

Preventing Abomasal Displacements

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- **Take Home Messages**

Because of intake depression prior to calving and slow intake ascent post-calving, the transition period is the major risk period for abomasal displacements. Feeding and management practices that prevent other calving-related disorders reduce the risk of abomasal displacements. Cows that have excess body condition at calving are at increased risk of ketosis and abomasal displacements. Both excessive and minimal feeding of concentrates pre-calving may increase the risk of abomasal displacements. Pre-calving concentrate lead feeding of .50% to .75% of body weight is recommended. The level of .75% of body weight or 4.5 to 5.5 kg per cow per day is recommended for pre-calving TMRs. Feed bunk management is an important risk factor for abomasal displacements and should be monitored closely on commercial dairies.

- **Introduction**

Nutritional risk factors for abomasal displacements were reviewed by Shaver (13). The purpose of this paper is to summarize the important findings from that review and highlight the management practices necessary for the prevention of abomasal displacements.

Abomasal displacements cause economic loss in dairy herds through treatment costs, premature culling and production loss. Current treatment costs range from \$100 to \$200 per case and 10% of cows diagnosed with displaced abomasum are culled or die before the next test day. Treated cows that remain in the herd produce about 362 kg less milk the following month than cows without a displaced abomasum.

Eighty to 90% of all abomasal displacements are left sided. Estimates of average incidence rates for left displaced abomasum (LDA) range from 1.4% to 5.8%. We reported (12) an average LDA incidence rate of 5% (range 0 to 21.7%) from a survey of 71 commercial dairy herds with 5,742 cows. Jordan

and Fourdraine (8) reported an average LDA incidence rate of 3.3% (range 0 to 14%) from a survey of 61 high-producing commercial dairy herds averaging about 11,000 kg of milk per lactation.

Eighty to 90% of LDA are diagnosed within one month post-calving. Estimates of the proportion of LDA diagnosed within two weeks post-calving range from 52% to 86%. This denotes the transition period 2 weeks pre-calving through 2 to 4 weeks post-calving as the major risk period for LDA.

- **Transition Period**

The transition period is characterized by intake depression pre-calving (1) and slow intake ascent (9) post-calving. Low feed consumption during the transition period is a risk factor for LDA through lower rumen fill, reduced forage:concentrate ratio in component-fed herds, and increased incidence of other calving-related disorders. Low rumen fill may provide greater opportunity for migration of the abomasum. Reduced forage:concentrate ratio (F:C) results from the over-consumption of concentrate relative to forage in component-fed herds and contributes to lower rumen fill. Decline of dry matter intake (DMI) is about 35% over the last week pre-calving and causes increased liver triglyceride immediately post-calving (1). Concurrent calving-related disorders have been implicated as risk factors for LDA.

Post-Calving Disorders

Cows with uncomplicated ketosis, retained placenta, metritis or subclinical milk fever are at an increased risk of LDA. This suggests that feeding and management practices that prevent other calving-related disorders will reduce the risk of LDA.

Conversely, LDA has been found to increase the risk of other calving-related disorders. Cows with LDA are at increased risk of complicated ketosis and metritis. This suggests that feeding and management practices that prevent LDA will reduce the incidence of some other calving-related disorders. Ketosis and LDA are closely related calving-related disorders.

Body Condition Score

Cows with excess body condition score (BCS) at calving are at increased risk of LDA; incidence rates for cows (n=1401, 95 commercial dairy herds) with low (2.75 to 3.25), medium (3.25 to 4), and high (> or = 4) BCS at calving were 3.1, 6.3, and 8.2%, respectively (6). This may be related to increased ketosis and fatty liver, greater pre-calving intake depression, and slower post-calving intake ascent for cows that are over-conditioned at calving.

Cows with excess BCS at calving were at increased risk of ketosis; incidence rates for cows with low, medium, and high BCS at calving were 8.9, 11.5, and

15.7%, respectively (6). Higher ketosis incidence in cows with greater BCS at calving may have predisposed them to the higher observed incidence of LDA.

