

Simulation of ill cows' value through their life-cycle for advising farmers by stochastic optimization when to sell

CHALLENGES: sustainable agriculture systems

PROBLEM DESCRIPTION

PRODUCTIVE SECTOR: livestock

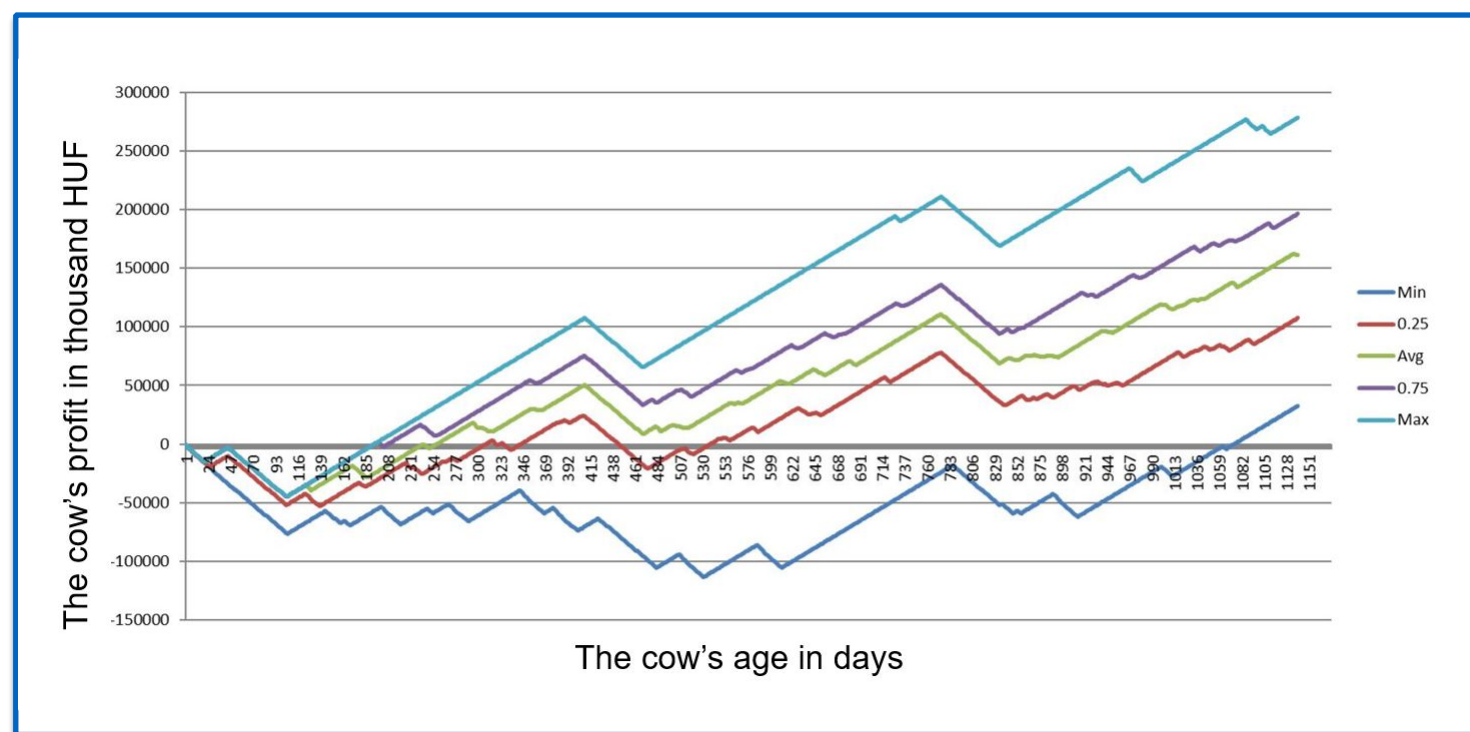
MATHEMATICAL AND COMPUTATIONAL METHODS

In Hungary, hundreds of thousands of cows produce milk for us. A common disease is mastitis that influences their productivity and profitability substantially. The usual practice is to use a thumb rule to decide whether the ill cow should be kept or sold. E.g., they are kept till the fifth mastitis case occurs. We have investigated this problem from a mathematical modeling point of view.

CHALLENGES AND GOALS

We apply local data instead of the countrywide averages. The research demonstrates a recommendation system's advantages, like a program that uses microsimulation and optimization techniques to obtain a well-established decision.

Having a model for the temporal evolution of a cow's value in animal husbandry (or livestock production), we simulate the financial balance's temporal flow for 100 cows. As a result, we obtain an approximate description of the profit's distribution function. It then helps to achieve an optimal decision on whether to sell (e.g., to a slaughterhouse) or keep the cow further.



Profit values of a cow

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Results and Benefits

We have added a labeling technique to our simulation model. It allows us to handle several events happening at the same time. For example, while the cow is pregnant, it may get ill with mastitis while giving milk. Using this method by summarizing the daily incomes and expenses, we can get profit values day-by-day. Implementing and using new labels is quick and easy, making the model easily extendable. Last but not least, when various events, similar to a certain extent, may happen simultaneously, we only have to choose the one we would like to incorporate in our model.

By using our simulations, we can predict the future profitability of keeping a cow

