Management of the Prepartum Cow

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The experience of dairymen working with today's high nutrient content, low fibre feeds, and research involving the dry cow, have made it clear that prepartum management and feeding have a major impact on health at parturition and early lactation productivity. When inadequate management is applied during the dry period, the incidence of post calving disorders, including retained placenta, metritis, milk fever, mastitis, ketosis, udder edema, and displaced abomasum may be significantly increased.

A dry period is needed to rejuvenate milk producing tissue. The concept that it is also a time to replenish body nutrients is not supported by research indicating inefficiency in dairy cows in storing many nutrients and linking excess intake of energy, protein and calcium to post calving disorders. Field studies of D.H.I. herds indicate that dry periods less than 45 days in length reduce post calving production, therefore it is recommended that cows be dried off 50-55 days before expected calving date. Cows producing insufficient milk to justify milking should not be dried off earlier unless the risk of overconditioning is lower in the dry group than under the feeding regime of low producing cows. While recommended drying off procedures vary, eliminating grain, and reducing the quality and quantity of forage 2 to 3 days before an abrupt halt to milking is satisfactory for most cows. Routine dry cow treatment and teat dipping the first two weeks of the dry period, and the last week before calving is advised.

Housing

Facilities for dry cows need not be complicated and can be of a design which fits in with the management of the milking herd. Tie stalls offer the advantage of individual and restricted feeding. In free stalls or loose housing, variation in eating rates demand that the ration include high fibre, unpalatable ingredients to limit free choice consumption. These systems provide greater opportunity for exercise, but this is of minimal benefit if the ration is properly formulated. Ideally facilities should be available to separate dry cows from the milking herd and to separate prepartum cows from the dry group 2 to 3 weeks before freshening.

Calving facilities should include one maternity pen per 20 cows in the herd. Our recommendations suggest these pens be constructed at least 3.5 metre square with solid walls, a dirt floor, and adequate dry bedding. Dairymen can rest this area in summer by calving cows outside.

Adequate ventilation is essential for all cattle including dry cows. Problem situations commonly occur in Ontario, when cattle density is lower in the maternity area, than the rest of the barn resulting in dampness caused by moisture moving to the cooler area. Strategic location of fans, better insulation in the cool area, air recirculation systems, or providing a separate air supply can be used to correct this situation.

Feeding in Late Lactation

Overconditioning of late lactation and dry cows remains the greatest single predisposing factor in "fat cow syndrome" and related problems at calving. Ideally a dairy cow should weigh 10% more at drying off and 20% more at calving than at peak lactation, with the increase in weight during the dry period reflecting growth of the fetus, fluids, and membranes. Conditioning of the cow should be done before drying off when weight gain or loss is most efficient. Overconditioning in late lactation may result from inadequate control over energy intake of low producing cows. In free stall herds group feeding in at least three groups of milking cows, or the use of individual transponder or computer controlled feeding systems to eliminate unrestricted parlour or bunk feeding is necessary to prevent overconditioning. In rations based on high energy, low protein forages combined with a single grain mix fed at all levels of production, low producing cows typically receive either too much energy or insufficient protein. To avoid overconditioning, it is beneficial to substitute protein supplement for a portion of the grain fed to low producers on this type of program (Table 1).

Feeding in Dry Period: Roughages

Dry cow nutrient requirements are very different from those of milking cows, making it essential that dry cows be

CORN SILAGE RATION

		Milk (Kg/Day)						
	Feeds (Kg)	10	15	20	25	30	35	40
	Corn Silage	28	28	28	28	27	26	25
	Hay	3	3	3	3	3	3	3
A	20% Grain Mix	2.4	4.4	6.4	8.4	10.7	13	15.5
B	20% Grain Mix	0.8	3.1	5.5	8.4	10.7	13	15.5
	44% Soybean Meal	0.8	0.7	0.6				

Table 1: Illustrating overfeeding of energy to late lactation cows:
A = typical grain program for corn silage based ration
B = Ideal ration limited to requirements for protein and energy

separated from the milking herd. Modern forages make proper dry cow feeding a difficult challenge for many dairymen (Table 2).

