18 May 2005

# Reliability/accuracy in relation to joint Nordic EBVs

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Accuracy is not directly related to evaluations but is useful information for practical users of EBVs. It is also required for submission of proofs to Interbull tests.

**Yield traits**

Finland is currently using a method that operates on a test day model and is based on general numerical absorption of defined model effects into breeding value coefficients. So it can be instructed to account for the information (degrees of freedom) lost in estimation of contemporary comparison groups and to properly model the number of observations by each animal. NAV plan to use this method for yield traits

**Type traits**

NAV use EDC's calculated based on Interbull methods and the measurement we use to express the accuracy of the EBV is number of efficient daughters.

**Other traits – Multi trait sire model**

So far all three countries have used approximate selection index based methods, it means ignoring the lost information (degrees of freedom) in estimation of contemporary comparison groups and in some cases also some of the observations from relatives.

Interbull EDC is calculated backwards from reliabilities by number of daughters and assumed heritability, so in this case we cannot directly use Interbull methods since Interbull EDCs are based on national reliabilities.

Reliabilities from a multi trait model can approximately be calculated as reliability from daughter information (using information about number of daughters with information about the single trait, all genetic parameters and economic weights). This information is used to calculate Interbull EDCs for instance for mastitis.

The reliability for the whole index (e.g. fertility, mastitis) can then easily be calculated by "adding" reliabilities related to pedigree information and information from sons (for sires of son). The method is described by Lars Gjøl Christensen (Direct Updating 1982) and Harris and Johnson (Interbull Meeting 1998)

*Reliability based on daughter information from a multi traits model*

Traditional formulas are used

if G= genetic variance covariance matrix
c= G*0.5
E= environmental variance covariance matrix
V=vector with economic weights
P=G+E

b= inv(p) * c * v

Rih2=((b'*c*v)/v'*g*v))

When looking at sires with n daughters in a daughter group one need to consider number of daughters in the calculations.

*Adding reliability from sons to the information from daughters*

b1=(1-Rih2(daughters)/(1-Rih2(daughters)*Rih2(sons))
b2=1-b1* Rih2(sons)
Rih2(progeny)=2-b1*b2

*Adding reliability from pedigree information to the information from progeny*

Rih2 (pedigree)= ¼*Rih2 (sire) + 1/16 Rih2 (maternal grandsire)
(We use the maternal grandsire since it is a sire model, otherwise we could use the dam)

Rih2 (total) = (Rih2 (pedigree) + Rih2 (progeny) – 2 * (Rih2 (pedigree) * Rih2 (progeny))/(1-(Rih2 (pedigree) * Rih2 (progeny)))

*EDCs*
EDCs are calculated by

Number of effective daughters (Ne):

Ne = Rih2(daughters) (4-heritability)/ (heritability*(1- Rih2(daughters)))