MARYLAND COOPERATIVE EXTENSION
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Fact Sheet

Fact Sheet 320

Feeding Dairy Cows: "When They Need It"

Feed is the largest single factor in the cost of milk production, and the quantity, quality and timing of feed for the dairy herd are important in determining profitability. However, feeding is only one management aspect of a highly complex activity. As an owner or manager of a dairy farm, you must also consider other factors that affect profit such as the genetic capability of cattle to produce, their state of health, reproductive status of the herd, milking practices and general management.

Economics of Production

The most economical level of feeding for dairy cattle is the point at which the last increment of concentrate feed added to the ration is just paid for by the milk stimulated by that unit of concentrate. This point is difficult to define for every cow in a herd. In addition, it changes with every fluctuation in the price of milk or feed.

Figure 1 charts the typical milk production response of dairy cattle to different levels of energy-or feed-in the ration. By careful observation of milk production, one can locate the point on this curve where the last increment of concentrate is paid for by the milk stimulated by it. Production response to increases or decreases in the level of grain feeding is related to genetic capability of cattle to produce. Maximum profit is achieved in most instances when cows are producing at close to their full capacity. However, due to relatively high feed prices and low milk prices, the point of maximum profit drops back from full capacity.

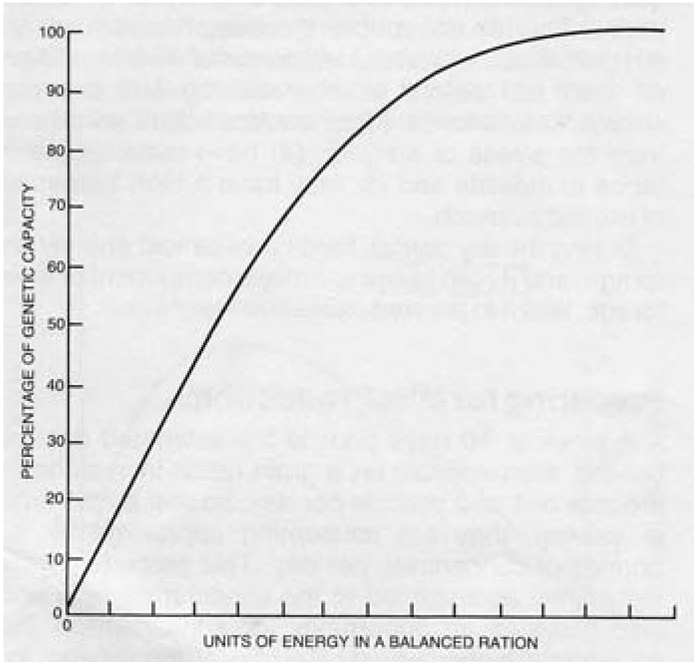

Figure 1. Model of Milk Production Response of Diary cows to increments of energy above maintenance in Balanced Ration

What is the genetic capability for milk production in the average dairy herd? Experimental data are not available to answer this question. However, the multitude of cows producing well above 30,000 pounds per year indicates that at least part of the population has this capability. The world record for milk production is over 55,000 pounds of milk per year, many times above current achievement. Certainly the approximately 12,000 pounds of milk per year produced by the average dairy cow in the United States is a great deal less than the genetic capability of cattle to produce. Milk production in most cows is limited by certain environmental and management factors. Among these, one important factor is the level of feeding.

Management Efforts in Establishing the Level of Feeding

1. In a balanced ration there is a direct relationship between the amount of milk produced and energy consumed. However, the response in milk production to increased energy intake eventually reaches a point of diminishing returns (Figure 1).

2. Maintenance costs are proportionately less for high producers than for low producers. Maintenance requirements for the animals in Table 1 are the same, assuming the same body weights. The increase in feed efficiency is primarily due to the lower proportion of feed (energy) required to maintain the body weight of the high producing cow.

3. Higher producers convert more feed to milk and generate more income over feed costs. Figure 2 provides a model of what the variations in profit may be when dairy herds are fed to different levels of production. If anything, the profit area on this line is conservative. The only added cost for the increased milk production computed into this line is that for feed. In addition, there may be some charge for additional management effort. However, there is little or no increase in costs for investment in animals, buildings, equipment, labor, interest, insurance, etc. As you will note from the lines on this model, both the absolute quantity and percentage of profit increase rapidly at higher production levels.

