

Stochastic modelling to determine the economic effects of blanket or selective dry cow therapy

Kirsten Huijps¹ and Henk Hogeveen^{1,2}

Introduction

In many countries blanket Dry Cow Therapy (DCT) is the standard way to dry-off cows. Because of antibiotic resistance and social pressure, selective DCT comes up as an alternative. There are hardly any economic data available on the cost-effectiveness of blanket DCT vs selective DCT.

Objectives

- Ø To create a stochastic Monte Carlo model that simulates the dynamics of intramammary infections (IMI) around the dry period.
- Ø To predict the economic consequences of DCT for various types of pathogens (*S. agalactiae*, *S. dysgalactae*, *S. uberis*, *S. aureus* and *E. coli*).

Material and Methods

- Ø The basic model of Hogeveen (2002) was extended to a stochastic model which accounts for variation and different types of pathogens.
- Ø Input values (minimum, most expected and maximum levels in a pert distribution) are based upon the expertise of 8 mastitis experts.
- Ø Variable parameters in the model are:
 - milk production,
 - distribution of pathogens,
 - risk of IMI during the dry period,
 - prevalence of IMI at the moment of drying off,
 - effectiveness of cow selection for selective DCT
 - probabilities of cure,
 - prevention of new infections and
 - economic values of these factors.
- Ø Economic losses for blanket and selective DCT are calculated and a sensitivity analysis is carried out.

Model

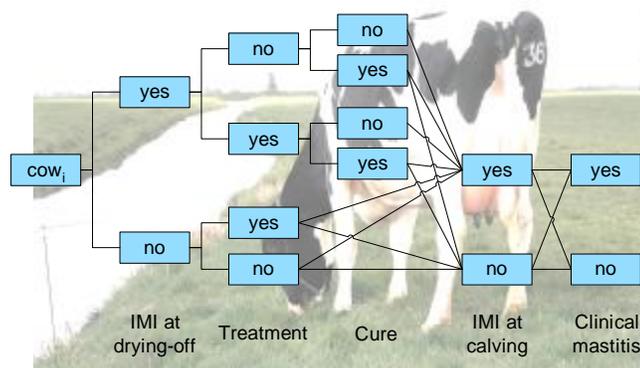
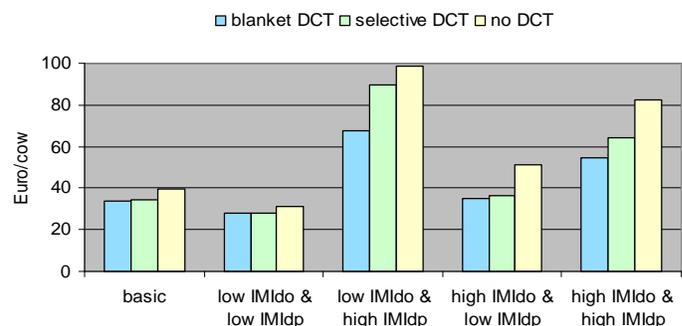


Figure 1. Schematic view of the various stages in the stochastic model.

Results

- Ø The average costs (€/cow) associated with mastitis control around the dry period were
 - €39.62 when no DCT
 - €33.59 when blanket DCT
 - €34.25 when selective DCT
- Ø The largest proportion of these costs was caused by the costs of clinical mastitis after calving (92%, 65% and 85% respectively).
- Ø Different farm probabilities change the optimal treatment (Figure 2).
- Ø In a situation with expensive antibiotic the costs were €38.85 and €37.01 per cow respectively for blanket and selective dry cow therapy.



IMIdo = IMI at drying off; IMIdp = IMI during dry period

Figure 2. Costs of mastitis around the dry period under different scenarios.

Conclusions

- Ø Treatment has an effect on the dynamics of IMI during drying off
- Ø Under basic (Dutch) assumptions, blanket DCT is the optimal approach to mastitis control around the dry period.
- Ø With a change of the farm circumstances (for example increase of antibiotic costs or a different type of pathogen) the optimal decision changes from blanket DCT to selective DCT

Recommendations for further research

- Ø Include pathogen-specific curing probabilities of different antibiotics for a more detailed and precise calculation.
- Ø Double infections should be included.
- Ø Include different probabilities for production loss and elimination of the animals in respect to the different pathogens.

Reference

Hogeveen, H. (2003). Economic aspects of dry cow therapy. Proceedings of the 42nd Annual Meeting of the National Mastitis Council, Fort Worth, TX, USA: 42-49.