

Hyperketonemia in early lactation dairy cattle: component and total cost per case

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Introduction

Excessive production of non-esterified fatty acids (NEFA) and β -hydroxybutyrate (BHBA) are indicative of a poor adaptive response to negative energy balance in early lactation dairy cattle, and numerous studies have reported on the detrimental effects of elevated NEFA and BHBA on early lactation immune function, milk production, and subsequent health events. Due to ease of measurement and quantification, the negative effects of elevated blood BHBA concentrations and resulting diagnosis of hyperketonemia (HYK; BHBA \geq 1.2 mmol/L) are better documented than those for elevated blood NEFA concentrations. Although the incidence of HYK in early lactation has been reported to range from 40 to 60%, there are few published reports on the economic impact of HYK. The cost of HYK as ascribed to direct consequences of the impact of this condition on milk production, treatment and culling (reported here as the component cost) is important, as is the cost of other diseases attributed to HYK (i.e. the increase in disease risk associated with HYK). The total cost, the sum of the component cost of HYK as well as the additional disease-attributed costs, is important to emphasize the impact of management and prevention of HYK. The objective of this study was to use deterministic models to estimate the direct and indirect costs associated with: 1) the component cost per case of HYK, and 2) the total cost per case of HYK when accounting for the costs related to HYK-attributable displaced abomasa (DA) and metritis cases.

Materials and Methods

Deterministic partial budget models to estimate the component and total costs of HYK were developed using Excel. Data from current literature was used to model the incidence and risks of HYK, displaced abomasa (DA), as well as metritis, disease associations, and milk production, culling, and reproductive outcomes. The component cost of HYK was estimated based on 1,000 calvings per year, the incidence of HYK in primiparous and multiparous animals, the percent of

animals receiving clinical treatment, the costs associated with diagnostics, therapeutics, labor, and death loss, and the costs of future milk production losses, future culling losses, and reproduction losses. Costs attributable to DA and metritis were estimated based on the incidence of each disease in the first 30 days-in-milk, the number of cases of each disease attributable to HYK, the costs associated with diagnostics, therapeutics, discarded milk during treatment and the withdrawal period, veterinary service (DA only), death loss, and the costs of future milk production losses, future culling losses, and reproduction losses.

Results

The component cost per case of HYK was estimated at \$127 and \$106 for primiparous and multiparous animals, respectively; the average component cost per case of HYK was estimated to be \$112. Thirty one percent of the average component cost of HYK was due to future reproductive losses, 28% to death loss, 22% to future milk production losses, 13% to future culling losses, 3% to therapeutics, 2% to labor, and 1% to diagnostics. The total cost per case of HYK was estimated at \$361 and \$247 for primiparous and multiparous animals, respectively; the average total cost per case of HYK was \$279. Forty percent of the average total cost of HYK was due to the component cost of HYK, 32% to the cost attributable to metritis, and 28% to the cost attributable to DA.

Significance

Based on an estimated \$279 total cost per case of HYK, for a herd with 1,000 calvings per year, a DA incidence of 5%, a metritis incidence of 13.5%, and an HYK incidence of 30%, the total cost of HYK approaches \$85,000 per year. As most HYK cases are subclinical in nature, the majority of these costs are unobserved. This reinforces the importance of proper nutritional and environmental management of dairy cows throughout the transition period in order to decrease the incidence of HYK and its subsequent negative health and production effects.