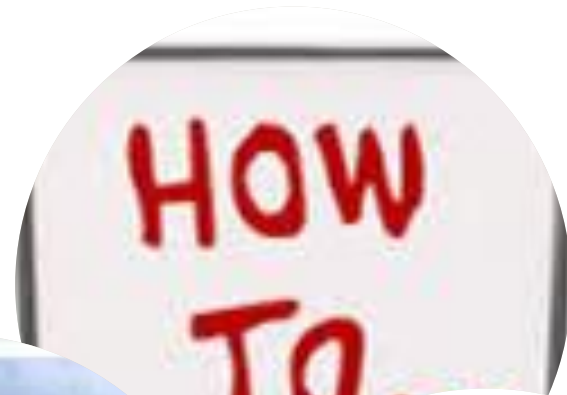


# Guidelines on the use of sensors for animal health and productivity. A NZ initiative

Claudia Kamphuis

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WAGENINGEN **UR**  
For quality of life

Precision Dairy technologies are increasingly popular on dairy farms

Farm management becoming more complex  
family-run to hired personnel



Precision Dairy technologies are increasingly popular on dairy farms

Farm management becoming more complex  
family-run to hired personnel  
small-scale to large(r)





Precision Dairy technologies are increasingly popular on dairy farms

Farm management more complex

and

Automation and sensor technologies available



But when it is time to invest in Precision Dairy technologies, there are some issues farmers and suppliers encounter

## Miscommunication between farmer and supplier



What he had in  
mind



What he thought  
he bought



What he actually  
got

But when it is time to invest in Precision Dairy technologies, there are some issues farmers and suppliers encounter

Miscommunication between farmer and supplier

Misunderstanding of provided information  
epidemiological performance indicators

	Disease present	Disease absent	
Test positive	A	B	A+B
Test negative	C	D	C+D
	A+C	B+D	

$$\text{Sensitivity} = A / (A+C)$$

$$\text{Specificity} = D / (B+D)$$

$$\text{Positive predictive value} = A / (A+B)$$

$$\text{Negative predictive value} = D / (C+D)$$

$$\text{Accuracy} = (A + D) / (A+B+C+D)$$

But when it is time to invest in Precision Dairy technologies, there are some issues farmers and suppliers encounter

Miscommunication between farmer and supplier

Misunderstanding of provided information  
epidemiological performance indicators  
**meaningless for farmers**



But when it is time to invest in Precision Dairy technologies, there are some issues farmers and suppliers encounter

Miscommunication between farmer and supplier

Misunderstanding of provided information

No uniform representation of information



Different standards



Different in- & exclusion criteria



Different time windows for alerts



N = limited



Farmers have no option to take fair well-informed investment decisions



Farmers have no option to take fair well-informed investment decisions

Suppliers have no guidance in evaluation, benchmark and improve



Evaluation protocols will help

Offer a framework  
to evaluate, develop, and  
improve technologies for  
suppliers

Providing robust, uniform,  
and understandable  
information for farmers

Kamphuis et al., 2013, JDS



**DAIRYNZ PROTOCOLS FOR  
FIELD EVALUATION OF IN-LINE  
AUTOMATED MASTITIS DETECTION  
(AMD) SYSTEMS**

This document was current as at the date shown below and may be revised at any time. It is strongly recommended that anyone intending to use the DairyNZ Protocols described in this document should contact DairyNZ to confirm that this is the latest information and discuss the opportunity for DairyNZ to provide advice or support to planned studies.

Date: 31 May 2013

<http://www.dairynz.co.nz/media/785859/Protocol-document-310513.pdf>

Farmers want



Find cows with  
clinical mastitis  
promptly and  
accurately



Manage  
bulk milk SCC



Support dry-cow therapy decisions



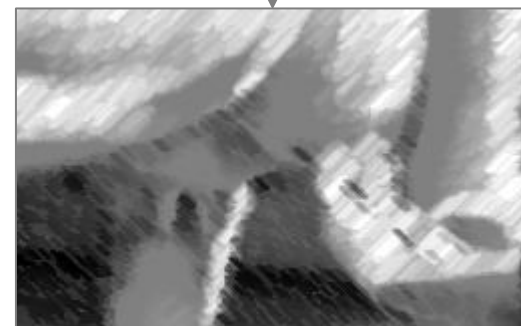
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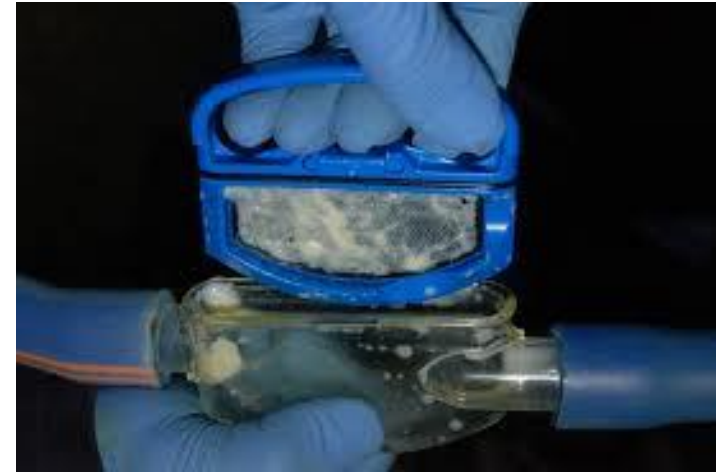
Manage  
bulk milk SCC



