

Exploring Best Replacement Policies in Dairy Herds

A large optimization model was used to study the replacement problem in the dairy herd. The model optimized the net revenue of the steady state dairy herd population having two options in each state: keeping or replacing an animal. Five diets based on different levels of forages and concentrates were used to assess the interplay of the economic, environmental, and herd structural outcomes.

Here are the main take home messages:

- In general, the optimal policy suggests to voluntarily replace open primiparous cows between 270 and 360 days in milk and open multiparous cows between 240 and 300 days in milk.
 - It is not economical to voluntarily replace pregnant cows.
- Under favorable market conditions (e.g., prices of 2008) higher net revenues are realized by longer lactations and under unfavorable market conditions (e.g., prices of 2009) higher net revenues are realized by shorter lactations.
 - Higher culling rates could be economically justified when market conditions are unfavorable.
- Diets with higher levels of concentrates will maximize net revenue with shorter lactations and diets with higher levels of forages will maximize net revenue with longer lactations.
 - Lower culling rates could be economically justified when using high forage diets.
- Diets with high proportion of concentrates realize greater net revenues under favorable market conditions, but high forage content diets could outperform high concentrate diets under unfavorable market conditions.
- High forage diets together with longer lactations could be preferred when it is desired to limit the amount of nitrogen expected to be excreted.

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Excerpt from:

Cabrera, V.E. 2010. A large Markovian linear program for replacement policies to optimize dairy herd net income for diets and nitrogen excretion. *Journal of Dairy Science* 93:394-406.