

Dry Cow Feeding and Management

M. Gamroth and D. Carroll

The dry, or non-milking, period late in pregnancy is critical to preparing a dairy cow for the next lactation. Dry cows have special nutritional and management needs. Proper care and feeding at this time will return more milk and healthier cows in the next lactation. The goal is to provide a stress-free “vacation” for the cow, prepare her for the next lactation, and provide a healthy transition back into lactation at the end of the dry period.

Dairy Herd Improvement Association (DHIA) records show that cows produce more milk when they are dry 50 to 70 days than when they are dry shorter or longer periods. A longer dry period increases production in the following lactation, but lifetime milk production will be less. If dry periods are short or absent, cows produce much less in their next lactation. This is because the udder needs time to regenerate milk-secreting tissue before the demand of a new lactation.

Good breeding and pregnancy records help to ensure that each cow gets an adequate dry period.

The dry period can be divided into three distinct parts:

- The drying off period (the first 4 to 10 days)
- The dry or “far-off” period (the next 30 to 40 days)
- The transition or “close-up” period (the last 21 days before calving)

Since nutrient requirements are different for each group, manage your dry cows in separate groups. If you find this many groups prohibitive, you will need to use other management practices to accomplish an effective dry cow feeding program.

Drying-off period

The drying-off process should take 4 to 10 days. Dry off cows with healthy udders abruptly.

During drying off, aim the feeding program at stopping milk production rather than meeting nutrient requirements. Eliminate grain, good quality legume forage, and corn silage from the ration. Replace them with lower energy forages such as grass hay or oat hay. If facilities permit, you may withhold or restrict water intake for 24 hours to discourage milk production.

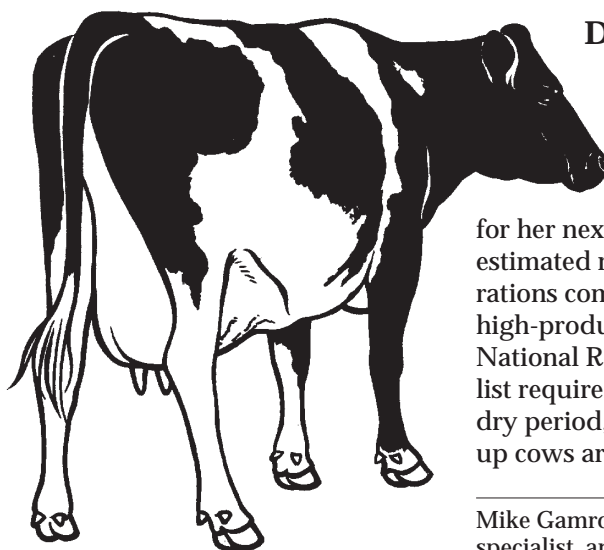
During the early stage of the dry period, cows are very susceptible to infections. It is particularly important to keep these cows in clean corrals or housing. Design an udder health program with your veterinarian.

Treat all quarters of all cows with commercial antibiotic infusion tubes at the start of the dry period. When used properly, antibiotics offer the best chance of preventing and curing mastitis. Use a milk culture to measure the sensitivity of your mastitis pathogens to various antibiotics. Then choose an antibiotic based on these results. Long-lasting antibiotics are labeled for use only on dry cows.

Watch cows closely until their udders do not contain milk. If any cows develop hard, swollen quarters, return them to the barn to be milked out, infused again with an antibiotic, and the teats dipped.

Dry period

During the far-off period, milk production has ceased, and body changes occur that prepare the cow for her next lactation. Table 1 shows estimated requirements for dry cow rations compared with those for a high-producing cow. Because the National Research Council does not list requirements by stages of the dry period, requirements for close-up cows are estimated at about



Mike Gamroth, Extension dairy specialist, and Diane Carroll, assistant professor of animal sciences; Oregon State University. This publication replaces WREP 13, *Dry Cow Feeding and Management*.

halfway between far-off and high-producing cows.