Corn silage must be limit fed to individual cows at 1.3 to 1.6 kg dry matter per 100 kg body weight to prevent overconditioning. In a group feeding situation it must be mixed with stover, straw, poor hay or some other unpalatable ingredient to limit free choice intake. Since displaced abomasum occurs more frequently on rations high in grain content, or lacking in long dry roughage, it is recommended that corn silage be limited to half or less of the dry matter intake.

		% (Dry Matter Basis)	
	TDN	Protein	Calcium
Dry Cow Requirement	53	10-12	0.37
Corn Silage	67*	8.5	0.27
Alfalfa Haylage	59	17*	1.30*
Oatlage	57	12	0.59
Grass Hay	55	10	0.55

Table 2: Comparing nutrient content of forages to dry cow requirements
*Denotes excess

Alfalfa hay or haylage is undesirable as a dry cow feed. Immature legume forages provide sufficient energy to cause overconditioning and the high protein level is known to aggrevate fat cow problems. More significant is the high calcium content of legumes, since excessive calcium intake prepartum is implicated in increasing milk fever incidence.

Feeds such as oatlage or other small grain silages fit well in dry cow programs, in that they meet the criteria of being high in fibre and low in energy, protein, and calcium. The roughage which best meets these requirements is grass hay of medium quality, and it is recommended that at least half of the forage be of this type.

In Ontario, the Ministry of Agriculture and Food provides a feed analysis and ration formulation service for both dry and lactating cows. This program limits dry cow energy intake to N.R.C. requirements and restricts calcium intake to less than 100 grams per day. This Feed Advisory Service is used by more than 1000 dairymen each year and has been effective in promoting proper dry cow programs. Restricting calcium intake has been particularly effective in reducing milk fever incidence. It should be noted that while "less than 100 grams" has been a popular recommendation, undoubtedly amounts closer to the 30-45 grams required by dry cows are more effective than rations which provide 90-100 grams of calcium. Earlier emphasis on the ratio of calcium to phosphorous in the prepartum diet appears to be much less important than restricting total calcium intake.

Minerals

To avoid excessive calcium intake, a high phosphorous, 0% calcium mineral based on sodium or ammonium phosphates is required to supplement most dry cow roughage programs. Trace elements play a definite role in some specific disorders, particularly retained placenta. Deficiencies of vitamin A, iodine, copper, and selenium have been reported to affect incidence. Dry cows have a high requirement for vitamin A which should be supplemented to provide 50,000 I.U. per cow per day throughout the dry period. Ontario and much of the North Eastern United States is selenium deficient. This element should be supplemented to provide at least .1 to .12 ppm selenium in the ration. In Canada, regulations restrict selenium supplementation to a single source in the ration. The feed industry has chosen to add it to complete grain mixes and protein supplements, thereby ignoring the needs of the dry cow. Dairymen should select a mineral premix containing selenium or request it be added to the mineral used for dry cows.

Excessive salt intake has been implicated in increased severity of udder edema, and should be avoided, by limit feeding salt at 30-40 grams per cow per day. Observations on farms, also implicate excessive intakes of potassium, suggesting that supplements containing potassium or new seeding forages and forages cut in periods of rapid growth should be avoided.

Mineral requirements of dry cows (Table 3) reflect a much lower requirement for calcium and phosphorous than the milking herd and similar requirements for trace elements and vitamins. Many commercial mineral products do not contain adequate levels of manganese, copper, zinc, iodine, selenium, and vitamin A for dry cows. Special mixes can be formulated, or a product with higher levels of these elements should be selected. To ensure adequate mineral intake it is essential that minerals be force fed, topdressed on ensiled roughages at 50-100 grams per cow per day. When hay is the only roughage, minerals can be included at 3 to 6% of a palatable low energy grain mix fed at a rate of 1.5 kg per cow per day.

