

## Nordic index for longevity

*The change from national to Nordic evaluation for longevity will have large impact on the breeding values. For the current sires the average longevity index changes with two to six index units and some individuals' changes up to 25-30 index units - indicating that reranking will take place. Magnitude of changes will be largest for bulls tested in Denmark.*

Previously indices for longevity were calculated separately in Denmark, Sweden and Finland. A common Nordic index for longevity has been published since October 2008 when NTM was introduced. However this index was calculated as the average of Danish, Swedish and Finnish national indices – a temporary solution that are now replaced by a common joint longevity index.

### Changes in model and trait definition

Denmark and Finland previously used models specially designed for survival traits, while Sweden used a linear model – same kind of model that is used for many other traits. Further, the breeding values for longevity were previously expressed in different ways. In Denmark and Finland the so-called functional longevity was published, which implied that longevity was corrected for genetic level for yield. In Sweden longevity was uncorrected for yield, also named productive longevity.

Both types of breeding values were equally good measures of genetic level of longevity – just expressing different aspects of longevity. Nevertheless, uncorrected longevity is easier to understand, because differences in daughter lifespan between bulls are reflected more directly in the index.

The new longevity model is quite similar to the previous Swedish model. Further the published index for longevity will be uncorrected for yield. The new model has the advantage that it is more flexible in relation to traits included. Inclusion of more traits in the model results in higher reliability and as a result the official breeding values will be published earlier than before.

### New linear model for longevity

The model for longevity is a five trait model with the following traits:

- ... Days from 1<sup>st</sup> calving to end of 1<sup>st</sup> lactation – max 365 days in first lactation
- ... Days from 1<sup>st</sup> calving to end of 2<sup>nd</sup> lactation – max 365 days per lactation
- ... **Days from 1<sup>st</sup> calving to end of 3<sup>rd</sup> lactation – max 365 days per lactation**
- ... Days from 1<sup>st</sup> calving to end of 4<sup>th</sup> lactation – max 365 days per lactation
- ... Days from 1<sup>st</sup> calving to end of 5<sup>th</sup> lactation – max 365 days per lactation

The breeding goal in the index is days from 1<sup>st</sup> calving to end of 3<sup>rd</sup> lactation. The other traits are only used to get higher reliability.

### Genetic base is changed

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 doesn't reflect that a few proven bulls are selected and used more heavily.

Today, 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 two index units. For Nordic Holstein the drop is six and a half index units, and for Jersey the drop is six index units.

It is important to remember that this change doesn't affect the ranking of the bulls, only the magnitude of the indices

### **Changes are largest in Denmark**

The total effect of new model and new genetic base on the level of indices and ranking of bulls are large. However, the changes are not similar in all countries. The country specific description of changes are found in the boxes below

#### **Changes in Denmark**

For bulls born from 2001-2004 the correlation between the previous longevity index and the new are approximately 0.80 for RDM, Holstein and Jersey - which is quite moderate.

For RDM and Jersey this means that amongst bulls in top 50 for longevity in the previous index, only 35-38 are still in top 50 in the new index, while 12-15 are replaced with other bulls. For Holstein even larger changes will be seen. For Holstein only 20 bulls in top 50 for longevity are maintained in the new index, while 30 bulls are new.

#### **Changes in Finland**

For bulls born from 2001-2004 the correlation between the previous longevity index and the new are approximately 0.80 for Ayrshire and Holstein - which is quite moderate.

For Ayrshire this means that amongst bulls in top 50 for longevity in the previous index, 27 are still in top 50 in the new index, while 23 are replaced with other bulls. For Holstein 36 bulls in top 50 for longevity are maintained in the new index, while 14 bulls are new.

#### **Changes in Sweden**

For bulls born from 2001-2004 the correlation between the previous longevity index and the new are approximately 0.85 for SRB and Holstein.

For SRB and Holstein this means that amongst bulls in top 50 for longevity in the previous index, only 25-31 are still in top 50 in the new index, while 19-25 are replaced with other bulls.

**Positively connected to fertility, health and yield**

Even though the new index in some ways are quite different from the previous one the effect on other traits are in many ways similar. The new index has positive genetic correlations to especially fertility, health traits and udder. The main difference is that it now has a positive correlation to yield. Longevity was the last trait that was previously calculated nationally. Today all traits are calculated Nordic.