The Industrial Problem

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.

INCLUDE THE MORE APPROPRIATED INDUSTRIAL SECTOR

Name of Research Group

Research group

SZTE TTIK
INFORMATIKAI INTÉZET

The research topics are Operations Research, Combinatorical Optimization, Global Optimization, and Numerical algorithms.

Company name

Company

Puskin tej Kft.

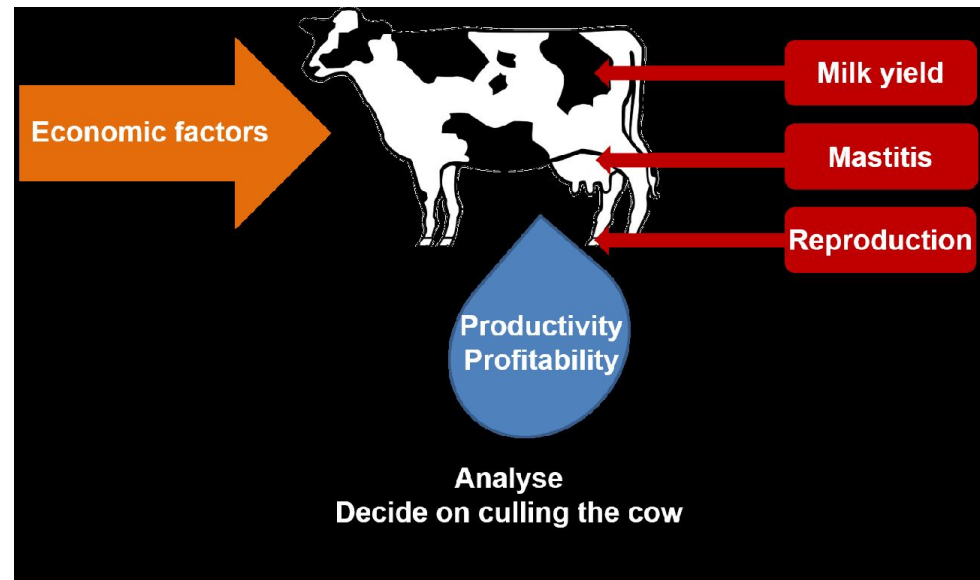**The most profit sensitive sector of the common section of agriculture.**

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

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Challenges & Goals

- One of the most popular cow species is Holstein-friz.

- There are 300 diary farms in Hungary.

- Mastitis is a common problem because of

  - Decreased milk production

  - Long recovery time

- Break-even maintenance

  - New cows are expensive to provide

  - Low milk price

  - Small decisions make big changes

- Aim: help diary farms in making decisions

Economic factors → (cow)

Milk yield
Mastitis
Reproduction

Productivity
Profitability

Analyse
Decide on culling the cow

Problem field

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Mathematical and computational methods and techniques applied

- Basic technique: simulate the value of a cow on daily basis through their life-cycle

- Input: a cow's age, the number of already suffered mastitis illnesses, and the phase of its dairy cycle

- For each day we draw a pseudo random number to indicate whether animal contracts the illness
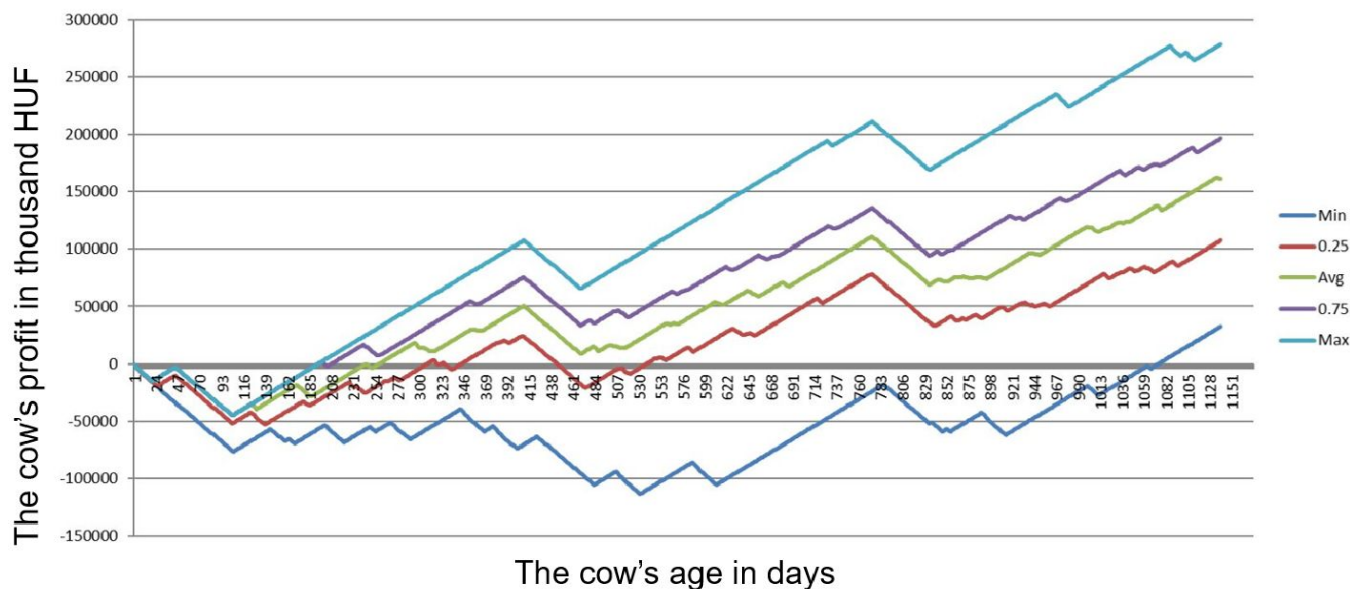

Average result of 100 simulations

Results & Benefits to the company

- 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 and 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.
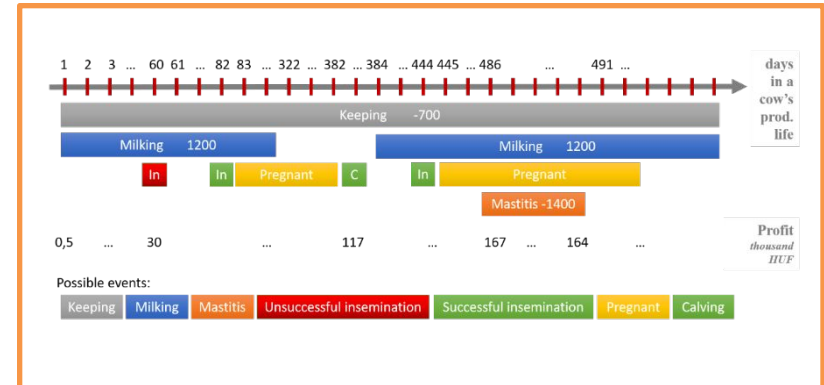
Labelling technique

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