

SUGGESTIVE SIGNALS INDICATING PROBLEMS
IN FEEDING

*by B. Harris, Jr.
Extension Dairyman
University of Florida*

Dairymen in the late 70's and early 80's will be faced with many challenging opportunities involving total management. The increased cost of labor, depreciation, taxes, capital, mechanical equipment, waste management, and other operating expenses makes high gross income per cow essential.

Maximizing net income over feed costs is an achievement worthy of serious concern and consideration by any dairyman since the greatest single costs involved in operating a dairy is the cost of feed. The question that one must ask is whether or not there is an art to feeding dairy cows or is one feeder as good as another in presenting the feed to the cow? Also, should all cows have the same ration and equal time at the feed bunk? Will cows adjust their feed intake according to their body weight and level of milk production or will they get fat? If they start a fattening process, will this effect their persistency in producing milk? Attempts will be made to answer many of these questions as we enter our discussions.

A big challenge facing dairymen in regard to feeding is in the selection of the most economical total ration. To properly achieve this, dairymen must examine all avenues available to them such as the feasibility of growing forages, purchasing all or certain ingredients, feeding inside and/or outside, and using a mixer wagon, badger system or other feeding systems.

Growing forages has certain advantages and may frequently be the most economical way to feed dairy cattle. This is especially true for dairymen located at fairly great distances from feed outlets, having good soil fertility, and the necessary labor and facilities for growing, harvesting and storing forages. On the other side though, dairymen located near large metropolitan centers or with restricted acreage and/or poor quality soil can seldom afford to get excited about growing a lot of forages.

The Digestive System

The ruminant stomach consists of four compartments: the rumen or paunch, the reticulum or honeycomb, the omasum or manyplies, and the abomasum or true stomach. The compound stomach of the mature cow will hold from 50 to 75 gallons.

Rumination may occur in calves as early as two weeks of age where grain is consumed early in life. By 3 to 4 weeks of age the calf may be weaned and by two months of age the rumen descends into its normal position followed by a rapid development of the reticulum and omasum. At 3 months of age the size of the rumen becomes established to bear the ratio to total size which will pertain throughout the animal's life.

High-concentrate low-fiber diets for newborn calves stimulates more rapid rumen development than high fiber diets. Apparently, the end products of rumen fermentation (fatty acids) are primarily responsible for the rapid development. A number of studies have shown that the rumen will reach its normal size with very little fiber being consumed by the calf. It seems evident that some fiber, perhaps no more than 10%, is needed to maintain a healthy rumen in calves after they reach 1 to 2 months of age.

Feed material ingested by the animal is mixed with saliva in the mouth and passed down the esophagus to the rumen where the feed is temporarily stored for the process of rumination. Rumination involves the cycle of regurgitation, mastitation, reinsalivation and re-swallowing. Boluses are not easily formed from certain rations eaten by cows and therefore less cud-chewing is observed. The rumen and reticulum, however, does continue the process of mixing and churning the ingested feed. Animals eating a high forage or roughage ration will spend about one-third of their time in the process of rumination.

The rumination process reduces the size of the feed particles, exposes more surface area for bacteria action and adds saliva which moistens and buffers the feed. During the period of a day, ruminants may secrete from 10 to 20 gallons of saliva which is essential in the swallowing of dry feedstuffs. The buffers in saliva (sodium bicarbonate, etc.) helps in maintaining a normal pH in the rumen. The ingested feed is retained in the rumen and reticulum until it attains a fine consistency, and then passes on to the lower regions of the digestive system.

The reticulum is involved in the process of rumination or cud-chewing. Sometimes it is referred to as the "hardware" compartment, since heavy objects such as nails may be swallowed and collected in it. Hardware disease is a result of metal objects accumulating in the reticulum and causing irritations or discomfort to the cow.

