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Feeding and Managing the Far-Off Dry Cow

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Dry cows are the most forgotten group of cows on a dairy farm, often placed on the "back 40" and forgotten until they are ready to calve. However, these cows represent one of the most important groups in terms of the future profitability of a dairy. Proper care, feeding, and management of the dry cow can help improve milk production and health of the cow during the next lactation. Conversely, poor management practices during the dry period may decrease milk production by 2,500 pounds of milk, thus resulting in $325 less potential milk income per cow. Thus, attention to details during the dry period is important for a profitable, productive dairy herd. The dry period needs to be regarded as an important beginning to the next lactation. This fact sheet covers the important concepts of feeding and managing a dry cow.

Importance of Dry Period

Why do cows need a dry period? First, the dry period is important for the rest and regeneration of tissues in the udder. Studies have shown that a short or absent dry period reduces the number of secretory cells in the udder, and therefore, subsequent milk production is reduced. Second, the dry cow is fed a high-fiber roughage diet, which helps restore the muscle tone of the rumen and allows time for any lesions in the liver to shrink. Thus, dry cows should be fed long-stemmed hay or pasture to stimulate cud chewing and ultimately increase rumen contractions and muscle tone. In addition, three-quarters of the growth of the calf occurs during the last two months of gestation, so the dry cow needs to be fed to maintain herself and allow the calf inside her to grow properly. Restricting energy intake will not result in a smaller calf but a dry cow in poorer body condition.

Drying Off Cows

"Drying a cow off " refers to the process of abruptly stopping to milk a cow. This process involves (1) abruptly stopping to milk the cow, (2) infusing each quarter of each cow with a commercial, single-dose intramammary antibiotic product specially formulated for dry cow therapy, and (3) dipping each cow's teats with an effective teat dip.

For high-producing cows (those producing more than 60 pounds of milk daily at time of dry off), the amount of grain fed can be reduced a week before drying off to decrease milk production. If the herd is fed a total mixed ration, remove the cow from the herd and provide lower quality forages to decrease her milk production. These management practices will decrease the amount of milk a cow produces, thus making it easier to dry off a cow.

Once cows are dried off, they should be removed from the milking herd. Reasons for removing dry cows from the herd include: (1) decreasing the chance these cows will be accidently milked and contaminate the bulk tank with antibiotics and (2) feeding them a higher-fiber diet to reduce costs and better match the nutrient needs of the dry cow. As shown in Table 1, a typical dry Holstein cow eats 50 percent to 60 percent less dry matter (feed with all of the water removed) than a milking cow. Also, dry cows have lower nutrient needs than the same cow producing 65 pounds of milk. Even with this lower dry matter intake (DMI), dry cows fed the milking herd diet will overconsume crude protein and energy. Besides increasing the likelihood of health problems after calving, lactating-cow rations are more costly than a properly formulated dry cow ration.

Dry cows need to be housed separately from the milking herd in a clean, dry environment. These cows are most susceptible to mastitis the first two weeks after they are dried off and again two weeks before they calve. In the summertime, allowing cows to congregate under shade trees will increase the likelihood of cows contracting environmental mastitis, because environmental bacteria thrive and multiply in urine and feces. Rotation of exercise lots, rotation of access to shade trees, or the use of movable shade structures can help decrease exposure to mastitis-causing organisms.

Table 1. Comparison of nutrient requirements of an average 1,300-lb mature Holstein.

Daily Intake	Far-Off Dry Cow	Milking Cow Producing 65 Lb Milk
Dry matter intake (lb)	25	45
Crude protein (lb)	2.8	6.4
Net energy of lactation (NE_L) (Mcal)[a]	13.2	21.6

Source: Calculated from 1989 *Nutrient Requirements of Dairy Cattle* (6th rev. ed.)
Note:
[a]Mcal = megacalories.

Length of Dry Period

Studies have shown that cows dry less than 40 days produce less milk in the next lactation compared to cows given a 60-day dry period. Cows with a 70-day or longer dry period may have a slightly higher milk production, but it can not be economically justified because the costs to feed the dry cow are not recouped by the slight increases seen in milk production. Thus, cows should be dried off 50 to 60 days before expected calving date. First-calf heifers may benefit from a slightly longer, or 60- to-70 day dry period. Considerable variation exists between actual calving date and the expected calving date. For example, the standard deviation for Holsteins and Jerseys is about five days, which means 67 percent of the cows will calve five days before or after the expected calving date, or 95 percent of the cows will calve within 10 days of the expected calving date (day 268 to 288 of pregnancy). This variation needs to be considered when deciding when to dry off a cow. For herds bred by natural service, having a veterinarian determine pregnancy at 45 to 90 days (the first trimester) of pregnancy will increase the accuracy of predicting the calving date. To more accurately predict calving date, a veterinarian should palpate cows not determined pregnant every six weeks to two months.