Research indicates that a two-group (far-off and close-up) dry cow feeding and management program can increase rolling herd averages by 1,000 to 2,000 lb compared to one-group systems. Close-up cows fed the low energy far-off ration will not be prepared for the high-producing cow ration, leading to rumen acidosis, displaced abomasum, and low dry matter intake in early lactation. Far-off cows fed the high energy close-up ration may be over-conditioned, with more cases of ketosis, fatty liver, displaced abomasum, and calving difficulties.

Disorders associated with poor dry cow diets

Rumen acidosis—Rumen acidosis, or a drop in rumen pH, leads to increased lactic acid in the rumen. This lactic acid can be absorbed in the blood and cause

laminitis. Cows exhibiting diarrhea, off-feed, and sore feet may have subclinical rumen acidosis.

Decreases in milkfat may not show up when the episode is short, but even one episode may damage the cow's rumen and hooves.

To prevent acidosis, be sure to adapt the rumen to the milking ration during the close-up period. During early lactation, include buffers in the ration and avoid overfeeding concentrates.

Displaced abomasum—Around the time of calving, cows that do not have an adequate rumen fiber mat may suffer from displaced abomasum. In this condition, the true stomach (abomasum) usually migrates to the left side of the rumen (or occasionally to the right) and becomes twisted, causing partial blockage of the digestive tract. This condition usually occurs within 1 month of calving and often is associated with subclinical milk fever or cows going off feed.

Displaced abomasum may occur if cows are fed low amounts of fiber or forage with inadequate fiber length.

Feeding bulky feeds, such as long-stemmed hay, in preference to cubes, pellets, or silage, helps prevent displaced abomasum. Fiber length should be more than 1.5 inches. Also provide adequate calcium in early lactation.

Ketosis—Ketosis causes rapid loss of body weight and greatly reduces milk production.

Feed intake naturally declines near the time the cow will calve. Fat cows often have even poorer appetites following calving. This predisposes them to ketosis.

Getting cows on feed soon after calving is essential to avoiding ketosis. Cows should lose no more than one body condition score (BCS) point between calving and peak milk production (first 60 days of lactation). If problems develop, seek professional guidance.

Do not underfeed dry cows so that they lose body weight; this also can cause ketosis and low milk production. Observe the condition of dry cows frequently and adjust the feed ration accordingly.

Fat cow syndrome—Fat cow syndrome is characterized by poor appetite and poor production. Some cows actually die from this disease. Postmortem examination shows a pale, fatty liver. Those that do not die usually have poor appetites, lose weight, produce less milk, and are more susceptible to metabolic disorders and infectious diseases. Generally, these cows respond poorly to treatment.

This condition is the result of high energy feeds during prolonged lactations or the dry period. To prevent the dry cow from becoming too fat, make sure the energy concentration for the dry cow ration is low compared with the lactating cow ration.

Milk fever (parturient paresis or parturient hypocalcemia)—When low blood calcium occurs, it causes a paralysis that nearly always occurs within 72 hours of calving.

Table 1. Recommended nutrient content of a far-off and close-up dry cow ration compared with a high-producing cow.

Minimum Nutrient Recommended	Dry Cow		High-producing cow
	Far-off	Close-up	
Dry matter intake, lb/day	28	26	54
Crude protein, %	13	15.5	18
Total digestible nutrients, %	56	66	75
NEL, Mcal/lb*	.58	.70	.78
Acid detergent fiber, %	30	24	19
Calcium, %	.50	.25	.66
Phosphorus, %	.25	.30	.41
Calcium to phosphorus ratio	1.5 to 2:1	1.0 to 2:1	1.5 to 2.2:1
Magnesium, %	.20	.25	.25
Potassium, %	.65	.65	1.00
Sodium, %	.10	.10	.18
Sulfur, %	.16	.20	.20
Iron, ppm	50	60	50
Manganese, ppm	40	50	40
Zinc, ppm	50	60	40
Copper, ppm	12	15	10
Cobalt, ppm	.10	.10	.10
Iodine, ppm	.60	.70	.60
Selenium, ppm	.30	.30	.30
Vitamin A, IU/lb	1,800	2,200	1,450
Vitamin D, IU/lb	750	1,000	450
Vitamin E, IU/lb	12	15–40	7

*NEL is net energy for lactation. Mcal/lb means Megacalorie per pound of feed.

