

Feeding strategy influencing clinical mastitis in Norwegian dairy cows, using the herd specific lactation curve



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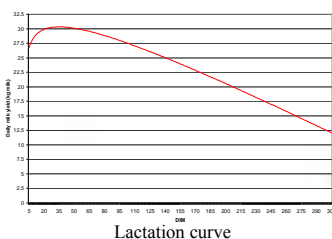
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Introduction

Inflammation of the parenchyma of the mammary gland, also known as mastitis, is the most common disease in dairy herds in many countries (Bradley, 2002; Sviland and Waage, 2002). Previous research has found an association between high milk production and elevated risk of contracting mastitis (Bar et al., 2007; Gröhn et al., 1990). The connection between feeding strategy and milk yield is also well established in earlier research (Spiekers et al., 1991; Yrjanen et al., 2003). The aim of this investigation was to find how feeding influences the risk of mastitis by analyzing the shape of the lactation curve. Modeling the shape of the lactation curve by controlling the feeding strategy can be used as a future tool in reducing the mastitis incidence.



Feeding strategy (Photo: Tine Mediebank)



Lactation curve



Mastitis risk (Photo: Tine Mediebank)

Material

Data from the Norwegian Dairy Herd Recording System were used in this investigation. The study population consisted of lactations of Norwegian Red cows ending in 2006. To avoid the influence of disease on the shape of the lactation curve, lactations with veterinary recordings from 15 days before calving until 305 DIM were excluded. The material was stratified into first parity lactations (n=41,940) and later parity lactations (n=68,586).

$Y_i = A + B \ln DIM_i + C DIM_i$	
Parameter	Describing
A	Milk yield at calving
B	The slope of the lactation curve and peak milk yield
C	The slope of the lactation curve after peak yield
PEAK_DAY	The day of peak milk yield
$[-B/C]$	
PEAK_YIELD	Peak milk yield
$[A+(B \cdot \ln PEAK_DAY)+(C \cdot PEAK_DAY)]$	

Table 1: The modified Wilmlink model used as a mixed model and a description of the lactation curve parameters used in the study.

Method

The study was performed as a retrospective cohort study with a closed population at herd level. A modified Wilmlink model was used as a mixed model (Macciotta et al., 2005; Wilmlink, 1987; SAS Institute Inc., 2003) to estimate the parameters of the lactation curve (Table 1). The number of mastitis treatments were counted at herd level within each strata, with treatments occurring within 8 days counted as one treatment. The influence of the lactation curve parameters (Table 1) on the mastitis treatment count was analyzed by using a negative binomial model for each strata at herd level (Schukken et al., 1991; SAS Institute Inc., 2003).

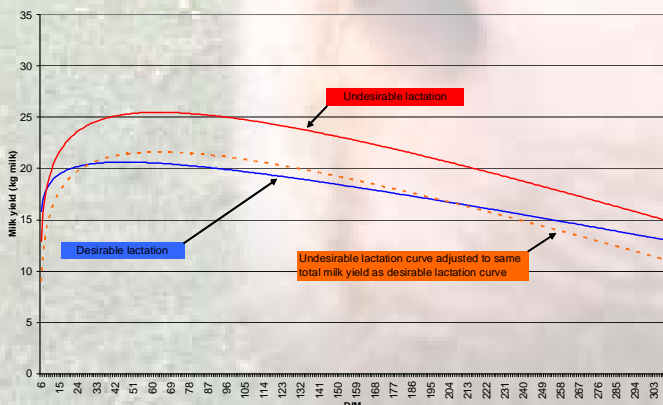


Figure 1: Estimated lactation curves in first parity cows. The desirable lactation curve has a herd mastitis count of 0.91 cases (n=938) and the undesirable lactation curve has a herd mastitis count of 1.27 (n=766). The dotted line indicates the constructed undesirable lactation curve with the same total milk yield as desirable lactation curve.

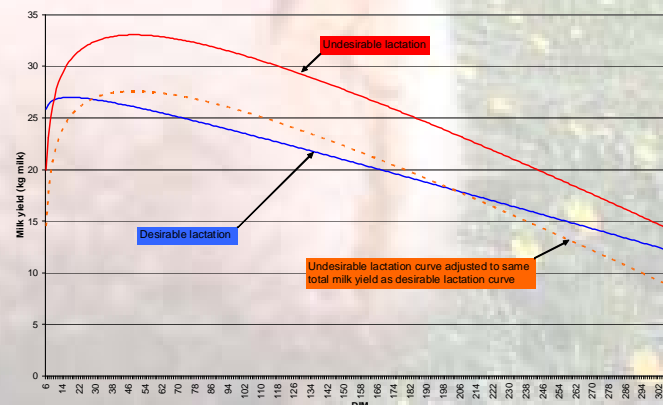


Figure 2: Estimated lactation curves in later parity cows. The desirable lactation curve has a herd mastitis count of 2.19 cases (n=886) and the undesirable lactation curve has a herd mastitis count of 3.56 (n=984). The dotted line indicates the constructed undesirable lactation curve with the same total milk yield as desirable lactation curve.

Results and Conclusion

For both strata a high peak yield resulted in a significant increase of the mastitis risk. In the later parity strata a delayed day of peak yield also significantly increased the mastitis risk. The results indicate that a flatter lactation curve is of positive value decreasing the mastitis occurrence at herd level for both strata (Figures 1 and 2).

References

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