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## G90-999 Nutritional Management of the High-Producing Dairy Cow in the 1990s

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# Nutritional Management of the High-Producing Dairy Cow in the 1990s

**This NebGuide discusses important aspects of grouping and feeding systems, body conditioning, and nutritional requirements for high-producing dairy cows.**

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An effective feeding system allows maximum intake of a nutritionally balanced ration. The use of production-enhancing compounds, such as Bovine Somatotropin (BST), makes proper nutritional management of high-producing dairy cows even more critical. This NebGuide discusses important aspects of grouping and feeding systems, body conditioning, and nutritional requirements for high-producing dairy cows.

As herd production levels continue to increase along with the average herd size, it is becoming more difficult for many dairy producers to feed their cattle adequate nutrients to maintain high production. Within a given herd a producer usually has cows at varying production levels and lactation stages, all of which require different ration formulations and energy levels if the cattle are going to produce at optimum levels. Also, proper nutrition is required early in the lactation to prepare the cow's reproductive system for conception and pregnancy. Proper nutrition is also important if cattle are to ward off infections, such as mastitis and metabolic problems. A properly nourished cow will be in better physical condition to handle stress and other physical challenges. Therefore, the feeding system must undergo significant modification as production levels increase, not only for the producer to maintain profitable production, but also for the physical well-being of dairy cattle.

## Grouping Strategies

Several management and physical changes may be needed in the dairy operation to adequately feed the high producing cow. One of the most effective ways to feed cattle to their production potential is to group them. There are several criteria to consider when grouping cattle. The more common grouping methods are:

1. by milk production level,
2. by age or lactation number,
3. by days or stage of lactation, and
4. by reproductive status.

All four methods have advantages and disadvantages, but grouping by production is most recommended if one is to gear the cows to their optimum nutrient requirements. If cows are grouped by production level, rations can be specifically formulated for given milk yields. This allows feed inventory to be used more efficiently since top quality feeds can be targeted for the top cows and poorer quality feeds can be fed to low producers.

Grouping by production levels also offers the advantage of being able to better manage feed allocation so as to not underfeed top producers or overfeed low producers. Of course, having three or four groups also increases the time needed to balance rations; however, the increases in milk yield and persistency far outweigh the disadvantages of formulating more rations.

An excellent system is to group cattle in quartiles. This means grouping the top 25 percent of the herd for production in one group, the second 25 percent of cows in the second group, and so on. Many producers also like to separate the first lactation cattle so that they can be more closely monitored during early lactation and then regroup them into production groups as they near mid lactation. Of course, dry cows should always be managed in a separate group so that they are not over fed and become fat (over conditioned). This will help prevent several health problems associated with obesity.

Grouping herds by production also can result in efficient use of the milking parlor since groups should milk out more uniformly. Also, the reproduction checks, breedings and pregnancy checks will tend to be concentrated in the higher production groups, thereby increasing the efficiency of both veterinarian herd health checks and routine reproductive checks.

## **Feeding Systems**

Four commonly used feeding systems include bunk, grain feeding in milking parlor, computerized grain feeder, and a total mixed ration (TMR).

The advantages of feeding cows in a stanchion or tie-stall include tight control of grain fed, easy detection of off-feed cows, and ability to easily supplement high producing cows with more grain. Disadvantages include high labor requirements, the potential for cows selecting only certain portions of their total diet, and the difficulty of using baled hay.

Many producers feed some or all of the daily grain allotment in the milking parlor. This practice allows grain feeding to be mechanized and makes individual cow feeding possible. However, time spent in the parlor is short and might limit the quantity of grain a high-producer could consume. Feeding grain in the parlor requires more equipment and causes more dust, increased defecation and slower exit times. Allowing the cow to consume her total grain allotment could slow the milking operation considerably. When feeding grain in the parlor, the number of feedings per day is obviously limited to the number of times cows are milked.

Another excellent way to individually feed cows the concentrate portion of the ration is to use a computerized feeder. It can regulate the grain (concentrate) intake for specific milk production levels. Individual cow intakes can be changed weekly so that as production increases or decreases, the ration can be changed. Even when grouping by production level, individual cows may need extra concentrates to maintain production and body condition during lactation. Therefore, having computerized feeders within production groupings gives the producer increased flexibility to alter rations more often.

A total mixed ration feeding system should theoretically do the best job of stabilizing rumen function. In essence, every mouthful of ration the cow consumes contains a balance of the required nutrients for her level of milk production. With all components of the diet mixed together, there is no need for free-choice minerals or separate grain feeding. Unpalatable feeds are masked or diluted, and non-protein nitrogen such as urea is consumed more slowly.

The bottom line is that regardless of the feeding system used, **a complete** adequate ration is a precise combination of all needed dietary ingredients, formulated to specific requirement levels, and offered ad libitum.