4. Overfeeding is a waste of feed and money and frequently leads to health problems.

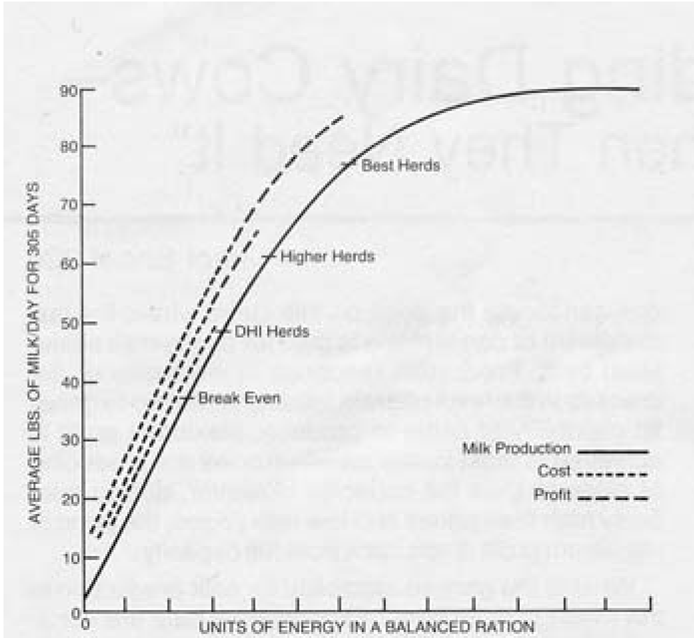

Figure 2. Model of Profit as Affected by Level of Feeding in a Well-Managed Herd

Developing a Feeding Program

Background knowledge that is essential in developing a profitable feeding program includes information concerning nutrient requirements of cattle, nutrient content of feeds and the suitability of feeds for lactating cows.

The nutritive value and palatability of forages vary so much from farm to farm that the use of standard data for these components of the ration is not usually satisfactory. Some form of evaluation on the forage that will be used in a dairy-herd is essential. Your Extension agent can advise you on procedures for forage testing.

Feeding a dairy herd on forages with which you are unfamiliar may be compared to having tanks of both diesel fuel and gasoline on a farm and filling the empty tanks of the vehicles at random without taking care to use the appropriate fuel for the type of engine involved.

Factors involved in determining the suitability of feeds include their palatability and acceptability by the animals. Obviously, high producing cows need a feed which is highly digestible if they are to consume enough to meet energy and other requirements. The total ration of a cow producing 60 pounds of milk per day or more should contain a minimum of 16 percent crude protein. Cows producing between 46 and 64 pounds per day should be fed a ration containing at least 15 percent protein, and 14 percent is recommended as a minimum for cows producing 30 to 45 pounds per day.

Minimum amounts of fiber are essential for normal metabolism of the rumen; 17 percent crude fiber in a ration is the recommended minimum. If the neutral detergent fiber analysis is made, the fiber content should be 20 percent or higher. In a suitable ration, at least 40 percent of the dry matter should come from forages. Cattle receiving rations with less than 40 percent dry matter from forages are difficult to maintain on feed and in top physiological condition.

There is a variety of information sources on nutrient requirements for growth, maintenance and lactation of dairy cattle. The National Research Council (NRC) publication "Nutritive Requirements of Dairy Cattle" is an excellent source. A wide variety of textbooks, Extension bulletins and other publications from land grant universities contain similar information.

Timing the Feeding Program

It is difficult to overemphasize the importance of proper timing for providing nutrients to a lactating cow. A sound feeding program starts well before lactation begins, either with the growing and developing heifer or during the last few weeks of the previous lactation.

Feed a lactating cow at such a rate that at the time of drying off she is at the body weight and condition that you expect immediately following calving. Any weight increase during the dry period should be limited to the weight of the calf, membranes and fluids. Research has shown this procedure to be the most economical because animals gain weight more efficiently during late lactation than during the dry period. A condition known as the "fat cow syndrome" frequently results if you over-feed a cow during her dry period. This is a nonspecific disease of cows that tend to (1) show an increased incidence of metritis; (2) go off feed just before or after calving and become chronic ketotic cows, (3) show less ability to recover from the stress of surgery, (4) have reduced resistance to mastitis and (5) may have a high incidence of twisted stomach.

During the dry period, feed cows almost entirely on forage, and if corn silage is a major component of their forage, limit it to prevent excessive weight gain.

Preparing for Milk Production

A week to 10 days prior to the estimated date of calving, start animals on a grain ration increasing at the rate of 1 or 2 pounds per day, so that by the time of calving, they are consuming approximately 15 pounds of concentrate per day. This procedure gets the animal accustomed to the concentrate feed and also provides an opportunity for adjustment of the rumen to a higher energy diet. Following calving, increase the concentrates in the ration to follow milk production, taking care not to throw the animal off feed. Figure 3 is a model of recommended body weight changes during a lactation.

