Report on a side event held at FAO:s International Technical Conference on AnGR
for Food and Agriculture on September 5, 2007.
Organized by the Interbull Centre, Uppsala, Sweden

How sustainable are the breeding programs of the global main stream dairy breeds?

The side event was chaired by Jan Philipsson, secretary of Interbull, a permanent subcommittee of the International Committee of Animal Recording (ICAR). The Interbull Centre was asked by FAO to organize this side event as it is responsible for international genetic evaluation of dairy bulls across countries and has access to global information on the main stream dairy breeds of the world.

Five speakers from different parts of the world gave presentations on the theme above:

Freddy Fikse, Interbull Centre director, reviewed the background of Interbull and its activities concerning some 40 member countries around the world. Communication, R&D and technical support accompany the main activity of international genetic evaluations. These comprise about 150,000 bulls of six dairy breeds that are evaluated three times a year. The method applied for genetic evaluations (MACE) considers genotype by environment interactions. The degree of genotype by environment interaction is measured by genetic correlations between performances in different countries/regions, and varies on average between 0.6 and 0.95. As a consequence, ranking of top bulls in the different regions differ, and many more top bulls of each breed will be used globally than was the case previously, thereby supporting the genetic diversity of each breed. International evaluations are carried out for production, conformation, udder health, calving traits, female fertility and longevity. Global trends show strong positive genetic trends in production, whereas a clear negative trend in fertility is shown in the Holstein breed. Almost all countries apply nowadays a Total Merit Index (TMI) aiming at balanced breeding for production and functional traits.

Markus Schneeberger of the ETH in Zürich reported on the main stream breeds, Braunvieh and Fleckvieh, and their historical developments in both central Europe and USA to evolve into Brown Swiss and different strains of Fleckvieh/Simmental and Montbéliarde with Red Holstein. TMI is applied since long in Switzerland and will be including health records in future. Studies show effective population sizes of their main breeds of >100 and the inbreeding rate is monitored and found acceptable.

Hans Ekström, representing the Nordic Gene Bank, reported on the development of the Nordic Red breeds. A continuous exchange of bull sire semen has taken place between the Nordic breeding organizations since long and similar breeding objectives have been practiced. TMI has been in place since long in these countries, and have for example in Sweden included female fertility and calving traits since more than 30 years and health traits since 1984. In contrast to Holstein, the Red breeds show in general positive trends for health and fertility traits, while a strong increase in production also has been achieved. Rates of inbreeding are monitored and kept under control.

Bevin Harris, geneticist at the Livestock Improvement Corp. in New Zealand, gave a broad overview of the development of the dairy cattle populations in the Oceanian region. Whereas Australia has about two million dairy cows, which were reduced recently due to severe droughts, the New Zealand population is steadily growing and expects to reach 5 million cows in 2010. Breeding objectives are strongly favoring the best cows under grazing conditions, penalizing large-sized breeds. Crosses between the predominant breeds Holstein and Jersey are gaining in numbers and a large proportion of the tested bulls are also

crossbreds. Farmers appear to be in favor to develop a synthetic breed, the "Kiwi". Fertility traits are considered very important as strict seasonal calving is practiced. Inbreeding is monitored regularly. Considerable problems seem to exist for the Jersey breed.

Fernando Madalena, professor at the Fed. University of Minas Gerais in Brazil**,** reported on the Latin American scene. Brazil has largely been importing Holstein semen, but the trend is declining, favoring domestically produced semen. Importing high yielding genetics without considering health and fertility traits have caused problems with these traits. Crossbreeding with Zebu, e.g. with Gir, is increasing to breed cows better adapted to the hot and humid climate. Also synthetic breeds have been developed. More alternative genetic sources, pure breeds and crossbreds, are needed to be tested for use in this continent.

Discussion

It was initially pointed out that the mainstream dairy breeds play an enormous role for global food security as producers of both milk and meat. The diversity between as well as within these breed groups must therefore be continuously attended, so that these breeds are not eroded while competing on the international market for the purpose of producing cheap food.

The discussion centered on the following issues:

1. How could we monitor inbreeding rate of main stream breeds which are used globally and where only fragmented information can be collected at national level?
2. How could we assure sustainable breeding programs, considering both rates of inbreeding and proper breeding objectives when breeds are spread around the world?
3. The need for diversity among the main stream breeds to fit the various production systems, regions and climatic zones of the world was stressed.
4. The need for increased attention to functional traits, in particular female fertility, in most breeds, and especially the Holstein breed, was underlined.
5. Global analyses of the genetic diversity of the Jersey breed in order to manage the inbreeding situation were proposed to be undertaken.
6. Improvements are needed for recording of congenital defects as a basis for early detection of carriers when these are not already included in e.g. a gene test.

It was proposed that FAO should take an initiative to discuss the above issues with the world breeding organizations, as they relate to globally used breeds. The aims would be to analyze and find feasible ways of monitoring breeding programs and discuss alternative strategies to ensure the sustainability at the global level of these breeds. As an example the World Guernsey Cattle Federation has started a promising global breeding program covering several continents. It was pointed out that Interbull would have continuously better information to provide for such analyses.