

Chlorine: 0.35 grams per 100 grams of ration DM divided by 0.0355 meq. per gram equals -9.9 meq. of chlorine per 100 grams of feed.

Sulfur: 0.2 grams per 100 grams of ration DM divided by .016 meq. per gram equals -12.5 meq. of sulfur per 100 grams of feed.

The cation-anion balance would be the summation of the above charges: +13, +20.5, -9.9, -12.5 = +11.0 meq./100 grams DM. The ration contains a greater amount of cations than anions.

Studies to date report less milk fever when cows are being fed on a low-cation or high-anion balanced diet during the dry period. British researchers reported that rations with an excess of anions resulted in positive calcium balance. Results of two experiments are in Table 17.

Table 17. Incidence of milk fever noted when using different cation-anion balanced rations in the dry period.

Station	Cation-Anion Balance (Milliequivalent)	Incidence (Milk Fever)
Canadian	+33.0	47.4
	-12.9	None
Colorado	-4.8	4.0
	+19.0	17.0

¹M. F. Hutjens, Hoards Dairyman, Sept. 10, 1988.

Lactating cows seem to respond more to a positive cation-balanced ration whereas the opposite appears to be the case for dry cows. Kentucky workers reported that milking cows fed a ration containing a +20.0 meq. per 100 grams produced 8.6% more milk than cows having a -10.0 cation-anion balanced ration.

Present research indicates that watching the cation-anion balance may have potential for improving milk yield and reducing the incidence of milk fever. Research is underway at the University of Florida to help in defining the parameters needed in making recommendations.

The Carbohydrate Approach

Balancing rations according to the amount of starch or soluble carbohydrates in the ration of high producing cows may be the buzz word for the 90s. It appears that proper management of carbohydrate feeding can have an effect

on herd performance. The challenge is to maximize the energy content of the ration without increasing the incidence of metabolic problems. Diets that contain too much fiber or poor quality forage is likely to limit energy intake and milk production. At the same time, rations that contain too much soluble carbohydrates such as corn, high-moisture corn, and wheat may lead to acidosis, depressed fiber digestion, reduced feed intake, and milk fat depression. Such rations affect peak milk yield, persistency in the herd, and may lead to increased reproductive problems.

Carbohydrates are compounds such as sugars, starches, and cellulose (Figure 2). The composition and digestibility of the carbohydrate fraction of feedstuff varies considerably depending on maturity and processing of the feedstuff. Some carbohydrates are degraded very rapidly in the rumen whereas others are more slowly digested. The key is having the right balance in the ration.

The structure of carbohydrates is divided into two components: cell wall and noncell wall fractions. They are termed structural and nonstructural carbohydrates. The amounts of starch and sugars recommended in dairy cattle rations varies from a low of about 30% to a maximum of 45% of the ration dry matter.

A simple formula for determining the amount of nonstructural carbohydrates (NSC) in various feedstuffs is as follows: (100) - (NDF, crude protein, fat, and minerals [ash]) = NSC value. Several feedstuffs are shown in Table 18.

It is important that rations be designed to promote microbial balance in the rumen. Dry matter intake declines with too much energy in the ration and too much fiber limits intake. An abundance of starches and sugars in the diet may shift the fermentation patterns in the rumen toward lactic acid fermentation that would lead to acidosis and low fat testing milk.

The most critical period in the cow's lactation is from parturition until peak production which takes from 5 to 8 weeks postpartum. It is during this period that the "stage is set" for obtaining the highest possible peak in production and also for the onset of normal reproductive cycling which may occur as early as 2-3 weeks in some cows. To be successful, the best strategies must be applied that include many areas such as feeding and management practices, quality and balance of feed, feed bunk management, milk practices, and the maintenance of good health.