

What efficiency and resilience gains have we actually achieved in the past century or decade, and at what cost*J. Lassen¹ and Y. De Haas²**¹Vikinggenetics, Ebeltoftvej 16, 8960 Randers, Denmark, ²Wageningen University and Research, P.O. Box 338, 6700 AH Wageningen, the Netherlands; jalas@vikinggenetics.com*

For the last two decades most countries have changed their breeding goal from main focussing on yield and conformation to a broader focus on health, fertility and longevity in a total merit index. This have been implemented due to the recognition of a phenotypic decline in the cost reducing traits. The reason why this has become possible is a much stronger focus and investment in new phenotypes and methods to register these phenotypes. Also, the development of national databases where the farmers can get use of the registrations is crucial in order to get good data. At the same time there is still much that can be achieved and improved. For fertility most countries use days from calving to first service and days from first to last service as the phenotype, which are clearly not good fertility traits. They are management inflated and not necessarily telling anything about the cows ability to show heat or get pregnant. For health traits treatments are often used. Again these traits are dependent on the farmers management decision and therefore not necessarily saying much about the cows disease resistance. With the introduction of total merit indices and use of these most countries show positive genetic trends for fertility, health and longevity and at the same time strong positive genetic trends for production. These trends though do not always show phenotypically. For feed efficiency very little data exists. The ongoing strong selection for production also gives a genetic response in feed intake, but the correlation is not one, which means that negative energy balance will get more and more severe problem unless proper genetic evaluations for feed intake and efficiency will be available. Over the last decades we have achieved genetic gains for efficiency and resilience traits because the focus on balanced breeding has been implemented in most countries and breeds. Over the future decades this will be improved even more through better phenotypes and genomic herd management tools. The GENTORE project will contribute to this development.

How fast can we change resilience and efficiency through breeding and management?*N. Gengler¹, M. Hostens² and Genotype Plus Environment Consortium (www.gpluse.eu)³**¹ULiège-GxABT, Passage des Déportés 2, 5030 Gembloux, Belgium, ²UGent, Salisburylaan 133, 9820 Merelbeke, Belgium, ³Lead Partner UCD, Belfield, Dublin 4, Ireland; nicolas.gengler@uliege.be*

The efficiency of dairy cattle has to be balanced against their resilience to disease challenges but also their individual responses to internal and external environmental stressors. A holistic approach is required as both efficiency and resilience have to be defined in a broad sense. Efficiency is more than only productive efficiency, the dilution of maintenance and indirect cost effects have to be considered through reduced feed, rearing, health and replacement costs; environmental costs should also not be forgotten. With this broader definition of efficiency, resilience as a major factor to reduce health costs contributes directly to a holistic view on efficiency. An underlying issue is here the old question if we change environments to address the needs of animals, or do we change animals to adapt to the environment. Previously, it was common understanding to prioritize first approach. However changing profoundly and suddenly environments and therefore management practices is difficult, disruptive and costly. However the EU FP7 project GplusE develops Hazard Analysis Critical Control Point (HACCP) and Evolutionary Operation (EVOP) based methods to optimize dairy cow management in a given production circumstance. The important advantage of this approach is that it is not disruptive but allows a slow but continued process of optimization. It is therefore not very different from the continuous process of cumulative optimization of the animals achieved by genomic selection, another important research topic of the GplusE project. Both approaches are complementary optimization opportunities for resilience and efficiency. However they are not possible without the development of appropriate response variables describing efficiency and resilience. The GplusE project has made the choice to develop novel milk based bio-markers and proxies for, often difficult to obtain; traits describing efficiency and resilience. Changes through breeding or management have to be continuous and well balanced considering the whole system. Changing environments or animals too fast should be avoided as this may lead to unforeseen consequences.