The third compartment or omasum lies between the reticulum and abomasum. It contains numerous leaves or a series of folds which provides a tremendous absorption area. The solid material is retained in the omasum for further grinding while 60-70% of the water content is absorbed and the more liquid portions of the ingesta pass directly to the abomasum or true stomach. The abomasum of the ruminant is very similar to the stomach of a pig or dog. In the abomasum, gastric juice is secreted at a rate similar to the amount of liquid absorbed or lost in the omasum. The hydrochloric acid content of the gastric juice causes the pH to fall to 1.5 to 3.0. This type of acid condition destroys the protozoa and bacteria, making the nutrients in their bodies available to the cow. Nutrients synthesized by the microorganisms (bacteria and protozoa) include all the amino acids and B-vitamins.

Developing Feeding Programs

A variety of successful feeding programs may be developed for dairy cattle that will promote high levels of milk production. The reason is because of the vast number of ingredients that are available to select from and many are quite similar in nutritional value. Basically, a good ration will contain adequate roughage or fiber and sufficient protein and energy for a given level of milk production. In addition, the minerals

and vitamins are added to provide good balance. In formulating good balanced rations, care must be taken in arriving at a good textured and palatable ration. Once the ration is put together in a least-cost manner the next important step becomes feeding management (the art of feeding).

Understanding Problems

1. Milk Production - The level of milk production in a herd is influenced by all environmental factors as well as the genetic ability of the cow to produce milk. With feed the main variable, reduced milk production is influenced the greatest by an inconsistency in the feeding program, a lack of attention to the dry cows, a shortage of feed to the high producing cows, an imbalanced ration, and a high soluble protein ration. High producing cows will consume upwards of 50 lbs. of complete feed (4.0 lbs. dry matter per 100 lbs. body weight) per cow per day. Less is consumed per day where cows are on silage rations. For maximum consumption the following are needed: 1) fresh water must be readily available, 2) a shade over the eating area, 3) feeding the cows 2-3 times per day and 4) having the cows eat all the feed in the trough each day. Consumption of feed can be increased by more frequent feeding of the ration.
2. High Feed Cost Per Cow - The cost of producing milk in Florida dairy herds frequently varies from a low of \$0.40 to a high of \$0.65 per gallon. As one would readily acknowledge, a cost of \$0.65 per gallon spells disaster for a dairyman over a period of time that may be relatively short. High feed costs usually result from the following reasons: 1) a failure to check with your feed dealer on the price of feed, 2) too many low producing cows in the herd, and 3) a lack of understanding of the feeds presented to the cows.
3. Uncomfortable Appearing Cows - Cows are like humans in that they enjoy comfort and freedom from stress. Cow comfort is increased with shade and freedom from mud and long periods of time on concrete. Overcrowded conditions, lack of space for resting, flies and other insects, and lack of bunk space for eating causes uncomfortable cows.
4. Reduced Milk Fat Test - Maintaining normal milk composition usually means producing milk with an acceptable butterfat test. A lower fat test than commonly observed in your herd is caused by a lack of effective fiber. Common signals that are indicative of a lowering of the milk fat test is loose bowels and acidosis. Loose bowels may result from grazing young tender pasture, lack of effective fiber, or an abrupt change in the feeding program.
5. Acidosis - Acidosis usually results from a major change in the ration such as moving cows from pasture to heavy grain or energy rations. Symptoms observed are diarrhea, depressed appetite, and frequently a rise in body temperature. Physiological changes observed include high levels of lactic acid in the blood and rumen, a lowered rumen pH and renal shutdown and dehydration. The problem can usually be avoided by properly adjusting animals to high energy rations and preventing lengthy gaps of time where animals are without feed in the feeding program. Thus, animals

off feed for 1-2 days because of shipment or diseases unrelated to feeding may need to be treated as unadapted animals during refeeding. Low level feeding of sodium bicarbonate (15 lbs/ton) is sometimes used as a preventative. Diarrhea in dairy cattle results in high water losses from the body which includes sodium, potassium and chloride.

