SELECTION INDEXES IN CATTLE BREEDING IN THE CZECH REPUBLIC

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ABSTRACT

Total selection index and sub-indexes were constructed for bulls of the Holstein and Czech Fleckvieh breeds according to groups of production traits – production. Total selection index (SIH), production index for milk and sub-indexes for udder and legs are used in Holstein cattle breeding. Total selection index (*SIC*) and sub-indexes for the selection of dual purpose sires for A.I. – for groups of production traits – production index for milk, meat reproduction and longevity were constructed. The sub-indexes were compared with the total index.
Every index for selection for a group of traits applies all available information – breeding values for traits of milk performance, fertility and linear type trait classification.

METHODS

Construction of selection index

Breeding values (*BV*) of traits are combined in selection index through weighting coefficients (*b*).

$$I = b_1 . BV_1 + b_2 . BV_2 + ... + b_n . BV_n$$

Total genotype (H) (breeding objective) is expressed by the sum

$$H = a_1 . g_1 + a_2 . g_2 + ... + a_m . G_m$$

where: *a* = economic weights of traits in breeding objective
g = unknown genetic values of traits in breeding objective

Prediction of total genotype (*H*) on the basis of index (*I*) → highest possible correlation exists between the index and total genotype. This correlation depends on the combination of weighting coefficients (*b*). The best combination is indicated by the solution of the equation system

$$b = P^{-1} . C . a$$

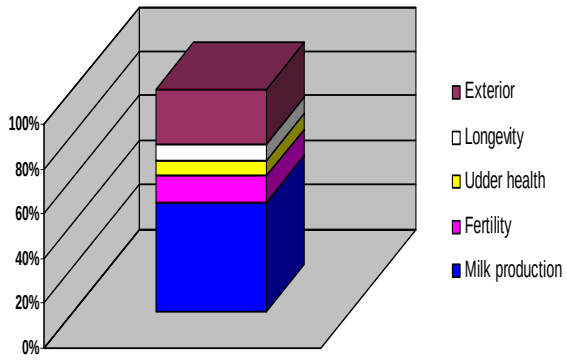
where: *P* = variance-covariance matrix of breeding values of the traits in performance testing
C = covariance matrix of BV of the traits in performance testing to the genetic values of

Input data to calculate weighting coefficients (b):

Economic weights of traits, genetic correlations and correlations between breeding values, genetic standard deviations and standard deviations of breeding values and reliabilities of estimations of breeding values for the particular traits.

RESULTS

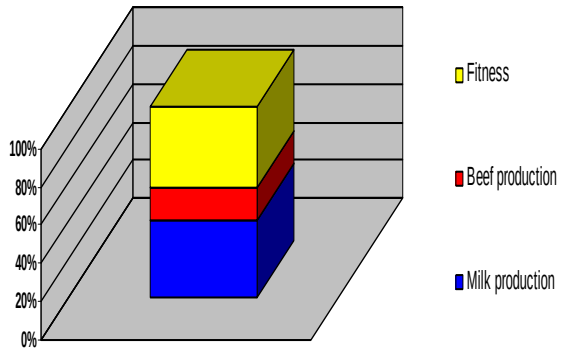
The importance of traits in selection index SIH



Traits in index
- fat (kg), protein (kg)
- fat (%), protein (%)
- SCS
- fertility of daughters
- longevity
- linear type traits

Sub-indexes
- milk production
- for legs
- for udder

The importance of traits in selection index SIC



Traits in index
- fat (kg), protein (kg)
- SCS
- net daily gain
- SEUROP
- dressing percentage
- own fertility
- fertility of daughters
- linear type traits

Sub-indexes
- milk production
- beef production
- reproduction
- longevity

CONCLUSIONS

Selection indexes were constructed for practical application in dairy and dual-purpose cattle in the Czech Republic. The constructed indexes are substantially influenced by population genetic and economic parameters.

This study was supported by Project No. 0002701404 of Ministry of Agriculture of the Czech Republic.