



Dry Cow Feeding and Management

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To be successful, dairy producers must master all aspects of dairy management. Proper dry cow nutrition and management is critical, since decisions made during this period will have a tremendous impact on milk production and health during the next lactation.

A sound dry cow program should be designed to accomplish the following objectives:

- Properly nourish the developing calf.
- Maintain optimum body condition.
- Prepare the mammary gland for the next lactation.
- Prepare the digestive tract for the next lactation.
- Minimize digestive, metabolic, and infectious diseases.

When setting goals for the dry cow program, remember that no single program will fit all cows or all dairy farms. Managers must rely on skill and experience to properly adjust the general program. Factors such as previous milk production, body condition at dry off, previous health history, and age must be considered when developing and adjusting a dry cow management program.

Purpose of a Dry Period

The purpose of a dry period is to allow the cow's udder an opportunity to regenerate secretory tissue and to allow the digestive system to recover from the stress of high levels of feed intake.

Research at Tennessee showed the importance of having a dry period, which involved the use of identical twins. One twin from each set was milked continuously through the first three lactations. The other twin was given a 60-day dry period between each lactation.

Twin mates which were milked continuously produced about the same amount of milk at their peak in the second and third lactations as in their first lactation. Those given a 60-day dry period peaked about ten pounds higher in the second lactation than they did in their first lactation. The twins milked continuously averaged only 75% as much milk in their second lactation and only 62% as much in their third lactation as their twin mates which had a 60-day dry period.

At the end of the third lactation, all cows were given a 60-day dry period. The production of those milked without a dry period between previous lactations recovered, and was as high during the fourth lactation as for the twin mates that had been allowed a 60-day dry period between each lactation.

Length of the Dry Period

The goal of a dry period is to attain a balance between the gains in production and profit from extending the current

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lactation with any losses in production and profit in the following lactation as a result of fewer days dry.

The optimum length of the dry period may vary from one cow to another. General recommendations are that a 45- to 60-day dry period is associated with highest lactation yield (Figure 1). Dry periods less than 45 days and greater than 60 days results in less production in the next lactation. Short dry periods do not allow for adequate udder involution, and long dry periods tend to result in over-conditioned dry cows. The end result in both cases is less milk in the next lactation. The estimated economic loss in income is \$3.00 per cow per day for every day less than 45 and for every day greater than 60. A practical goal is to have 70 to 80% of all dry periods between 40 to 70 days.

Drying Off the Cow

The recommended method of drying off is to stop milking the cow abruptly. Cows should not be milked partially for several days or milked every other day as a means to dry off. This practice will actually prolong the drying off process and may increase the incidence of mastitis. The pressure of the milk in the udder actually assists in the drying off process.

If the cow is producing more than 40 pounds of milk daily, it may be necessary to reduce feed intake for several days

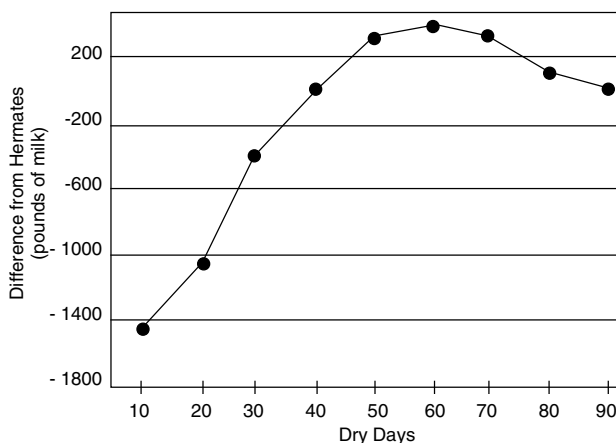


Figure 1. Effect of days dry milk yield in comparison to herd mates in subsequent lactation.

prior to drying off. Reducing feed intake by 50 to 70% will drastically reduce the supply of nutrients available to the udder, causing milk synthesis to decrease.

Mastitis Control and Treatment

Cows are especially susceptible to new intra-mammary infections during the first week following drying off and during the week just prior to calving. Research has shown that 40% of all new infections originate during the dry period. The National Mastitis Council suggests treating all quarters on all cows at dry-off with an approved dry cow treatment product. A teat dip should be used on cows after treatment, and animals should be observed daily for a week, or until the mammary gland has begun to involute and is not secreting milk. Cows with udders or quarters that become hard and swollen during the dry period may need additional treatment.

In addition to helping prevent new infections, dry cow treatment offers the best opportunity of curing subclinical mastitis. Dry cow therapy is very effective against the contagious organisms *Streptococcus agalactia* and *Staphylococcus aureus*. However, while most dry cow therapy products are reasonably effective against environmental streptococci, they are not effective against coliform bacteria such as *Escherichia coli*. Providing a clean, dry environment for the cows is the best protection against environmental pathogens during the dry period.

