

New method for udder health evaluation

Data in evaluation for udder health is based on diagnoses of mastitis, somatic cell count and recordings of udder conformation. In an improved model we treat data for somatic cell count differently and get more accurate breeding values and in the same time we switch to an animal model. The breeding goal is still to reduce treatments of mastitis.

Test-day model for somatic cell count

The old model was a sire model and thus only bulls got breeding values directly. In the new model two improvements are introduced.

The new model for all udder health traits is an animal model, which implies that all relationships between animals are utilized. This means that both bulls and cows get breeding values directly.

The new model uses single test-day records of somatic cell count instead of lactation average. Test-day model includes more accurate corrections of environmental effects: the corrections are on monthly basis compared to the former model's herd-year corrections. Thus, for example changes in the quality of fodder, weather or overall health status of the herd will be corrected month by month.

With the new improvements for udder health trait, the model for somatic cell count resembles the one that is used for yield traits.

Own information for cows

The breeding values for udder health for cows were previously based on pedigree information. As a result of using a new model cows will get breeding values based on their own recordings of treatments, somatic cell count and udder conformation.

This means that breeding values for udder health for cows can change considerably in this run especially in Denmark and Sweden. In Finland a national test-day model has been used for estimating breeding values for somatic cell count since 2003. For Finnish cows changes in udder health index will occur due to the fact that the index has now changed from pure SCC index to combined udder health index.

Genetic base

The change to common Nordic model also marks a change in genetic base. Previously breeding values of all bulls was related to genetic level of nationally proven bulls born 7-9 years from present date. This base mimics a cow base, because these bulls are sires of the females born 3-5 years ago. However, this genetic base does not reflect that a few proven bulls are selected and used more heavily.

From this genetic evaluation the genetic base is a true cow base. The base consists of all Nordic cows born 3-5 years ago. The cow base has a higher genetic level than the previous sire base, which means that the indices drop for all proven bulls. For RDC (SRB, RDM and Finnish Ayrshire) this general drop is **1.8** index units. For Nordic Holstein the drop is **5.8** index units, and for Jersey the drop is **4.3** index units. It is important to remember that this change does not affect the ranking of the bulls, only the magnitude of the indices.

Udder health traits

The traits included in udder health are the same as in the old evaluation.

The NAV model treats mastitis as four different traits. The first three lactations are included in the evaluation:

- ... 15 days before calving until 50 days after calving *in first parity* (CM11)
- ... 51 days after calving until 300 days after calving *in first parity* (CM12)
- ... 15 days before calving until 150 days after calving *in second parity* (CM2)
- ... 15 days before calving until 150 days after calving *in third parity* (CM3)

The trait is divided into different traits due to the fact that there seems to be partly different genetic background in mastitis resistance during the lifespan of a cow. An incidence of mastitis in each of these periods is recorded as a binary trait – the cow is either healthy or sick.

Linear type classifications for fore udder attachment and udder depth in first parity and somatic cell count test day records in lactation 1 to 3 are used as correlated traits when estimating the breeding values for mastitis resistance. They give additional information about the cow's genetic ability to resist mastitis.

Overall udder health index

The estimated breeding values for the four mastitis traits – CM11, CM12, CM2 and CM3 - are weighted together in a mastitis resistance index/udder health index (CM). The mean of udder health index is 100 and standard deviation is 10, as in all traits evaluated by NAV. The estimated breeding values for the four mastitis traits are weighted together by relative weights shown in table 1. These weights are the same as earlier.

Table 1. Weights in index for udder health

Trait	Weight
CM11 (1 st lactation early)	0.25
CM12 (1 st lactation late)	0.25
CM2 (2 nd lactation)	0.30
CM3 (3 rd lactation)	0.20

Large effect on index for heifers and cows

Changes in model will affect ranking of bulls and cows. However, correlation between EBV's from May evaluation and the current evaluation for udder health shows that correlation for proven bulls are high, indication that only moderate reranking will occur – see table 2.

Table 2. Correlations between udder health index from May evaluation and current evaluation.

	Denmark	Sweden	Finland
RDC	0.94	0.95	0.96
Holstein	0.94	0.94	0.95
Jersey	0.88		

Correlations for cows between May evaluation and the current evaluation is 0.60-0.70, which is expected since the old index was based on pedigree information only.

In Finland an index for somatic cell count was previously published for cows. This index was based on test day records on somatic cell count in 1st-3rd lactation. This index has been replaced by the new udder health index. The correlation between the old Finnish index for somatic cell count and the new index for udder health for cows is 0.91-0.92.