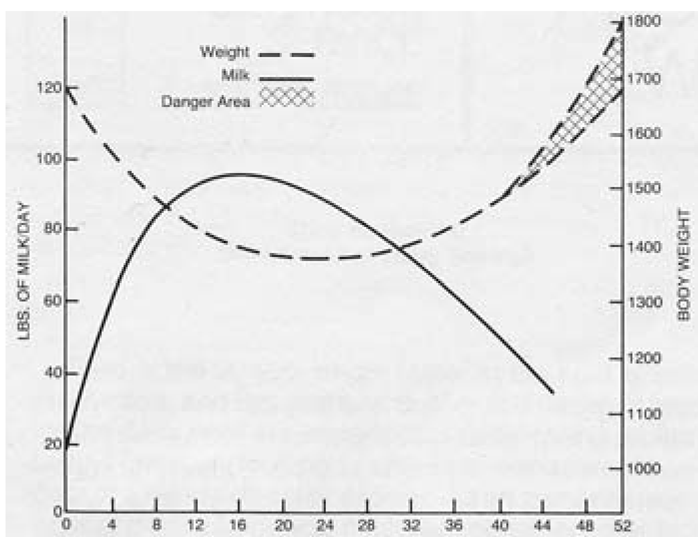

Figure 3. Model of Changes in Body Weight of Cows during Lactation in a Well-Managed Herd

As indicated in Figure 4, maximum intake of concentrates in the ration, which usually means maximunintake of energy, should be at approximately the time milk production is at its peak. Careful nutritional management is essential during early lactation, when the demand for nutrients by the high-producing cow is greater than she can consume. The highest level of fat-corrected milk production occurs as early as 2 to 4 weeks after freshening, while peak dry matter intake is not reached until 4 to 6 weeks after calving.

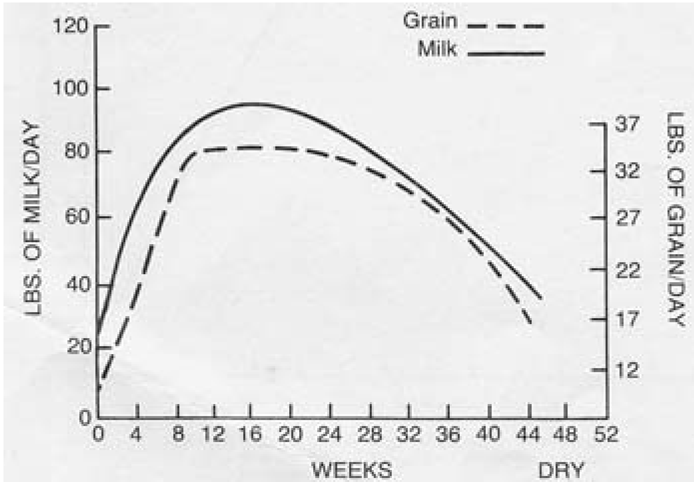

Figure 4. Model of changes in Grain Feeding to Individual Cows During a Lactation

Healthy cows use body tissues for energy and lose weight during early lactation as shown in Figure 3. Once milk production and feed intake have reached an equilibrium, gradually reduce the amount of concentrates offered as milk production declines. Remember to be cautious about feeding too much towards the end of lactation, so that animals do not become too fat.

Recommended Feeding Levels

Table 1 contains levels of grain and forage feeding for groups of cows averaging four different levels of production. Feeding levels for individual cows may be calculated from this table for production groups above or below these levels. Rations actually fed should follow the guidelines for protein, fiber and proportion of forage previously stated.

Table 1. Optimum Rations for Cows in Groups with Average Production at Four Different Levels.[1]

	Low	Production Medium	Groups Med-High	High
Milk/day at 3.5% fat (lb.)	37	55	75	95
Roughage intake (lb.)[2]	33	31	27	26
Concentrate intake (lb.)	9	16	29	35

An example of the effect of feeding cows to stimulate milk production close to their genetic capacity on income over feed cost is given in Table 2. In that example the price of milk is $13.50 per hundredweight (CWT), the cost of grain is $11.00 per CWT and the cost of forage is $5.00 per CWT.

Table 2. Affect of Different Levels of Production on Income over Feed Cost.[1]

	Production Groups			
	Low	Medium	Med-High	High
Milk/day at 3.5% fat (lb.)	37	55	75	95
Feed cost ($/day)	2.64	3.31	4.54	5.15
Income over feed cost ($/day)	2.35	4.11	5.58	7.67
Lb. milk/lb. feed	.9	1.2	1.4	1.6

Summary

As a dairy farm manager or owner, you should pay attention to all the essential facets of management to obtain maximum profit from feeding dairy cattle. Points that you should consider include: having animals of top genetic potential; using proper milking procedures; maintaining animals in good health and that exhibit high reproductive efficiency; and minimizing management stresses.

Proper management of feeding starts well before the beginning of any given lactation. It is essential that you adjust the rate of feeding throughout the lactation in order to meet nutrient requirements as closely as possible. Cows should not get too fat at any point in the lactation cycle.

Management must balance the precision of feeding with the added labor costs of individual attention to achieve maximum profit. In most cases, you will achieve maximum profit when the animals are producing close to their genetic potential.

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