Proper Conditioning

During the dry period, cows should be maintained in good body condition. The condition of the cow as she nears the dry period is the best index of how to manage her as she makes the transition from the lactating to the non-lactating group. At dry off, cows should have a body condition score of about 3.5 on a scale of 1 (very thin) to 5 (extremely fat). Thin cows will need to be fed enough to restore their body flesh, plus the build up of some body reserves. Ideally, cows should not need to gain more than .25 to .50 body condition score during the dry period. Lactating cows utilize energy 25% more efficiently for body gain than do dry cows. Therefore, the ideal time to put on additional condition, if needed, is during late lactation.

Cows allowed to fatten in excess during the dry period are more subject to displaced abomasum, udder edema, ketosis, and other general health problems than dry cows maintained in adequate body condition. Alternatively, cows entering the dry period in excess condition should not be put on a diet. Research has shown that feeding cows to lose weight during the dry period can lead to fatty livers, ketosis, and other disorders.

Body condition scoring of the milking herd and dry cows on a routine schedule is an excellent tool to help manage a herd more effectively and reduce the incidence of metabolic disorders at calving. More detailed information on when and how to body condition score dairy cattle can be found in OSU Extension Leaflet L-221.

Nutrition of the Dry Cow

Table 1 outlines the nutrient requirements during the dry period. The four primary goals for feeding the dry cow from dry off to three weeks prior to calving include:

- Maintain optimum dietary fiber content.

- Limit energy intake.
- Avoid overfeeding protein.
- Meet mineral and vitamin requirements.

Dry cows must be separated from the milking herd in order to be fed properly. Additionally, dry cows are best managed in two groups. The first group should contain all dry cows except those within two to three weeks of calving. Dry matter (DM) intake by the first group is usually in the range of 1.8 to 2.2% of body weight. Dry matter intake of cows within two weeks of calving decline to about 1.5 to 1.8% of body weight. Due to this decrease in dry matter intake, cows within two to three weeks of calving should be placed on a more nutrient-dense diet in order to meet their nutrient needs (Table 1).

Forage intake should be a minimum of 1.0% of body weight or 50% of the dietary DM intake. Ideal roughage sources for the dry period include coarse hays, grass, or grass-legume mixtures. Corn or sorghum stalks may be used when properly supplemented. High quality forages are best reserved for early lactation cows with high energy requirements. Also, finely chopped silage or ground hay should be avoided. Cows should consume at least two to four pounds of forage dry matter that is at least 1.5 inches long. Feeding forage of adequate particle length will aid in rehabilitating the rumen and maintain normal rumen function.

Whether legume or mixed, primarily legume forages should be limited to not more than 30 to 50% of forage dry matter intake. Heavy feeding of these forages can result in excessive protein, calcium, and potassium intake, which make the cow more susceptible to udder edema, milk fever, ketosis, and possibly certain types of reproductive problems caused by protein and mineral imbalances.

Corn silage should not provide over 50 to 60% of forage dry matter intake. Dry cows fed corn silage at greater than 50% of forage dry matter may become over-conditioned and have more metabolic and reproductive problem at calving and in early lactation. Dry cows should never be limit fed to reduce energy intake. Maximizing dry matter intake during this period will promote maximum dry matter intake in early lactation and improve milk production. Sorghum, sorghum-sudan, and small grain silages fit well into many dry cow forage programs, with little chance of cows becoming over conditioned. Again, forage particle length in the ration must be considered when feeding these forages. Providing dry grass hay free choice, or at least 4 to 6 pounds per head daily, is a sound management practice. If silage is fed to lactating cows, feeding 10 to 20 pounds of silage to at least the cows within two to three weeks of calving may improve intake and rumen function after calving.

A grain mix should be formulated to meet the nutrient needs of the dry cow that are not supplied by the forage portion of the ration. If high quality hay or finely chopped silages are fed, it is usually beneficial to have grain mixtures higher in fiber to offset the low fiber intake from these forages. On medium quality forage diets, usually a minimal amount of grain is needed to meet the energy and protein needs of dry cows. However, it is recommended to feed at least three pounds of grain per head daily throughout the dry period. Feeding this amount will help maintain a rumen microbial population that is adapted to a ration containing grain. The grain also should reduce the occurrence of digestive and off-

Table 1. Nutrient Guidelines for Dry Cows (Dry matter basis).

