

Future animal improvement programs applied to global populations

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Breeding programs evolved gradually from within-herd phenotypic selection to local and regional cooperatives to national evaluations and now international evaluations. In the future, breeders may apply reproductive, computational, and genomic methods to global populations as easily as with national populations now. Countries could merge phenotypes for standard traits such as production, SCS, and longevity across borders to reduce evaluation efforts within each country and to simplify across border marketing. Larger farms collect much automatic data, but might not provide it for use in evaluations unless paid to do so. Phenotypes for new or less heritable traits will become a limiting factor as the supply of genotypes rapidly expands and the price of genotyping decreases. Individual country data sets for traits recorded only recently such as heifer fertility may be too small for reliable genomic predictions, whereas a combined international file could give good results. Dairy cattle breeders exchange traditional breeding values worldwide via Interbull, and methods are now needed to exchange either genomic evaluations or genotypes. Goals are to adapt multi-trait across country evaluation (MACE) in the short term and to merge genotypes in the long term. Swine and poultry breeding companies may find that more open exchange such as in dairy cattle leads to more rapid progress in the genomic era. Separate breeding companies can each pay to test their own animals, but shared investment in genotyping of reference populations can result in larger returns. Genotyped young animals are rapidly replacing progeny tested bulls and phenotyped cows as sources of breeding stock. A new market could also develop for genotyped frozen embryos. Marker subsets may be selected to provide, for example, 40% of the benefit of the full set for only 10% of the cost, allowing wide application of low density chips. The global population of animal breeders will develop and apply many other new tools to improve the global population of animals.

Practical cattle breeding in the future: commercialised or cooperative, across borderlines between countries and organisations

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Due to the development of new technologies the dairy cattle breeding industry is facing many changes. Selection of bulls will be changed from progeny testing scheme to genomic selection of young animals with a dramatic drop in the number of progeny tested bulls. The breeding goal will be efficient milk- and beef production from sound, healthy animals with respect to animal welfare and ethics. This paradigm will lead to further globalization of the dairy cattle industry. The effectiveness of the breeding programme will still depend of intensive registration of phenotypic data on farm and common use of data through central databases. Traditional cooperatives like A.I. centres and cattle breeding associations need to collaborate or merge within countries and across borderlines to secure continuous development of breeding programmes and resulting genetic progress in the population.