

# Dairy Cow Nutrition

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Feeding a dairy herd involves the skillful selection and blending of feed ingredients to furnish a balanced, palatable, economical ration.

## Economics of Feeding

The dairy cow is more versatile than we often give her credit for being. She can use large amounts of forage in her diet or relatively restricted amounts. Certainly, for high milk production a relatively large amount of her nutrients must come from a supplemental grain mix.

Supplemented grain mixes, commonly called "grain" by the feeder, are blends of cereal grains, protein supplements, minerals, and vitamins. Feed suppliers or feeders can vary the protein or other nutrient content of the grain mix to properly supplement the forage being fed. In this fact sheet the word "grain" refers to the supplemented grain mix.

As the price of both locally available cereal grains and forages varies from year to year, dairymen should determine the most economical source of energy and build the dairy ration around this ingredient. Good economical rations offer the opportunity to greatly increase net income.

## Feed Intake

Though a cow can consume larger amounts of feed than a simple stomached animal, her capacity is not unlimited. High producing cows often

Table 1. Estimated daily feed intakes and amount of grain mix recommended for various levels of milk production (by body weight of cow)

Pounds milk per day (3.5% butterfat)	Pounds daily total feed and pounds grain mix <sup>1</sup> within the total ration			
	1,000 pound cow	1,200 pound cow	1,400 pound cow	1,600 pound cow
33	30 (10)	36 (10)	42 (10)	48 (10)
44	33 (14)	39 (14)	45 (14)	52 (14)
55	35 (17)	42 (17)	49 (17)	56 (17)
66	37 (21)	45 (21)	53 (21)	59 (21)
77	40 (24)	48 (24)	56 (24)	64 (24)

<sup>1</sup> Numbers in parentheses refer to pounds of grain mix within the total ration.

lose weight during peak lactation because of this. Therefore, energy concentration, or the total digestible nutrients (TDN) in a pound of feed is important. Table 1 shows the average feed intake at different levels of production.

## Complete Dairy Ration

In the past few years there has been interest in feeding dairy cows a total mixed ration. Some of the requirements of such a ration are shown in Table 2.

Table 2. Specifications for a complete dairy ration (air dry)

Nutrient	Percent
Crude protein (minimum)	13
Crude fiber (minimum)	17
Forage (hay-silage) (minimum)	50
Calcium (minimum)	0.60
Phosphorus (minimum)	0.40
Nonprotein nitrogen (maximum)	0.45
Salt (exactly)	0.50
Total digestible nutrients	50 to 65
Vitamin A (minimum)	2,000 I.U./lb.
Vitamin D (minimum)	600 I.U./lb.

The more usual method of feeding cattle is to feed forage (hay or silage) free choice, and balance the forage with a grain mixture. It makes no difference if the ingredients are fed as a complete ration or separately; the nutrient requirements are the same and must be met for economical milk production.

Dairymen may purchase the needed supplements in a commercial feed mix or determine their own feeding program by consulting published tables of nutrient values of locally or seasonally available grains or by-products. The nutrient requirements and forage analysis tables can be found in "The Nutrient Requirements of Domestic Animals, No. 3, Nutrient Requirements of Dairy Cattle," 4th ed. 1971, National Academy of Science, Washington D. C.

**Protein.** Protein usually is costly, so dairymen try to feed adequate but not excessive amounts. A general guideline is given in Table 3.



Table 3. Guide for protein level in a dairy grain mix

Type of forage	Percent protein in forage	Percent protein required in grain
Legume hay or silage .....	15 or more	12
Legume grass mixes or early cut grass .....	12-14	14
Grass hay or corn silage legume mixes .....	10-12	16
All corn or sorghum silage or late cut grass .....	10 or less	20

Dairymen should have the forage analyzed for protein. If he knows the protein and water content of the forage, it is a simple calculation to determine the protein needed in the grain ration.

Nonprotein nitrogen is well utilized by cows to make protein and is usually economical compared to natural proteins. Those dairymen feeding high levels of protein in the grain should consider a nonprotein nitrogen source such as urea.

**Fiber.** Approximately 17 percent fiber in the feed is necessary to maintain a normal level butterfat test. Low-fiber rations are efficient for fattening and are used for beef cattle, but they may result in a lower butterfat percentage.

**Forage.** Forage usually is the primary source of fiber. At least half the ration should be forage that is not ground or pelleted. Long, chopped, or cubed hay provides rumen stimulation for the cud-chewing reflex and insures a normal butterfat test. Good quality forage can furnish a major share of the required nutrients needed by lactating cows.

**Energy.** Energy is commonly measured as TDN in this country. High milk production demands high TDN intake. This is accomplished by substituting cereal grains such as barley for forages, since the cereal grains usually contain about twice as much TDN per pound as forages.

There are a number of tables and formulas that give the amount of grain to feed. This simple formula is adequate when forage is of good quality and fed liberally.

$(\text{Pounds of butterfat produced per day} - 1) \times 15 =$   
Pounds recommended grain per day

Those dairymen participating in DHI record programs should have confidence in the amount of grain recommended on the individual cow report.

**Minerals.** Cows need calcium, phosphorus, salt, and iodine. These are commonly added to dairy grains. Salt, at a level of 0.5 percent in the total ration, is sufficient, so 1 percent is commonly added to grain rations. Iodized salt will furnish iodine to prevent goiter and thus maintain milk production.

Calcium and phosphorus are interrelated and should be fed within restricted ratios. Ratios of 1.5:1 to 3:1 calcium to phosphorus are recommended. Poor results have been reported with several species of animals when phosphorus exceeds calcium. When calcium exceeds phosphorus by too wide a ratio (more than 7:1), it is a contributing cause of milk fever, a blood calcium deficiency.

Most forages, except corn silage, supply adequate amounts of calcium, but phosphorus must be added. When the ratio of calcium to phosphorus is within the recommended limits, dicalcium phosphate is a good supplement, but if calcium is in great excess then monosodium phosphate or diammonium phosphate should be used. Dairymen can consult their Extension agent to determine if their area has specific mineral deficiencies that must be corrected.

**Vitamins.** Most dairy rations will furnish the needed vitamins if they contain high quality forage. Because of variation in the amount and quality of the forages fed, however, it is insurance to supplement with vitamins A and D.