Feeding the Exceptionally High Producing Dairy Cow

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The goal of every dairy herdsman should be to provide the right amount of feed for the right cow at the right time. This should maximize profits while minimizing metabolic problems. The most difficult problem is to change the feeding program of cows from that which meets the needs of dry cows to a program that meets the needs of cows producing at very high levels.

Most modern day dairy cows peak in milk production in six to eight weeks. Peak dry matter intake, however, is not attained until ten to sixteen weeks.

Cows should be in good condition but not fat when they calve. Body reserves of energy and protein are necessary for early peak milk production when dry matter intake is relatively low. Over-fattening dry cows predisposes them to metritis, off-feed, ketosis and displaced abomasum.

Recently fresh cows should be forced to consume forage. This can be done by providing excellent quality forage and increasing the intake of concentrates slowly so that forage supplies more than 50% of the dry matter intake. Prebloom alfalfa hay is the best possible forage. Excellent quality silage made from probloom alfalfa can nearly replace dry hay. Corn silage can be substituted for some of the excellent alfalfa forage. Concentrate mixtures can be used to increase the energy density of dairy rations and to provide supplemental protein, minerals and vitamins, but excellent quality forages is essential for exceptionally high milk productions. Research from Wisconsin indicates that Holstein cows can produce over eighty pounds of 4% F.C.M. (fat corrected milk) when prebloom alfalfa hay provides 80% of the dry matter and concentrates provide only 20%. However, when full bloom alfalfa hay provided 30% of the dry matter intake and concentrates provided 70% of the dry matter, Holstein cows produced less than seventy pounds of 4% F.D.M. This research reemphasizes the fact that excellent quality forage is essential for high milk production.

The concentrate intake of recently fresh cows should be increased at the rate of one pound per day. If part of the concentrates offered are refused, do not increase the amount of concentrates offered until the cow's appetite returns. This system should work well in stanchion or comfort stall barns or with computerized feeders. Total mixed rations (TMR) usually do not cause problems because the TMR designed for the high producing group should force all cows to consume approximately 50% of their dry matter as forage. When concentrates are fed in a milking parlor and a magnetic feeder, recently fresh cows should be fed concentrates only in the parlor for the first three to four weeks. Only when she is eating well in the parlor should cows be provided free-choice access to the magnetic feeder. Most of the concentrate mixtures fed in magnetic feeders should be buffered with one and one half percent (30 lb. per ton) bicarbonate of soda. Bicarbonate of soda reduces the rate and the amount of concentrate intake and buffers the environment of the rumen.

Cows need a broad range of nutrients. Each one should be provided by weight (grams, kilograms or pounds). "The National Research Councils Requirements for Dairy Cattle 1978" is used by most dairy nutritionists. Since these are intended to be minimums many nutritionists add safety factors of 5 to 10%. A new bulletin will be published in 1986. Most of the changes will be minor. Sometimes for convenience we discuss or formulate dairy rations in percentages or parts per million (ppm) on a dry matter basis. This approach works reasonably well if the cow eats enough dry matter to be in energy balance. Cows that are in negative energy balance and are using body stores of fat as an energy source need a higher percentage of protein and minerals in their ration if production is to be maintained.

Feeding large amounts of readily fermentable starch in a short period of time frequently overwhelms the buffering capacity of the rumen and may cause acidosis, "off-feed", butterfat depression and/or founder. Cows that consume more than 2% of the bodyweight as concentrates should be fed concentrates more than twice a day. Such concentrate mixtures should be buffered with one and one half percent bicarbonate of soda or sodium sequicarbonate (combination of sodium bicarbonate and sodium carbonate). Substituting readily digested fiberous materials such as soy bran flakes, dried beet pulp, dried citrus pulp, wheat bran or wheat middlings for corn grain or wheat may also reduce the problem of acidosis.

Protein should be provided for both the microorganisms in the rumen and for the cow. The microorganisms digest and metabolize ration nitrogen to ammonia (NH_3) before synthesizing it into microorganismic protein. This protein is digested and utilized by the cow when the microorganisms reach the small intestine. Microorganismic protein is sufficient for low or average producing cows. High producing cows should be fed ration protein that is not broken down in the rumen and is digestible in the small

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intestine. Increasing the rate of passage of concentrate mixtures through the rumen by feeding more per day increases the escape potential of readily degraded protein as found in soybean meal. Dry forages and corn contain slowly degradable protein. Heat treated corn protein, as found in corn distiller's feed, and corn gluten meal, are frequently used sources of supplemental escape (by-pass) protein. Heat-treatment of protein in the presence of sugar can produce a nonenzymatic browning (Maillard) reaction in which an insoluble, indigestible polymer of sugar and amino acids is formed. Fifty percent or more of the crude protein in a feedstuff can be lost through this reaction. The solubility of protein in a solution that imitates rumen fluid is used as a rough measure of protein's escape potential. Research workers recommend that daily rations for high producing cows contain approximately 30% soluble protein and 70% insoluble. Testing each feedstuff is desirable because of variations in the protein solubility of different batches of the same feedstuffs but table values developed by Dr. C. J. Sniffen of Cornell can be used to compute dairy rations.

The article on page 1054 of the October 10, 1985 issue of Hoard's Dairyman contains an interesting article by Herb Bucholtz and Bill Thomas of Michigan State University about minerals and vitamins in dairy rations. Their tables reflect the recommendations of many of those nutritionists who have developed computer programs for balancing dairy rations. They recommend increases above the "National Research Council Requirements" as follows: calcium +50%, magnesium +25%, potassium +50%, iron +50%, copper +50%, manganese +25%, zinc +25% and selenium +100%.

Vitamin A is added to most dairy rations to help maintain the reproductive process. Thirty thousand to one hundred thousand International Units per head per day would be a reasonable supplement amount. Vitamin D supplementation is recommended at a rate of 10,000 to 20,000 International Units per head per day if the cows are confined indoors at all times and silages provide most of the forage. If cows are fed stored forage throughout the year, supplemental vitamin E at the rate of 500 to 1000 International Units (or milligrams) is recommended per head per day.