Breeding and Genetics: Dairy Cattle Breeding II

707 Methods for the assessment of milk coagulation properties: A genetic analysis. A. Cecchinato*, M. Penasa, M. De Marchi, C. Cipolat Gotet, I. Bazzoli, N. Cologna, and G. Bittante, *Department of Animal Science, University of Padova, Viale dell'Università, Legnaro, Padova, Italy.*

Milk coagulation properties (MCP: clotting time, curd firmness) are of great importance because they influence cheese processing, yield and quality. Assessment of MCP can be performed through Formagraph (FMG), which is an instrument based on the tiny forces exerted by pendulums when samples of coagulating milk are exposed to linear oscillations, or Optigraph (OPT), which is based on an optical signal in the near-infrared reflectance spectroscopy. The FMG provides measures of milk clotting time (RCT, min), defined as the time from the addition of rennet to milk until the beginning of coagulation (within a 90-min testing time), and curd firmness (in mm) measured at different time: 30 (a30), 60 (a60), 75 (a75) and 90 (a90) min from the beginning of the test. The OPT provides same measures of MCP by means of particular feature points extracted from optical information acquired in real time. The aim of this study was to estimate heritabilities of and genetic correlations between MCP obtained from FMG and OPT. A total of 1,014 Brown Swiss cows were sampled once in 68 herds from January 2010 to February 2011. Individual milk samples were collected during the evening milking and analyzed for MCP by using FMG and OPT. A Bayesian standard linear model was implemented via Gibbs Sampling. The model included the non genetic effects of days in milk, parity, herd and the additive genetic effect of animals. For RCT measured by FMG, marginal posterior mean (SD) of heritability was 0.30 (0.09). Estimates of heritability for a30, a60, a75 and a90 averaged 0.14 (0.06) and ranged from 0.13 (0.06) to 0.16 (0.07). For OPT, corresponding estimates were slightly lower. Genetic correlations between MCP from FMG and OPT approached 0.90 (0.06). On the basis of the genetic parameters obtained in this study, the improvement of MCP through selection is possible, regardless the method used.

Key words: milk coagulation properties, near-infrared spectroscopy, genetic parameters

708 Genetic relationships between fertility and content of major fatty acids in milk for first-parity Walloon Holstein cows. C. Bastin*[1], N. Gengler[1,2], and H. Soyeurt[1,2], *[1]University of Liège, Gembloux Agro-Bio Tech, Animal Science Unit, Gembloux, Belgium, [2]National Fund for Scientific Research, Brussels, Belgium.*

Fertility traits are difficult to measure and have low heritabilities. Consequently, indicators traits are of interest for breeding value estimation for fertility especially if these traits are easier to measure, have higher heritabilities and are well correlated with fertility. Furthermore, some traits of the milk fatty acid (FA) profile could be considered because they can be related to the energy balance status. Therefore the objective of this study was to estimate genetic correlations between days open (DO) and the contents of 19 individual and groups of milk FA. Fatty acids contents (in g/dl of milk) were estimated by MIR and were: saturated, unsaturated, monounsaturated, polyunsaturated, long chain, short chain, medium chain, C4:0, C6:0, C8:0, C10:0, C12:0, C14:0, C16:0, C17:0, C18:0, C18:1, C18:1 cis, and C18:1 cis-9. Data included 143,332 FA and 29,792 DO records collected from 29,792 Holstein cows in first parity. Co(variances) were estimated using 19 2-trait models that included random regression for FA traits. Overall, genetic correlations between DO and FA contents in milk changed significantly over the lactation. For unsaturated, monounsaturated, long chain, C18:0, C18:1, C18:1 cis, and C18:1 cis-9, genetic correlations with DO were positive in early lactation and became negative after 100 d in milk. For the other fatty acids, genetic correlations with DO were negative along the whole lactation. At 5 d in milk, genetic correlation between DO and C18:1 cis-9 was 0.40 and genetic correlations between DO and C6:0 to C16:0 ranged between −0.55 and −0.20. These results emphasized the relationship between fertility and energy balance status and could be explained by the release of long chain fatty acids in early lactation due to the mobilization of body fat reserves and the consequent inhibition of de novo FA synthesis in the mammary gland. At 200 d in milk, correlations between DO and fatty acid contents ranged between −0.40 for C18:1 cis-9 to −0.10 for C6:0. This research suggested the interest of using FA contents in milk in indirect selection for better fertility in dairy cows.

Key words: fatty acid, fertility, genetic correlation

709 Relationships between mortality and 305-d milk yield of Holstein cows in three regions in US. K. Tokuhisa*, S. Tsuruta, and I. Misztal, *University of Georgia, Athens.*

Several recent research reports have indicated increasing dairy cow mortality over the years; however, the reasons for the increase are unclear. This study aimed to investigate the relationship between mortality and 305-d milk yield. DHI data contained 3 regions: Southeast (SE), Southwest (SW), and Northeast (NE). A total of 3,522,824 records for 3 parities were used: 732,009 (SE), 656,768 (SW), 2,134,047 (NE) from 1999 to 2008. Termination code "6" was regarded as "death" and used for mortality calculation. A 2-trait (305-d milk yield, mortality) animal model fitting fixed effects of herd year, age, DIM, month-of-termination, and random animal genetic effect was used to compute correlations and heritability, separately for each region and parity. Mortality was the highest in August for any parity, and the lowest in spring (i.e., the largest difference between the highest and the lowest mortality in SE was 0.63% in 3rd parity). The highest mortality was observed in SE, and mortality in NE and SW were similar. Mortality increased with parity in all regions. Mortalities in first 3 parities across regions were 3.3%, 4.8%, 7.2% (SE), 2.4%, 3.3%, 5.0% (SW), and 2.2%, 3.7%, 5.4% (NE). The span of mortality between 1st and 3rd parity was the largest in SE (3.9%) and the smallest in SW (2.6%). Genetic correlations between the 2 traits were 0.09, 0.09, 0.17 (SE), −0.03, −0.05, 0.17 (SW), and 0.19, 0.19, 0.00 (NE). The environmental correlations were 0.03, 0.05, 0.06 (SE), 0.03, 0.05, 0.05 (SW), and 0.01, 0.05, 0.06 (NE). Heritability estimates of milk yields were 0.28, 0.19, 0.13 (SE), 0.32, 0.19, 0.16 (SW), and 0.35, 0.24, 0.19 (NE). Heritability estimates of mortality were 0.01 for all 3 parities and all 3 regions. The mortality is the highest in SE and is influenced by season and by parity. Environmentally, high milk producing cows tend to have high mortality. Genetically, effects of high milk production on mortality are less clear. Results may have been influenced by special veterinary care to superior cows.

Key words: US Holsteins, cow mortality, regions

710 Genetic parameters of body condition score and other type traits in Canadian Holsteins. S. Loker*[1], C. Bastin[2], F. Miglior[3,4], A. Sewalem[3,4], L. R. Schaeffer[1], J. Jamrozik[1], and V. Osborne[5], *[1]CGIL, Dept. of Animal and Poultry Science, University of Guelph, Guelph,*