

DOLLAR VALUE FOR HIGH AND LOW TDN ALFALFA HAY DETERMINED BY COMPUTER RATION FORMULATION

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Approximately 70% of the alfalfa hay crop produced in California is fed to dairy cattle. High TDN hay is prized by most dairymen because they know from experience that when it is fed it results in 1) more milk per cow; 2) faster weight gains by growing cattle; 3) less supplemental protein is needed in the other ration ingredients, thus reducing feed costs; 4) it is more palatable; and 5) there is less waste.

In recent years, many dairymen have started using computers to formulate rations for their cows. The computer formulates the ration using the combination of feed ingredients which results in the lowest possible feed cost and still fulfills the nutrient requirements of the cows. Thus, these rations are called "least-cost" rations. The amount of each feed ingredient that is used in the ration is dependent on the price of that ingredient and its nutrient content. Many nutrients are included in the computer's evaluation of an ingredient, but the two most important are its energy (TDN) and protein content. The higher the TDN and protein levels, the more value that ingredient has, and the more of it is included in the cow's ration.

The following examples were developed using the least-cost dairy ration computer program at the University of California, Davis. In each case, the ration was formulated to fulfill the requirements of a 1400-pound cow producing 60 pounds of milk per day. Alfalfa hay of three different qualities was used in the examples--1) a high-quality hay (55% TDN); 2) a medium-quality hay (52% TDN); and 3) a low-quality hay (49% TDN). Other feeds available were corn silage at \$30 per ton and a grain-concentrate mix at \$130 per ton.

Table 1. 1400-Pound Cow Producing 60 Pounds of Milk

	TDN of Alfalfa Hay		
	49	52	55
Alfalfa Hay @ \$85 Per Ton			
Corn Silage @ \$30 Per Ton			
Concentrate Mix @ \$130 Per Ton			
Alfalfa Hay (1b/day)	15		15
Corn Silage (1b/day)	34		44
Concentrate Mix (1b/day)	20		16
Ration Cost (\$/day)	\$2.43	\$2.37	\$2.31

In the first example in Table 1, it was assumed that the dairyman was feeding 15 pounds of alfalfa hay per cow daily with the hay priced at \$85 per ton. Using 49% TDN hay, a ration that would support production of 60 pounds of milk daily costs \$2.43 per cow. With 52% TDN hay, the ration cost drops to \$2.37 per cow, and with 55% TDN hay, it is only \$2.31 per cow. The difference between \$2.43 and \$2.31 is \$0.12 per cow daily which may not seem like much. However, in a typical 400-cow dairy herd, that \$0.12 per cow becomes a savings of \$17,520 per year in feed costs, as shown in Table 2.

Table 2. 1400-Pound Cow Producing 60 Pounds of Milk

Alfalfa Hay @ \$85 Per Ton Corn Silage @ \$30 Per Ton Concentrate Mix @ \$130 Per Ton	
49% TDN Hay Ration	\$2.43 Per Cow
55% TDN Hay Ration	<u>2.31</u> Per Cow
Difference	\$0.12 Per Cow
400 Cows x \$0.12	\$48 Per Day
365 Days x \$48	\$17,520 Per Year

In Table 1, the amount of alfalfa hay in the ration was constrained at exactly 15 pounds per cow. If the computer is allowed to vary the amount of alfalfa hay in the ration depending on the TDN content of the hay, a different result occurs, as shown in Table 3.

**Table 3. 1400-Pound Cow Producing 60 Pounds of Milk**

	Alfalfa Hay @ \$85 Per Ton Corn Silage @ \$30 Per Ton Concentrate Mix @ \$130 Per Ton		
	TDN of Alfalfa Hay		
	49	52	55
Alfalfa Hay (lb/day)	6	15	36
Corn Silage (lb/day)	45	36	0
Concentrate Mix (lb/day)	24	19	12
Ration Cost (\$/day)	\$2.41	\$2.37	\$2.29

When 49% TDN hay at \$85 per ton is available, along with corn silage at \$30 per ton and a concentrate mix at \$130 per ton, the least-cost ration for 60 pounds of milk consists of 6 pounds of alfalfa hay, 45 pounds of corn silage, and 24 pounds of the concentrate mix at a cost of \$2.41 per cow daily. With 52% TDN hay, the least-cost ration is 15 pounds of alfalfa hay, 36 pounds of corn silage, and 19 pounds of concentrate mix, and the cost is \$2.37 per cow daily. When 55% TDN is available, the least-cost ration contains 36 pounds of alfalfa hay, 12 pounds of concentrate mix, and no corn silage. The cost of this ration drops to \$2.29 per cow daily. The higher TDN and protein levels of the 55% TDN hay allow the ration to be balanced for 60 pounds of milk with only half as much concentrate as is needed when 49% TDN hay is fed (12 pounds of concentrates with 55% TDN hay vs 24 pounds of concentrates with 49% TDN hay).

In the third example in Table 4, the prices of the corn silage and concentrate mix remained the same at \$30 and \$130 per ton, but the price of alfalfa hay was allowed to vary depending on the TDN content. The computer program determined that alfalfa hay with 49% TDN was worth only \$77 per ton in a least-cost ration containing 15 pounds or more of hay. Hay with 52% TDN was worth \$85 per ton and 55% TDN hay was worth \$93 per ton under the same conditions. Therefore, there was a spread of \$16 per ton in the feeding value when comparing 55% TDN hay with 49% TDN hay.

**Table 4. 1400-Pound Cow Producing 60 Pounds of Milk**

	Corn Silage @ \$30 Per Ton Concentrate Mix @ \$130 Per Ton		
	TDN of Alfalfa Hay		
	49	52	55
Alfalfa Hay (\$/ton)	\$ 77	\$ 85	\$ 93
Alfalfa Hay (lb/day)	18	15	16
Corn Silage (lb/day)	27	36	40
Concentrate Mix (lb/day)	20	19	16
Ration Cost (\$/day)	\$2.37	\$2.37	\$2.37

It is obvious from the above examples that high TDN hay is worth more to the dairyman. However, it also is well known that producing high TDN hay is more expensive for the hay grower. He must receive a higher price per ton for high TDN hay to make it profitable to produce it. Many dairymen recognize the value of high TDN hay and are willing to pay a higher price for it. This is an area of negotiation where more understanding is needed between dairymen and hay growers. Use of computers as illustrated above may be helpful in determining the relative value of different qualities of hay. Thus, a dairyman could be assured that the price he pays for high TDN hay is justified, and a hay grower who produces high TDN hay would be rewarded with a higher price per ton for his product.

Table 5. Income Per Acre

10 Ton of 49% TDN Hay @ \$77 = \$770

8.3 Ton of 55% TDN Hay @ \$93 = \$770

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One final point may be worthy of consideration by hay growers. From Table 4 it can be seen that 49% TDN hay was worth only \$77 and 55% TDN hay was worth \$93 per ton compared with corn silage at \$30 per ton and a concentrate mix at \$130 per ton. If a hay grower were able to produce 10 tons per acre and sell it for \$77 per ton, that would return \$770 per acre, as shown in Table 5. However, if he produced only 8.3 ton per acre of 55% TDN hay and sold it for \$93 per ton, it would return just as much income per acre as 10 ton of 49% TDN hay ( $8.3 \text{ T} \times \$93 = \$770$ ). The difference is that it is more difficult to sell low TDN hay, especially in years when there is a hay surplus. However, there is always a good market with dairymen for high TDN hay.