

An analysis of recovery probability from high SCC in UK dairy cows

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Introduction

Somatic cells found in milk include the lymphocytes released as part of the animal's inflammatory response to infection (Ruegg and Pantoja, 2013). As a result the Somatic Cell Count (SCC) is commonly used as an indicator of the level of udder infection, although 20-35% of milk samples taken from animals with a high SCC give a negative result to bacterial culture analysis (Herlekar et al., 2013).

A high SCC is transient in many cows, with milk returning to a low SCC (<200,000 cells/ml) at the subsequent Milk Recording (MR). The lack of understanding of the factors influencing such 'self-recovery', means that it is difficult for farmers and veterinary professionals to make decisions on how to treat cows with high SCCs in the most effective manner possible to reduce the loss in productivity and minimise the use of antimicrobials.

What has an impact on the probability of "self-recovery" from a high SCC?

This research explored how the probability of 'self-recovery' is associated with different factors such as:

- parity
- stage of lactation
- magnitude of SCC
- Type of high SCC (Table 1)

Objectives:

- Improve efficiency and efficacy in managing and treating cows with high SCCs
- Increase productivity of dairy herds
- Enable more targeted and effective use of antimicrobials

It is hoped that the findings may enable farmers and veterinary professionals to improve decision making and practices of when and how to treat an animal with high SCC.

Materials and Methods

A dataset of 15,000 lactations was obtained from a cross-section of 500 UK milk recorded herds (Hanks and Kossaibati, 2014). The lactations were randomly selected from cows calving between 1 September 2012 and 31 August 2013. The lactations also had to include at least one milk record with "high" SCC (defined as greater than or equal to 200,000 cells/ml).

30,080 cases of high SCC MRs from these lactations were used for a logistic regression analysis of the probability of "recovery". Recovery (the dependent variable) is defined as returning to a low SCC (below 200,000 cells/ml) at the next monthly milk recording. The potential explanatory variables were: stage of lactation (days in milk); SCC (,000 cells/ml); the 'type' of high SCC; parity of the cow and the size of the herd.

Table 1: Definitions of high SCC 'type'

'Types' of High SCC and definition ...if it is the first MR in the lactation...	
First Heifer	Heifer calving with a high SCC in first MR
First New	Cow calving with a high SCC in first MR – the last MR of previous lactation was LOW
First Chronic	Cow calving with a high SCC in first MR – the last MR of previous lactation was HIGH
...if it is NOT the first MR in the lactation...	
New	The first high SCC in a lactation (that is not the first MR)
ChronicN	A high SCC immediately following 'N' consecutive high SCCs (i.e. Chronic1 ... Chronic11)
Repeat	A high SCC that follows a low SCC, but is NOT the first high SCC in the lactation