### **Body Condition Scoring**

An important component of any feeding system is to properly monitor the body condition of cows at various lactation stages. Body condition should be recorded during the first month of freshening. Routinely recording a body condition score on your herd will be a valuable aid in monitoring your nutrition program. The first two months of lactation are critical. Milk production peaks at a lower level in under-conditioned cows. Over conditioned cows are susceptible to metabolic disorders, diseases, mastitis and reproductive problems. In many cases having an unbiased observer record body condition scores is advisable because the producer may be too close to the situation to objectively score animals. Perhaps your DHI supervisor, veterinarian or a dairy producer in the area could objectively score the herd's body condition. Another good time to score body condition is in late lactation because body condition can be adjusted most efficiently then.

### **Production Records**

To have an effective nutrition program, it is essential to have accurate routine production records. Production records are obviously important if cows are to be grouped by production. They also are necessary for fine tuning the nutrition program for individual cows. In addition to milk production data, milk protein and fat data are needed. The amount of protein and fat that a cow produces also will affect the energy requirement in the diet. Another important component in many ration balancing programs is body weight. Accurate body weights are needed to be certain that the ration is producing enough nutrients for both production and body upkeep. One way to obtain accurate production data as well as body weight information is to enroll in a Dairy Herd Improvement Production Testing System. Simply give your local DHI supervisor a call and have the supervisor visit your herd and see how easy it is to have a production test.

### **Nutritional Strategies For Feeding the High-Producing Cow**

Dairy cows in early lactation will be in negative energy balance. That is, the cow does not consume enough nutrients to meet the energy demand of lactation. Dry matter intake typically lags behind peak milk production by eight to 10 weeks, resulting in a loss of body condition. Anything which will increase feed intake will increase production. Maximizing intake will be especially critical for BST-treated cows due to their high milk production level.

Many management factors may enhance feeding activity and increase intake. One of the most critical factors affecting feed intake is the availability and timing of feeding. Feed and water should always be available when the cow wants them. Feedbunks should be kept clean to avoid spoilage and subsequent reduced intake. Shading of the feedbunk often will enhance intake by reducing silage heating. Feeding frequency and sequence of feeding play major roles in determining how well a balanced diet will support high levels of milk production. The grain portion of the diet should be fed as often as practical to minimize digestive problems and enhance milk production. Feeding forage before grain, especially in the morning, promotes saliva production so the rumen is buffered and ready for the grain. This feeding approach has been shown to increase milk production and milk fat test.

## **Nutrition Requirements For High Milk Production**

The nutritional requirements for a 1,300-pound dairy cow producing 4.0 percent fat milk at various production levels is given in *Table I*. Considerations specific to the high-producer are discussed below.

### **Energy**

High quality forage is necessary to meet the energy requirement for the high producing dairy cow. In general, this means using an alfalfa forage of 40 percent neutral detergent fiber and 20 percent crude protein. If high quality forage is unavailable in the necessary quantities, increase the diet's grain content. Diets containing more than 50 percent grain (dry basis), however, may cause metabolic disturbances resulting in less milk fat, rumen acidosis, and sore feet. To avoid these problems, consider adding dietary fat for cows with production of 18,000 - 20,000 or more pounds of milk per year. Details of feeding added fat sources to dairy cattle are given in the NebGuide *G90-961, Supplemental Fat for High Producing Dairy Cows*.

### **Protein**

The crude protein content of the total diet required for high levels of milk production (90+ lb/day) may exceed 16 percent to 17 percent. It is necessary to meet the total crude protein requirements, as well as the undegradable crude protein requirements ("escape" or bypass" protein). In general, 35 percent to 40 percent of the dietary crude should be undegradable in the rumen to maximize milk production. Common sources of escape protein include heat treated soybeans or soybean meal, distillers grains, feathermeal, blood meal, and meat/bone meal.

### **Fiber**

The fiber levels given in *Table I* are minimum levels required in the total ration. When diets contain less than the recommended fiber level, metabolic disturbances, such as milk fat depression, may result. The fiber requirement for high milk production is not only a matter of level, but of particle size as well. Forage which has been too finely ground will not maintain normal rumen function and milk fat test.

Specific nutrient requirements for all production levels are given in the National Research Council's publication *Nutrient Requirements of Dairy Cattle 1989*. This information is available through area cooperative extension offices and some feed companies.

**Table I. Complete ration nutrient requirements for cows at various levels of production.**

<i>Nutrient</i>	High (93 lb)	Medium (70 lb)	Low (47 lb)
NE <sub>L</sub> , Mcal/lb	0.78	0.73	0.69
Crude protein, %	17.0	16.0	15.0
Acid detergent fiber, % (minimum)	19.0	21.0	21.0
Neutral detergent fiber, % (minimum)	26.0	28.0	28.0
Ether extract (fat), %	3.0	3.0	3.0
Calcium, %	.7-1.2	6-1.2	.53-1.2
Phosphorus, %	.45-.65	.40- .60	.35-.55
Source: Nutrient Requirements of Dairy Cattle. NRC. 1989.			

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