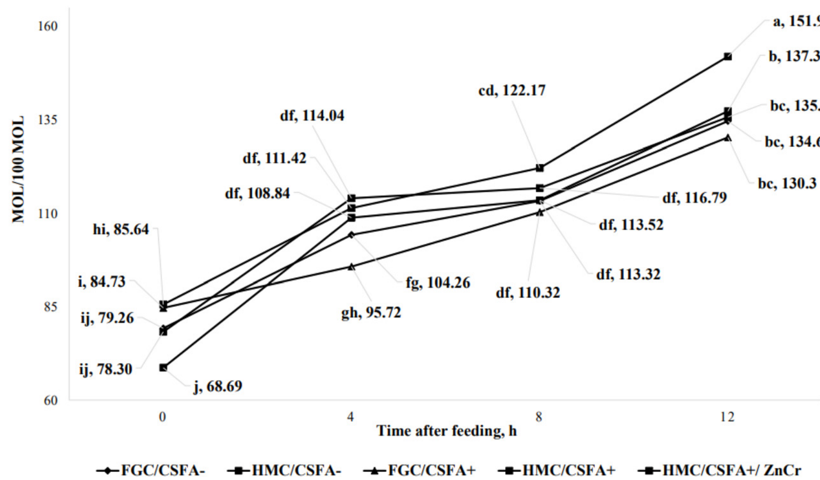

Fig. 1. Interaction between treatments and collection time (hours) for the total concentration of short-chain fatty acid (SCFA) (mol/100mol) of Nellore cattle cannulated in the rumen, and fed diets to increase marbling precursors. [a,b,c,d,f,g,h,i] Means with different superscripts differ (P < 0.05).

Results and discussion

The replacement of FGC with HMC reduced the dry matter intake in kg (P=0.02) and as % of BW (P=0.01) without altering (P>0.05) SCFA and rumen pH (Table 1). Likewise, there was no main effect (P>0.05) of CSFA inclusion on SCFA and rumen pH variables, as well as on dry matter intake. The addition of Zn and Cr increased the molar proportion of propionate (P=0.01), resulting in a greater concentration of total SCFA (Fig. 1) 12 hours after feeding. Moreover, the inclusion of Zn+Cr in feedlot diets stimulated insulin release (P<0.01), which resulted in a greater glucose uptake reducing its blood concentration (P<0.01). The replacement of FGC with HMC increased blood glucose concentration (P<0.01); however, no effects on blood insulin were detected (P=0.53). For N-NH_3 there was an interaction (P<0.01) of corn type with the addition of CSFA (Table 1). In the absence of CSFA, N-NH_3 concentration decreased when FGC was replaced by HMC; however, in the presence of CSFA, N-NH_3 increased when FGC was replaced by HMC. The same type of response was observed for blood NEFA concentrations (P<0.01). Finally, the presence of CSFA reduced rumen temperature (P=0.04), which was expected since CSFA is protected from rumen degradation.

Conclusion and implications

The addition of CSFA did not impact marbling precursors in cannulated Nellore cattle, and HMC only increased blood glucose concentrations The greatest effect on marbling precursors was observed by adding Zn+Cr to the diet. An additional investigation should be elaborated on studying the effect of both minerals on the ruminal environment.

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39. Milk losses due to mastitis in Holstein dairy cows: a modeling approach

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Introduction

Despite significant advances over the years in diagnosing, preventing, and managing mastitis (Ruegg, 2017), the disease is still prevalent and a large cause of milk losses in dairy systems. Most data reported in literature access milk losses due to mastitis based on a single-day drop evaluation. However, milk yield may drop a few days before the mastitis diagnosis and takes some time to recover. To our knowledge,

