



Accomplishing a Sound Dairy Nutritional Program

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A common belief is that a sound nutritional program only involves analyzing the nutrient content of forages and balancing rations to meet the nutrient needs of dairy cows. This is definitely the place to start. But implementing sound nutritional programs and evaluating the effectiveness of these feeding programs are both required to make a dairy operation profitable. This factsheet covers some of the key points in implementing and evaluating a sound nutritional program for a dairy herd.

Implementing a Sound Feeding Program

Implementing a sound feeding program is the place to start in accomplishing a profitable nutritional program. This involves:

- 1. Testing forages**
- 2. Balancing rations**
- 3. Maximizing amount of feed consumed**
- 4. Harvesting and feeding high quality forages**
- 5. Preventing cows from going off-feed**

1. Test Forages To Determine Their Nutrient Content

Testing forages to accurately determine their dry matter and nutrient content is essential as a starting point in a sound nutritional program. Forages often “look” better than their nutrient analysis reveals. Forages vary in nutrient content from year to year and should be tested yearly. Underestimating forage quality will result in unnecessary grain being fed and increased feed costs. Overestimating forage quality will result in cows receiving less nutrients than they need. As a consequence, milk production may be lower than expected.

2. Balance Rations To Meet Nutrient Needs

After forages are tested, the next step is to have a qualified nutritionist balance a ration. Rations that are deficient in any particular nutrient can decrease milk production, reproductive efficiency, and/or cause health problems. On the other hand, rations that contain excess nutrients decrease profits and may result in health problems, such as ketosis or fat cow syndrome.

Rations should be balanced to use the forages on hand. Just as importantly, these rations should be balanced to reflect the *amount* of these forages on hand and a particular feeding system. Many different combinations of forage and concentrates will meet the nutrient needs of cows. The goal is to find a cost-efficient combination which a farmer is comfortable feeding and which is balanced to meet the cows' nutrient needs.

3. Maximize Amount of Feed Consumed

Getting cows to consume as much high quality feed (dry matter) as possible is very important in order to get cows to milk to their potential. The more nutrients an early lactation cow receives, the more milk she can produce. Proper management of the feeding program is essential to get cows to maximize feed intake. Feeding cows a balanced ration and making sure that quality feed is always available are two management principles which are very important if cows are going to milk to their genetic potential. For more information on ways to increase feed intake, see Extension publication ASC-135 *More Feed = More Milk*.

4. Harvest and Feed High Quality Forages

High quality forages contain a higher concentration of nutrients in every bite, allow cows to increase feed intake, and allow more forage to be fed while at the same time meeting the cow's nutrient needs. These factors increase milk production and decrease feed costs. Producing quality forages should be a high priority of every dairy farmer. This may mean finding ways to preserve quality forages regardless of the weather.

Feed intake is lower in early lactation cows (4-6 weeks), and feeding high quality forages helps these cows get a higher concentration of nutrients in the feed they do consume. Early lactation cows should be fed the highest quality forages available. If early lactation cows are not housed in a separate group, the best quality forages should be reserved for the time when the highest percentage of cows freshen. Cows fed poor quality forages are often thin, low-producing cows. They are poor breeders and may also be more susceptible to various health problems.

5. Prevent Cows From Going Off-Feed

Preventing cows from going off-feed is very important especially in early lactation cows. Increasing the amount of grain too quickly, feeding moldy forage, or making sudden changes in the type of forage fed can cause cows to go off-feed. Good managers seldom have their whole herd of cows go off-feed. Individual cows which go off-feed need to be spotted quickly and given individual attention to quickly correct the problem.

Evaluating the Feeding Program

After a feeding program has been implemented, the next step is to routinely evaluate if this feeding program is meeting the needs of the milking herd and dry cows. Areas that need to be evaluated include:

- 1. Accurately measuring feed intakes**
- 2. Monitoring whether the ration is meeting nutrient needs**
- 3. Monitoring body condition of cows**
- 4. Reviewing milk records**

1. Measure Dry Matter Intake

The amount of dry matter cows consume will predict the amount of nutrients they receive and the amount of milk they can produce. Feed intakes and the dry matter content of feeds should be measured monthly. Scales on feeding equipment and computer grain-feeders should be calibrated routinely. The amount of feed cows are consuming is often overestimated. "Guesswork is as costly as giving a blank check to a thief." This information, should then be compared to the original ration which was balanced on paper. If cows, on the average, are consuming less dry matter than expected, now is the time to start asking why!