European workers (7) fed cows to a BCS (adjusted to a 1 to 5 scale) at calving of 2 to 3 (low), 3 to 4 (medium), and 4 to 5 (high) in two trials. During the first 16 wk postcalving, cows with higher BCS at calving consumed less DM and reached maximum DMI later. Similar results were reported by (14) using two groups of cows with BCS at calving of 3 and 5 (adjusted to a 1 to 5 scale).

Lead Feeding

Lead feeding, the practice of increasing concentrates during the last 2 to 3 weeks prior to calving, is a common practice on commercial dairies. Lead feeding energy and protein have been shown to lower the risk of LDA and ketosis (3).

Coppock and co-workers (2) fed TMR containing 75, 60, 45, and 30% forage (DM basis) to 40 Holstein cows from 4 wk pre-calving through 4 wk post-calving. No LDA were observed in cows fed the high forage diet. Incidence rates for LDA in cows fed the 60, 45, and 30% forage diets were 16.7, 40, and 36%, respectively. This study involved an abrupt switch to TMR with higher levels of concentrate at 4 wk pre-calving rather than a gradual increase in the amount of concentrate fed during the last few weeks prior to calving. This abrupt dietary switch may have aggravated the LDA response to higher concentrate feeding, but it reflects lead feeding practices in commercial dairy herds feeding TMR.

In component-fed herds, lead feeding concentrates may result in very low pre-calving F:C. Lead feeding was defined by Coppock and co-workers (2) as the practice of increasing the amount of concentrate fed over the 2 to 3 wk prior to calving to 1 to 1.5% of BW. With a total DMI of 1.25% of BW at one day prior to calving, feeding concentrate at 1% of BW would result in a 20:80 F:C. This assumes that the concentrates offered are consumed at the expense of forage DM. A guideline for pre-calving concentrate lead feeding of .5 to .75% of BW restricts F:C between 60:40 and 40:60 after acknowledging pre-calving intake depression.

European workers (5) reported that the ruminal papillae cross-sectional area declined when cows were placed on a low-energy dry cow diet reaching a low point 1 to 2 wk prior to parturition. The ruminal papillae cross-sectional area increased gradually after cows were placed on a high-energy lactation diet starting 2 wk prior to calving, but was not maximized until 6 to 8 wk post-calving. This suggests that capacity for ruminal VFA absorption is lowest during the transition period.

Minimal lead feeding pre-calving may increase the risk of acidosis and LDA through failure to increase the absorptive capacity of the ruminal papillae prior to the feeding of high-energy post-calving diets. Pre-calving adaptation of the rumen microbial population prior to the feeding of high-energy postpartum diets

may also be important. Further, pre-calving concentrate lead feeding may increase energy intake and reduce fatty acid mobilization from adipose tissue which may reduce the incidence of fatty liver and ketosis.

The foregoing discussion suggests that the practice of lead feeding is equivocal. Both excessive and minimal feeding of concentrates pre-calving may increase the risk of LDA. It appears that a pre-calving concentrate lead feeding recommendation of .50% to .75% of BW is reasonable. The level of .75% of BW or 4.5 to 5.5 kg per cow per day is probably a reasonable guideline for pre-calving TMRs.

Post-Calving Concentrate Feeding

Because of slow intake ascent postcalving, very low F:C may occur in component-fed herds. Using DMI for wk 1 through 4 postcalving of 16.5, 19.3, 21.2, and 22.3 kg/day (mature cows; 9) and assuming that the amount of concentrate formulated for wk 4 with 50:50 F:C is fed during early lactation, the F:C for wk 1, 2, and 3 are 30:70, 40:60, and 45:55, respectively. This assumes that the concentrates offered are consumed at the expense of forage DM.

It is recommended that concentrates be held at the lead feeding amount for 3 to 4 d following calving. Concentrate DM can then be increased at the rate of .25 kg/day until peak levels are reached. Concentrates should be fed at least 3 to 4 times daily. Feeding a TMR to control F:C is recommended. A transition group TMR for early post-calving cows is also recommended.

