



Planning the Yearly Forage and Commodity Needs for a Dairy Herd

Donna M. Amaral-Phillips and Jack McAllister, Department of Animal Sciences

Costs for raising or purchasing forages and grain commodities represent 50 to 60 percent of the total cost of producing milk or raising replacement heifers. Economical feeding programs begin with calculating forage and commodity needs. These needs should be calculated yearly to ensure adequate forage and fiber intakes, optimal performance, and economical feeding programs not only for the milking herd but also for heifers and dry cows. This planning process should include:

- Calculating the amount of forage needed to feed the milking herd as well as replacement heifers.
- Calculating the total forage needs early in the feeding period after forages have been harvested. This calculation allows one to plan purchases and to spread out these purchases over a longer time period. These additional purchases can be in the form of additional forage or by-products to meet the forage and/or fiber needs of the dairy herd.
- Accounting for the additional forage needed when adding cows or heifers. The addition of cows or heifers can represent adding five more cows or a major herd expansion.
- Calculating the amount of forage, by-products, or supplements that could be contracted to meet the feed needs of the dairy herd.

Steps to calculate the forage and commodity needs of the dairy herd include:

- Step 1.** Determining the number of cattle to be fed during the calendar year or until the next year's forage crop is harvested.
- Step 2.** Calculating the amount of feed each group of cattle needs to consume.
- Step 3.** Calculating the total amount of feed that needs to be purchased or raised after accounting for feeding and storage losses.

Step 4. Calculating the total tonnage of each forage or purchased feed needed.

Step 5. Converting tonnage needed into acres that need to be planted.

This publication covers these steps using a sample herd. Blank worksheets are located in the back of this publication to calculate the forage, concentrate, or by-product needs of your herd.

Sample Herd

Step 1: Determine the number of cattle to be fed. Here, the time frame can refer to the next crop year, the remainder of the feeding period, or the next calendar year.

Sample Herd

Table 1. Number of cattle on the dairy farm.

Dairy cattle identification	Number of head of cattle
Milking cows	85
Dry cows	15
Heifers under 1 year of age	40
Heifers over 1 year of age	40

Step 2: Calculate the amount of feed each group of cattle needs to eat to meet their nutritional needs. These needs can be taken from balanced rations or from estimating dry matter or hay equivalent intakes.

Forage needs are expressed as hay equivalents or as dry matter intake to account for differences between breeds and different combinations of hays and silages. Calculations used to determine intake of each forage are explained in the footnotes of Information Table 1.

Information Table

Table 1. Estimated daily forage needs for dairy cattle.

Dairy cattle identification	Estimated daily forage needs expressed as	
	Hay equivalents ¹	Dry matter intake
Milking cows	2.25 to 2.5% body weight ²	2.0 to 2.25% body weight ³
Dry cows	2.25% body weight ²	2.0% body weight ³
Heifers under 1 year of age	10 lb hay equivalents (Holstein)	9 lb dry matter (Holstein)
Heifers over 1 year of age	20 lb hay equivalents (Holstein)	18 lb dry matter (Holstein)

¹ 1 lb hay equivalent (0.9 lb dry matter intake) = 1 lb of hay = 2.5 lb silage (as fed) = 2 lb balage (as fed).

² To calculate the number of hay equivalents needed by milking cows, multiply the average body weight of cows by 2.25 percent intake. A 1,300 pound Holstein milking cow needs to consume 29.25 pounds of hay equivalents daily (1,300 lb x 0.0225 [move the decimal point two places to the left] = 29.25 lb hay equivalents). If we want to feed 5 pounds of alfalfa hay and the remainder of the forage supplied by corn silage, a cow would need to eat 60 pounds of corn silage (29.25 lb hay equivalents – 5 lb alfalfa hay = 24.25 lb hay equivalents; then, 24.25 lb hay equivalents x 2.5 (lb of silage in one hay equivalent) = 60 lb corn silage).