Recovery probabilities by stage of lactation

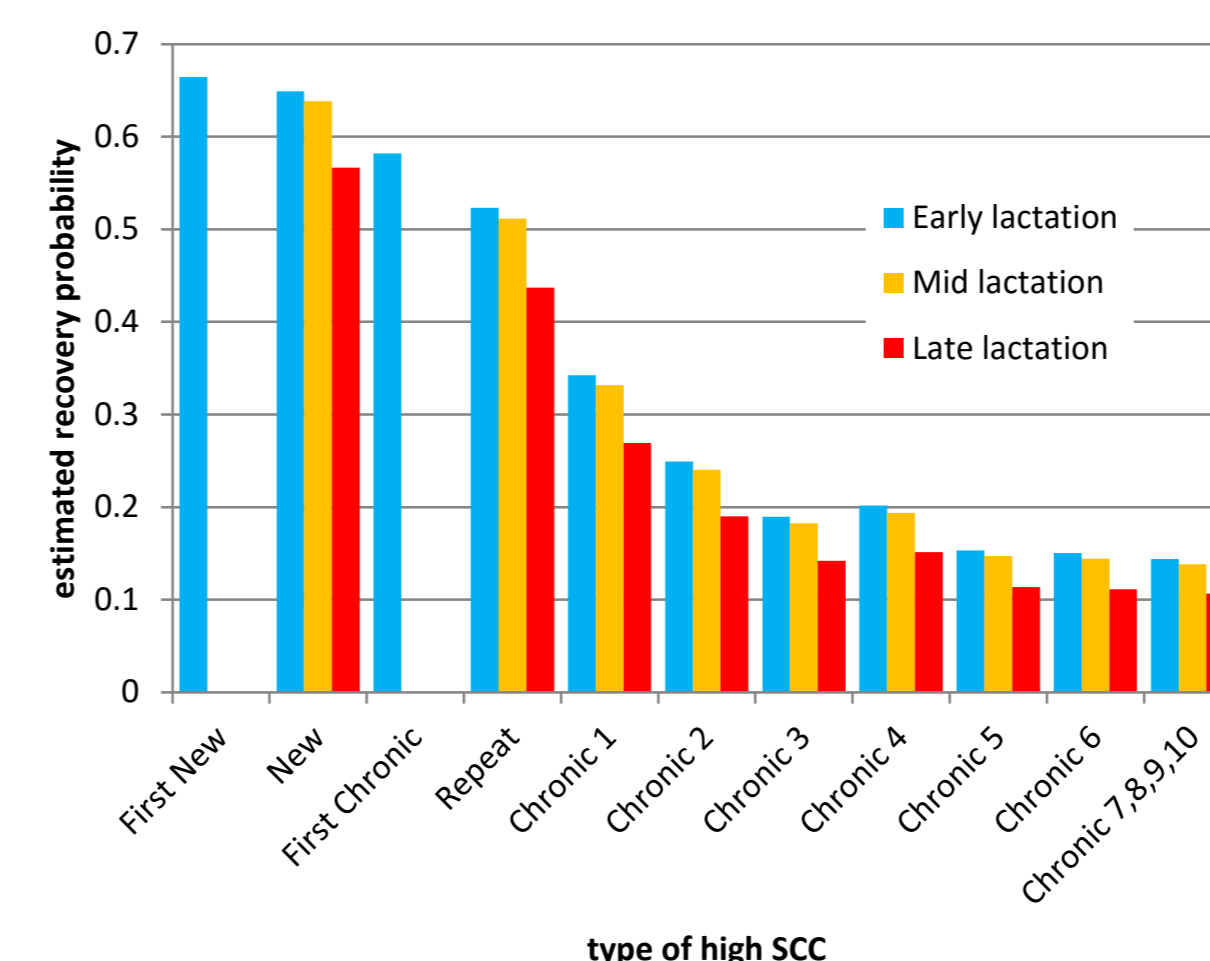


Figure 1. Estimated recovery probabilities for different types of high SCC, for a third parity cow in a medium sized herd with a SCC of 250,000 to 299,000 cells per ml, by stage of lactation

