Breeding and Genetics - Livestock and Poultry: New Challenges and Opportunities From Automation of Animal Data Recording

420 Current and near term technologies for automated recording of animal data for precision dairy farming. G. Katz*[1], A. Arazi[1], N. Pinsky[1], I. Halachmi[2], Z. Schmilovitz[2], E. Aizinbud[1,2], and E. Maltz[2], [1]*SAE Afimilk*, *Kibbutz Afikim, Israel*, [2]*Institute of Agricultural Engineering, Agricultural Research Organization - The Volcani Center*, *Bet Dagan, Israel*.

Data monitoring in the modern dairy farm enables the ongoing control of production, animal health and welfare. It is used for management planning, early disease diagnosis control and retrospective analysis of performance from single cow to herd. Currently most data is extracted manually, yet manual observation is gradually being replaced in many milking systems by automated recording(milk yield, milk conductivity, activity recording and body weight measurements) leading to better data, both in quantity and quality. Two new additional sensors are introduced: a milk analyzer and a behavior meter both are already installed and used in several commercial and research farms. The first gives real time measurements of milk solid concentrations and indicates the presence of blood and the level of somatic cells in the milk. The behavior meter continuously records the laying time, laying bouts and the activity of the individual cows. These additional sensors open new horizons. Herd genetics may be improved by selection based on frequent milk solids determination in individual cows in herds where milk is not tested regularly. Automated daily determination of fat corrected milk and body weight enables the prediction of dry matter intake for better use of computer controlled self feeders and asses the required rest periods for individual lactating cows. Daily solids determination alerts to any sudden changes in fat and protein content of the milk, of individual cows, groups or the whole, ensuring its economic value. Early diagnosis of sub acute ruminal acidosis and ketosis by using milk fat concentration, fat to protein ratio and weight changes in both individual and groups of cows, allows for better prevention policy and prompt treatment. The cow-behavior enables animal welfare assessment in different environmental conditions and stress situations, as well as reproductive and health status. These new sensors, in addition to the present ones (which record milk yield, milk flow rate, milk electric conductivity and daily body weight) will therefore improve individual cow health, overall herd performance and management decision making.

421 Thriving in a declining market – the new service paradigm for DHI's. N. Petreny*, *CanWest Dairy Herd Improvement*, *Guelph, Ontario, Canada*.

Exponential growth of computing capabilities and the development of advanced analytical instrumentation now offer ability to transfer traditionally centralized functions to the individual farm level – including record processing and milk analysis. The resulting challenge for the broader industry is the loss of data that supports traditional herd improvement and genetic evaluation activities as isolated data islands are created within the industry. Handling of independent data streams will become more complex and the underlying elements of data collection will become increasingly variable. Without evolution, the slow death of traditional dairy herd improvement (DHI) activities shall occur as organizations operate using historic service guidelines designed for the wrong customer, fail to innovate and adopt technology applications at a rate significantly slower than the dairy farm customers they service (in-voluntary obsolescence). Herd improvement organizations must shift their primary focus to supporting dairy herd profitability and not act as data collectors for genetic evaluation and breed improvement activities – both of which should be a by-product of the core DHI services. Technologies must be harnessed to enhance the profitability of customers by personalizing services and extracting more information from data and milk samples. Current Information technologies will now accommodate active benchmarking and individual farm adjustment factors. New analytical technologies allow for cost effective health and disease diagnostics from the millions of milk samples currently collected. Innovation requires continuous planning, research and investment. Businesses not reinvesting in infrastructure have a limited future as assets near the end of their life without a replacement plan. Dairy is no exception. Efforts to retain traditional agencies with a withering client base by operating a skeleton service will not last. The DHI sector needs to ensure that partnerships, economies of scale and innovation are implemented at the organizations level at a speed at least equal to the farm adoption rate.

Key Words: DHI, Technology, Innovation

422 Harnessing automatic data collection to enhance genetic improvement programs. G. R. Wiggans*[1], M. A. Faust[2], and F. Miglior[3,4], [1]*Agricultural Research Service, USDA*, *Beltsville, MD*, [2]*ABS Global, Inc.*, *Deforest, WI*, [3]*Agriculture and Agri-Food Canada*, *Sherbrooke, QC, Canada*, [4]*Canadian Dairy Network*, *Guelph, ON, Canada*.

Automatic data collection can improve data accuracy, reduce cost of obtaining data, and enable addition of other traits. In the United States, genetic improvement programs for dairy cattle have benefited from a long history of innovation related to data collection and processing: computerization in the 1950s, establishment of laboratories for component testing in the 1960s, electronic transfer of data from farms and laboratories in the 1980s, on-farm data entry in the 1990s, and the recent use of hand-held devices. The recent evolution of increasing emphasis on fitness relative to yield is likely to be hastened because of automated data collection. Electronic milk meters currently are used for 7% of DHI cows and can provide data on total yield, milking speed, and milk conductivity. Other sensors may be added to detect progesterone levels, milk temperature, and information on component concentration. The expected widespread adoption of radio-frequency identification will facilitate electronic collection of data by improving the reliability of identification determination. Electronic scales may be justified as a way to determine body condition score automatically. Hand-held computers may facilitate collection of health data and increase uniformity across herds. Weather data may be used to account for environmental effects better. As the number of traits increases, herds that can supply more data will become increasingly important. A separate progeny-test category may be developed for farms that collect all data electronically and have those data monitored closely. Owners could be paid for their data on a quality basis, thus adding a source of revenue. Such herds could also have parentage verification to improve accuracy further. Automated data collection along with parentage verification offers substantial opportunities for genetic improvement of overall economic merit.

Key Words: Automatic Data Collection, Genetic Improvement, Fitness Traits