The dry matter of wet feeds, such as silages and wet byproducts, should be determined monthly or whenever a new supply or batch of feed is received. Changes in the dry matter content of forages and wet byproducts can affect the amount of nutrients and fiber cows are receiving from these feed ingredients. A microwave oven can be used to determine the dry matter content of forages. For more information on determining the dry matter content of feeds see Extension publication ASC-135.

2. Monitor Whether the Ration is Meeting Nutrient Needs

Changes in the type and quality of forages can affect the amount of nutrients cows receive. These small changes could decrease milk production or the ability of a cow to regain body condition or weight during the second half of a lactation. Thus, rations need to be reevaluated frequently to make sure the cows are receiving the nutrients they need. The following examples illustrate how changes in forage quality and type of forage fed affect the amount of energy cows receive and, thus, the amount of milk they can potentially produce.

Examples illustrating how changing the type and quality of forage affects the amount of energy supplied in the diet when a ration is not rebalanced to reflect the changes in the nutrient content of forages:

Example 1: Effects of changing the type of silage fed

<i>Original ration</i>	<i>Adjusted ration</i>
55 lbs corn silage 5 lbs excellent alfalfa hay 21 lbs grain mix	55 lbs alfalfa/grass haylage 5 lbs excellent alfalfa hay 21 lbs grain mix
Supplies 32.0 Mcal NE _L	Supplies 29.7 Mcal NE _L

Difference 2.3 Mcal NE_L = 7 lbs milk or 1 lb weight gain

Example 2: Effects of changing the quality of hay fed

<i>Original ration</i>	<i>Adjusted ration</i>
15 lbs alfalfa/grass hay (0.63 Mcal NE_L/lb DM) 35 lbs corn silage 21 lbs grain mix	15 lbs alfalfa/grass hay (0.47 Mcal NE_L/lb DM) 35 lbs corn silage 21 lbs grain mix
Supplies 32.0 Mcal NE _L	Supplies 29.7 Mcal NE _L

Difference 2.3 Mcal NE_L = 7 lbs milk or 1 lb weight gain

3. Monitor Body Condition of Cows

Body condition, or amount of fat deposits, can influence milk production, reproduction, health, and longevity of cows in a dairy herd. Cows that calve too thin will not produce as much milk as cows in good body condition. On the other hand, cows which calve with an excessive amount of condition and are not managed properly after calving can have calving problems, milk fever, retained placenta, metritis (uterine infection), ketosis, etc. and may not milk as well.

Early lactation cows cannot consume enough feed during the first six to ten weeks of lactation to support the nutrient needs for producing milk. To make up for the energy deficiency, a cow relies on her body fat stores as an energy source. For every pound of body weight mobilized, enough energy can be supplied to support the production of 7 lbs of milk. Early lactation cows should lose no more than 2 lbs of body weight daily.

Cows need to be in the correct condition at calving, or they will not produce to their potential and will not breed back quickly. Getting cows in the correct condition at calving does not happen overnight and should start in the middle of the previous lactation. Cows gain weight very efficiently as their milk production declines during the last half of a lactation. If possible, cows should be in the correct condition when turned dry and be fed to maintain that condition during the dry period. Some high-producing cows will need to put on additional weight during the dry period.

The idea is to invest enough feed into a cow during the last part of the current lactation to put her in good body condition, then recoup your investment at the start of the next lactation when she uses this body fat to produce milk. This method of putting fat on, then taking it off, is metabolically efficient. You just have to wait a few months to get a return on your investment.

Table 1. Recommended body condition scores for different stages of lactation

Stage of Lactation	Body Condition Score
Calving	3.5 - 4.0
Early lactation	2.0 - 2.5
Mid-lactation	2.5 - 3.0
At time of drying off	3.5 - 4.0

The amount of body condition cows carry at a particular *stage of lactation* indicates how well a nutrition and management program is working. It is important to evaluate the amount of condition cows carry at various stages of lactation. Just looking at the amount of condition cows are carrying without knowing their calving date and breeding history reveals very little about how well the nutrition and management program is working.

4. Review Milk Production Records

The total amount of milk in the bulk tank is one area to help evaluate how well a feeding program is working. Sound feeding and management programs result in little variation in milk production between pickups. If milk production decreases by more than 3 to 5% from one pickup to the next, the feeding and management program should be reviewed to detect problem areas.

Although the amount of milk in the bulk tank is important to the cash flow of a dairy operation, it does not give the total picture as to how well a feeding program is working. Changes in the number of cows being milked or numbers of cows in each stage of lactation can greatly distort changes in milk production. To accurately evaluate and fine-tune a feeding program, the amount of milk produced by each cow should be weighed monthly.

