Dairy Guidelines

COOPERATIVE EXTENSION SERVICE, V.P.I., BLACKSBURG, VIRGINIA

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Low-Cost Rations for More Milk Dollars

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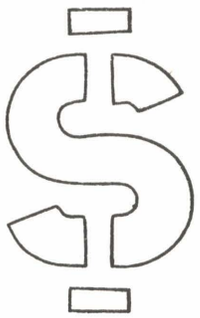

Adequate feeding of the dairy herd for optimum performance and economical production is the greatest challenge facing the dairyman. Many feeds and feed ingredients are available for feeding the dairy cow, and many combinations of these feeds will give good performance. But the combination of feeds that gives the greatest dollar return above costs is of interest to every dairyman.

More Milk Dollars From Forages

Since the cost of feed accounts for approximately 50% of the total cost of producing milk, and forages can make up 60% to 80% of the total feed for the dairy herd, it is important to have the highest profit forage system that can be developed on the farm. The comparative cost of producing 100 therms of Estimated Net Energy (ENE), Table 1, definitely favors pasture and corn and barley silages, and shows all hays and other types of silages as being higher-cost feeds. But because soil types, topography, rainfall, and climate vary throughout Virginia, the crops grown must be adapted to local farm situations. On well-adapted soils, corn silage and alfalfa will produce more ENE and net return per acre than pasture. Conversely, land with steep slopes that erode when cultivated should be used for good quality grazing during lush pasture growing seasons.

An example, shown in Table 2, of how to increase yields of ENE and digestible protein on the same farm, using the same acreage, by rearranging the fields and matching crops to soil type and topography was demonstrated by a dairyman in southwest Virginia. He was a cooperator in the TVA-VPI Rapid Adjustment Farm Program.

ISSUED IN FURTHERANCE OF COOPERATIVE EXTENSION WORK, ACTS OF MAY 8 AND JUNE 30, 1914, IN COOPERATION WITH THE U. S. DEPARTMENT OF AGRICULTURE. W. E. SKELTON, DIRECTOR OF EXTENSION SERVICE, VIRGINIA POLYTECHNIC INSTITUTE, BLACKSBURG, VIRGINIA 24061.

Table 1. Yields and Cost of ENE of Crops*

Crop	Yield Per Acre	ENE Per Acre (Therms)	Cost Per 100 Therms ENE**
Bluegrass pasture	1.4T	1400	$1.25
Corn silage	20 T	7440	$1.50
Ladino-Orchard pasture	1.7T	1680	$1.62
Barley silage	10 T	3700	$1.76
Corn grain	100 Bu.	4486	$1.89
Barley grain	50 Bu.	1922	$2.35
Alfalfa "haylage"	10.9T	4360	$2.48
Sorghum silage	15 T	4320	$2.50
Oat silage	6 T	2232	$2.65
Alfalfa hay	4.8T	3667	$2.77
Red clover hay	3 T	2340	$2.85
Oat grain	45 Bu.	1038	$3.93

*Calculated from tables prepared by Departments of Agronomy and Agricultural Economics, V.P.I., March 1966.

**Includes cost of production, storage, grinding (where applicable), and feeding.

Table 2. Full Potential From Land*

Crop	Before (1961)		After (1966)	
	Acres(38)	Yield	Acres(39)	Yield
Corn grain	9	70 Bu.	--	-----
Oat-Wheat grain	13	30 Bu.	--	-----
Oat hay	4	1.5 T	--	-----
Soybean hay	6	2.5 T	--	-----
Mixed hay	6	1.5 T	--	-----
Corn silage	-	-----	25	20.0 T
Alfalfa hay	-	-----	14	3.6 T
Total ENE	72,981 therms		215,000 therms	
Total Dig. Protein	9,800 lbs.		24,550 lbs.	

*TVA-VPI Rapid Adjustment Farm, Washington County, Va.

Corn Silage

Corn for silage in Virginia has the potential of yielding more ENE per acre at the lowest cost per nutrient and the highest profit per acre of any harvested crop. In addition to being a low cost, highly palatable, milk producing feed, it also lends itself to mechanized harvesting, storing, and feeding; large amounts can be harvested daily with a minimum of labor; and harvest and storage losses are low.