Hypocalcemia

From a study with 510 Holstein cows in a commercial dairy herd, Florida workers (10) reported that cows hypocalcemic at parturition (total serum calcium < 7.9 milligrams/100 milliliters and serum ionized calcium < 4.0 milligrams/100 milliliters) were at increased risk of LDA. There may be a role for strategies to prevent hypocalcemia at calving, such as formulation of pre-calving diets for dietary cation-anion difference, in the prevention of LDA.

- **Ration Physical Form**

Oklahoma workers (4) reported that cows fed ground alfalfa hay (.64 cm hammer-mill screen) and concentrate in a pelleted (.46 cm) experimental TMR starting at calving were at increased risk of LDA (17.4 vs. 1.6%) compared with cows fed the standard herd ration of sorghum silage (1.27 cm theoretical length of cut) and concentrate mixed plus loose alfalfa hay. Cows that developed LDA were diagnosed within 8 to 18 days post-calving.

These results demonstrate that an extreme alteration in ration physical form (pelleted TMR) during the early post-calving period increases LDA. Data are lacking with regard to the impact of varying silage and TMR physical form within typical field ranges on the incidence of LDA. We recommend that haycrop

silages be chopped to contain a minimum of 15 to 20% of the particles (weight basis) over 4 cm long. Research is needed to determine the critical TMR physical form for preventing LDA. We recommend that TMRs have 8% to 10% of the particles (weight basis) over 4 cm long.

Lack of physical form reduces chewing activity and ruminal fill, motility, and fiber-mat formation and increases ruminal VFA concentration, which all may play a role in causing LDA. The importance of physical form as a risk factor for LDA is likely greatest during the early post-calving period, because of the coinciding events of the transition period.

• **Dry Cow Forage Program**

A wide variety of forage programs are used for dry cows on commercial dairies, but data are limited regarding their impact on the incidence of LDA. Purdue workers (15) reported LDA incidence rates of 1/29 (LDA/n), 3/30 and 3/30 for chopped hay, haycrop silage and corn silage dry cow forage programs, respectively. Agway workers (11) evaluated dry cow forage programs consisting of long hay, 50% long hay and 50% corn silage (DM basis), and corn silage DM restricted to 1% of BW plus 2.0 lb. liquid protein supplement per cow per day. Incidence rates for LDA were 3.0, 4.3 and 6.3% for hay, hay - corn silage and corn silage, respectively. Incidence rates for ketosis were highest for hay (9.1% vs. 6.3 to 6.4%). Higher incidence of LDA for corn silage may have been due to low rumen fill related to limit-feeding and lack of physical form. Higher incidence of ketosis for hay may have been due to lack of energy. The lowest incidence of LDA plus ketosis was observed for hay - corn silage (10.6% vs. 12.1 to 12.7%).

It appears that all corn silage rations should not be fed to dry cows. If they are limit-fed, rumen fill may not be sufficient to prevent LDA. If they are not limit-fed, excess energy consumption may cause over-conditioning and associated metabolic disorders. However, controlled use of corn silage as a component of forage programs for dry cows may be beneficial.

• **Bunk Management**

Feed bunk management is a risk factor for LDA through effects on feed consumption and actual nutrient densities of the consumed ration. Inadequate bunk space and high competition at the feed bunk may limit feed intake. Also, restricted bunk access time and feed availability may limit intake. Poor environmental and social adaptation of transition cows may limit feed intake. Low feed intake may lower rumen fill, providing greater opportunity for migration of the abomasum. The importance of bunk management practices that limit feed intake in causing LDA is likely greatest during the early post-calving period, because of the coinciding events of the transition period. The TMR mixing process can alter the actual nutrient densities of the consumed ration relative to nutrient specifications of the formulated ration. Sorting of the TMR in the feed bunk can also cause this problem. Fiber densities of the consumed ration that

are below minimum recommended allowances may result. Excess TMR mixing may grind coarse particles and cause a lack of fiber physical form.

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