

Ecobreed: The economic value of a cow as a selection criterion

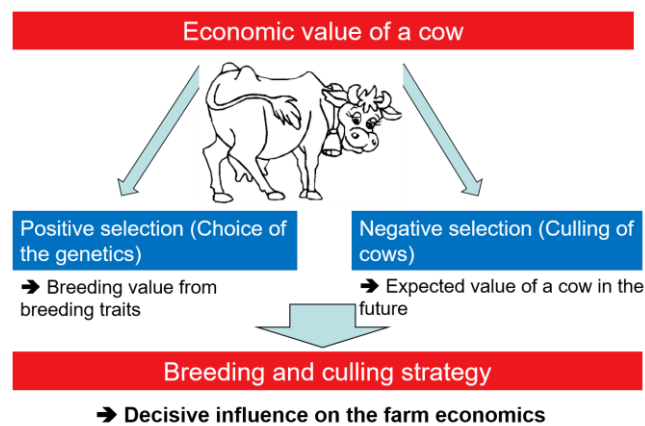
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Introduction

The on farm culling decision is a complex one, it is influenced by many different factors some more evidently to the farmer than other, such as:

- Cost of a replacement heifer
- Selling price of the culled cow
- Genetic improvement of the heifer
- Reduced rearing costs through increased longevity
- Age related, increased milk yield
- Health and fertility

The complexity of the culling decision as well as the absence of an aiding tool for the farmer means that economically suboptimal decisions are very likely.



Graphic 1: The economic value of a cow a selection criterion

Markov chain method

In a first step of the Markov chain model different states are defined such as:

- Number of lactation
- Month after calving
- Month of pregnancy

In the second step the probability of a cow passing from one state to another state is derived from herd data.

In a third step the probability of reaching the state is combined with an economic value of that state.

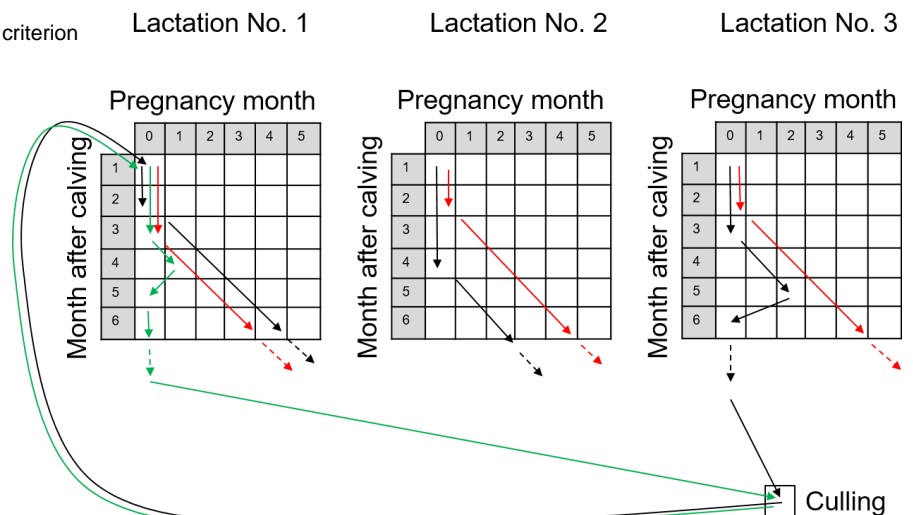
Additional information about the herd and the single animal is needed such as:

- On the animal
 - What is the initial state of the animal?
 - What is the milk yield
- On the replacement heifer
 - What is the expected milk yield of the heifer
- On the herd
 - Average milk yield of the herd
 - Lactation curve for different lactations
 - Fertility

In the graphic 2 is an example on how an heifer which comes into the herd can move through different states and depending on the state before it moves into a different state in the future.

Research questions

- What is the economic value of a cow compared to a replacement heifer?
- How do the economic values differentiate between the cows in the herd?
- What are the circumstances to keep a valuable cow for breeding (positive selection), what are the circumstances to culled the least valuable cows (negative selection)?
- What is the value of a pregnancy and also the cost of an abort?



Graphic 2: An example of a Markov chain

References

Cabrera, V. E. (2012). "A simple formulation and solution to the replacement problem: a practical tool to assess the economic cow value, the value of a new pregnancy, and the cost of a pregnancy loss." *J Dairy Sci* **95**(8): 4683-4698.

Kelleher, M. M., et al. (2015). "Development of an index to rank dairy females on expected lifetime profit." *J Dairy Sci* **98**(6): 4225-4239.

Summary

The goal of this project is to develop a Markov chain-based model for the Swiss dairy farming industry with the additional aim to design and implement a decision support tool for dairy farmers.