6. Milk Fever - Milk fever is a metabolic disorder that occurs most frequently in high producing cows within the first three days after calving. The most obvious and consistent abnormality displayed in milk fever cases is low blood calcium. The level of calcium in the blood serum drops from a normal of about 10 mg/100 ml to levels of 3 to 7 mg/100 ml.

Excessive calcium and the resulting lack of phosphorus or an imbalance of the calcium-phosphorus ratio are key factors in causing milk fever in dairy cattle. Most research studies have shown that the level of calcium and phosphorus in the total ration and their ratio are important in controlling the incidence of milk fever in a herd.

Since milk fever occurs more frequently in early lactation, it is reasonable to assume that the dry herd ration is responsible for the major portion of the problem. The most widely accepted and workable plan for reducing the incidence of milk fever is by providing rations containing adequate levels of calcium and phosphorus during the dry period. During the dry period the dairy cow should be maintained in good condition. Thinner cows will need to gain in extra flesh. Every attempt, however, should be made to maintain the dry cow in real good flesh rather than fatten her. The nutrient requirements for dry cows are outlined in Table 1.

Table 1: Nutrient Requirements During the Dry Period (Last 2 Months of Gestation)

Body Wt.	Protein		TDN	Ca	Phos.
	Crude	Dig.			
	(lbs)	(lbs)	(lbs)	(grams)	(grams)
800	1.31	0.72	8.16	22.0	17.0
	1.63	0.90	10.00	26.0	20.0
	1.87	1.02	11.44	31.0	24.0
	2.09	1.16	13.00	36.0	28.0
	2.30	1.27	14.34	42.0	32.0

Milk fever problems have been rarely observed in Florida dairy herds when dairy rations contained adequate levels of calcium and phosphorus (0.40 to 0.50% phosphorus and 0.60 to 1.0% calcium).

7. Udder Edema - Udder edema is frequently a problem in certain herds at different times throughout the year. Restricting salt intake in order to control water balance in humans with edema problems is an accepted practice by many medical doctors. A recent report by researchers at the University of Maryland and elsewhere indicate

that salt intake could affect the severity of udder edema in dairy cows. The results are shown in Table 2.

Table 2: Average Udder Edema on Farms A & B

<u>Location</u>	<u>Control</u>	<u>Added Potassium</u>	<u>Added Sodium</u>	<u>Added Potassium & Sodium</u>
Farm A	2.19	3.64	3.77	4.22
Farm B	1.75	3.08	2.76	2.67

The more common cause of udder edema in Florida dairy herds has been the use of appetized mineral supplements. Also, cows receiving fairly large amounts of silage during the dry period are more likely to consume fairly large amounts of salt. If udder edema is a problem in your dairy herd, examine the availability of salt, especially where an appetizer is added to the salt.

It has been demonstrated that salt intake during the last month before calving has more influence on udder edema than concentrate feeding. It also is very evident that the practice of limiting concentrate intake by including high levels of salt in the mix certainly cannot be recommended for springing heifers or dry cows.

8. Ketosis - Ketosis or Acetonemia is a common metabolic disease of lactating cows occurring within a few days to a few weeks after freshening. The disease results in a lowered glucose concentration in the circulating blood with an increase in ketone bodies. Also, an increase of ketone bodies is observed in the urine.

Increased incidences of ketosis appear to result from two different types of feeding programs. In the first case, nutrition appears to be lacking; whereas, in the second case, nutrition is abundant. Case one will be discussed first.

Animals susceptible to ketosis should be maintained on a relatively high energy ration prior to calving and the level should be increased substantially after the cow freshens.

Body tissue is used for milk production with relatively high energetic efficiency and a moderate amount of weight loss in early lactation appears to have no harmful effects. On the other hand, excessive weight loss appears to make a cow more susceptible to ketosis, and should be avoided. Maximum energy intake by cows relatively early in lactation can be attained by challenge feeding after calving. This is an effective means of holding weight loss to a minimum and also for attaining high peak production and greater lactation yield.