From these monthly milk records, you can evaluate if each cow is peaking in milk four to six weeks into a given lactation and if each cow is dropping off in production too quickly. For those enrolled on DHIA, the herd summary sheet (DHI-202) calculates the average peak milk production and a persistency of the lactation for all cows in the herd. These numbers allow you to evaluate on a monthly basis how well a feeding program is working. Three areas to evaluate include:

Average Peak Milk Production: The higher cows peak in milk production, the more milk they give over the lactation. For every pound higher cows peak in milk production, they normally will produce 200 lbs more milk over that lactation. In DHIA records, this value reflects the highest test day milk production of all cows after they are 50 days in milk and is calculated for first, second or third+ lactation cows.

Goals:

For **Holsteins**, normally expect second lactation cows to peak 14 lbs higher than first-calf heifers. Mature cows normally peak 19 lbs higher than first-calf heifers.

For **Jerseys**, normally expect second lactation cows to peak 10 lbs higher than first-calf heifers. Mature cows normally peak 15 lbs higher than first-calf heifers.

Questions To Ask If Your Cows Do Not Meet These Goals

■ *When the difference between heifers and other groups is larger than expected, the problem may be with the milk production of the first-calf heifers. Questions to ask include:*

■ Is there enough bunk space and hay rack space for the timid heifers to compete with the mature cows? Ideally, there should be 30 inches of bunk space per Holstein cow if all cows eat at the same time.

■ Are heifers getting their allotment of grain? If you have a computer feeder, are they eating their allotment of grain?

■ Are your first-calf heifers younger than 28 months of age? Heifers that calve at 24 to 26 months of age may give 3 to 5 lbs less milk at peak milk production. However, remember these heifers still are making you more money than ones that calve at 28 months of age.

■ Are your first-calf heifers large enough when they calve? Holsteins should weigh over 1100 lbs and Jerseys over 800 lbs when they calve at 24 to 26 months of age. If they are not large enough, reexamine the heifer raising program.

■ *When the difference between heifers and other groups is smaller than expected, the problem may be associated with the older cows. Possibilities include:*

■ Are your cows calving with enough body condition? If cows are thin when they calve (body condition score of less than 3.5), they will not peak as high in milk production and, if they do peak, will not hold that milk production for very long.

■ How many times a day are cows fed? Do cows have fresh, high quality forage in front of them at all times?

■ Do early lactation cows go off-feed in early lactation and lose weight rapidly? Too rapid of a switch in forages or increasing the amount of grain fed too rapidly can cause cows to go off-feed.

■ Have the majority of the cows had dry periods of 45-60 days? Cows dry less than 45 days give less milk than those having dry periods lasting 45 to 60 days.

■ First-calf heifers should be genetically superior to the mature cows. Better genetics may *partially* explain why the difference between first-calf heifers and mature cows is smaller than expected.

■ *When the difference in peak milk production for first-calf heifers and second lactation cows is less than expected but the expected difference in milk production is seen between the first-calf heifers and mature cows, the problem is associated with the second lactation cows.*

■ Called “sophomore slump”

■ Problem relates to feeding program of these cows when they were first-calf heifers. These cows were not given enough energy and protein for milk production, growth, and body weight gain. As a consequence, these heifers did not regain body condition lost when they were first-calf heifers.

Average Daily Milk Production by Stage of Lactation: Mature cows generally peak in milk production four to six weeks into lactation. Are cows peaking in milk production the second month into lactation? On the herd summary sheet from DHIA, the “Stage of Lactation Profile for Average Daily Milk Production” calculates the average milk production of cows in the herd by stage of lactation for the current month.

Goal:

We expect cows to peak four to six weeks into their lactation. Heifers do not peak as high as cows, but they are more persistent in milk production.

Questions To Ask If Your Cows Do Not Meet This Goal:

- Are cows calving with adequate body condition (body condition score of 3.5-4.0)? If cows do not calve with adequate body condition, they will not peak as high and they will drop off quicker in milk production.
- Are early lactation cows being fed high quality forages?
- Do early lactation cows receive more grain than later lactation cows, or do all cows receive the same amount of grain? If all cows receive the same amount of grain, cows may not peak as high but may be more persistent in milk production.
- Are your cows getting enough protein in their diet? Are you feeding haylage or hay that is heat-damaged or caramelized? Heat damage to these forages reduces the amount of protein available to the cow.

Standardized 150-day milk production (found on DHIA herd summary sheets): Standardized 150-day milk is an estimate of what the average cow would have produced this month if she was 150 days in milk. Each month, DHIA recalculates this value to reflect new production data. This calculated value removes the effects of stage of lactation and allows the comparison of milk production between months. However, this value does not take into account differences in the age of cows within a herd.

