SOME EFFECTS ON WEANING WEIGHT OF HUNGARIAN SIMMENTAL BEEF CALVES

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INTRODUCTION
Weaned calves are the products of beef cattle sector, therefore the economic results are influenced by weaning weight. On the other hand the weaning weight expresses the calf rearing ability of cow, so the changes of weaning weight are useful factors at selection. Therefore it is important to estimate the environmental effects and breeding value based on weaning results very exactly.

Environmental effects on weaning weight are evaluated by several authors. Kovács et al. (1993) found that the sex, stock-farm and calving season influenced the weaning weight of Limousin calves (P<0.01). The same effects were found in Aberdeen Angus and Hereford (P<0.01) (Nelsen and Kress, 1981), Jakubec et al. (2000) (P<0.01), Szabó and Gajdi (1993), and in case of Charolais Komlósi (1999) (P<0.05) and Gáspárty et al. (1998). Massey and Benyhsek (1981) found the same results in case of crossbreed population. Szabó (1993) summarised the results of 35 publications and found that the heritability of calf’s daily gain before weaning was 0.27 on average and the heritability of weaning weight was 0.30 on average according to 61 publications.

This goes to show that the hereditary of the previous traits is medium, so the environmental effects (year, season, sex) influence the weaning performances. Massey and Benyhsek (1981) found that heritability of the 205-day weight and preweaning daily gain were 0.11 and 0.08, respectively. Szabó et al. (2001) showed that the heritability of weaning weight was 0.29.

MATERIALS AND METHODS
Weaning results of 1393 purebred calves (695 male and 698 female) born from 520 cows sired by 15 breeding bulls were analysed. Data were collected in the Hungarian Simmental stockfarm in Hungary. Traits were weaning weight (WW), preening daily gain (PDG) and 205-day weaning weight (CWW). Statistical analyses was Harvey’s (1990) Least Squares and Maximum Likelihood Computer Program and MTDFREML (1993) program.

The model for estimate the genetic parameters was as follows:

\[ Y_{ijklm} = \mu + S_i + Y_j + E_k + I_l + b(x_{ijklm} - \bar{x}) + e_{ijklm}, \]

where \( Y_{ijklm} \) = performance characteristic, \( \mu \) = a mean value common to all observations, \( S_i \) = random effect of sire, \( Y_j \) = fixed effect of year of birth, \( E_k \) = fixed effect of season of birth, \( I_l \) = fixed effect of sex, \( b \) = partial regression coefficient, \( x_{ijklm} \) = continuous variable for age of calf, \( e_{ijklm} \) = random error.
The model used to estimate heritability of 205-day weight was:

\[ Y_{ijklm} = \mu + S_i + Y_j + E_k + I_l + e_{ijklm} \]

Heritability values of the mentioned traits were calculated with method of half-sibs. The formula was:

\[ 4\sigma^2_S / (\sigma^2 + \sigma^2_W) \]

where,\n
\[ \sigma^2_S = \text{additive genetic variance of sire}, \quad \sigma^2_W = \text{variance within progenies}. \]

When estimating the database with MTDFREML, the next model was used:

\[ Y_{ijklmn} = \mu + A_i + YE_j + C_l + I_m + b(x_{ijklmn} - \bar{x}) + e_{ijklmn} \]

Where, fix effects are year-season effects (Ye), number of calving (C_l) and sex (I_m) and random effect was animal (A_i), and the age of calves was covariant (b).

RESULTS AND DISCUSSION

The results of the examination showed that the environmental factors had a definite effect on weaning performance (P<0.01). The effect of sire was 3-5% on the evaluated traits. It forecasts that the ratio of genetic variance in phenotypic variance is small, so the heritability value of examined traits will be small, too. Among the fix effects the sex (48-59%) had the largest influence on the weaning weight. The effect of the year, season, number of calving contributed to total variance in the case of traits in question 12-13%, 10-20%, 11-15%, respectively:

- The effect of year appeared in the average weaning results. Data show that the least square means (LSM) during the evaluated eight years are from 204 to 236 kg and from 1083 to 1253 g/day and standard error of LSM (SE) from 3.50 to 4.89 of WW and PDG, respectively.
- Similar results were obtained when analysing the database with MTDFREML.
- The effect of season shows the different weaning performance of calves, which were born, in the different seasons. In the case of the examined population the best weaning performances were at spring-born calves (WW=231±2.73kg, PDG=1218±16.60g/day).
- The sex effect, the better weaning results of male calves than female verify definite influence. Constant is higher (7.86 kg and 42.84 g/day) in case of results by Animal model than that of by Sire model (3.93 kg, 22.328 g).
- The effect of calving number indicate that by increasing the calving number (the same as the increasing of the age of dam) causes change the weaning weight and preweaning daily gain of calves. The highest weaning weight and daily gain was observed in the case of the calves born from 3-4th calving.
- Sire effect: The value of sire variance was influenced by value of the environmental effects. The breeding values of the examined sires was different according to the results of sire- and animal model and the rank of the sires has also modified.
- The heritability of weaning weight (WW) and preweaning daily gain (PDG) were 0.096-0.11, 0.11-0.13 by two different models and 205 day weaning weight (SWW) was 0.12 by sire model.
Phenotypic correlation between the WW and the age of calves was medium positive (r=0.53) and between PDG and the age of calf it was medium negative (r=-0.39).

Direct-maternal effect caused great influence on weaning weight and gain, too and the breeding value was different during the examined period.

<table>
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<tr>
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<th>Sire model</th>
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<tr>
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<tr>
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$\sigma^2_d$: additive direct variance, $\sigma_{dm}$: direct maternal genetic covariance, $\sigma^2_{pe}$: permanent environmental variance, $\sigma^2_e$: residual variance, $h^2_1$: heritability by sire model, $h^2_2$: heritability by animal model, $r_{dm}$: direct-maternal correlation

CONCLUSION
The examined factors had an effect on the evaluated traits (P<0.01). The sex had the strongest and sire had the slightest effect. Calves born from the 3-4-5-6th calving of cows had the highest weaning weight. The estimated breeding value by sire model and animal model was different due to mainly the difference between two methods. On the base of rank of order it appears the breeding values of sires were often overestimated by sire model. In our study the heritability values of the weaning weight and gain were smaller than that of in the relevant publications.

REFERENCES