 14 to 90 d of life. Calves were fed a milk replacer (28% CP and 15% fat) at 1,105 g/d at the maximum. Treatment did not affect solid feed intake or growth performance during the pre-weaning or weaning periods, but MIX calves had lower ADG (1.20 vs 1.31 kg/d; P < 0.01) in the post-weaning period. This is possibly because MIX calves were provided a fixed amount of hay (10%) in a mixture leading to lower overall DMI (3,292 vs. 3,536 g/d; P < 0.05) due to earlier rumen fill compared to CONT calves that could easily choose desired feed components. Although MIX calves sorted against (P < 0.05) long particles (primarily hay), they had lower starch intake (966 vs. 1,098 g/d; P < 0.05), indicating reduced calf starter intake compared to CONT calves. In addition, MIX calves had lower plasma concentration of glucagon-like peptide 2 (0.46 vs. 0.77 ng/mg; P < 0.05), a hormone stimulating gut development and nutrient absorption. As such, mixing 10% hay with calf starter is not recommended for post-weaned calves as it may limit DMI, ADG, and perhaps gut development of calves.

Dairy Production Performance Replacing Corn and Barley Silages with Whole Crop Faba Bean Silage in Western Canada

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The aim of this study was to determine the effect of partial (50% and 75%) and complete (100%) replacement of barley and corn silages with low tannin (snowdrop variety) whole crop faba bean silage at late pod stage (97 days old) on high production dairy cows in terms of milk yield, efficiency, digestibility of primary nutrients and rumen fermentation characteristics. A double 4 × 4 Latin square was used as experimental design. Statistical analyses were performed using PROC MIXED procedure of SAS 9.4 with significance declared at $P < 0.05$. The results showed that T100 (30.60 % whole crop faba bean silage) produced higher ($P < 0.05$) fat corrected milk (3.5% FCM) and higher ($P < 0.05$) energy corrected milk (ECM) than control diet T0 (18.37% corn silage + 12.23 % barley silage) (+4.35 and +3.48 kg/cow/d respectively), but produce similar FCM and ECM than T50 (9.18% corn silage + 6.12 % barley silage + 15.30 % whole crop faba bean silage) and T75 (4.59% corn silage + 3.06 % barley silage + 22.95 % whole crop faba bean silage). Additionally, the fat yield was higher ($P < 0.05$) when whole crop faba bean silage was included in the diet (2.11 vs. 1.89 kg/cow/d). Efficiency (DMI/FCM) was higher ($P < 0.05$) when animals consumed T75 than T0 (2.21 vs. 1.91), while the digestibility of starch was similar ($P > 0.10$) among T50, T75 and T100 but were lower ($P < 0.05$) than in T0 (92.65 % vs. 96.13 %). Ammonia, volatile fatty acids and pH were similar ($P > 0.10$) among all the treatment. In conclusion, the inclusion of whole crop faba bean silage at late pod stage improve fat corrected milk, energy corrected milk, milk fat yield and efficiency without negatively affecting the intake of dry matter. Consequently, this study showed that whole crop faba bean silage is a highly nutritive alternative feed to improve the performance of dairy cows in western Canada.

The Effects of Concentrate Feeding Level and Rate of Increase When Offered Through an Automatic Milking System on Fresh Cow Performance

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The objective of this study was to determine if the amount of pellet offered through an automated milking system (AMS) and the rate of increase for the pellet allocation affects dry matter intake (DMI), milking frequency, and milk and milk component yield of fresh cows housed in a guided traffic barn. Fifty-nine cows were fed the same partial mixed ration (PMR, 19.3% starch DM basis) and assigned to 1 of 3 AMS pellet (39.6% starch DM basis) allowances. Cows received (DM basis) either a low allocation (3 kg/d, LOW; n=19); or 1 of 2 high allocations (HIG; 8 kg/d). Pellet allocations for the high treatments increased at moderate (MOD; increased from 3 to 8 kg over 15 d) or rapid (RAP; increased from 3 to 8 kg over 5 d) rates. Intake of AMS pellet and PMR, milk yield, and milking frequency were recorded daily with milk samples analyzed weekly. Average DMI of the AMS pellet was 2.76, 4.06 and 4.01 kg/d for LOW, MOD, and RAP. The standard deviation in pellet intake was less for LOW as compared to HIG (0.43 vs. 0.83 kg/d). PMR intake did not differ between LOW and HIG (15.7 kg/d; $P = 0.33$); however, PMR intake was greater for MOD than RAP (16.8 vs. 14.1 kg/d; $P = 0.03$). There were no treatment differences for total DMI (18.8 kg/d; $P = 0.11$), milking frequency (3.1 milkings/d; $P = 0.66$), or milk yield (39.7 kg/d; $P = 0.33$). Milk fat yield tended to be greater for LOW when compared to HIG (1.64 vs. 1.48 kg/d; $P = 0.08$), but there was no difference for milk protein yield (1.30 kg/d; $P = 0.44$). Take Home Messages: Offering a high amount of pellet through the AMS increased variation in pellet intake without affecting DMI, milk yield, or milking frequency; however, there may be negative impacts on milk fat yield. Overall, the data suggest there is no benefit to offering an increased amount of pellet through the AMS in a guided traffic barn in early lactation.

Impact of Concentrate Allowance on the Behavior and Production of Dairy Cows Milked in a Free Traffic Automated Milking System.

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Automated milking systems (AMS) have been used for over 30 years, however, research on optimizing feeding strategies in these systems is ongoing. Concentrated feed is typically used within the AMS to motivate cows to voluntarily visit the milking unit, and the type and amount of concentrate provided may be modified for each cow. The objective of this study was to determine if the allowance of AMS concentrate affects partial mixed ration (PMR) eating behavior, milking activity, and production of dairy cows milked in a free-traffic AMS. Fifteen Holstein cows (124±53 DIM) were used in a cross-over design with 28-d periods and were provided a basal PMR; with treatments consisting of a pelleted AMS concentrate allowance of either 3.0 kg/d (L-AMS) or 6.0 kg/d (H-AMS) on a dry matter (DM) basis. As designed, cows on the H-AMS had greater AMS concentrate provision (5.9 vs. 3.0 kg/d; $P<0.01$). The standard deviation for mean daily concentrate intake increased from 0.49 to 1.3 kg/d ($P<0.01$) with greater AMS concentrate allocation. When on the H-AMS, PMR intake was reduced (24.7 vs. 26.3 kg/d; $P=0.03$) and meal size was smaller (3.2 vs. 3.5 kg/meal; $P=0.02$). The reduction in PMR intake was offset by greater AMS concentrate provision; thus, cows on the H-AMS tended to have greater total dry matter intake (30.6 vs. 29.3 kg/d; $P=0.06$). When on the L-AMS, cows spent 19.3 min/d more time ruminating ($P<0.01$), tended to have greater lying bout length (93.7 vs. 85.9 min/bout; $P=0.07$), and lost body condition (-0.04 vs. +0.13 BCS units; $P=0.02$). Milk yield was numerically greater when cows were on the H-AMS (46.0 vs. 44.4 kg/d), however milking activity (3.9 milking/d) was not affected by treatment. Overall, these data suggest that allocating a greater amount of concentrate to the AMS, in a free traffic setup, may promote greater total dry matter intake, but may also result in greater day-to-day variation in AMS concentrate intake.



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