Sources: Van Saun (1991), Oetzel (1994), and National Academy of Science–National Research Council (1989).

However, it may be harmful to raise the level of calcium in the dry cow diet. Therefore, alfalfa and legume hay or silage, because of high calcium levels, are not desirable as the only forage for dry cows.

Research and experience show that cows fed a low level of calcium (Ca) and an adequate, but not excessive, amount of phosphorus (P) during the dry period have less milk fever. You can attain the desirable level of calcium by diluting alfalfa with other forages, such as oat hay. A mixture of one-third oat hay, one-third corn silage, and one-third alfalfa is a desirable mixture for dry cows, particularly during the close-up period.

An alternative method to restricting dietary calcium is to alter the dietary cation-anion difference. An acidic diet has been shown to reduce the incidence of milk fever. Seek professional nutrition guidance in developing a cation-anion balance dry diet.

Management: far-off cows

Most cows in well-managed herds finish their lactation in good condition because they gain weight in late lactation.

Milking cows gain weight more efficiently than dry cows. You can save feed and troubles after calving by feeding cows to gain body condition during the last 3 or 4 months of lactation and not during the dry period.

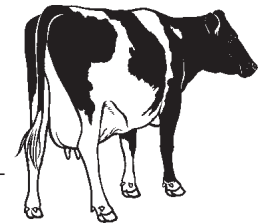
To keep the dry cow from becoming too fat, the energy concentration for the dry cow ration should be low compared with the lactating cow ration. If cows are in good body condition (about 3.5 on a scale of 1 to 5) when turned dry, feed them to gain only a small amount of weight to allow for growth of the fetus. A gain of 1 lb per day (50 to 60 lb during the total dry period) is adequate.

Give very thin dry cows extra feed to gain some body condition (less than 0.5 BCS unit) by calving time. Avoid having cows gain a full condition score (about 100 lb) during the dry period.

Helpful Hints

Improving your dry cow program means more efficient, healthier milking cows later. Here are some tips:

- ✓ Feed good quality feeds to meet nutrient requirements of far-off and close-up dry cows.
- ✓ Maintain acceptable dry matter intake throughout the dry period. During heat stress, provide shade and night feeding to increase intake. During cold weather, provide more total ration in clean feed bunks to encourage eating. Watch intake the week before calving. Do everything possible to minimize reduced intake at calving.
- ✓ Have dry cows in proper body condition (about 3.5 BCS). Have them maintain body weight during the dry period and gain or lose body weight late in lactation before the dry period. Observe the condition of dry cows frequently and adjust the ration accordingly.
- ✓ Seek professional advice if cows have significant problems immediately after calving.



Phosphorus is low in most of the forages produced in the United States. Low phosphorus intake is associated with milk fever, downer cow syndrome, retained placenta, and anestrus (no heat) following calving. Milk fever control has been good when calcium and phosphorus levels meet requirements and the Ca:P ratio does not exceed 2:1 (See Table 1). You can attain the desirable level of calcium in the dry cow ration by diluting alfalfa, which is high in calcium, with other forages, such as oat hay. A mixed ration of one-third oat hay, one-third corn silage, and one-third alfalfa is a desirable forage mixture for dry cows.

You may supplement phosphorus in the concentrate or feed it free choice in a mineral mix. Adding phosphorus through the concentrate is a better way to ensure adequate intake. However, since little or no grain is fed to dry cows, you may need to feed a high-phosphorus mineral mix free choice or mixed with silages.

Limit salt to dry cows and close-up heifers, since excessive salt is associated with udder edema or swelling. Do not mix salt with other

minerals during the dry period because of the possibility of excessive intake. Don't feed rumen buffers until after calving.

Trace minerals also are needed for health and reproduction. Those trace minerals especially associated with problems at calving are iodine (deficiency causes goiter in calves), and selenium (retained placenta and white muscle disease in calves). Most of these can be supplied in a dry cow mineral supplement.

