

**SIRE BREEDING VALUE EVALUATION FOR DIFFICULT  
CALVING****J. Pogačar, M. Štepec, T. Rastija****Summary**

Three groups of first lactation cows, consisting of 12511 Simmental, 15282 Brown and 7924 Black and White breeds were evaluated for difficult calving. The average percentage of difficult calving was 3.41% in Simmental, 2.91% in Brown, and 2.08 in Black/White breed.

The evaluation of the sires, both as fathers of calves (direct effect) and as fathers of cows (indirect effect) is shown.

a) as a simple deviation from the average of the breed and b) as an evaluation of the breeding value according to the BLUP method, in which the following influences are eliminated as interacting ones: sex of the calves x year of calving x season of calving x evaluator.

The correlations of breeding value between the two mentioned ways of evaluation are within limits of 0.75 to 0.84. Method b proved to be more exact than method a. According to method LSQ,  $h^2$  for difficult calving is low. The values found are between 0.01 and 0.02.

*Introduction*

The desire of every cattle breeder is to have cows that are capable of easy calving. For this reason calving is monitored in almost all countries (Interbull, 1992) and the breeding values of sires are evaluated from the aspect of direct effect (fathers of calves) as well as of indirect effect (fathers of cows) (Philipsson, 1976). The question thus arises of using the correct method for registration, breeding value evaluation, as well as for selection.

*Materials*

In Slovenia the evaluation of difficult calving takes place in most first lactation cows included in A control, and is performed by specialists who

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evaluate the conformation too. Usually both evaluations are done at the same time. The breeder gives informatin about calving difficulty, which ranges as follows (Scale A):

- 1 - easy
- 2 - normal
- 3 - difficult
- 4 - difficult with death of newborn

In final calculation Scale B is used:

- 0 - easy and normal calving
- 1 - difficult and difficult calving with death of newborn

Data for 12511 Simmental, 15282 Brown, and 7924 Black/White first lactation cows are analysed.

For all these breeds, for Scale A and B, for direct and indirect effect, the LSQ method is used and the following mixed model:

$$Y_{ijkl} = u + (S \cdot Y \cdot E \cdot SEX)_i + G_j + S_{jk} + e_{ijkl}$$

S = fixed effect for season of calving

Y = fixed effect for the year of evaluation

E = fixed effect for the evaluator

SEX = fixed effect for the sex of calf

$G_j$  = effect of genetic group for sires j according to the year of birth

$S_{jk}$  = random effect k within genetic group j (father of calf = direct effect; father of cows = indirect effect)

$e_{ijkl}$  = random effect

Breeding value of sires (BV) is evaluated according to BLUP, where the same model described for LSQ is used.

### Results

Table 1. - STATISTICAL PARAMETERS AND THE RATE OF DESCRIBED VARIANCE ( $R^2$ ) WITH FIXED EFFECTS

	Brown	Simmental	Black/White
Scale A			
- $\bar{x}$	1.604	1.487	1.654
- SD	0.574	0.614	0.551
- $r^2$	0.23	0.27	0.28
Scale B			
- $\bar{x}$	0.029	0.034	0.021
- SD	0.168	0.179	0.148
- $r^2$	0.02	0.02	0.01

By Scale A a higher rate of variance is described with fixed effects - from 23 to 28%, where the effects of calf's sex, the effect of evaluator, as well as the effect of season and the year of birth are significant - By Scale B, only 1 to 2% of variance can be described.

Table 2. - HERITABILITY ( $h^2$ ) FOR DIFFICULT CALVINGS

	Brown	Simmental	Black/White
Scale A			
- direct effect	0.015	0.011	0.031
- indirect effect	0.010	0.018	0.020
Scale B			
- direct effect	0.010	0.012	0.010
- indirect effect	0.011	0.012	0.021
N (sires) direct	145	153	49
N (sires) indirect	135	157	52

Heritability ( $h^2$ ) is low for direct, as well as for indirect effect for all three breeds.

Table 3. - STANDARD DEVIATION FOR BREEDING VALUES ( $SD_{BV}$ ) FOR DIFFERENT METHODS OF SIRE EVALUATIONS. ONLY DIRECT EFFECT

Method of sire evaluation	$SD_{BV}$		
	Brown	Simmental	Black/White
a) Deviation from average	2.74	3.14	2.46
b) BV Scale B	0.032	0.034	0.026
c) BV Scale A	0.107	0.096	0.140
n (sires)	145	153	49

Table 4. - BREEDING VALUE CORRELATIONS FOR DIRECT EFFECT AMONG DIFFERENT METHODS FOR BV EVALUATION

	Effect	Brown	Simmental	Black/White
Deviation from average	direct	0.30	0.66	0.32
BV Scale A	indirect	0.55	0.57	0.24
Deviation from average	direct	0.75	0.84	0.75
BV Scale B	indirect	0.85	0.87	0.81
BV Scale A	direct	0.51	0.73	0.38
BV Scale B	indirect	0.64	0.71	0.37

Until recently, sire evaluation in Slovenia was performed according to Scale B and just as a deviation from average within breeds, but now BLUP with Scale B or even Scale A has been suggested for the evaluation of sires' breeding value.

Breeding value correlations prove that the classifications of sires according to Scale A or Scale B is very similar, yet different.

### *Conclusions*

1. Fixed effects of evaluator, sex of calf, year and season of evaluation have a strong influence on the grade of sire BV evaluation for difficult calving, especially, by Scale A, and less by Scale B.

2. Heritability ( $h^2$ ) for difficult calving is relatively low. The reason most probably being in subjective evaluation of traits.

3. Because of systematic environmental effects and different number of offspring it is better to use BV for sire evaluation, than just the deviation from average.

### REFERENCES

1. Interbull Sire evaluation in various countries. Bulletin No. 5, No. 6, Uppsala, Sweden (1992):
2. Philipsson, J.: Studies on calving difficulty, stillbirth and associated factors in Swedish cattle breeds. I. General introduction and breed averages. Acta Agric. Scand. 36 (1976), 151-164.

### OCJENA UZGOJNE VRIJEDNOSTI BIKOVA NA TEŠKOĆE KOD TELENJA

#### Sažetak

Teškoće kod telenja ocijenjene su u tri skupine od 12511 simentalskih, 15282 smeđih i 7924 crno šarenih prvotelki. Prosječni postotak teških telenja iznosio je 3.41% za simentalske, 2.91 za smeđe i 2.08 za crno šarene krave.

Ocjena uzgojne vrijednosti bikova, kako očeva teladi (direktni učinak) tako i očeva prvotelkinja (indirektni učinak) prikazan je kao:

a) jednostavno odstupanje od srednje vrijednosti pasmine odnosno

b) ocjena uzgojne vrijednosti po BLUP metodi gdje su isključeni sljedeći utjecaji kao utjecaji interakcije: spol teladi x godina telenja, sezona telenja i ocjenjivač.

Korelacija uzgojne vrijednosti između obje metode ocjene bile su unutar granica 0,75 i 0,84. Metoda b bila je točnija od metode a. Prema LSQ metodi,  $h^2$  za teškoće kod telenja je nizak i kreće se od 0,01 do 0,02.

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