

Comparison of on-line SCC analysers and herd testing for detecting mastitis



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Background

Clinical:
Visible signs



Subclinical: Additional
testing



Background

SCC proxy for mastitis:

- 150,000 – 250,000 cells/mL threshold

Two methods:

- On-line SCC analysers
- Conventional herd testing

Aim

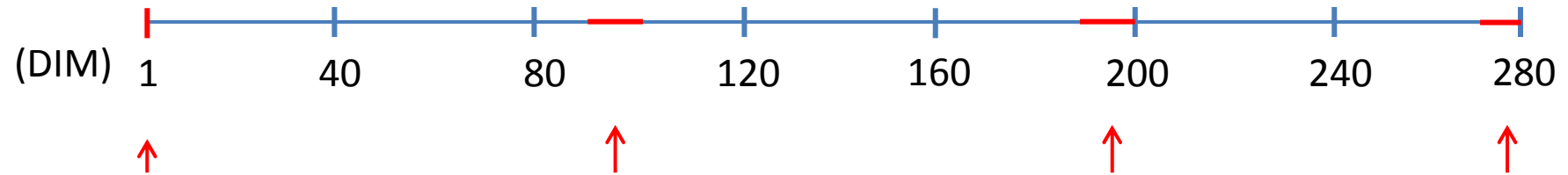
Compare proportion of mastitis detection using simulation

Empirical Dataset

DairyNZ Lye Farm (Waikato, New Zealand)

Seven seasons (2004 – 2013), average 21 HTs

Bacteriology: Sampled four times during lactation



Empirical Dataset

1,435 cow-lactations, 26,407 quarter samples

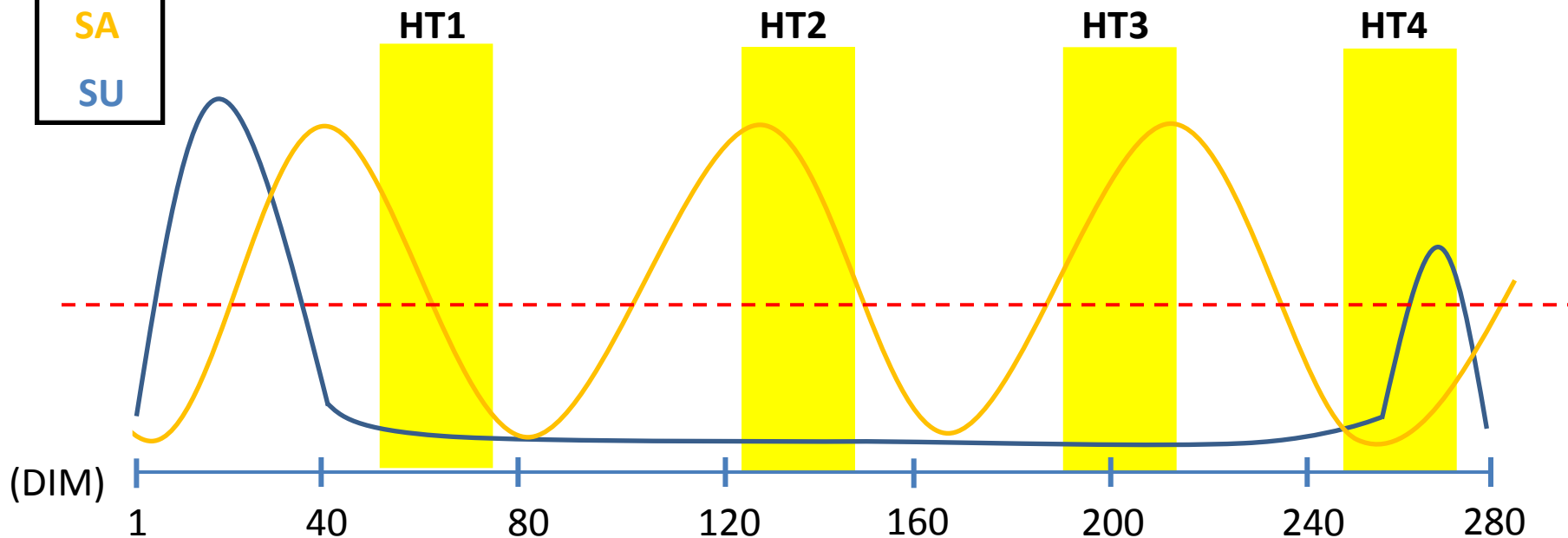
34% cow-lactations uninfected

Bacteriologically-positive quarters:

