

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

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In many countries blanket dry cow therapy (DCT) is the standard way to dry-off cows. However, due to concerns on antibiotic resistance, selective DCT is proposed as an alternative. The economic consequences of different types of DCT have been studied before (Hogeveen, 2003). However, that model did not account for variation and different types of pathogens. The goal of this study was to create a stochastic Monte Carlo model that simulates the dynamics of intramammary infections (IMI) around the dry period in order to predict the economic consequences of DCT for various types of pathogens (*S. agalactiae*, *S. dysgalactae*, *S. uberis*, *S. aureus* and *E. coli*). The parameters 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 and probabilities of cure, prevention of new infections and economic values of these factors can be varied with the model. The probabilities for the basic situation are gathered by interviewing experts. The expert opinions are translated into a minimum, most expected and maximum value (Pert distribution) of the different probabilities.

For Dutch circumstances, the average costs associated with mastitis and mastitis control around the dry period were €39.62, €33.59 and €34.25 per cow for respectively no DCT, blanket DCT and selective DCT. The largest proportion of these costs was caused by the costs of clinical mastitis after calving (92%, 65% and 85% respectively).

Risk of IMI during the dry period, spontaneous cure and the costs associated with antibiotic treatment showed the largest influence on the costs of mastitis around the dry period. A lower risk of IMI during the dry period, compared with higher costs of antibiotic treatment changed the optimal decision from blanket DCT to selective DCT. In the situation with the most expensive antibiotic, the costs were €38.85 and €37.01 for blanket and selective dry cow therapy. In the situation with a low risk of IMI during the dry period the costs are €28.18 and €27.69 for blanket and selective dry cow therapy selectively.

With a small change in the situation the optimal decision will change from blanket DCT to selective DCT. It will be good to include also the probabilities of pathogen-specific cure rates for the various types of antibiotics. Also double infections should be included and this is the same for different chances for production loss and elimination of the animals in respect to the different pathogens.

References

- 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.