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Popular Article

Strategies for Coping with Feed Scarcity during Natural Disaster

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Phase Feeding of Dairy Animals

Nutrient requirements vary with the stage of lactation and gestation. Five distinct feeding phases can be defined to attain optimum production, reproduction and health of dairy cows:

- **Phase 1: Early lactation**—1 to 70 days (peak milk production) after calving (postpartum).
- **Phase 2: Peak DM intake**—70 to 140 days (declining milk production) postpartum.
- **Phase 3: Mid- and late lactation**—140 to 305 days (declining milk production) postpartum.
- **Phase 4: Dry period**—60 to 14 days before the next lactation.
- **Phase 5: Transition or close-up period**—14 days before to parturition.

Phase 1: Early Lactation - 0 To 70 Days Postpartum

The important features of this phase are,

- Milk production increases rapidly during this period and the peak milk production occurs at 6 to 8 weeks after calving.
- Feed intake is not adequate because the appetite of the animal during the early lactation (up to 8 weeks) is reduced by 2 to 3 kg per day. So there will be shortfall in the intake of energy and protein needed for high levels of milk production.
- The protein will also be diverted for mammogenesis, body growth in case of heifers and young animals, protein may also be diverted for synthesis of lactose (milk sugar). The animal loses body weight since it mobilizes body tissues for sustaining milk production.
- During this period, the cow could lose as much as 0.7 kg/day. Because of reduced dry matter or feed intake, dietary energy is the most limiting factor in milk production.



Feeding during this phase:

Feed intake is the key factor in maintaining high milk production. Cows should be encouraged to maximize their intake during early lactation. Each additional kg of dry matter consumed can support 2-2.4 kg more milk. The roughages should be of high quality with not more than 40-45 % NDF. A protein level of 13-14 % CP can support 20 kg milk in cows and 15 kg in buffaloes. For those cows or buffaloes yielding more milk, the ideal protein content of the ration should be 19 % with 30-35 % RDP. A guideline is to feed 0.5 kg of a 34 to 50% protein concentrates for every 5 kg of milk produced above 20 kg of milk. A minimum level of fibre (17 to 18% Crude Fiber or 21 to 22% ADF or 28 percent NDF in the ration) is necessary because excessive levels of concentrates (over 60 percent of the total DM) fed during early lactation can cause acidosis and low milk fat percentage. To avoid any digestive problems (e.g. acidosis, depressed intake), concentrates should be added gradually at a rate of about 0.5 to 0.7 kg/day for the first two weeks. Do not feed more than 2.5-3.5 kg of concentrates per feeding. The roughage should not be ground or pelleted but should be chopped to a length of 2 inches or longer. The energy content of the ration is increased by feeding of full-fat oilseeds like cottonseed, sunflower seed and soybean. They are also rich in TDN; thus their supplementation in the diet is useful for meeting energy requirements of high yielding animals. Cottonseed is the most popular amongst farmer and it also helps in increasing milk fat. The energy content of the ration can also be increased by using fats or oil at 4% in the concentrate mixture or 0.5 kg / day

Challenge Feeding

Feeding of concentrates should be started 2 weeks before calving, if no concentrate is fed during the dry period. This helps in adaptation of the rumen microbes with the grain/concentrate during the ensuing lactation period when nutrient requirement cannot be met, especially in high-yielding (more than 20 kg milk) cows without grain or concentrates. Generally, the animals are started with 1.5 to 2.0 kg concentrate mixture (@0.3 to 0.5 % of body weight) on the date 2 weeks before calving, followed by an increment of 0.3 to 0.5 kg daily, so that they will be receiving about 1 kg concentrate mixture per 100 kg body weight at calving. This is also called challenge or lead feeding, as it is the practice of feeding higher levels of concentrate to challenge the cow to reach her maximum milk production potential.

Other Feeding Strategies for High Producing dairy cattle during early lactation

- Cows usually eat after milking. So fresh feed should always be available since high producing animals may eat up to 12 times in a day
- If concentrates are being fed separately from forages, they should be fed several times a day.



- *Feeding frequency*: Increased feeding frequency reduces daily variations in rumen pH and thus helps stabilizing the rumen environment. The proper range and consistency of ruminal pH is critical in fiber digestion.
- *Feeding sequence*: If forage and concentrates are being fed separately, forages should be fed first in the morning followed by a portion of the concentrates.

Phase 2. Peak Dm Intake

During this phase the feed intake is near maximum and can supply nutrient needs. Animals are expected to take dry matter at 4 % of body weight. Concentrate intake should not exceed 2.5 percent of the cow's body weight and intake of good quality forage should be minimum 1.5 percent of the cow's body weight (DM basis) to maintain rumen function and normal levels of milk fat. Protein requirements during mid lactation are lower than in early lactation. Therefore, rations for dairy cows in mid-lactation should contain 15-17% crude protein. To maximize nutrient intake Feed forages and grain several times a day. If urea is included in the rations, limit urea to 100 g per cow per day.

Phase 3. Mid- To Late Lactation - 140 To 305 Days Postpartum

This is the period where milk yield begins to fall. During this period the animal should be able to restore body weight lost in early lactation as well as supporting the increasing demands of developing fetus. The rations for dairy cows in late lactation contain 12-14% protein.

