

# Somatic Cell Count – Recording and Evaluation

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## Summary

The first SCC test-day samples were collected by the milk recording organisation in Poland already few years ago, but SCC recording in national database started in some regions of Poland only two years ago. However, until the end of this year all SCC data will be recorded. Although SCC data were not recorded in our cattle breeding information system some evaluation of SCC has been started. Data on SCC, milk, protein and fat yield, as well as the pedigree information were collected from 2590 Polish Fresian cows, daughters of 162 sires, from 17 test herds maintained in north-west Poland. Heritability of SCC was respectively 0.128 and 0.096 for first and all lactations. Genetic correlations between SCC and fat yield were 0.125 and 0.165 for first and all lactation and between SCC and protein yield 0.132 and 0.193 respectively.

*Key words: somatic cell count*

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## Introduction

Information about clinical mastitis, somatic cell count (SCC) and udder traits could help in the selection for udder health and thus help farmers to increase their incomes. Information about clinical mastitis is not collected by Polish veterinarian or breeding databases. Conformation linear data have been recorded for four years. Collection of SCC in test-day samples by the milk recording organisation – Central Animal Breeding Office – was started already a few years ago, but recording of SCC in the national database, and only from some regions of Poland, has started two years ago. This was because only some of the 17 milk-testing laboratories were properly equipped. During the last two years the number of laboratory decreased to seven but those existing today are better equipped. At present SCC samples are collected in all laboratories but information is recorded in six. By the end of this year all SCC data will be recorded.

Although SCC data were not recorded in our cattle breeding information system some researches have started. Below are presented first results of an estimation of the genetic parameters of SCC evaluated at the Institute of Genetics and Animal Breeding.

## Material and Methods

Data on SCC, milk, protein and fat yield, as well as the pedigree information were collected for 2590 Polish Fresian cows, daughters of 162 sires, from 17 test herds maintained in north-west Poland. The investigation covered 17879 records of all cows in the herds. Test-day milk samples were collected at monthly intervals, at least five times during lactation. All the statistical evaluations were made separately for the first and for all lactations. The first lactation data subset consisted of 1287 cows, sired by 94 bulls. Test-day SCC was log-transformed to base 10. A multivariate animal model was used, with the REML method (VCE4, version 4.2, written by Eildert Groeneveld –eg@tzv.fal.de).

$$y_{ijkl} = \alpha + a_i + p_i + l_j + h_k + \beta_1 x_{ijkl} + \beta_2 x_{ijkl}^2 + e_{ijkl}$$

where:

- $y_{ijkl}$  - observation on test –day SCC, milk, protein and fat yield;
- $\alpha$  - intercept;
- $a_i$  - animal additive genetic effect;
- $p_i$  - permanent environment effect;
- $l_j$  - effect of j-th lactation; (j-1...9) (when appropriate)

$h_k$  - effect of k –th combination of herd,  
year and month of sampling;  
 $\beta_1 x_{ijkl}$  - linear regression on day of lactation;  
 $\beta_2 x_{ijkl}^2$  - quadratic regression on day of  
lactation;  
 $e_{ijkl}$  - random error

Animal additive genetic and permanent environment effects were random.

## Results and Discussion

In general, yield traits tend to be moderately heritable, while mastitis resistance has a heritability of about 0.02 (clinical cases) or 0.10 (SCC). The heritabilities of SCC for the first or all lactations of Polish Friesian cows were of similar magnitude and ranged from 0.096 to 0.128 (Tab. 1).

Genetic correlations between SCC and fat and protein yield varied from 0.125 to 0.193 (Tab.2). Authors who have reported a genetic correlation between SCC and protein yield, found that correlation estimates ranged from –

0.14 to 0.54 (mean of 0.17), what indicates a stronger relationship than that between SCC and milk yield (from -0.22 to 0.48). This is especially important in view of recent trends to place greater selection emphasis on protein yield. This is also the situation in Poland. The mean correlation between SCC and fat yield was reported to be about 0.02 (from 0.01 to 0.14), which suggest a low relationship between the two traits. In our results correlations between SCC and the fat and protein yield are similar.

The positive genetic correlation and negative phenotypic correlation that was reported by many authors is rather confusing, as phenotypic correlations reflect both the environment and genetic cause of covariance. However, this confusion may be explained by the fact that cows with a genetic capacity for high milk yield are genetically more predispose to mastitis. In turn, the incidence of subclinical or clinical mastitis reduces the milk or protein production. Thus, the phenotypic milk yield is decreased, yet the genetic ability of the cow to produce milk is retained.

Table 1. Heritability ( $h^2$ ) and standard errors of SCC from several test-day observations during lactation

Lactation	$h^2$	se
First	0.128	0.028
All pooled	0.096	0.016

Table 2. Genetic correlations between SCC and milk traits

Lactation	Fat(kg)	Protein(kg)
First	0.125	0.132
All pooled	0.165	0.193

## Conclusion

The present study this is the first try to estimate genetic parameters for Polish Friesian cows and it needs more research on larger data sets.

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