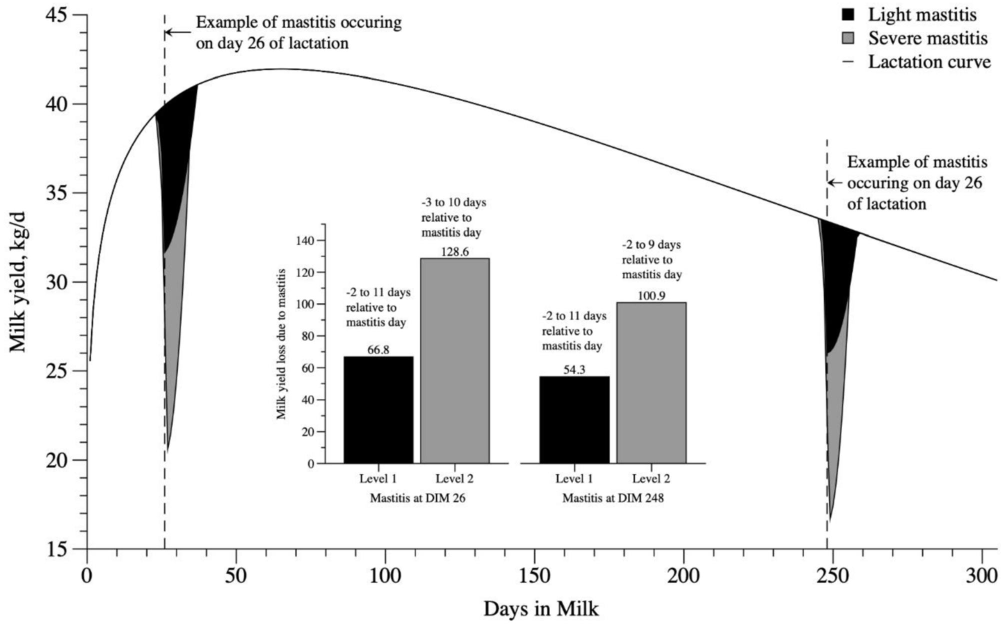

Fig. 1. Lactation curve of Holstein cows diagnosed with clinical mastitis (Mast) level 1 or 2 in two different events jointly to the respective milk yield (MY) drops, recovers, and milk losses caused by mastitis

no study attempted to model the drop and recovery of milk yield in cows diagnosed with clinical mastitis. The study aimed to model the milk yield drop and recovery caused by clinical mastitis in order to estimate the total milk lactation losses in Holstein dairy cows.

Material and methods

We used data from five dairies in Brazil, Spain, and Canada composing a database of 992,614 monthly individual milk test records from 4,272 cows from January 2017 to February 2022. Lactations with less than 10 records, with milk yield (MY) and days in milk (DMI) equal to zero, or any missing data were removed from the database. Cows should have at least one record before 60 DIM and one after 150 DIM to be used in this study. During the modeling procedures, mastitis was considered to affect MY if observed at least 7 days before or after the milk test day. The mastitis level (ML) was scored as 1) light mastitis or 2) severe mastitis. We modeled MY drop following three steps. Firstly, we removed all mastitis records (only the day that mastitis was identified) from the data and fitted a wood's curve (WC) for each cow and lactation number. Secondly, we returned the mastitis data to the database and estimated the residual milk loss (RML) due to mastitis as the difference between the MY predicted by the WC and the actual milk record. Thirdly, we used a meta-analytical approach, including farm as control effect (random), considering the following parameters to estimate RML: ML, day relative to mastitis event (Day), and predict MY (pMY; from wood's curve). Two models were built using the same approach, one to model the drop in MY before the mastitis event and another to model the MY recovery after the mastitis event: RML = β_0 ML + β_1 Day + β_2 pMY + β_3 ML $\times$ pMY + β_4 ML $\times$ Day + β_5 Day $\times$ Day +β_6 Day $\times$ Day $\times$ ML. Parameters were removed from the model if non-significant (P > 0.05).

Results and discussion

One equation was fit for RML for each ML for both MY drop or recovery: Drop (ML =1): RML = 0.3778 + 0.1169 $\times$ pMY + 2.8269 $\times$ Day + 0.3406 $\times$ Day^2; Drop (ML =2): RML = 3.2770 + 0.1169 $\times$ pMY + 3.6453 $\times$ Day + 0.3406 $\times$ Day^2; Recover (ML = 1): RML = 2.8846 + 0.0570 $\times$ Day + 0.1347 $\times$ pMY – 0.0633 $\times$ Day^2, Recovery (ML = 2): RML = 2.8846 + 0.3494 $\times$ Day + 0.4194 $\times$ pMY – 0.2287 $\times$ Day^2, where pMY in the MY predicted by the Wood's curve. As an example, we estimated mastitis (from both levels) occurring with 26 and 248 DIM (Fig. 1). A light mastitis would promote a MY loss in 13 days of 66.8 and 54.3 kg, respectively, when occurring with 26 and 248 DIM. A severe mastitis would promote a MY loss in 12-13 days of 128.6 and 100.9 kg. Heikkilä et al. (2018) suggested a range of 1.4 to 3.5 kg/d of milk losses due to clinical mastitis. Taking into consideration that the drop and recovery time takes 13 days (based on our estimations), it means that one mastitis occurrence depresses a maximum of 45.5 kg, which is a much lower loss than those estimated by our model.

Conclusion and implications

We demonstrated that milk yield drops and recovers in 13 days due to clinical mastitis infection regardless of the severity, and our MY losses estimations were higher than the values reported in the literature.

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