Phase 4. Dry Period - 60 To 14 Days Before Parturition

The dry period is a critical phase of the lactation cycle to increase milk yield during the following lactation and minimize metabolic problems at or immediately following calving.

Importance of the dry period

(a) Involution of the udder

The principal reason for the dry period is to allow the secretory tissue of the udder to involute. During this period, the secretory cells of udder actually break down and are reabsorbed, and a new set of secretory cells is formed. This cell renewal process takes approximately six weeks and, if a cow is allowed no dry period at all, will result in a loss of milk of at least 30% in the subsequent lactation.

(b) Foetal development

During the last eight weeks before calving the foetus gains almost 60% of its birth weight, an overall rate of gain for the cow of about 0.75 kg/day. At the very least, the cow must be fed for foetal growth.



(c) Replenishment of body reserves

Mineral reserves are an entirely different matter to energy reserves. The high-producing cow will have severely depleted her body reserves of minerals, especially calcium and phosphorus, during her lactation. These reserves can only be completely replenished when the cow is dry. Adequate mineral nutrition during the dry period is very important. If the cow is very weak or underweight, the dry period helps her to replenish body reserves and she may be fed to gain about 20-25 kg body weight during the dry period.

(d) The length of the dry period

It is wise to aim for a dry period of eight weeks (56 days). Rations should be formulated to specifically meet the nutrient requirements of dry cows: body maintenance, fetal growth, and for replacing any additional body weight not replaced during phase. Pregnant animals are to be offered extra nutrients during the last two months of gestation. The aim is that by the end of gestation period the cows should not only gain their initial body weight but also put on an extra 25 to 30 kg of body weight. This is necessary to enable the animal to withstand the stress of parturition and to maintain the persistency of milk production during the subsequent lactation period, the provision of extra nutrients should be given in the form of concentrate mixture and not as forage because roughages are not as efficient as concentrates in increasing the body weight. The rest of the ration must contain sufficient green feeds so that the colostrum secreted after parturition should be rich in vitamin A. DM intake will be near 2 percent of the cow's body weight. A minimum of 12 percent CP in the DM is recommended. Calcium intakes of 60 to 80 grams and phosphorus intakes of 30 to 40 grams are sufficient for most cows and avoid excess calcium and phosphorus intakes. Dry cow rations above 0.6% calcium and 0.4% phosphorus (DM basis) have substantially increased milk fever problems. Provide adequate amounts of vitamin A, D, and E in rations to improve calf survival and lower retained placenta and milk fever problems. Trace minerals, including selenium for most producers, should be adequately supplemented in dry cow diets. Change to a transition ration starting 2 weeks before calving. During the last 3 days prior to calving, the amount of concentrate mixture should be reduced and a little warm bran is fed to keep the animal in laxative condition before calving.

Phase 5. Transition Period—14 Days Before to Parturition

The transition or close-up dry cow feeding program is critical to adjusting dry cows to the lactation ration and preventing metabolic problems. During the last 3 days prior to calving, the amount of concentrate mixture should be reduced and a little warm bran is fed to keep the animal in laxative condition before calving. After parturition, the cow /buffalo should be given fresh warm water and a



mash consisting of 1 kg wheat bran, 1-1.5 kg ground grain, 0.5 kg jaggery and 25 g each of common salt and mineral mixture. This mash may be continued for 3 to 4 days after calving; the regular feed may be gradually introduced to the cow. Some concentrate mixture, if not previously fed, should be fed starting two weeks before freshening. Introduction of concentrate mixture is necessary to begin changing the rumen bacteria population over from an all-forage digestion population to a mixed population of forage and grain digesters. Also, addition of some ingredients used in the lactation ration during this period minimizes the stress of ration changes after calving.

Summary of nutrient requirements of high yielding dairy cattle during different phases of lactation

(a) Water requirements

- Lactating dairy cows need 60–70 litres of water each day for maintenance, plus an extra 4–5 litres for each litre of milk produced.
- Water requirements increase by 6 lts/day for every 4⁰ C raise in air temperatures. Lactating cows will drink 150 to 200 litres of water per day in the summer months.

(b) Crude protein requirements

Stage of lactation	% CP in the ration
Early lactation	16 - 18 %
Mid lactation	14 - 16 %
Late lactation	12 - 14 %
Dry period	10 - 12 %

- Undegradable or bypass protein (UIP) should be 35 to 40 percent of the CP in early lactation and 30 to 35 percent of CP in late lactation.

(d) Energy in the ration

TDN

- Early lactation – 75 % of dietary DM
- late lactation - 65 % of dietary DM
- dry period - 55 % of dietary DM

(e) Non-fiber carbohydrates: 35 to 40 percent of the dietary DM.

(f) Fat



- Maximum of 7 percent of the total ration DM with no more than 4 percent from supplemental fat.
- Salt: 0.5 percent of the ration DM or 1 percent of the concentrate mixture.

(i) Mineral:

- Approximately 1 percent of the grain mix should be a calcium-phosphorus mineral.

(j) Urea:

- 3 % of concentrate mixture or 1 percent of the total dry matter intake.
- *Vitamins:* Supplemented A, D, and E in rations to meet requirements.
- *Ration form:* Avoid too fine chopping of forages and concentrates.