Prepartum Feeding

During the last 2-3 weeks before calving, the objectives of the feeding program should include acclimatizing the cow to the post-partum ration, while maintaining a low energy and particularly a low calcium intake. Traditional

DRY COW REQUIREMENTS	MINERALS	MINERAL ANALYSIS
36 g	salt	
44 g (100)	calcium	0%
31 g	phosphorous	18-24%
0.16%	magnesium	0-4%
40 ppm	manganese	0-2-0.4%
10 ppm	copper	0.08-0.16%
50 ppm	zinc	0.4-0.8%
0.1-0.12 ppm	selenium	0.001-0.002%
0.5 ppm	iodine	
0.1 ppm	cobal	
50,000 IU	vitamin A	700,000 IU/Kg
8,000 IU	vitamin D	110,000 IU/Kg

Table 3: (Left column) Mineral and vitamin requirements of 600 kg dry cow during last two months of gestation.
(Right column) Suggested ideal analysis of mineral mix to supplement typical Ontario forages.

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recommendations have suggested moving cows to a medium producing group, or lead feeding with the milking cow grain mix. Since these options may add 30-40 grams of calcium to the ration they are not practical where milk fever incidence is of concern. Nevertheless, lead feeding with 3 to 5 kg of grain is valuable in providing a gradual change in ration to avoid off-feed problems and ketosis post partum. Ideally grain used for lead feeding should be similar to the grains fed to milking cows, but should contain no added minerals. Higher calcium forages and mineral should be introduced when signs of calving appear.

Abrupt changes in forage at calving are associated with a greater incidence of off-feed problems and displaced abomasum, therefore, it is important to maintain a reasonable level of fibre intake after calving. High quality palatable hay should form a major portion of the diet immediately after calving, and be replaced gradually by other forages fed to the milking herd.

Injections of selenium and vitamins A., D., E., prepartum may be warranted if levels of these nutrients in the ration are in doubt. The injection of 2 million I.U. of vitamin D_3 per 100 kg of body weight 2 to 4 days before freshening has been shown to be effective in preventing milk fever in cows with a history of this disorder, however, the unpredictability of calving date makes this a less desirable program than prevention of milk fever via restricted calcium intake.

The Problem Herd

Typically, herds with a high incidence of post calving disorders lack the facilities to manage prepartum feeding properly. Such facilities need to be designed to provide a practical, labour efficient way of handling dry cows, while making it possible to separate them from the milking herd into a group including all dry cows more than 2 to 3 weeks from calving, and a second prepartum group. Operators of tie stall herds can tie all dry cows in a single area. Adequate maternity facilities must also be encouraged.

Dry cow rations should be based on feed analysis and formulated according to requirements, with emphasis on restricting feed intake where necessary. While blood profiles may be of less value than feed analysis, specific enzyme tests etc. may be beneficial in providing supporting evidence for overconditioning, liver degeneration or specific nutrient deficiencies. Many dairymen have difficulty accepting the importance of proper dry cow care, and only through continued education and encouragement will proper management of the prepartum cow receive the emphasis it deserves.

Example 1	Example 2	Example 3
grass hay 10.5 kg	mixed hay 6.5 kg	hay crop silage 5 kg
grain mix* 1.5 kg	corn silage 13.0 kg	corn silage 16.5 kg
*mix of 5% high phosphorus mineral, 2.75% cobal -iodized salt, 7.5% wet molasses, and the remainder as rolled oats	high phosphorous mineral 50 grams cobalt-iodized salt 36 grams	straw 4 kg cobalt-iodized salt 36 grams

Table 4: Typical Dry Cow Rations: Example 1: with grain mix and free choice hay
Example 2: for limit feeding
Example 3: for free choice feeding
Based on 630 kg dry cow during last 2 months of gestation