³ To calculate dry matter intake, multiply the average body weight by the estimated daily forage needs (two percent of body weight). A 1,300 pound Holstein milking cow needs to consume 26 pounds of dry matter daily (1,300 lb x 0.020 [move the decimal point two places to the left] = 26 lb dry matter). If we want to feed 5 pounds of alfalfa hay with the remainder of the forage supplied by corn silage, we first need to calculate the pounds of dry matter supplied by the hay. If the alfalfa hay is 85 percent dry matter, the alfalfa hay supplies 4.25 pounds dry matter (5 lb hay x 0.85 = 4.25 lb dry matter from hay). To calculate the amount of dry matter needed to be supplied by corn silage, subtract the amount of dry matter supplied by alfalfa hay from the amount of dry matter needed by the cow (26 lb dry matter needed from forages – 4.25 lb dry matter from alfalfa hay = 21.75 lb dry matter needed from corn silage). To calculate the amount of corn silage needed, divide the pounds of dry matter needed by the dry matter content (corn silage is 35 percent dry matter; then, 21.75 lb dry matter / 0.35 = 62 lb corn silage).

Sample Herd

Table 2. Calculating the daily and yearly needs.

Dairy cattle identification and assumptions	Sample herd (fed 365 days)		
	Daily amount per cow (lb/day)	Daily amount for herd (lb/day)	Total amount for herd for feeding period (tons/feeding period)
Milking cows¹			
Total hay equivalents needed	29 lb		
Total lb dry matter needed	26 lb		
<i>Forages (as fed)</i>			
Alfalfa hay (5 lb/head)	5 lb	425 lb	77.5 tons
Corn silage	60 lb	5,100 lb	930 tons
<i>Commodities (as fed)</i>			
Whole cottonseed	6 lb	510 lb	93 tons
Dry cows²			
Total hay equivalents needed	31 lb		
Total lb dry matter needed	28 lb		
<i>Forages (as fed)</i>			
Corn silage (25 lb/head)	25 lb	375 lb	68 tons
Wheat hay	21 lb	315 lb	57 tons
Heifers under 1 year of age³			
Hay only (as fed)	10 lb	400 lb	73 tons
Heifers over 1 year of age⁴			
Hay only (as fed)	20 lb	800 lb	146 tons

¹ 85 cows average 1,300 lb and eat 2.25 percent body weight for hay equivalents or 2.0 percent body weight for dry matter intake

² 1,400 lb body weight; average 15 cows/day

³ Average 40 head fed hay all year

⁴ Average 40 head fed hay all year

Step 3: Calculate the total amount of feed that needs to be purchased or raised after accounting for feeding and storage losses.

To calculate amount of feed needed in storage, multiply the total amount of feed needed by the factor listed in Information Table 2.

For example: To calculate the amount of alfalfa hay that should be purchased as square bales for this sample herd: 77.5 tons alfalfa hay needed x 1.10 = 85 tons alfalfa hay needed to be purchased.

Information Table

Table 2. Calculating the amount of feed (tonnage) needed in storage.

Where stored	Storage losses	Feeding losses	Average feeding and storage losses	Factor
Grain mix				
Grain bin	3%	5%	8%	1.08
Whole cottonseed				
Commodity shed	8%	5%	13%	1.13
Square bales of hay				
In barn	5%	5%	10%	1.10
Round bales of hay				
Inside or outside with sleeves	5%	15%	20%	1.20
Outside on rock pad	15%	15%	30%	1.30
Outside on ground, uncovered	30%	15%	45%	1.45
Balage	10%	10%	20%	1.20
Silage				
Concrete stave	9%	5%	14%	1.14
Bags	5%	5%	10%	1.10
Bunker	12%	5%	17%	1.17
Trench	15%	5%	20%	1.20

Sample Herd

Table 3. Yearly forage needs.