- *Streptococcus uberis* (SU) (16%)
- *Staphylococcus aureus* (SA) (5%)
- *Coagulase-negative staphylococci* (CNS) (23%)
- Other(56%); *C. Bovis* (38%)

Biological significance

SA
SU



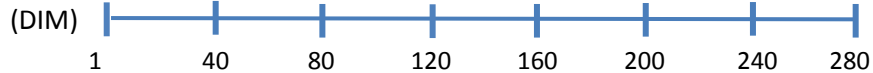
Dataset

Simulation

Real herd test events



Real bacteriology



Dataset

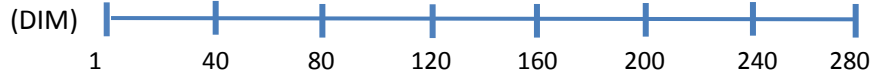
Real mastitis events



Real herd test events



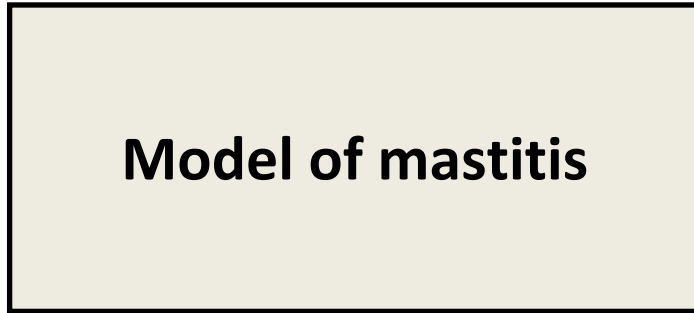
Real bacteriology



Simulation

Dataset

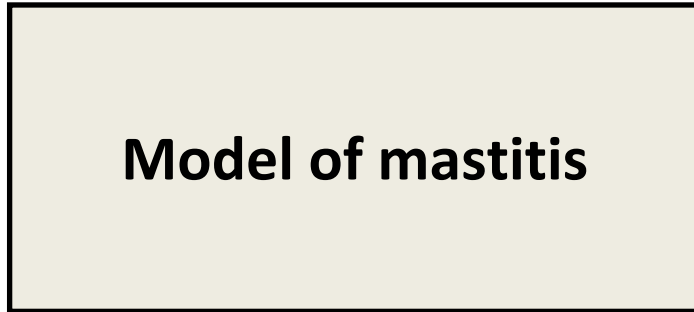
Real mastitis events



Simulation

Dataset

