McMEEKAN MEMORIAL AWARD
Bevin L. Harris

"While nutrition and management, broadly speaking, determine the actual or immediate level of production of an individual cow and herd, inherent dairy merit governs the ultimate and future level of productivity. In the long run, no dairying country, and accordingly no individual dairy farmer, can afford to stand still in the struggle for ever-increasing efficiency." (McMeekan, 1960).

Dr Bevin Harris has been a principal designer of the New Zealand system for genetic evaluation of dairy cattle for over fifteen years. This system is an essential tool in the ongoing struggle for ever-increasing efficiency. Bevin's initial contributions began in the 1990s with implementation of animal models for trait evaluations of dairy cows in New Zealand, and development of a breeding objectives model that extended the empirical analysis of the efficiency McMeekan envisaged. These two developments were described at the Annual Conference of the Society in 1996. The trait evaluations established truly valid across breed comparability for the first time. A very high proportion of New Zealand dairy farmers adopted the Breeding Worth index (BW) when identifying suitable parents for generating replacement animals for their farms. Net benefits of BW selection, compared to previous methods, now approach one billion dollars.

By the end of the twentieth century, it was apparent that genetic selection for improved production had been associated with an unintended consequence for cow fertility. The antagonistic genetic relationship between production and reproduction had been less evident in New Zealand than overseas, partially due to a form of natural selection associated with local dairy farming practices that require late-calving cows to be culled and replacements to be retained almost exclusively from early calving cows. Nonetheless, there was an urgent need at the beginning of the twenty-first century to develop trait evaluations for dairy cow fertility; and to include this trait in the BW index. Neither of these developments had been achieved outside Scandinavia. Bevin developed new evaluation techniques that were implemented in 2001-2002. The new genetic evaluation identified a large number of sires, particularly imported sires, which were transmitting daughter fertility that was too low to be suitable for New Zealand seasonal dairy farming. Some of these were very high profile international sires. To a close approximation, their male descendants were siphoned out of the New Zealand genetic pipeline.

Genetic selection for improved dairy production was associated with another unintended consequence. There is an antagonistic genetic relationship between dairy production traits and somatic cell counts in milk (SCC). Unfavourable trends in SCC in the national milk supply became evident early in the new century. Bevin and Anne Winkelman worked together to implement trait evaluations by 2005, with inclusion of the trait in the BW index in the same year.

This was the first implementation of a random regression model for a national genetic evaluation centre for dairy cattle in the southern hemisphere. The technique made better use of all available data than previous methods, coping with differences in genetic merit at every point along the trajectories of lactations.

Bevin and his co-workers turned next to extending these random regression methods to the dairy production traits, to increase accuracy of evaluations and to enable herd testers to offer more flexible services.

Standard practice overseas is to use only data from the first three lactations of a cow when developing these "test day" models. Bevin's development utilises the first six lactations. Genetic parameter estimation was unusually complex, requiring innovative use of covariance structures. New methods were needed for routine solution of the extraordinarily large system of equations in a twenty-four hour computational window.

Dr. Bevin Harris has continued to engage in the challenging task of deriving useful information from the huge datasets that modern recording practices generate. His skills encompass advanced statistical methods in animal breeding and the development of efficient algorithms to utilise the increasing computing power becoming available in the twenty-first century. One of the tributes paid to "Mac", as McMeekan was known, was that he and his team had been extraordinarily successful in sorting out the issues that really matter in dairy farming. In the sphere of cattle breeding, Bevin is carrying on that tradition.

Bill Montgomerie and Peter Brumby

REFERENCES

McMeekan, C.P. 1960: Grass to milk. The New Zealand Dairy Exporter, Wellington, New Zealand. p. 29