Economic considerations for subclinical ketosis in lactating dairy cattle

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Introduction

Milk production and reproductive performance can decrease as a result of hyperketonemia in lactating dairy cows. In addition, cows with hyperketonemia are at higher risk of developing a variety of diseases including displaced abomasum, metritis, retained placenta, and clinical ketosis, and are more likely to be culled. The negative impact of hyperketonemia can be observed at both the individual-cow and herd levels. As a result, significant economic losses might be encountered in dairy herds with a high incidence of hyperketonemia.

Materials and Methods

A spreadsheet-based model was developed to estimate the cost of subclinical ketosis (SCK). All calculations in the model were based on the use of serum β-hydroxybutyrate ≥ 1400 µmol/L as a threshold to identify cows with SCK. Inputs for the model included increased odds of developing disease due to SCK, herd turnover rate, replacement heifer and cull cow prices, milk and feed prices, cost of 1 day open beyond the voluntary waiting period, and incidence of clinical diseases in a herd.

A partial budget was used to estimate the economic value of monensin (Rumensin®) controlled-release capsules (CRC) administered during the dry period to decrease the incidence of SCK and other diseases after calving. Inputs for this partial budget model included incidence of each disease in the herd that CRC can impact, the cost of each disease, milk and feed prices, labor expenses, reduction in disease, increase in milk production after administration of CRC, and the price of CRC.

Another partial budget model was used to estimate the economic value of using oral propylene glycol (PG) to treat SCK after the condition was diagnosed by means of different cow-side tests. The sensitivity and specificity of each method of diagnosis of SCK was incorporated into the model. Inputs in this partial budget model included reduction in disease and culling, increase in milk production after administration of PG, cost of PG used for treatment, cost of the cow-side test used to diagnose SCK, incidence of each disease in cows diagnosed with SCK that PG can impact, milk and feed prices, and labor expenses.

Results

One case of SCK can result in losses up to $330. The breakdown of losses was as follows: milk production, $211; diseases, $78; reproduction, $23; and culling, $18. The cost of a day open beyond the voluntary waiting period and the incidence of displaced abomasum in a herd were the most sensitive inputs in the model. The return on investment for using CRC was 5.7:1. For 1 cow, return on investment for use of PG in a ketosis monitoring program ranged from $1.3 to $22/cow tested, depending on which cow-side test was used, whereas the opportunity cost for false-negative test results ranged from $20-$106. Return on investment was highest for Ketostix® ($22:1), but the same test had the highest opportunity cost ($106) for cows that were falsely diagnosed as negatives because of its lower sensitivity and the small proportion of cows from which a urine sample can be obtained. Return on investment was the lowest for testing with a hand-held blood meter (Precision XTRA®), but it increased as the herd size increased because the meter's price is divided among more cows ($1.3:1 for 1 cow and $12:1 for a 100-cow herd). Precision XTRA® had the lowest opportunity cost for cows with false-negative results ($20) because of its high sensitivity.

Significance

Quantifying the cost of SCK highlights the importance of reducing its incidence through implementation of management practices to prevent SCK during the transition period. The economic value of using CRC to reduce SCK depends on the incidence of other diseases in a herd. The use of a test with high sensitivity and specificity, such as Precision XTRA®, to diagnose SCK pays off through minimizing the losses by classifying fewer cows as false negatives, and therefore treating more sick cows and mitigating the negative impact of SCK.