Goal:

If the standardized 150-day milk remains constant from month to month, the feeding program is holding its own. However, if this value drops by more than 3-4 lbs, the feeding program needs to be critically reevaluated to find the cause for the drop in milk production.

Questions To Ask If Your Cows Do Not Meet This Goal:

- Have you changed the type of forage you are feeding?
- Has the quality of the forage changed?
- How much forage are your cows eating? How does this amount compare to last month?
- Have you calibrated your grain feeding system recently?
- How many first-calf heifers have you added to your herd this month? Freshening a high percentage of first-calf heifers may lower this value.

Managing by Stage of Lactation

At different stages of lactation, different nutritional practices become more important. Some of these are outlined as follows:

1. Heifers

- Heifers should be managed so they grow at a constant, efficient rate and calve around 24 months of age.
- Heifers need to calve with adequate skeletal growth and size.
- Heifers should calve with a body condition score of 3.0 to 3.5 on a scale of 1 to 5.
- First-calf heifers need to grow during their first and second lactations. They need to be fed enough nutrients for maintenance, milk production, and weight gain as well as growth.

2. Dry Cows

■ Dry cows are often neglected. Poor feeding and management programs for dry cows can decrease milk production by 1000 to 1500 lbs of milk this next lactation.

■ Cows should be turned dry 50 to 60 days before they calve. First-calf heifers need to be dry 10 extra days. During this dry period, milk-producing cells in the mammary gland (udder) are regenerated.

■ Dry cows should be fed a balanced diet that maintains their body condition at a score of 3.5 to 4.0. **DRY COWS SHOULD NOT LOSE BODY CONDITION DURING THE DRY PERIOD.** Cows that are turned dry thin should be fed extra grain (up to an additional 5 lbs of grain) to get them to gain some body condition.

■ Forages fed to dry cows should be tested and rations balanced to account for the quality of forages being fed. Oftentimes, dry cows are fed poor quality forages and, as a result, lose weight during the dry period because their diets are not supplemented properly.

■ During late summer, the quality and quantity of pasture decreases. Dry cows may need to be fed good quality hay in addition to pasture to maintain body condition.

■ Endophyte-infected fescue pastures decrease feed intake during the hot summer months and may prevent cows from coming into milk after they calve. Interseeding endophyte-infected fescue pastures with clover will help reduce these harmful effects.

■ Lead-feed dry cows grain up to 1% of their body weight (10-12 lbs of grain for a mature Holstein cow) two to three weeks before calving.

3. Early Lactation Cows

Although proper management at all stages of lactation is important, how well an early lactation cow is managed governs the amount of profit made per cow. The more milk early lactation cows produce and the higher they peak, the more profit that can be made. Management and nutritional changes which are made during the first 120 days in milk will translate into a greater milk production response than if the same changes are made later. A sound nutritional program for early lactation cows involves keeping them on feed, getting them to consume as much dry matter as possible, and preventing rapid losses in body condition.

■ Manage later lactation and dry cows so that they calve with adequate body condition (a body condition score of 3.5 to 4.0).

■ Slowly bring cows up on grain. The amount of grain ideally should be increased in 2-3 lb increments up to 20 lbs of grain and then increased by 1/2 lb/day after 20 lbs of grain.

■ Slowly change the type of forages fed to fresh cows as well as cows already in the milking herd.

■ Early lactation cows will lose body condition. The important point is that they do not lose too much body condition too fast. Cows which lose weight too fast are susceptible to fatty liver and to trouble getting them re-bred.

■ Early lactation cows should be fed the best quality forages available.

■ Balance early lactation diets to provide enough "effective fiber" or **long** fiber to stimulate cows to chew their cuds. When a cow chews its cud, saliva is produced which buffers the rumen contents.

■ Manage early lactation cows so that they consume as much dry matter as possible.

4. Later Lactation Cows

■ Mid- to late lactation cows should be managed so that they regain body condition lost during early lactation. The amount of body condition they should carry varies with the number of days before they will calve again. Lactating cows are more efficient at putting on body condition when they are milking than when they are dry.

Spot Potential Problems Early

Sound nutritional management programs are the key to a profitable dairy operation. Paying attention to the small details as well as major ones helps cows milk to their potential so that profits can be maximized. These details are important when raising heifers as well as in managing the milking herd. For the milking herd, the most critical period is early lactation. Minimizing the stress after calving is the key to a smooth transition into the milking herd so that profits from each cow can be maximized. It is important that potential problem areas be spotted before they become disasters.