Real mastitis events



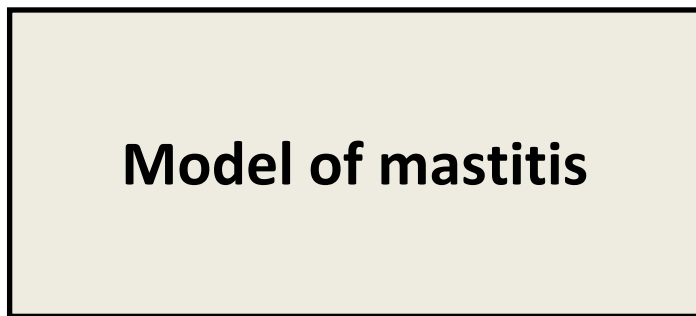
Simulation

Simulated mastitis events



Dataset

Real mastitis events



Simulation

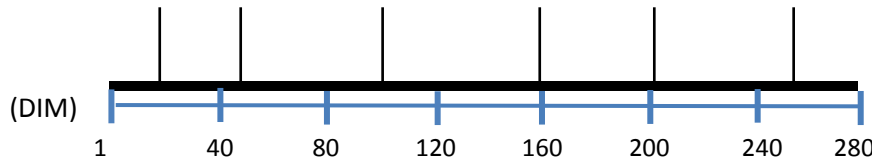
Simulated mastitis event



Simulated herd test events



Simulated analyser events



100 herds of 1000 cows

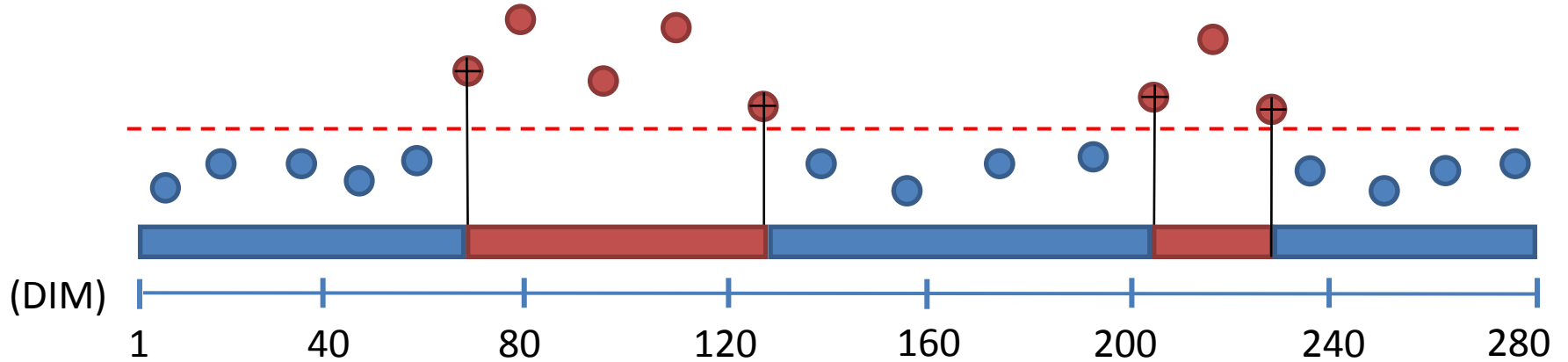


HT/ analyser detection rate



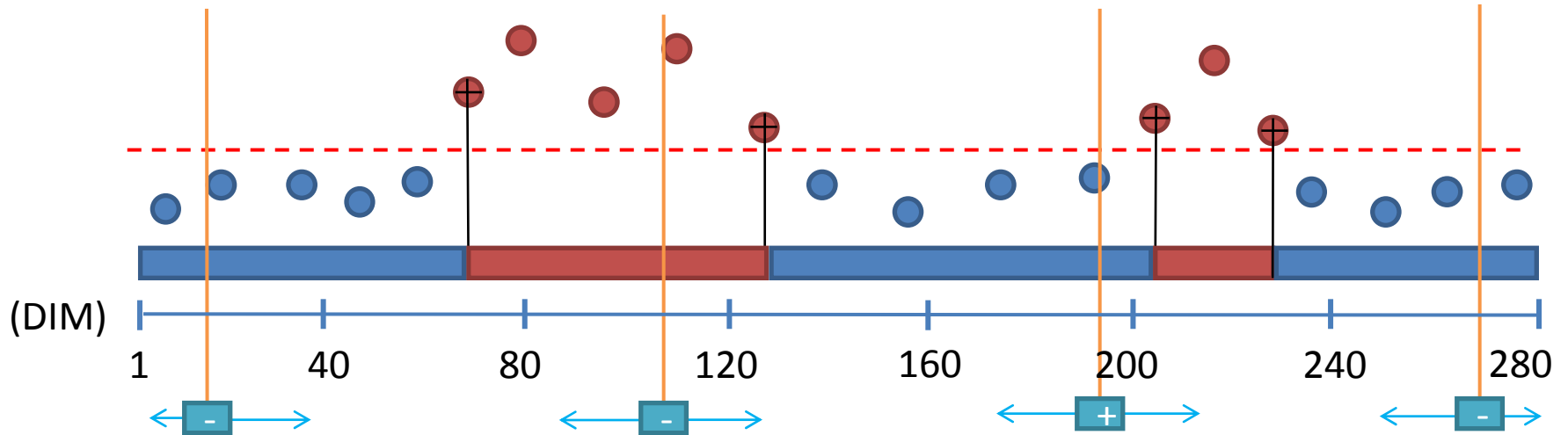
Mastitis Parameters

Inflammatory event: SCC above 200k cells/mL



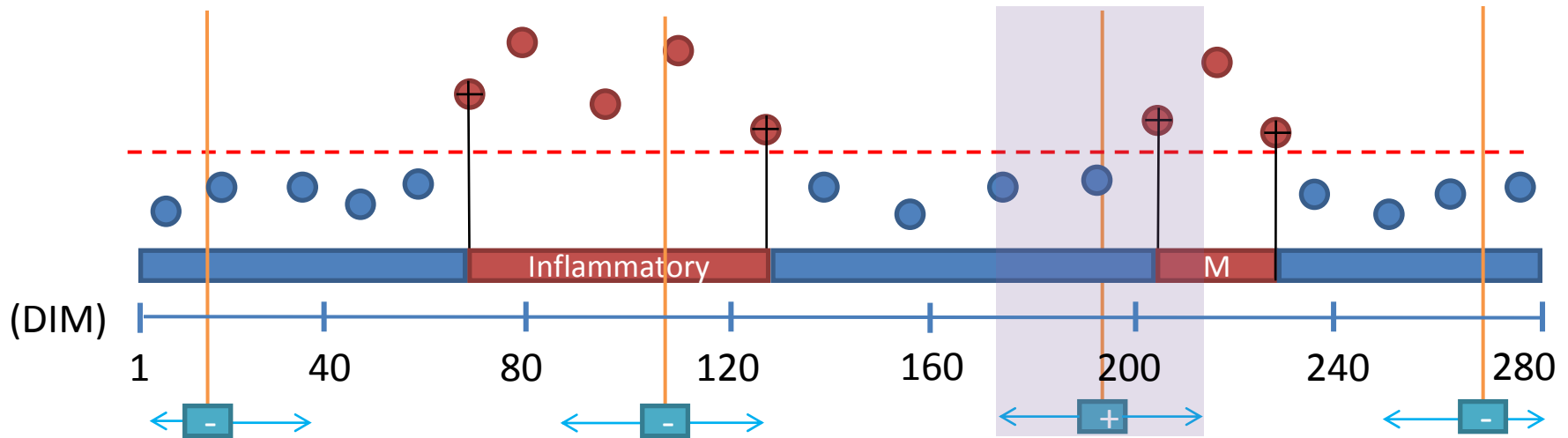
Mastitis Parameters