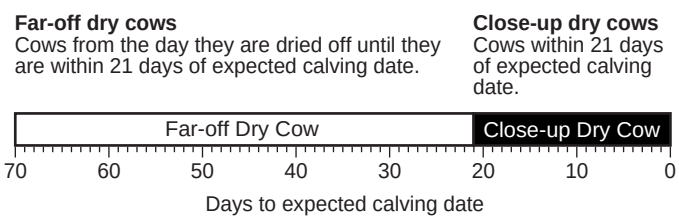
Two Groups of Dry Cows

Dry cows should be separated, managed, and fed as two different groups. Why separate dry cows into two separate groups? The reason is that the nutritional needs of the dry cow are different during the first 30 days versus the last three weeks of the dry period. By managing dry cows in two separate groups, the farmer can more closely match the feeding and management program to the needs of the dry cow and get her ready for the next lactation.

Far-off dry cow group: One group of dry cows would include cows from the day they are dried off until they are within 21 days of expected calving date. This group is the conventional dry cow group currently called the far-off dry cow group. Cows that are in the early part of their dry period have different nutrient needs than dry cows just before calving. This fact sheet deals with the feeding and management practices of this far-off group of dry cows.

Close-up dry cow group: The close-up dry cow group includes cows within 21 days of expected calving. These cows are fed a "hotter" ration, which is intermediate in nutrient density compared to the far-off dry cow diet and milking-cow diet (Table 2). A properly implemented close-up dry cow program can improve dry matter intake (specifically, the amount of feed with all water removed) after calving and decrease the incidence of metabolic disorders such as milk fever. Improving dry matter intake and reducing metabolic problems at or just after calving results in cows peaking higher in milk production, and cows give more milk over the entire next lactation. Thus, the goal is to allow cows to start the transition in a stepwise process to a more nutrient-dense ration before calving. After calving, cows will be ready to enter the milking herd and be fed the milking-herd ration, especially if it is a total mixed ration.

Two Groups of Dry Cows



Several studies have shown that dry matter intake decreases gradually the last three weeks before calving, with the most dramatic decrease seen within a week of calving. This dramatic drop in dry matter intake just before calving can account for as much as a 30 percent decrease in dry matter intake. The reason for this reduction in dry matter intake has not been determined, but it may be related to hormone changes associated with the calving process.

Close-Up Dry Cow Diet

- Is fed 21 days before expected calving date
- Initiates the transition period for the cow before she calves
- Allows the cow to readjust to the milking cow diet in a stepwise manner before calving

With this decrease in dry matter intake, the close-up diet is made more nutrient dense so that the cow and calf inside her receive the appropriate amount of each nutrient. The close-up ration should contain some of the same forages and other feed ingredients fed in the milking-herd diet. This practice allows the microorganisms or bugs in the cow's rumen a chance to adjust to the diet before calving, and it may help prevent cows from going off-feed after calving. When cows go off-feed shortly after calving, they lose a lot of weight through mobilization of body fat, which can increase the incidence of ketosis and fatty liver. Thus, close-up dry cow programs can help reduce metabolic disorders or diseases after calving.

In addition, a more energy-dense diet will help elongate the rumen papillae, which can increase the absorption of the volatile fatty acids and help prevent reductions in rumen pH. Both of these changes then can help prevent ruminal acidosis and laminitis (feet problems) after calving when fresh cows are introduced to the more nutrient-dense, milking-cow diets.

Table 2. Comparison of nutrient requirements used in formulating rations for dry and milking cows.

	Far-Off Dry Cows[a]	Close-Up Dry Cows[b]	Milking Cows High Group[c]
Dry matter intake (% body weight)	1.9-2.0	1.6-1.8	2.5-4.0
NE_L (Mcal/lb DM)	0.57-0.62	0.63-0.72	0.75-0.78
Crude protein (%)	12	14-15	16-19

Notes:
[a]First 30-40 days of dry period
[b]Last 21 days before expected calving date
[c]Early lactation

Furthermore, close-up dry cow diets can be formulated to help reduce the incidence of milk fever by adding anionic salts and by properly balancing the diet for the macrominerals such as sodium, potassium, chloride, and sulfur.