Research studies and many experienced dairymen have demonstrated that a feeding program with corn silage as the only forage will maintain equally as high milk production as an all-hay or hay-plus-corn silage program. Cows will eat 5 to 7 lbs. of corn silage per 100 lbs. body weight daily. Thus a large cow will consume an average of about 80 lbs. of 35% dry matter silage daily. To determine the tonnage that should be stored for feeding the herd, 80 x 30 (days/month) = 2400 lbs. or 1.2 tons per month. Thus, for a year's feed supply, a dairyman needs about 14.4 tons per milking cow. In addition, he will need silage for his replacement heifers. If silage is the only forage fed, 2 heifers will eat about the same amount as 1 cow.

Corn should be harvested for silage in the hard dough stage of maturity. The grains are firm to hard but can be dented with the fingernail. The kernels on the entire ear are well dented on most varieties. Husks are brown or turning brown, but most leaves are green.* The dry matter content of the finished silage will be above 35%. Higher yields, improved palatability, greater animal intake, and lower storage losses are obtained when harvested at this or later stages of maturity.

Corn silage is low in protein content. If it is the only forage fed to lactating cows, the concentrate mixture should have 18 to 20% total protein to adequately supply protein needs. If 10 lbs. of urea are added per ton of silage at ensiling time, then a 14 to 16% protein concentrate mixture will be adequate.

Small Grains

Small grains, such as barley or oats, make good silage for dairy cows. Mixing crimson clover with the small grain increases the yield and protein content of the silage. For top quality and to avoid having to wilt before ensiling, the grain should be in the soft dough stage of development at the time of harvest. The crops work well into a rotation with corn, will provide a summer feed, and permit double cropping of land and double use of silo capacity.

Pasture

Pasture will usually supply a therm of net energy at less cost than any other type of forage. For large herds or where land is limited for feed production, land suitable for other crops should not be used for pasture because of the relatively low total yield of nutrients per acre as compared to yields from corn or alfalfa. Land suitable only for pasture should be properly seeded and fertilized to be productive. Management is difficult in using it for lactating cows because of the variation in amount of nutrients the cows can get from grazing. During lush growth, the amount of nutrients may be adequate, but it can become short in supply rather quickly during dry weather. Thus, dairymen should supplement the silage or hay feeding program with pasture when it is available. Grazing pasture continuously with dry cows and heifers is generally the best use.

*"Harvesting Corn Silage," Leaflet 153, VPI 1964.

Alfalfa Hay

Alfalfa is the best perennial forage legume available in Virginia. On most farms it works well in a rotation with corn for silage. Problems in controlling the alfalfa weevil have been the chief cause of the acreage of alfalfa being cut in half since 1960. Alfalfa is high in protein when compared with corn silage and has a high calcium and vitamin A content. Hay harvesting, curing, storing, and feeding is not as easily mechanized as corn silage and requires more labor and equipment. Furthermore, nutrient losses during curing and storing of hay are greater than for corn silage. Haylage or low moisture alfalfa silage can be handled similarly to corn silage and losses in curing and storing are not as great as for hay. When yields of 5 tons of hay per acre are produced under top management and the cost of weevil control is reduced, then alfalfa can more nearly compete with corn silage on a cost per nutrient basis.

Red Clover

Red clover and grass hay is widely used in Virginia and makes good quality hay or silage. Red clover acts as a biennial, and yields are usually less than for alfalfa. However, it fits well into short rotations and is adapted to a wider range of soil types. The best stage of maturity at which to cut red clover for hay or silage is when it is 1/4 in bloom.

More Milk Dollars From Least Cost Grains

The major objective in feeding concentrate mixtures to dairy cows is to provide adequate energy, protein, vitamins, and minerals for optimum production. Forages usually are lower in cost per nutrient than grains, but cows cannot consume sufficient silage, hay, or pasture to produce at a profitable level. Grain rations that are equal in nutrients produce the same results even though the cost is different. Thus, great savings in feed cost are possible if least-cost ingredients are used.