Support dry-cow therapy decisions

For both objectives protocols describe  
(Kamphuis et al., 2013, JDS; Kamphuis et al., 2015, under review)

A practical gold standard  
flakes/clots in 2 out of 3 milkings



# For both objectives protocols describe

(Kamphuis et al., 2013, JDS; Kamphuis et al., 2015, under review)

## A practical gold standard

flakes/clots in 2 out of 3 milkings

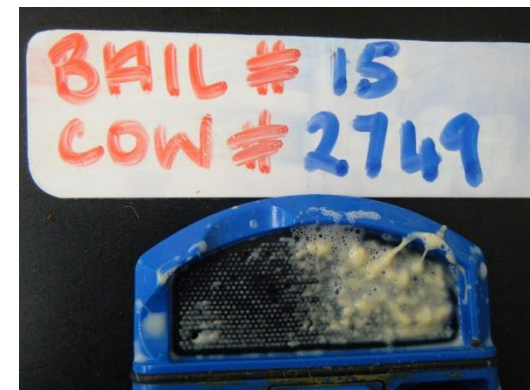
## Description of data collection, in- and exclusion criteria

three commercial farms

$\geq 20$  CM episodes / farm;  $\geq 60$  CM episodes in total

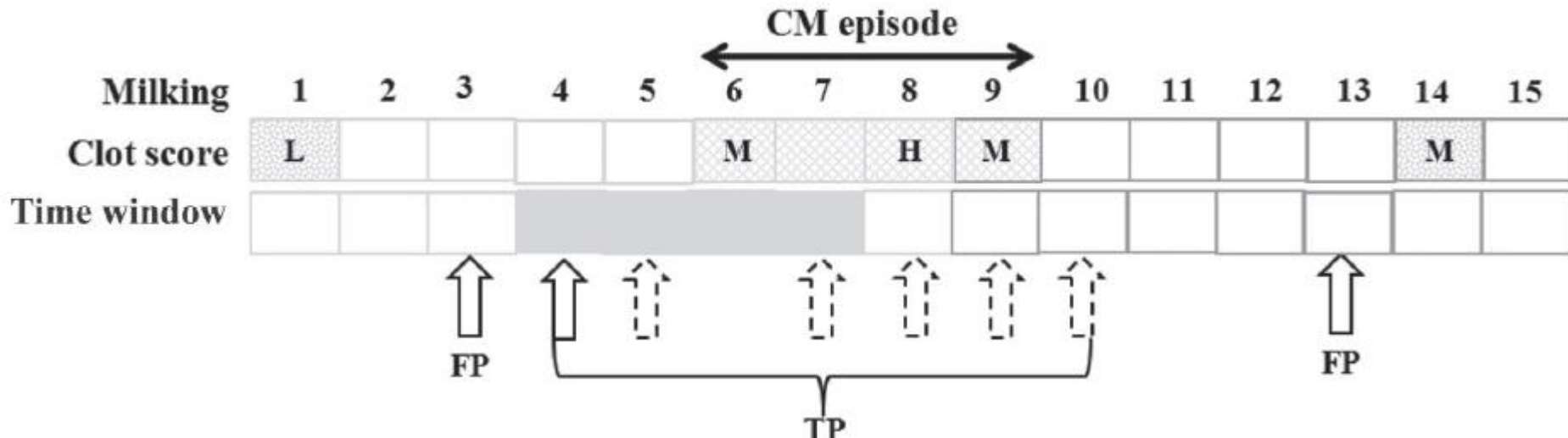
record cowID, stallID, milking session, pics for density scores

collect sensor information (mastitis alerts)



For both objectives protocols describe  
(Kamphuis et al., 2013, JDS; Kamphuis et al., 2015, under review)

## Method for evaluating alerts against gold standard





## For both objectives protocols describe

(Kamphuis et al., 2013, JDS; Kamphuis et al., 2015, under review)

Method for evaluating alerts against gold standard

Method to present understandable performance information

Sensitivity per farm and combined

At different levels of false alerts per 1,000 milkings

Farm	CM episodes	Milkings (n)	<u>EC<sub>max</sub></u>		
			FAR1000	<u>Se<sub>timely</sub></u>	<u>Se<sub>overall</sub></u>
1	35	33,310	10	43	54
			20	57	66
			50	71	74
			100	74	80

protocols have been evaluated

## Applying it in the field (Kamphuis et al., 2015, under review)

### Showing results and presenting protocols during workshop

7 main NZ companies of monitoring technologies

3 farmers

3 representatives of dairy industry



Protocols have been evaluated

Field evaluation was OK in practical sense

Suppliers representatives expressed general support



But now the next steps are required

## Other Precision Dairy technologies

Use DairyNZ initiative as stepping stone  
automated heat detection

## Other areas that are of interest for farmers

'Proof' the value of technologies  
Investment model for mastitis detection





But now the next steps are required

Suppliers need an incentive to use protocols

farmers asking for protocol-approved systems

private companies and/or wider dairy industry

International awareness

publications in international journals/books

Further international collaborations

IDF workforce to further refine DairyNZ protocols



# Awareness starts here





C O N F E R E N C E   O N

**PRECISION DAIRY FARMING**

LEEWARDEN **THE NETHERLANDS**  
**21-23 JUNE**

**2016**

Thank you for your attention