Evaluation of the Effects of a Monensin Overdose on Health, Feed Intake, Milk Yield, and Milk Composition in Early Lactation Holsteins

David McClary, *DVM, MS;* **John Kube,** *MS;* **Howard Green,** *MS;* **Elvin Thomas,** *PhD;* **John Wilkinson,** *PhD;* **Gerald Mechor,** *DVM, MS*
Elanco Animal Health, Greenfield, IN

Introduction

Monensin (M) (Rumensin®:Elanco) is approved for use in lactating and dry dairy cattle for improved milk production efficiency. The labeled dose for M in a total mixed ration (TMR) is 11-22 gm/T dry matter (DM) fed continuously. M is safe for cattle when fed according to label directions but mixing errors can occur and lead to an overdose (OD) and possibly debilitating or fatal consequences. The objectives of this study were to determine the impact of a 10X OD on dry matter intake (DMI) and milk yield (MY), observe the signs associated with a 10X OD, determine if cows acclimated to M responded differently to OD compared to M naïve cows, and determine if recovery was affected by inclusion of M in the post OD diet.

Materials and Methods

Twenty-two Holsteins at or near peak MY were exposed to a TMR containing M at 220 gm/T DM for three consecutive days. Prior to OD cows were fed M at either 0 (n=11) or 22 (n=11) gm/T DM in a TMR for a 4 week pre-OD period. Cows were blocked at the beginning of the pre-OD period based on daily MY, days in milk (DIM), and body condition score. Cows were 40 to 75 DIM at the beginning of the pre-OD period. Following OD cows were switched to a TMR containing M at 0 or 22 gm/T for a 28-day recovery (R) period. MY and DMI were determined daily throughout the study. Milk protein (MP) and milk fat (MF) yield and percent were based on daily values during the OD (d 1-3) and acute recovery (AR) (d 4-7) periods and on weekly means for the pre-OD and chronic recovery (CR) periods (weeks 2, 3, and 4). Cows were observed daily for clinical signs associated with M toxicity.

Results

Reduced DMI was observed within 24 hours of OD exposure. DMI declined almost 50% (mean 57.2 lb pre-OD vs. 30.1 lb d 3 of OD) in all cows regardless of pre-OD M treatment. Following OD DMI returned within 90% of pre-OD levels by week 2 post OD in both groups. Cows that received M in the pre-OD period had higher DMI throughout the AR period ($P<0.001$) and weeks 2 and 3 of the CR period ($P<0.02$) compared those that did not receive M pre-OD. Daily MY declined >20% by d 3 of OD (mean 96.1 lb pre-OD vs. 73.3 lb d 3 of OD). As with DMI, MY tended to be higher throughout the OD and AR period in cows that received M pre-OD with significant differences ($P<0.05$) noted on d 2, 5 and 6 post initial day of OD. There were no significant differences in MF or MP yield or percentage between the pre OD M treatment groups. The most consistent clinical sign observed in this study was a profuse, watery diarrhea. Signs of diarrhea did not develop in a majority of the cows until 48 to 56 hours post OD exposure. At 220 gm/T and a 57.2 lb/d DMI the potential M dose would have been in excess of 6 gms per day. DMI for day 1 of OD was 41.1 lbs which declined to 30.1 lbs by day 3 of OD. Actual M intake was calculated at 4.5, 3.6 and 3.3 gms for the 3 days of OD, respectively. Reduced intake, while being one of the first signs of a M OD, may also be somewhat protective in reducing the total exposure.

Significance

Cows receiving M prior to the acute 10X OD maintained DMI and the corresponding MY in both the OD and R periods compared to M naïve cows. The inclusion of M in the R period had no significant effect on any of the parameters measured. It is the author's opinion returning cows to a normal M level, following an acute OD exposure to M, will shorten the time until normal MY and DMI are resumed. However, these are anticipated to be modest improvements and we were unable to detect a significant difference in these parameters in this study with relatively small sample size. DMI and MY returned to normal levels within 2 weeks even though the exposed cows were at peak production at OD. Diarrhea ceased in all cows within one to two d following OD. While all cows appeared normal for the 28 d subsequent to OD, any long term effects on health or reproduction were not determined due to the duration of the study.