

O035**Milk yield, culling rate and reasons of pure Holsteins and second generation crossbred cows from Montbéliard × Swedish Red × Holstein**

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Crossbreeding has been proposed as management tool to improved fertility of dairy herds. Aim of this study was to compare milk yield, longevity and culling reason of pure Holstein cows (HO; $n = 990$) with those of second generation crossbred cows from Montbéliarde × (Swedish Red × HO) ($n = 193$). The research was carried out monitoring cows from a single dairy herd reared in a farm located in the Po Valley. All cows were loose housed in a barn provided with cubicles and they were subjected to the same management and feeding program. The sample considered 373 primiparous, 306 secondiparous and 504 multiparous cows (≥ 3 lactations) that calved from 2008 to 2016. Milk yield was estimated on 1699 closed lactations of the considered sample and pure HO had a higher average milk yield (10403 kg) than crossbred cows (9142 kg) ($p < .001$). However, when milk yield considered the whole productive career of the animals, there was no breed effect due the greater longevity of crossbred compared to pure HO (2.64 vs 2.40 lactations; $p = 0.02$). A total of 367 cows were culled during the recording period with an average culling rate of 31.0%. In line with longevity, culling rate was significantly ($p < .001$) lower for crossbred cows (12.4%) than for pure HO (34.7%) and a significant breed effect ($p < .001$) was observed particularly for culling rate of primiparous cows (30.6%), with pure HO showing the highest value (33.5% vs 10.4%). Culling reasons were gathered from farm recording sheets and peripartum disorders, as aggregate of post-partum problems, abomasum displacement and uterine prolapse, resulted the most frequent cause (15.8% of total culled cows) followed by low fertility (12.3%) and intestinal clostridiosis (10.3%). Odds ratios (OR) and 95% confidence intervals (CI) were calculated for these three main culling reasons considering crossbreeding as preventive term. The exposure to peripartum disorders was reduced by 60% ($p < .05$) for crossbred compared to pure HO cows (OR = 0.44; 95% CI 0.20-1.00). Similarly, crossbreeding decreased by 90% the likelihood of being culled for fertility reasons (OR = 0.09; 95% CI 0.01-0.64). There was no preventive effect of crossbreeding on the occurrence of intestinal clostridiosis, (OR = 0.49; 95% CI 0.19-1.29). A relevant environmental cause was hypothesized for this culling reason due to the

recycling as bedding material of the solid fraction of the manure, after an incomplete composting process.

O036**Predictive models for locomotion issues in Italian Holstein dairy cows**

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Locomotion system issues are major issues in dairy herds, affecting both animal welfare and farm productivity. Early detection could improve the effectiveness of treatments and increase the chances to cure lame cows. Currently, locomotion issues detection requires direct observation of cows walking (locomotion score). However, this is a time-consuming task and is not always an available option in large dairy farms. Aim of this preliminary study was to build a predictive model for locomotion system issues in Italian Holstein dairy cows using some novel phenotypes from automatic recording systems (milking parallel parlour and SCR Heatime and DataFlow2 system) as predictors. Data was recorded from a commercial farm located in the province of Mantua (Lombardy, Northern Italy) for a total of 413 animals, daily monitored for two years (Sept. 2014 – Dec. 2016). The response variable was binary (0/1: healthy and diseased, respectively). The selected variables were daily rumination time, parity, DIM, daily milk production, daily activity and month of recording. Summary statistics (mean and SD) were calculated: rumination time, 563.28 ± 88.48 min/day; parity, 1.93 ± 1.28 ; DIM, 171.34 ± 124.14 days; milk production, 24.14 ± 13.74 kg/day; activity, 614.00 ± 134.64 min/day. DIM were classified in four classes to assess the potential effect of the lactation stage: dry, early, mid, and late lactation (no lactation, <120 days, 120-240 days, and >240 days, respectively). Three different datasets were prepared, where rumination, milk, and activity were averaged as means of 1, 3, and 5 days before the response variable record. On each dataset, two models were fitted: logistic regression and random forest. All the analyses were performed in R using the caret package. Data were divided into a training and a testing dataset (proportion 80/20). Training data was used to train two different algorithms which were used to predict the class variable. The two selected algorithms were: 1. a logistic regression 2. a random forest.

