Inline Somatic Cell Count improves the detection of clinical mastitis in an automatic milking system.

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Current automatic milking (AM) systems generate mastitis alerts by using sensor information, with the most common sensor being the electrical conductivity (EC). However, a common complaint by farmers using AM is that there are too many false positive alerts on these lists. Somatic cell count (SCC) is also measured off-line as in indicator for udder health status, but is measured infrequently. Recently, a new sensor has been developed, estimating SCC inline (Whyte et al., 2000). This study investigated the potential of using this sensor for clinical mastitis detection. Data was sourced from a research farm in New-Zealand, and included 194 cows milked by 2 AM systems during a period from the 1st of July 2006 to 1st of May 2007. Data included EC, inline SCC of composite milk per cow (ISCC), periodic laboratory testing of SCC in composite milk per cow and antibiotic treatment records of clinical mastitis.

A frequency table was constructed (Table 1) to see whether ISCC measurements were in agreement with fortnightly laboratory-determined SCC (FSCC). SCC measurements were divided into 6 categories. Table 1 shows that 86% of all milkings with a FSCC lower than 200,000cells/ml also had an ISCC lower than 200,000cells/ml; 84% of all milkings with a FSCC higher than 200,000cells/ml also showed an ISCC higher than 200,000cells/ml. Pearson correlation coefficients between normalized (log base 10) values of ISCC and FSCC were 0.24 for FSCC values lower than 200,000cells/ml and 0.83 for FSCC values higher than 200,000cell/ml.

Table 1. Number of cow milkings falling into a specific SCC category when determined by inline SCC or fortnightly SCC measurements

Inline SCC (x1,000cells/ml)	Fortnightly SCC (x1,000cells/ml)						
	≤50	50 - ≤ 100	100 - ≤ 200	200 - ≤ 500	500 - ≤ 1,000	>1,000	Totals
≤50	31	108	68	6	0	0	214
50 - ≤ 100	18	48	77	10	0	0	153
100 - ≤ 200	13	36	114	44	1	2	210
200 - ≤ 500	12	16	43	143	23	2	239
500 - ≤1,000	5	2	5	31	57	11	111
>1,000	0	3	0	1	8	75	78
Totals	79	213	307	236	89	81	1,005

Using EC only as a detection tool for clinical mastitis and setting the parameters to achieve a sensitivity (SN) of 80%, the positive predictive value (PV+) was 9.4% and the false positive attentions per 1,000 milkings (FP1000) was 7.8%. Figures using ISCC only were 11.3% and 6.1%. A fuzzy logic algorithm was developed that combined EC and ISCC information, and again parameters were set such that a SN of 80% was reached. Using the combination of sensors, the PV+ increased to 15.6% and the FP1000 decreased to 4.4%.

These results suggest that measuring composite inline SCC makes a worthwhile contribution to an automatic sensing system for the detection of clinical mastitis.