Getting these cows off to a good start before calving will help cows milk well after calving. These cows will be able to enter the milking herd with fewer problems. Studies have shown that dry matter intake before calving is positively related to dry matter intake at 21 days after calving. Dry cows with a good close-up dry cow program may peak 10 pounds higher. For every additional pound at peak there is an additional 250 pounds of milk over the lactation, resulting in an additional 2,500 pounds of milk per lactation per cow. With milk priced at $13 per hundred weight, this equates to $325 more milk income per fresh cow.

Feeding the Far-Off Dry Cow

Far-off dry cows are fed high roughage or forage diets generally at the rate of 2 percent of the cow's body weight. For example, a 1,400-pound Holstein would be fed 28 pounds of dry matter from forage, or 32 pounds of hay at 87 percent dry matter, or 13 percent moisture. Long-stemmed forages usually account for at least 50 percent of the total forage intake, or 1 percent of the cow's body weight. Corn silage can be fed to far-off dry cows, but intake should be limited to 50 percent of the forage dry matter. For example, Holsteins should not be fed more than 35 pounds of corn silage (on an as-fed basis with 35 percent dry matter). The remainder of the forage would be provided by long-stemmed forages such as hay, baleage, or pasture.

Like the milking-herd diet, the content of forages fed to dry cows needs to be analyzed for nutrient content, and rations then should be balanced to specifically meet the nutrient requirements of the far-off dry cow. Tables 3 and 4 list the nutrient requirements for far-off dry cows. Table 3 lists the nutrient needs on an **amount** basis, whereas Table 4 lists the nutrient needs of a far-off dry cow on a **concentration** basis after assuming a certain dry matter intake.

Effects of Forage Quality

Diets for far-off dry cows are based on forages. If the nutrient needs of the far-off dry cow group can not be met by forages alone, a concentrate or grain mix must be formulated and fed to supply these nutrient shortages. **The amount and protein content of this concentrate or grain mix is determined by the quality and type of forage fed.** Table 5 illustrates the effect that forage quality has on the amount and composition of the concentrate mix. To supply the nutrients not provided by the forages, far-off dry cows should be supplemented with less than one and up to eight pounds of grain daily. As the quality of a forage decreases, more concentrate mix or grain needs to be fed to supply the needed nutrients. For proper growth of the fetus and health of the dry cow, adequate amounts of protein, energy, minerals, and vitamins need to be provided.

Table 3. Amount of nutrients requirement for far-off dry cows.

Nutrient	1,000-lb Jersey	1,400-lb Holstein
Dry matter intake (lb/day)	18-22	25-30
Crude protein (lb/day)	2.2	2.8
Energy needs (Mcal NE_L /day)	10.2	13.2
Calcium (lb/day)	0.066	0.092
Phosphorus (lb/day)	0.040	0.056

Source: 1989 *Nutrient Requirements of Dairy Cattle* (6th rev. ed.)

Table 4. Concentration of nutrients recommended in a total mixed ration for far-off dry cows.

Nutrient	Dry Matter Basis
Crude protein (%)	12.0
Energy: NE (Mcal/day)	0.60
TDN (%)	60
Calcium (%)	0.39
Phosphorus (%)	0.24
Magnesium (%)	0.16
Potassium (%)	0.65
Sulfur (%)	0.16
Copper (ppm)	10
Zinc (ppm)	40
Selenium (ppm)	0.30
Vitamin A (IU/lb)	1,800
Vitamin E (IU/lb)[a]	40

Source: 1989 *Nutrient Requirements of Dairy Cattle* (6th rev. ed.).
Note:
[a]Should be adjusted to supply 1,000 IU vitamin E daily (reflects research by Larry Smith and Joe Hogan at The Ohio State University)

To convert trace mineral units:

0.1% = 1,000 ppm
(Move decimal four places to the right.)

1 ppm = 1 mg/kg

1 ppm = 0.45 mg/lb

1 mg/lb = 2.2 ppm or
2.2 mg/kg

Maintain Body Condition

Maintaining an appropriate and constant body condition, or fatness, is important for optimum milk production after calving. Cows should be turned dry at a body condition score of 3.5, and this condition should be maintained during the dry period. Cows are more efficient at laying down body fat stores when they are milking versus when they are dry. After calving, early lactation cows use their stores of body fat to supply additional energy needed to support milk production because they are unable to consume enough feed to meet their energy needs for milk production and maintenance during this time period. Dry cows should not lose weight during the dry period. Besides losses in subsequent, peak milk production, dry cows that lose weight are more susceptible to disease problems after calving, such as fatty liver and ketosis.