For all the datasets, logistic regression was not able to predict diseased individuals, assigning all to the 'healthy' class.

Random forest performed better, although with a high-class error. The 5-day window had the lowest OOB error rate (0.24%) and the lowest class error (0.71). Further tuning of the selected models will be necessary to build a valuable tool to predict locomotion system issues.

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O037

Use of an electronic rumination-monitoring system in pre-weaned calves

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The onset of rumination in calves starts approximately at 1-2 wks of age and increases up to 5 h/d at 4-6 wks. Nevertheless, the rumination behavior during the overall pre-weaning period and the daily rumination pattern is difficult to be investigated. The recent introduction of the Hi-Tag rumination-monitoring system (SCR Engineers Ltd., Netanya, Israel) in adult cows allows the automatic quantification of rumination time (RT) and opens new perspectives in the study of other physiological periods. This study was intended to evaluate the Hi-Tag system for monitoring rumination (RT and daily pattern) in pre-weaned calves and to assess the relationship of RT with inflammo-metabolic conditions. Nine Simmental calves were kept in individual pens from birth to 6 wk of age. At $d 2 \pm 1$, calves were fitted with Hi-Tag loggers, which record the sounds of regurgitation and rumination. RT data were calculated in 2-h intervals. Calves were fed whole milk twice daily and also calf starter was provided. Blood samples were collected at $d 0, 1$, and then weekly. Data were analyzed using PROC MIXED and PROC CORR of SAS (SAS Institute Inc., Cary, NC). The average of daily RT was 91, 210, 313, 362, 373 and 377 min/d for wk 1, 2, 3, 4, 5 and 6, respectively. The daily RT observed at wk 6 represents the 63% of the mean daily RT value recorded in adult cows in mid lactation. Moreover, the daily rumination pattern observed in calves over weeks is similar to that reported in

adult cows. At wk 6, the Hi-Tag loggers recorded values of RT at nighttime greater than those registered at daytime (61% vs 39%; $p < .001$) as already observed in adult cows. In all calves, RT was not influenced by milk suckling. Indeed, the RT in the 2-h interval recorded at milk feeding was markedly lower (especially in the morning) compared to RT in the 2-h interval before. Relevant correlations between daily RT and a number of plasma parameters (albumin: $r = 0.50$, $p = .001$; paraoxonase: $r = 0.59$, $p < .001$; cholesterol: $r = 0.36$, $p < .01$; GGT: $r = -0.55$, $p < .001$) were observed. These associations demonstrate that RT in pre-weaned calves is well related with markers of liver functionality. These results represent a first attempt to use an automatic system to obtain a reasonable quantification of RT in calves at the pre-weaning stage. Despite this technology remains not validated for calves, the outcome of the present study seems promising to identify animals with poor post-birth adaptation or poor health status.

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Effect of different ventilation systems on beef cattle during the early fattening period

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The aim of this study was to assess the effect of the ventilation system on the environment and the performance of beef cattle during the early fattening period. It was conducted on one group ($n = 106$) of young Charolais bulls from the first of August to the 9th of October. Animals were raised in a roofed, loose housing facility with straw bedding. The day after their arrival bulls (429 ± 24 kg) were grouped according to weight in 10 pens. Five pens were equipped with 2 ceiling fans (CF), whereas the other 5 had 2 horizontal fans (HF). The pens with different ventilation were separated by an empty pen with a windbreak. The trial lasted 70 days and it was divided into 3 periods. In the first and in the third periods all the fans were in operation, whereas in the second period they were switched off to see the effect of the ventilation on the animals and on the environment. In order to