MASTITIS AND CULLING OF IRISH DAIRY HEIFERS

S. C. Archer,*† F. Mc Coy,† W. Wapanaar,* F. Buckley,† and M. J. Green*
*School of Veterinary Medicine and Science, University of Nottingham, Sutton Bonington, Leicestershire LE12 5RD, UK
†Animal and Grassland Research and Innovation Centre, Teagasc, Moorepark, Fermoy, Co. Cork, Ireland

AIM

To assess association between SCC of primiparous cows at 5 to 30 DIM (SCC1), and risk of culling from Irish dairy herds.

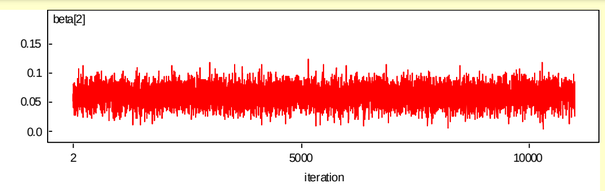
MATERIALS AND METHODS 1

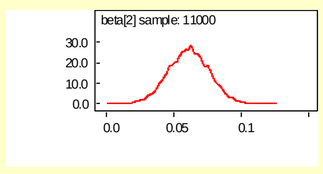
Dataset 1: 147,458 recordings from 7,537 cows in 812 herds. Used for model development.
Dataset 2: 144,113 records from 7,353 cows in 808 herds. Used for cross validation.

Survival time = days (d) between the dates of first calving, and last recording, split into 50 d intervals.

Cows censored at last recording, if identified at a later date in other herds, or if recorded at the last test date for their herd

Data were analysed in discrete time logistic survival models that accounted for clustering of intervals within cows, and cows within herds. Parameters were estimated from 10,000 Markov chain Monte Carlo simulations using WinBugs.

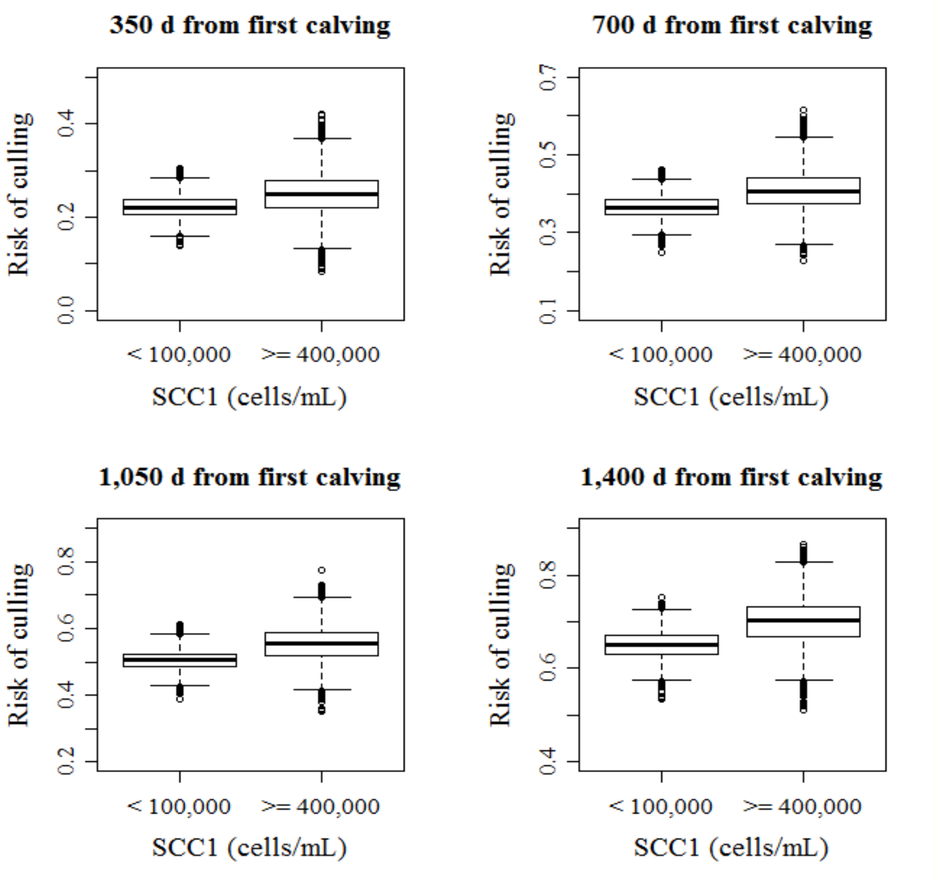




RESULTS

The odds of a cow being culled in any 50 d interval increased by approximately 6% per log score increase in SCC1 as shown by the posterior distribution above.