Home Mixtures

Choosing grains and protein concentrates for home mixes or custom mixes by local feed mills offer opportunities for great savings in feed ingredient costs. Ingredients should be evaluated on their: 1) nutritional value; 2) cost on an energy and/or protein basis; 3) feeds available in the area; and 4) palatability of the feeds. Composition tables, or chemical analyses are used to obtain nutritive content of feed ingredients.

Evaluating grain or by-product feeds on a cost per therm of ENE or protein basis is not difficult. The following calculations are suggested when comparing ingredients that are rich energy feeds (Formula A) or those concentrates high in protein (Formula B). Often prices are quoted on a bushel basis. To convert bushel price to hundred weight price use:

$$\frac{\text{Cost per bushel}}{\text{Weight per bushel}} \times 100 = \text{cost per 100 lbs.}$$

Formula A. for energy feeds

$$\frac{\text{Cost per 100 lbs. of feed}}{\text{Therms of E.N.E. of the feed}} = \text{cost per therm of E.N.E.}$$

Formula B. for protein concentrate feeds. Either total or digestible protein may be used.

$$\frac{\text{Cost per 100 lbs. of feed}}{\text{\% protein of the feed}} = \text{cost per lb. of protein}$$

It is possible to evaluate and compare cost of a combination of energy and protein in feeds for either grains, grain by-product, or forages. See Dairy Guideline Series No. 107 for one method.

Another method is to use corn and soybean meal constants (Table 3). Even though these feeds may not be the least cost, the comparison of actual price to value indicates which feeds are the best buys.

Table 3. Determining Best Buy Feeds, Using Corn and Soybean Meal Constants*

Feed	Constants	
	Corn	SBM
Corn No. 2	1.000	.000
SBM 44%	0.000	1.000
Barley	0.908	0.093
Oats	0.924	0.076
Milo	0.916	0.056
Peanut meal 45%	-0.122	1.023
Cottonseed meal 36%	0.173	0.615
Cottonseed meal 41%	0.025	0.770
Wheat bran	0.619	0.218
Alfalfa hay	0.296	0.212
Corn silage	0.265	-0.011

Example: Corn @ $50 per ton and SBM @ $100 per ton

What is the value of barley?

0.908 x $50 + 0.093 x $100 = $54.70 per ton

What is the value of peanut meal?

1.023 x $100 - 0.122 x $50 = $96.20

*F. B. Morrison. Feeds and Feeding. 22nd Edition - Table II.

If barley is available for less than $54.70 per ton, it is a better buy than corn at $50 per ton; when peanut meal can be bought for less than $96.20 per ton, it is less expensive on a nutrient basis than soybean meal at $100 per ton. The table is useful for any local prices for corn or soybean meal.

Commercial Concentrates

Determining the cost of ENE or protein in a ready mixed feed is difficult because the composition and amounts of ingredients are not normally listed on the feed tag. By state law, feed companies are required to list ingredients included, but not amounts of each. Further, they must guarantee a minimum of total protein and fat and a maximum of crude fiber.

Estimating the digestible protein content of a commercially mixed dairy feed is usually considered as 80% of the total protein listed on the tag. This may vary with mixes, but is a good guide.

Determining the ENE or TDN content of commercial feeds is more difficult. The best guide is the fiber content. Even though maximum fiber content allowed by state law is listed on the tag, many feed mixes have considerably less than the maximum. Furthermore, some high fiber ingredients, such as soy flakes or soybean millfeed, are highly digestible. Generally, those feeds that contain more than 10% crude fiber are lower in ENE or TDN than the high energy feed with under 7% crude fiber. A thumb rule for estimating the TDN in feeds is:

> Assume 75% TDN for a 6% crude fiber feed. Decrease TDN 1.5% for each 1% crude fiber exceeding 6%. For example, a 10% crude fiber feed would be about 69% TDN.*

*J. W. Crowley, Hoard's Dairyman, November 10, 1966.