Mastitis event: Inflammatory event with contemporary positive bacteriology



Mastitis Parameters

Mastitis event: Inflammatory event with contemporary positive bacteriology



Mastitis parameters

Result of algorithm:

790 mastitis events

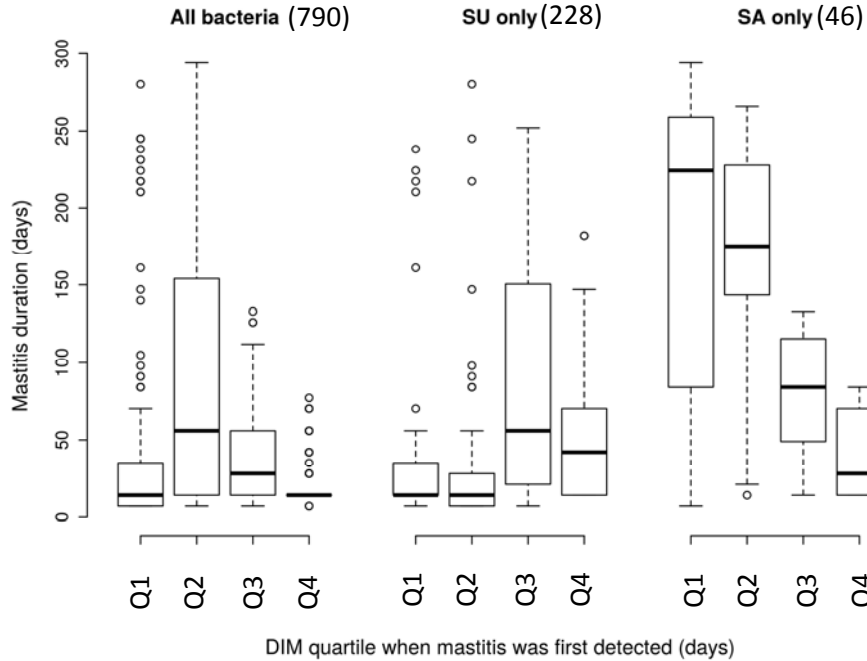
- 228 SU
- 46 SA

Derived DIM at mastitis start and mastitis duration

To build model of mastitis

Mastitis parameters

Duration of mastitis events by start date (DIM quartile)



Mastitis simulation

Three simulations: all, SU only, SA only

100 herds, 1000 cows

Mastitis events:

Sampling from bivariate joint distribution

Analyser events :

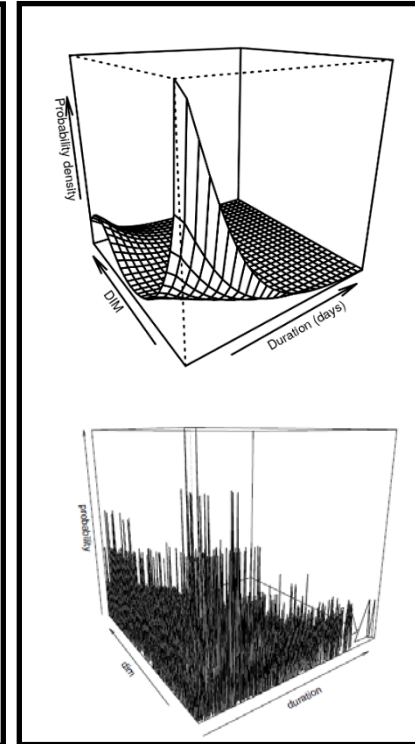
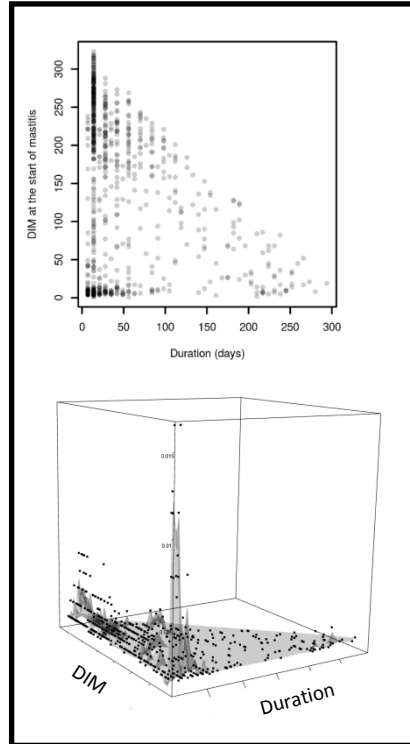
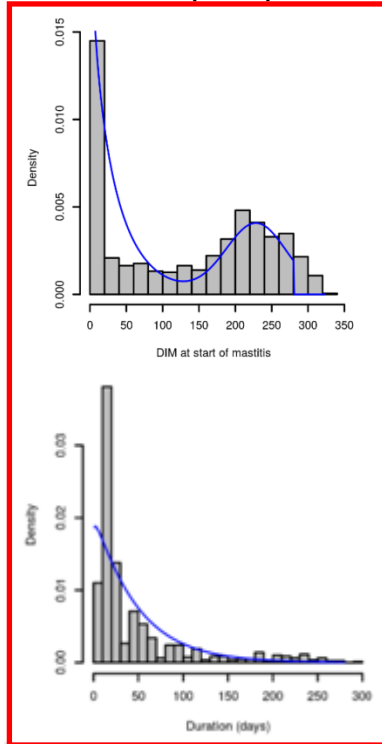
20 scenarios

Herd testing events:

5 scenarios

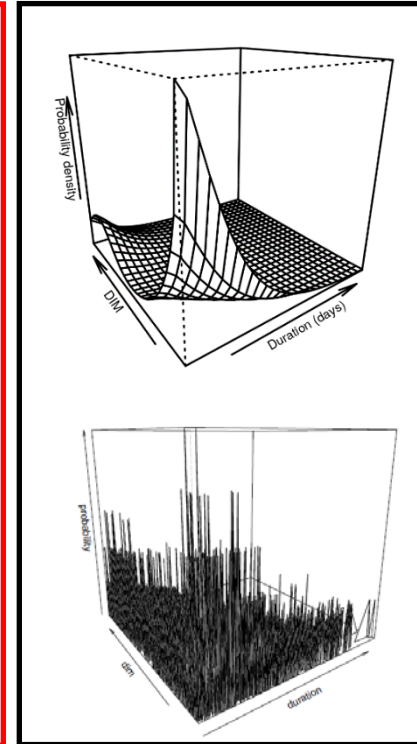
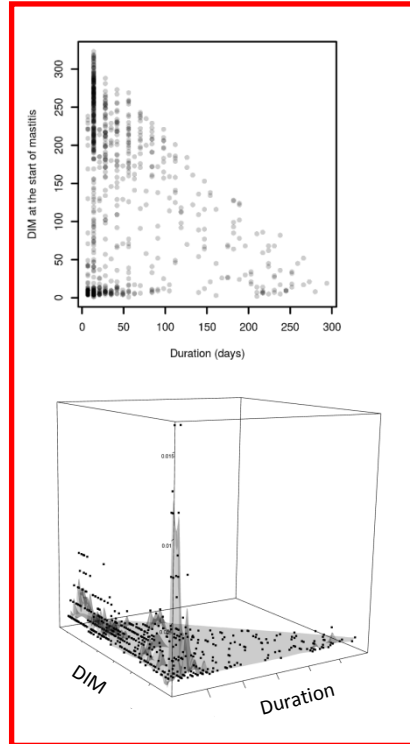
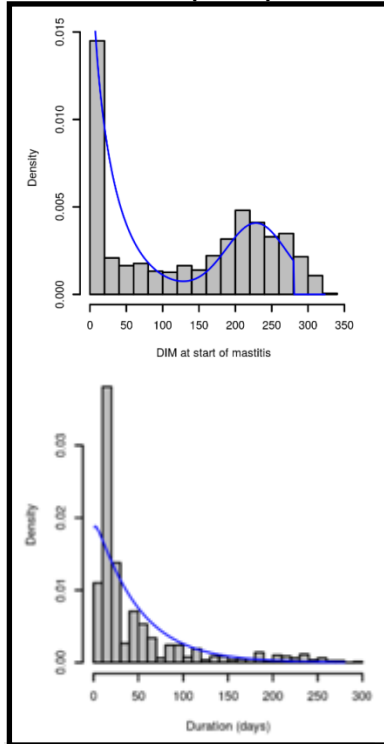
Simulating mastitis events

All bacteria (790)



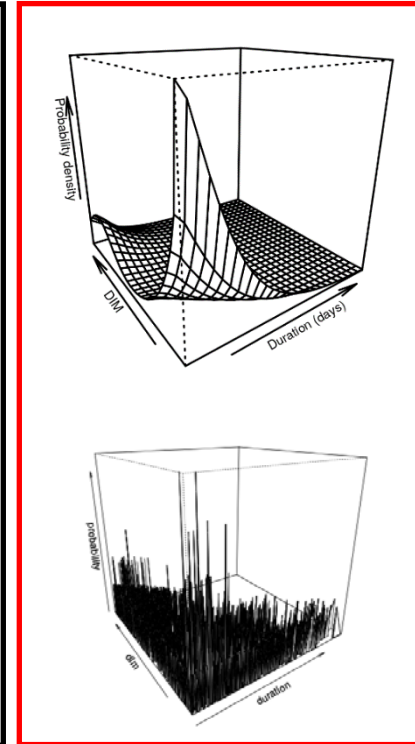
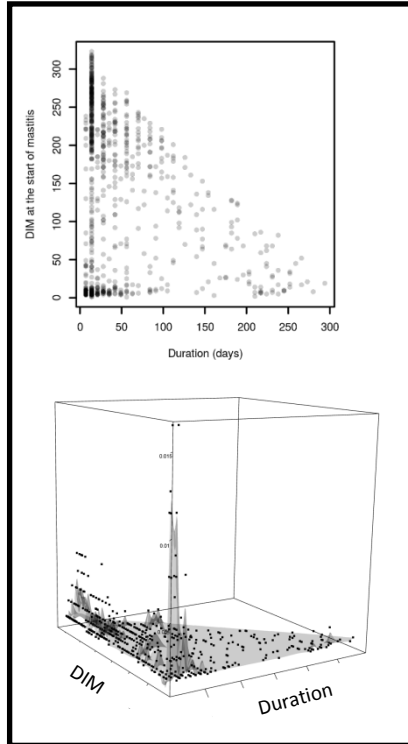
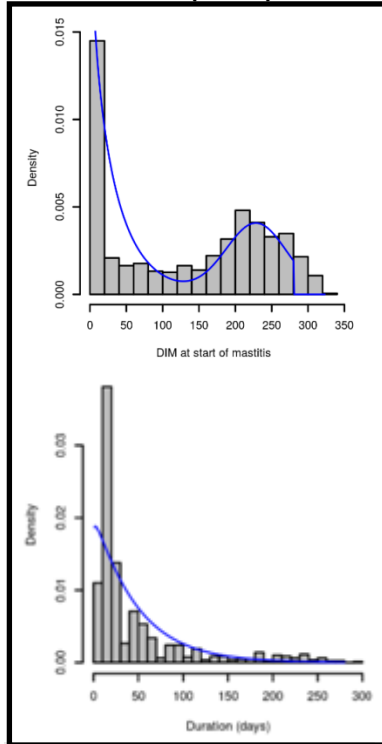
Simulating mastitis events