Selenium should be fed at the rate of 0.3 ppm in the total ration. If rations are low in selenium and cannot be supplemented, an intramuscular injection 20 days before calving can reduce the chance of a retained placenta. It should contain 50 mg of sodium selenite and 680 IU of alpha tocopherol acetate (commercial preparation).

Research in some herds with more than 10 percent retained placentas showed injections markedly reduced this problem. This same commercial preparation will prevent white muscle disease in the newborn calf and may reduce the number of weak calves.

Dairy cows require a source of fat-soluble vitamins—A, D, and E.

Adequate quantities of other vitamins can be made by the rumen bacteria or the cow's body. Deficiency of vitamins A, D, or E can cause reduced disease resistance, increased calving disorders, and lack of vitamins in the colostrum for proper newborn nutrition.

The far-off period is an excellent time to treat dairy cattle for internal and external parasites if needed. Most worming medicines, if fed to the lactating cow, require that milk be withheld from the market. By treating during the dry period, milk loss is avoided. Also, external parasites such as lice or ringworm cause discomfort and disease, so their elimination is desirable.

Late in the far-off period, vaccinate cows. Vaccines immunize the cow, thereby producing antibodies that protect the calf through the colostrum. Be sure to read the directions on all vaccines or medicines carefully; some live virus vaccines and drugs can cause abortion.

Management: close-up cows

The third phase of the dry period, the close-up period, begins 21 days before the estimated calving date. Move the cows to the close-up group and condition them for calving. This includes management for sanitary milk production, such as clipping or flaming the hair from udder and flanks.

Traditional "lead-feeding" recommendations have been revised. Starting on day 21 before calving, feed a ration based on the nutrients listed in Table 1. This will provide approximately 8 to 12 lb of as-fed concentrate per cow per day, or less if corn silage is included in the close-up diet.

Feed a close-up ration that includes the concentrates and forages in the milking ration. This allows the microorganisms in the rumen to adjust to the milking ration and helps the cow reach high production more quickly.

The close-up ration should include coarse, bulky forages that will form a rumen mat. Fiber length should be at least 1.5 inches. The hay should be palatable and low in potassium. If you grow your own hay, manage some fields for dry cow hay and avoid fertilizing them with potassium-containing fertilizers and manure. If forages are high in potassium, consider using a balanced ration with anionic salts.

Grouping dry cows for close-up feeding is a problem in small- or medium-sized herds. One suggestion is to put them with the lower producing cows when the herds are separated according to production. This allows the close-up cows to get some grain. However, take care to avoid high intakes of salt, calcium, or potassium by the close-up cows.

When a cow is within a few days of calving, move her to a separate clean calving pen where you can observe her closely. Cleanliness at this time will reduce coliform mastitis, which can occur before freshening, and will ensure calf health and minimize uterine infection. Make sure cows have adequate fresh feed available in the calving pen. Avoiding stress may reduce problems after calving.

Management: early lactation

Getting cows on feed soon after calving is essential. Cows should lose no more than one body condition score (BCS) point between

calving and peak milk production (first 60 days of lactation).

If you feed a total mixed ration (TMR) and a close-up diet, the cows can be moved directly onto the high-producing TMR. However, this can lead to increased metabolic problems if the cows have not acclimated to the new diet.

To prevent acidosis, include buffers in the ration and avoid overfeeding concentrates.

If you have housing, an additional post-fresh group is recommended. Feed these cows a ration that contains the same ingredients as the high-producing cows, but is higher in crude protein and fiber and lower in added fat. Some producers use a mid-lactation diet with high protein hay. Cows can be fed this diet for 10 days to 3 weeks, depending on the energy level of the diet, and then moved to the high-producing group.

For further reading

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- Van Saun, R.J. 1991. Dry cow nutrition: the key to improving fresh cow performance. Dairy Nutrition Management, C.J. Sniffen and T.H. Herdt, eds. Veterinary Clinics of North America: Food Animal Practitioners 7:599.

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