Using DHIA Recorded Individual Cow Somatic Cell Counts to Determine Clinical Mastitis Treatment Cure Rates

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Introduction

Several on-farm monitors of clinical mastitis treatment success have been used. These include days to clinical cure (DCC), days out of tank (DOOT), clinical quarter re-treatment rates (after periods of 7-21 days), bacteriological cure (defined at a certain number of days post-treatment) and somatic cell count (SCC) cure (defined as returning a cow to less than 200,000/ml composite SCC). DCC and DOOT are of economic importance to the farm, but are poor predictors of bacteriological cure. Re-treatment rates are influenced by clinical mastitis detection rates and treatment policies and bacteriological cure is impractical and too costly to assess in a commercial setting.

SCC cure reflects both bacteriological cure and resolution of tissue inflammation. Farmers receive premiums and penalties related to the sale of somatic cells in fluid milk, thus SCC cure has some advantages over other monitors of treatment success or failure. Although pathogen specific patterns of SCC change during clinical mastitis have been well described (de Haas et al., 2002), use of SCC cure in commercial herds has been poorly documented.

The objective of this paper was to report on the use of a method to assess clinical mastitis cure using SCC in monthly tested DHIA recorded dairy herds with records of clinical mastitis events.

Materials and Methods

Data from monthly individual cow DHIA SCC tests and clinical mastitis events in 11 commercial dairy herds in Wisconsin, ranging in herd size from 49 to 1359 cows, for a minimum period of one year, were merged in an Excel spreadsheet. Herd mean annual weighted SCC ranged from 190,000/ml to 664,000/ml.

A clinical mastitis event was defined as a cow case, with one or more quarters affected. Where more than one cow case occurred for the same cow between DHIA tests, all cases were treated as a single cow case.

For each herd, prior to the clinical event, cows were categorized by SCC status into three categories. These were;

1. **Fresh cows before 1st DHIA test**
2. **Cows <200,000/ml SCC at the previous DHIA test, and**
3. **Cows >200,000/ml at the previous DHIA test.**

Cure was defined as return to a SCC <200,000/ml at either the first or second SCC test after the clinical event. Cumulative Cure Rate (CCR) was calculated according to the following equation:

$$CCR = \frac{\text{Number of cows cured at 1st SCC test + Number cows cured at 2nd SCC test}}{\text{Number of cow cases of mastitis}}$$

The data were analyzed using the MIXED procedure of SAS using a weighting to compensate for differing numbers of cows at each DHIA test. A significance level of P<0.05 was used.

Results and Conclusions

Data were available from 1949 clinical cow cases of mastitis. Mean (range) CCR for all 11 herds and SCC sub-groups was 55% (44–61%). There was no significant herd effect (P=0.599), but SCC status prior to the clinical event was significant (P<0.001). CCR for cows >200,000 at the previous test was significantly different from that for fresh cows and for cows <200,000 at the previous test (P<0.001).

Least squares means (SE) CCR for cows >200,000 was only 33.0% (2.1), compared to 62.6% (2.8) for fresh cows and 65.5% (2.2) for cows <200,000.

Although culture data for each case were not available, the predominant pathogens treated in all herds were the coliforms and the environmental streptococci. CCR for fresh cows and cows <200,000 at the previous test exceeded 60% on average, over a wide range of treatment protocols, using both label and extra-label intra-mammary therapy. All clinical cases were treated with antibiotic in all herds, with no effort to identify gram negative infections and withhold antibiotic therapy as described by Hess et al., (2003).

CCR was poor for cows >200,000 at previous test. These infections are likely due to environmental streptococci and *Staphylococcus aureus* in the majority of cases (de Haas et al., 2002). This finding explains the poor cure rates reported by herds which switch from a non-antibiotic therapy program to one using antibiotics, with the treatment of many cows which are chronically infected. In order to manage such a transition with success, treatment of new clinical infections should be the focus of initial therapy.

Table 1. Mean (SE) Cumulative Cure Rates by SCC status prior to the clinical mastitis event for 11 Wisconsin dairy herds.

SCC Status at Previous DHIA Test (n=1949)	Cumulative Cure Rate (%)	
	Least Squares Means (SE)	Range
Fresh cows before 1st test	62.6 (2.8)[a]	33-82
<200,000 previous test	65.5 (2.2)[a]	54-78
>200,000 previous test	33.0 (2.1)[b]	23-47

[a b] Different superscripts significant within a column at P<0.05

With such poor cure rates in cows >200,000 at previous test there are clearly two options for managing clinical mastitis in this group:

1. Do not treat with antibiotics

2. Treat more aggressively with antibiotic than new infections

We suggest a '**History Based Approach**' to therapy. Clinical mastitis in cows <200,000 at previous test may be successfully treated with label therapy. Cows >200,000 at previous test should be California Milk Tested in all four quarters when they become clinical. Extended duration therapy should be considered for all positive quarters for the first case of mastitis during a lactation. For relapse cases in this group, particularly in cows beyond first lactation, greater than 100 DIM and not yet pregnant, a no antibiotic treatment approach may be considered.

References

De Haas, Y., H.W. Barkema, and R.F. Veerkamp. 2002. The Effect of Pathogen-Specific Clinical Mastitis on the Lactation Curve for Somatic Cell Count. J. Dairy Sci. 85: 1314-1323.

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