Recovery probabilities by magnitude of SCC

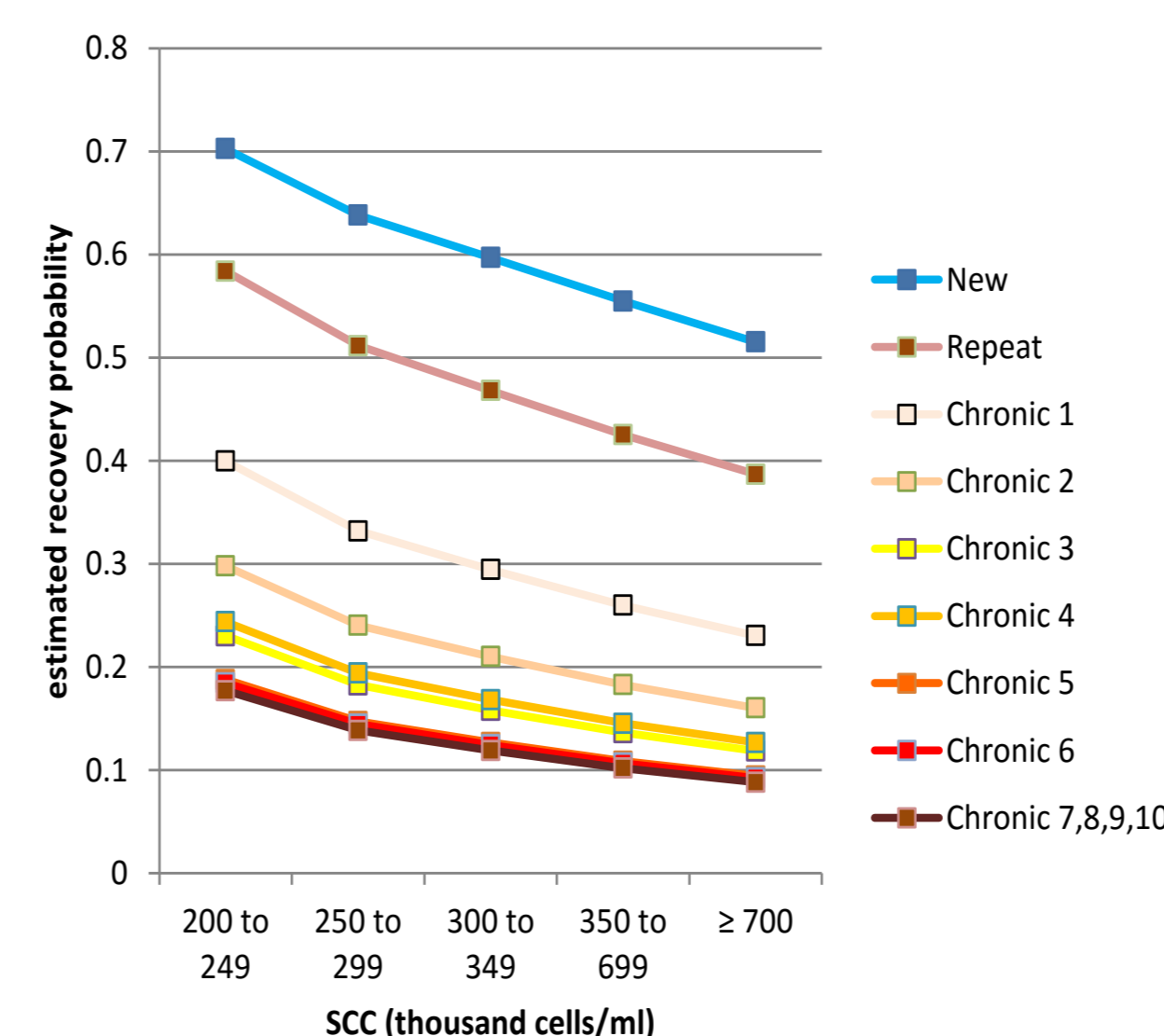


Figure 1. Estimated recovery probabilities for different types of high SCC, for a mid-lactation third parity cow in a medium sized herd, by magnitude of SCC

Summary of results

- Overall 37% of the high SCC MRs were followed by a SCC lower than 200,000 cells/ml (recovery probability of 0.37)
- Recovery probability declined as days in milk, magnitude of SCC and parity increase
- The overall recovery probability for "New" and "First New" high SCC was 0.60, and recovery probability was higher still for the "First Heifer" type of high SCC
- Recovery probability for "First Chronic" and "Repeat" high SCC was lower, at 0.48 and 0.46 respectively
- Recovery probabilities for high SCC occurring as a chronic sequence were much lower, 0.28 for a high SCC occurring second in a sequence (Chronic 1), with declining probability as a sequence progresses
- The logistic regression analysis showed that stage of lactation; magnitude of SCC; the 'type' of high SCC and parity of the cow are all significantly associated with recovery probability.
- The size of the herd was not a significant factor

Conclusions

- Both the magnitude and type of SCC are important determining the recovery probability
- Intervention, for example with antimicrobial treatment, should not be the first resort for a 'New' case of high SCC, no matter how high the SCC is
- Intervention, or at least an examination, should be considered for all 'Chronic' high SCC cases even if the SCC is only slightly above 200,000 cells/ml
- For repeat cases, the decision on action should also take into account the magnitude of SCC, and possibly other factors such as stage in lactation and parity of the cow

References

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