FACULTY OF VETERINARY MEDICINE
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DEPARTMENT OF REPRODUCTION, OBSTETRICS AND HERD HEALTH

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GENETIC PARAMETERS FOR LACTATION CURVE TRAITS IN HOLSTEIN DAIRY COWS

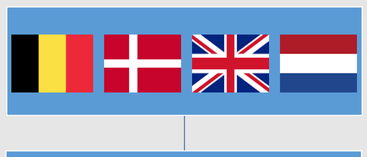
Introduction

Milk production is mainly dependent on the shape of the lactation curve, defined as the graphical representation of milk yield over th course of the lactating period. The shape of the lactation curve is characterized by 4 determinants: the slope of the initial rise of the curve, peak yield, time to peak, and persistency.

The MilkBot model is a nonlinear lactation curve model in which parameter values can be interpreted by the effect that they have on the lactation curve. The MilkBot model is flexible enough to accommodate disease and management effects, and can provide more accurate estimates of dairy milk yield.

Aim: this study aims to estimate the genetic parameters for the MilkBot lactation curve model in Holstein dairy cows

Materials and Methods



118 herds

21,068 lactations

9,910 Primiparous

11,158 Multiparous

Pedigree information
43,181 Animals

MilkBot model

$$y_t = \mathbf{a}\left(1 - \frac{\exp\left(\frac{c-t}{b}\right)}{2}\right)\exp(-dt)$$

a = Scale – Theoretical Milk Yield MAX ~ Peak yield

b = Ramp – Early lactation rise rate

c = Offset – Time between partus & start lactation

d = Decay – Late lactation decline rate ~ Persistency

REML — BLUPF90 software

Single & multiple trait animal model — (Co)variance component
- Milk yield
- MilkBot parameters

Linear model
- Country
- Herd/Year/Season
- AFC
- Animal
- Parity (multi)
- Permanent effect (multi)

Results

	Heritability (Primi)	Heritability (Multi)	Repeatability	Genetic correlation (Primi)	Genetic correlation (Multi)
305-d milk	0.37 (0.01)	0.26 (0.02)	0.42 (0.01)		
Ramp	0.12 (0.01)	0.05 (0.02)	0.05 (0.01)	0.20 (0.001)	0.15 (0.005)
Scale	0.30 (0.01)	0.21 (0.02)	0.29 (0.01)	0.97 (0.001)	0.89 (0.005)
Decay	0.19 (0.01)	0.20 (0.02)	0.24 (0.01)	-0.52 (0.001)	-0.49 (0.005)

Discussion

The higher correlation between 305-d milk yield and peak yield in comparison to lactation persistency, indicates that peak yield is more important for determining lactation yield than persistency.

In conclusion, scale showed the highest heritability and the highest genetic correlation with 305-d milk yield, thus it could be used as a management tool to monitor milk production performance of the herd.

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