

ACCURACY OF MILK AMYLOID A (MAA) CONCENTRATION AND SOMATIC CELL COUNT FOR DIAGNOSING BOVINE MASTITIS

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Introduction

Acute phase proteins are inflammatory serum glycoproteins that undergo substantial changes in concentration following inflammation, infection or trauma (1). Recently, acute phase proteins have also been reported to be present in bovine milk (2,3) indicating a potential for detecting mastitis in dairy cattle. Our aim was to estimate the accuracy of the acute phase protein milk amyloid A (MAA) for diagnosing bovine mastitis.

Materials and Methods

One-hundred-twenty-nine dairy cows from 5 herds in the Central Valley of California were selected based on somatic cell count and mastitis records, days in milk in the current lactation and lactation group to ensure an adequate spectrum of mastitis cases and non-affected controls. All cows were clinically examined, and milk was sampled from 2 contra-lateral quarters after pre-stripping. From cows with clinical signs of mastitis, the affected and the contra-lateral quarter were sampled. Milk was tested for MAA concentration using a commercial kit (Tridelta Ltd, Ireland) and submitted for somatic cell count and microbiological examination at a diagnostic laboratory. Quarters were classified as healthy if no clinical signs (pain, swelling, oedema, abnormal milk) were observed and if the microbiology was negative. A quarter was defined as mastitic if one or more of the clinical signs were present or if the sample was positive when cultured (pure culture of known mastitis pathogen).

Results

Of 43 mastitic quarters, 19 had clinical signs only, 12 were only microbiologically positive (sub-clinical cases) and 12 were positive on both. Clinical signs were present without positive microbiology in 54% of the clinical cases of mastitis. When all paired samples from 2 contra-lateral quarters were compared, a weak correlation ($r^2 = 0.08$, $n = 129$) was found. The MAA content in samples from contra-lateral, uninfected quarters was better correlated ($r^2 = 0.24$, $n = 90$) with no significant differences in concentration. The MAA concentration was higher in quarters with mastitis compared to corresponding contra-lateral healthy quarters ($p = 0.0001$, $n = 28$).

The test performance estimated using the area under the ROC-curve showed no significant differences between the MAA and SCC. However, when optimizing the cut-off value based on the ROC-curves, MAA were generally a more sensitive and less specific parameter than the SCC (Table I).

Table I. Comparison of milk amyloid A (MAA) and somatic cell count (SCC) used for diagnosing bovine mastitis in single quarter milk samples ($n=230$). Sensitivity (Se), specificity (Sp), area under the curve (AUC) and 95% confidence interval of AUC (95% CI) for different definitions of a positive mastitis diagnosis.

Parameter	Mastitis				Clinical mastitis				Sub-clinical mastitis			
	Se	Sp	AUC	95% CI	Se	Sp	AUC	95% CI	Se	Sp	AUC	95% CI
MAA	86.0	74.5	0.81	0.75-0.85	90.3	73.2	0.83	0.78-0.88	83.3	63.8	0.67	0.61-0.73
SCC	67.4	87.2	0.77	0.74-0.84	71.0	87.0	0.80	0.75-0.85	66.7	77.7	0.71	0.65-0.76

Conclusion

The MAA concentration in milk is quarter specific and reflects quarter infection status. Despite no overall difference in the ROC-curves for SCC and MAA, MAA was found to be a more sensitive and less specific mastitis parameter than SCC indicating a possible future use of MAA in diagnosing bovine mastitis.

References

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