All bacteria (790)



Simulating mastitis events

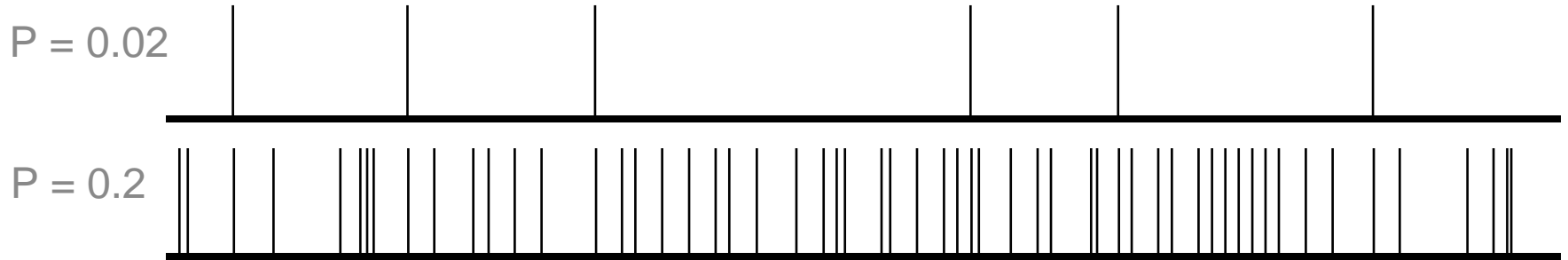
All bacteria (790)



Simulating analyser events

P = probability cow milked at a bail with on-line SCC

- 10 proportions of bails installed
- Once-a-day and twice-a-day milking



Simulating herd test events

5 scenarios: 2, 4, 6, 8, 10 herd tests

Four herd tests: 2015 season

Other #: from uniform distributions

#HTs = 4



#HTs = 8



Obtaining detection rate

Simulated mastitis event



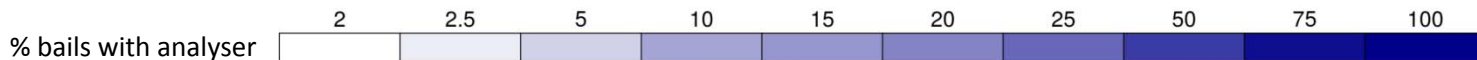
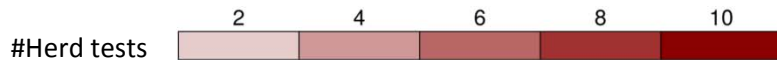
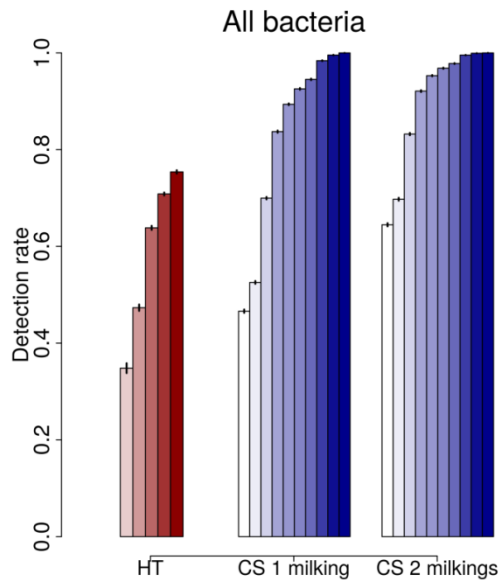
Simulated herd test event. Detection = FALSE



Simulated analyser event. Detection = TRUE



Simulation Results



Discussion

- Right censoring
- “Detection” rate
- Mastitis parameters based on one farm in NZ

Conclusion

On-line SCC analyser > conventional herd testing
at detecting mastitis events

Future work

Investigate economic impact of earlier detection and trends