Feed Adequate Minerals, Vitamins

Providing adequate amounts of minerals and vitamins to the dry cow is necessary to minimize health problems around freshening time. Adequate amounts of selenium, vitamins A and E, iodine, copper, and calcium are necessary to prevent problems with a retained placenta. Copper, zinc, selenium, and vitamins A and E all play a role in improving a cow's immune response. Feeding adequate amounts during the dry period is necessary to give the cow the best chance to fight off a disease challenge, such as a mastitis infection, just before or after calving.

Keys to a Profitable Dry Cow Program

- Test forages and balance rations for far-off dry cows. Grain mix fed to the far-off dry cows should supply the needed amounts of crude protein, energy, minerals, and vitamins which are not be provided by the forages.
- Separate dry cows into a far-off and close-up dry cow group. Close-up dry cows are fed a diet specially formulated to meet their needs, prevent milk fever and other metabolic diseases, and get them off to a good start after they calve.
- Feed mid-to late-lactation cows so they are turned dry with a body condition score of 3.5. Dry cows should not be allowed to lose body condition during the dry period.
- House dry cows in an environment which decreases the chance of environmental mastitis. Dry cows should not be allowed access to stagnant ponds or allowed to congregate under shade trees.

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Table 5. Example rations for a 1,400 lb far-off dry cow (for the first 40 days of the dry period).

Forage Composition	Cool-Season Grass Hay (endophyte-free fescue, orchardgrass or timothy)			Cool-Season Grass Pasture		Wheat Hay[a]			Legume/Grass Hay		20-lb Corn Silage and Cool-Season Grass Hay (endophyte-free fescue, orchardgrass, or timothy)		10 lb Cool-Season Hay and Pasture
Hay/ pasture quality[b]	**Above Average**	**Average**	**Below Average**	**Above Average**	**Below Average**	**Above Average**	**Average**	**Below Average**	**Below Average**	**Poor**	**Average**	**Below Average**	**Average Hay Above-Average Pasture**
Crude protein (% dry matter)	14	11	8	14	12	12	10	8	14	12	11	8	
ADF (% dry matter)	35	40	45	34	40	30	40	48	40	45	40	45	
TDN (% dry matter)	63	58	52	62	56	60	58	55	58	55	58	52	
Hay or pasture (lb/day)	26	24	20	98	82	25	23	20	25	22	20 lb corn silage + 17 lb hay	20 lb corn silage + 15 lb hay	10 lb hay + 57 lb pasture
Concentrate mix (lb/day)	2.0	4.0	8.0	0.3	5.0	2.0	5.0	7.0	3.0	5.5	3.0	6.0	2.0
Crude protein content of concentrate mix (%)	7	16	20	--	12	12	20	21	7	12	24	24	7
Concentrate mix (lb grain or mineral/ton)													
Corn, cracked	1,750	1,425	1,310		1,650	1,500	1,260	1,210	1,800	1,675	950	1,000	1,750
Soybean meal (44%)		450	630		250	250	630	700		200	870	875	
Dry cow mineral[c]	250	125	60	2,000	100	250	100	90	200	125	150	100	250
Limestone							10				30	30	

Notes:

Rations were formulated to meet requirements of a 1,400-lb dry cow entering her second lactation. Minimum requirements were 24.6 lb dry matter intake, 12% crude protein, and 0.61 Mcal NE_L/lb dry matter.

[a]To convert wheat hay to wheat silage, multiply the amount of wheat hay by a factor of 3.

[b]All rations shown were balanced using nutrient specifications of forages listed. Changes in the nutrient content of forages will change the amount and composition of concentrate mix necessary to ensure the nutrient needs of the far-off dry cow are met. ADF = acid detergent fiber, TDN = total digestible nutrients. Concentration of nutrients in forages listed on a dry-matter basis.

[c]Commercial dry cow mineral needs to meet calcium, phosphorus, and other macromineral, trace mineral, and vitamin requirements. The amount of dry cow mineral needed must be adjusted to reflect the nutrient specifications of the commercial dry cow mineral and must provide adequate and not excessive amounts of each macromineral, trace mineral, and vitamin.