Placing cows on full feed immediately after calving frequently causes some cows to go off-feed and within a short period secondary ketosis develops. Generally, this problem can be partially avoided by placing the fresh cows in a freshening group for a week to 10 days prior to putting them in the high group. This is especially true for many cows that may not have had the

opportunity of having been on the lactating cows ration prior to calving. Avoid all forms of stress as much as possible.

Overfeeding during late lactation or the dry period increases the incidence of ketosis. Certain dairymen in Florida during the past few years have observed an increased incidence of ketosis when cows were fed ad lib or allowed to fatten toward the end of lactation and maintained in this condition until freshening. Apparently, cows in a fattening condition cannot tolerate as much stress or perhaps are under more stress as compared to cows freshening in excellent condition. The ketosis problem was eliminated in the herds studied by changing the feeding program to a program such as group feeding so that the cows will not fatten in late lactation or during the dry period.

9. Displaced Abomasum - Displaced abomasum is the term applied to a condition associated with the abomasum (the fourth or true stomach) rotating from its normal position on the right ventral abdominal wall. The abomasum becomes dilated with fluid and/or gas with subsequent migration to the right or left and dorsally within the abdominal cavity. In displacement to the left, distention of the abomasum is caused primarily by gas; displacement to the right is usually accompanied by torsion and accumulation of fluid within the organ. Most displacements encountered in this country have been to the left. A number of cases have been observed in Florida. The condition is more likely to occur in older cows near the parturition or within 30 days after freshening.

Most cows with abomasal displacement (AD) are off-feed and show some signs of ketosis. Most have scanty bowel movements, some degree of dehydration, and about half have uterine infections or virus diseases such as IBR, BVD, and PI₃. The distinguishing feature between AD and ketosis is the diarrhea-like condition frequently observed in AD cases and constipation with ketosis. The field test for ketosis on milk and urine is strong for ketotic cows but only mild with the occurrence of AD. The depressed area over the rumen stays full with AD because the abomasum is displaced and filled with gas or fluid.

Several factors are probably responsible for the condition. The type of ration being fed in combination with some type of infection seems to dominate in most cases. High concentrate rations fed near freshening could possibly lower abomasal motility and increase abomasal gas production, resulting in AD in some cows near parturition. Cows carrying excessive flesh (fat) are more prone to have AD than cows freshening in good condition. Feeding some long hay during the dry period helps to avoid the problem.

10. Feedlot Bloat - Feedlot bloat, sometimes called frothy bloat, has been more commonly observed in Florida dairy herds than common bloat which is normally seen in cows consuming lush legumes such as alfalfa and clovers. Feedlot bloat has not been a real problem in most herds but has been a problem in a few herds under

certain conditions. The condition normally develops from a lack of roughage or where the ration contains more than 50% concentrate. It is thought to be caused partially by acid indigestion. Even so, it is not related to the eating habits of the animals or the fact that feed consumption has been increased. The fatty acid ratios and pH of the rumen contents are similar for bloaters and nonbloaters. It has been demonstrated that certain bacteria increase in cattle as bloating becomes a problem. Possible solutions to the problem would be the addition of more roughage to the ration or the addition of 12-15 lbs of sodium bicarbonate per ton of feed. The use of sodium bicarbonate would aid in preventing acid indigestion.

11. Fat Cow Syndrome - The fat cow syndrome is a problem in some herds where cows are fed too heavy in late lactation or allowed to fatten during the dry period. To maintain high production in the early part of the lactation, a cow must be in good condition, but hungry and active when she freshens. Specific signs include loss of appetite, depression, marked drop in milk production, progressive weight loss, chronic ketosis, nervous signs and an elevated temperature due to associated disease problems. Post mortem examinations on these cows show excessive fat throughout the body, plus a severely affected liver. To avoid the problem, feed less energy and more roughage.