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Does Moderating Amount Fed and Forage Type in Dry Cow Diets Affect Pre- and Postpartum Feeding and Lying Behavior?

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Introduction

The effect of prepartum diets containing large amount of wheat straw on postpartum feeding behavior are not yet known. Alterations in feeding behavior due to feeding wheat straw were described in heifers by Greter et al. (2008) in which feeding 10 and 20% wheat straw in a TMR resulted in a linear increase in eating time among heifers as the amount of straw in the ration increased. These results may be desirable in that heifers and multiparous cows will continue this increased feeding behavior postpartum resulting in greater dry matter and energy intake. It is unknown if other dry forages such as grass hay have a similar effect on modifying feeding behavior.

To evaluate the effects of prepartum diet on postpartum feeding behavior we designed a study to compare the effects of feeding TMR's containing 30 percent chopped wheat straw or chopped vegetative orchard grass hay in either ad libitum or restricted amounts. Our hypothesis was that feeding a TMR containing wheat straw at an ad libitum rate prepartum would result in greater time spent feeding and more frequent meal bouts and that this effect would carry over after parturition. Comparisons using vegetative orchard grass were made in order to determine if physical and chemical properties of two widely different forages affected feeding behavior. Additionally, grass hay is also used in dry cow diets and is more readily available to producers in different geographic locations throughout the United States.

Materials and Methods

Forty Holstein and Cross-bred multiparous dairy cows were fed one of four dietary treatments (N=10) for a 45 day dry period; 1) 30% wheat straw TMR fed ad libitum (WSA), 2) 30% Orchard-grass TMR fed ad libitum (OGA), 3) Wheat straw TMR (1) fed restricted (WSR); 4) Orchard grass TMR (2) fed restricted (OGR) to meet NRC, 2001 recommendations for energy intake based on body weight at dry-off. Diets were formulated to be isocaloric and isonitrogenous and fed in amounts to ensure all nutrient requirements were met (NRC, 2001). Days on treatment averaged 43.1, 38.8, 41.3, and 39.4 for treatments WSA, OGA, WSR, and OGR respectively. After calving, cows were placed on a common lactation diet. Three cows assigned to OGA gave birth to twins. Cows were housed in a tie stall barn and remained in the stall throughout the study except twice daily milking in a milking parlor. To monitor cow behavior, video cameras were placed in the front of each stall and 24 hr video surveillance was recorded from d 5 prepartum to d 5 postpartum. Behaviors evaluated included feeding bouts, feeding time, and lying behavior using 10 minute video scans of 24 hr video. Ten minute video scans have been previously used in cow behavior research (Krawczel et al., 2008). Variables were recorded onto MS Excel spreadsheets and summarized by day. Data were analyzed by day using the PROC Mixed procedure of SAS for a completely randomized design. Significance was declared at $P < 0.05$ and trends are discussed as $P < 0.10$.

Results

Observed prepartum feeding times were not different among treatments ($P = 0.18$) and averaged 3.2, 2.5, 3.1 and 2.0 hr per day for WSA, OGA, WSR, and OGR respectively. As designed, prepartum DMI for the week prior to calving was higher ($P < 0.05$) for WSA and OGA compared with WSR and OGR and averaged 15.4, 15.5, 8.5, and 8.9 kg/d for WSA, OGA, WSR, and OGR respectively. Cows fed on an ad libitum basis reduced feeding bouts around the day of calving, and restricted fed cows did not show this trend. Observed postpartum feeding time was not affected by treatment ($P = 0.53$) and averaged 2.7, 2.3, 2.8 and 2.5 hr/d. However there was a significant treatment \times time interaction ($P = 0.01$) as WSA resulted in longer time spent eating on d 2 and d 4 postpartum. Generally, cows fed ad libitum or restricted wheat straw exhibited more consistent feeding behavior than grass fed cows. Lying time was not significantly different among treatments and averaged 9.9, 10.2, 12.0, 11.1 h/d prepartum and 8.9, 7.3, 9.3 and 9.8 h/d postpartum. Milk yield for the first week after calving was not different among treatments ($P = 0.38$) and averaged 29.4, 30.4, 28.0 and 33.4 kg/d for WSA, OGA, WSR, and OGR respectively.

Significance

Although there were no significant differences among the treatments for lying and feeding behavior, there were some interesting observations that should not be overlooked. When feeding restricted diets, feed costs for TMRs were reduced by up to \$0.40, and did not result in any adverse effects for the cow feeding behavior. Restricted fed cows will also produce less manure compared to ad libitum fed cows. All negative health events recorded including ketosis, mastitis, retained placenta, and metritis occurred in cows being fed on an ad libitum basis. Although this study sheds some light on the effects of prepartum nutrition on postpartum feeding and lying behavior, this study should be repeated in a commercial free-stall barn with more cows per treatment.

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