iCull – A bioeconomic model for herd management and disease control

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Mycobacterium avium ssp. paratuberculosis (MAP) may cause fatal diarrhoea and lower milk production in cattle. Test sensitivity is correlated with progression of infection and consequently low due to chronicity of infection. The iCull model is a stochastic and mechanistic framework simulating a dairy herd, currently using 32 individual parameters per cow and 38 management parameters.

The model was parameterized using data from 700 farms from 2000-2014, including milk yield, MAP-ELISA and SCC test values for individual cows.

The model can use real-time data from the Danish cattle database, allowing herd-specific improvement of the management. It can be used to simulate different control strategies, e.g. targeted culling of test positive cows. The model is suited for finding the economically optimal strategy for individual herds.

Future versions of the model will be used to evaluate economic consequences of management strategies for individual cows and relate it to farm data, taking into consideration the future value of each cow. Thus it will be a herd- and cow-specific online decision tool for the farmer.