The simulation results are shown in the graphs below.

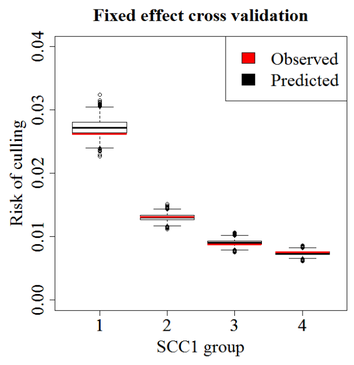


MATERIALS AND METHODS 2

Model fit was assessed by comparison of posterior predictions of culling risk with the observed data.

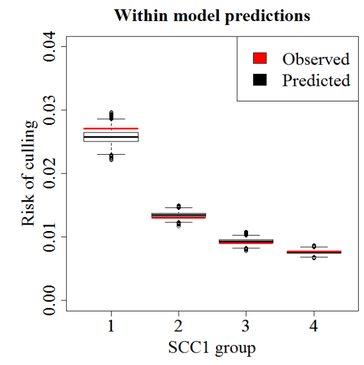
A simulation of 1,000 cows was used to demonstrate the impact of culling risk based on SCC1.

•Predicted binomial occurrence of culling in any interval (y_{ijk}) based on model coefficients, ($\boldsymbol{\beta}$) , data ($\mathbf{X}$), and random effects, at the cow (u_{jk}) and herd (v_k) levels):



$$y_{ijk} \sim p(y_{ijk} | \boldsymbol{\beta}, \mathbf{X}, v_k, u_{jk})$$
$$v_k \sim p(v_k | \sigma^2_v)$$
$$u_{jk} \sim p(u_{jk} | \sigma^2_u)$$

$$y_{ijk}^{xval} \sim p(y_{ijk}^{xval} | \boldsymbol{\beta}, \mathbf{X}^{xval})$$

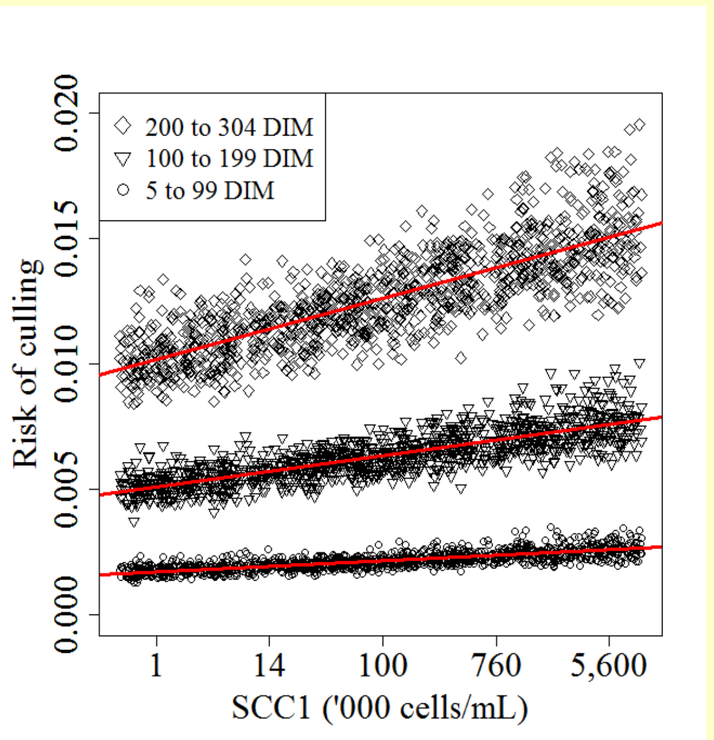


• Culling risk within 350 d of first calving was simulated for 1,000 cows that calved in February, where $pred_{ij}$ is the probability of culling for cow j, in interval i, thus;

$1 - ((1- pred_{1j}) \times (1- pred_{2j}) \times (1- pred_{3j}) \times (1- pred_{4j}) \times (1- pred_{5j}) \times (1- pred_{6j}) \times (1- pred_{7j}))$, and

$$pred_{ij} \sim p(pred_{ij} | \boldsymbol{\beta}, \mathbf{X}^{sim}).$$

• This was repeated for culling risk within 700, 1,050, and 1,400 d from first calving based on SCC1 cut offs for putative intra-mammary infection.
• Baseline culling risk was also predicted on a continuous scale for all possible values of SCC1, by DIM group (below).



CONCLUSION

The mean effect of SCC1 on culling is small. With all variability included in posterior predictions, distributions of culling risk for cows with low and high SCC1 overlap.

Further work is needed to determine the economic impact of SCC1, and this should include the influence on lifetime milk yield.