<i>Nutrient</i>	<i>Units</i>	<i>Far-off</i>	<i>Close-up^a</i>
Crude protein (CP)	%	12-13	14-15
Degradable intake protein	% of CP	65-70	62-65
Soluble intake protein	% of CP	30-40	25-30
Undegradable intake protein	% of CP	30-35	35-38
Acid detergent fiber	min, %	35-40	30-35
Neutral detergent fiber (NDF)	min, %	50-55	45-50
NDF from forage	min, %	35-40	30-35
Nonfiber carbohydrate	%	26-35	30-38
Net energy-lactation	Mcal/lb.	.57-.64	.66-.72
Fat	%	3-4	4-5
Calcium	%	.45-.60	.55-.65
Phosphorus	%	.30-.35	.35-.40
Magnesium	%	.20-.25	.25-.30
Potassium	%	.70-.80	.70-.80
Sodium	%	.10	.10
Chlorine	%	.20	.20
Sulfur	%	.16-.20	.16-.20
Cobalt	ppm	.2	.2
Copper	ppm	12-15	15-20
Iodine	ppm	.5	.5
Iron	ppm	100	100
Manganese	ppm	45-60	45-60
Selenium	ppm	.3	.3
Zinc	ppm	70-80	70-80
Vitamin A	IU/day	75-100,000	75-100,000
Vitamin D	IU/day	25-30,000	25-30,000
Vitamin E	IU/day	500-1,000	1,000

^a Close-up cows fed anionic salts may have chlorine, sulfur, and magnesium levels up to 1.0, 0.45, and 0.40%, respectively. Close-up cows fed anionic salts should receive a minimum of 1.3% calcium.

feed problems at calving. The latter is especially true if a close-up group is not used.

To assure proper intake of minerals and vitamins, it is desirable to incorporate these into the grain mix instead of offering them free choice. Unlike lactating cows, buffers should not be fed to dry cows because of the increased likelihood of udder edema and milk fever. Salt can be fed to the far-off dry cow group at a rate of .25% of the total ration dry matter. However, if udder edema is a problem, salt should be removed from the close-up ration.

Vitamins A, D, and E are all important for proper dry cow nutrition. Retained placentas have been associated with both Vitamin A and E deficiencies. Vitamin E deficiency is also related to reduced resistance to infection and increased incidence of mastitis. The need for additional Vitamin A is dependent largely upon the type and quality of forage fed. If green sun-cured hay is fed or if green pasture is available, there is probably no need for a Vitamin A supplement. However, if corn or sorghum silage or poor quality hay is fed, it could be good insurance to provide some source of supplemental Vitamin A. Vitamin D supplementation will also be needed when cows are fed direct-cut forages or forage that is ensiled. If doubt exists about the quality of the forages, it is cheap insurance to supplement the dry cows with the currently recommended levels of Vitamins A, D, and E.

The primary goal when feeding minerals during the dry period is to avoid excessive calcium and keep the calcium to phosphorus ratio between 2.0:1 to 1.5:1. The control of calcium and phosphorus is important for the prevention of milk fever. Additionally, potassium levels greater than 1.5% of the ration dry matter may interfere with magnesium absorption and calcium mobilization, also resulting in milk fever, as well as retained placenta, and downer cow problems at calving. The trace minerals are also important in preventing many of the metabolic disorders and infectious diseases encountered during the dry period. Proper supplementation of these elements should not be ignored, and the guidelines set forth in this publication should be followed closely.

Feeding Prior to Calving

Even if no grain is fed during the majority of the dry period, there is some benefit to feeding 6 to 12 pounds of grain three weeks before calving to adjust the rumen bacteria to the digestion of grain. This enables the digestive system of the cow to adjust to higher energy consumption more rapidly after calving and will improve dry matter intake.

Additionally, the ration should be modified to incorporate feeds contained in the lactating ration. This again will facilitate adaptation of the rumen and reduce the incidence of off-feed problems and associated disorders in early lactation.

Metabolic Disorders

The major metabolic disorders that affect dry cows are usually the result of nutrition and feed management problems. These disorders include milk fever, ketosis, fatty livers, retained placenta, displaced abomasum, and udder edema. Producers should strive to achieve the following incidence rates for the major metabolic disorders: milk fever, less than 5%; displaced abomasum, less than 5%; retained placenta, less than 8%; and ketosis, less than 3%.

Many metabolic and digestive disorders that occur at calving are interrelated. Milk fever, for instance, is associated with higher incidences of dystocia, metritis, displaced abomasum, retained placenta, and low conception rates. If an incidence rate in the herd for any of these disorders is higher than expected, a thorough review of the dry cow program needs to be completed.

Summary

Recommendations concerning management of the dry cow could be summarized as follows:

1. Keep accurate records on breeding and calving dates.
2. Feed cows during late lactation so that they will be in adequate body condition at drying off.
3. Dry off each cow to allow for a dry period of 45 to 60 days.
4. Provide enough forage and some grain, if needed, to insure that the dry cow will be in proper condition at calving.
5. Provide supplemental minerals and vitamins as needed for adequate nutrition of the cow.
6. Feed 6 to 12 pounds of grain at least 14 to 21 days prior to calving to condition the digestive system of the cow for lactation.

Remember that the dry period is both the end of one lactation and the beginning of the next. Careful attention to proper feeding and management are critical to obtaining maximum dry matter intake, good health, increased reproductive efficiency, and optimum milk production in the following lactation.

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