Dairy cattle identification and assumptions	Before losses	Factor for feeding and storage losses ¹	After feeding and storage losses
Milking cows			
<i>Forages (as fed)</i>			
Alfalfa hay (square bales, purchased)	77.5 tons	1.10	85 tons
Corn silage (bunker)	930 tons	1.17	1,088 tons
<i>Commodities (as fed)</i>			
Whole cottonseed (purchased)	93 tons	1.13	105 tons
Dry cows			
Corn silage (bunker)	68 tons	1.17	80 tons
Wheat hay (round bales, stored outside uncovered)	57 tons	1.45	83 tons
Heifers under 1 year of age			
Hay (round bales, stored outside uncovered)	73 tons	1.45	106 tons
Heifers over 1 year of age			
Hay (round bales, stored outside uncovered)	146 tons	1.45	212 tons

¹ Factors to account for feeding and storage losses were obtained from Information Table 2 listing the feeding and storage losses associated with different methods of storing feeds.

Step 4: Calculate the total tonnage of each forage or amount of purchased feed needed. To calculate the total amount of forage or commodity needed, add together the needs of each group of cattle for each type of forage or commodity.

Sample Herd

Table 4. Total amount of feed needed.

Feed	Tonnage needed for the year by different groups of dairy cattle				Total tonnage needed
	Milk cows	Dry cows	Heifers under 1 year age	Heifers over 1 year age	
Alfalfa hay	85	—	—	—	85
Corn silage	1,088	80	—	—	1,168
Wheat hay	—	83	—	—	83
Other hay	—	—	106	212	318
Whole cottonseed	105	—	—	—	105

Step 5: Convert tonnage needed into acreage of each crop needed. If you wish to convert tonnage needed into acres to plant, expected yields for Kentucky are listed in Information Table 3.

Information Table

Table 3. To calculate the number of acres needed, you must account for losses during harvesting.

	Yields as crop in the field (tons—as fed/acre)	Harvest losses (%)	Net yield harvested and placed in storage structure (tons—as fed/acre)
Alfalfa hay	5.0	20	4.0
Alfalfa silage	12.5	13	10.9
Grass hay	3.5	10	3.2
Clover/Grass hay	4.0	15	3.4
Corn silage	17.0	5	16.0
Wheat hay	3.3	10	3.0

Sample Herd

Table 5. Total number of acres needed.

Feed	Total tonnage needed	Average net yield (tons/acre)	Acreage needed
Alfalfa hay	85	Purchased	---
Corn silage	1,168	16.0	73
Wheat hay	83	3.0	28
Other hay	318	3.2	99
Whole cottonseed	105	Purchased	---

Actual acreage needed will vary due to differences in yields because of weather and other agronomic factors. These calculations are to be used as a planning tool to estimate acreage needed.

Your Herd

Step 1: Determine the number of cattle to be fed over the year. (Year can refer to either the next crop year or the remainder of this year.)

Your Herd

Table 1. Number of cattle on the dairy farm.

Dairy cattle identification	Number of head of cattle
Milking cows	
Dry cows	
Heifers under 1 year of age	
Heifers over 1 year of age	

Step 2: Calculate the amount of feed each group of cattle needs to eat to meet their nutritional needs.

Your Herd

Table 2. Calculating the daily and yearly needs.

Dairy cattle identification and assumptions	Your herd (fed _____ days)		
	Daily amount per cow (lb/day)	Daily amount for herd (lb/day)	Total amount for herd for feeding period (tons/feeding period)
Milking cows¹			
Total hay equivalents needed			
Total lb dry matter needed			
<i>Forages (as fed)</i>			
<i>Commodities (as fed)</i>			
Dry cows²			
Total hay equivalents needed			
Total lb dry matter needed			
<i>Forages (as fed)</i>			
Heifers under 1 year of age³			
Heifers over 1 year of age⁴			

¹ _____ = number of cows; average = _____ pounds

² _____ = pounds body weight; average = _____ cows/day

³ _____ = average head fed hay all year

⁴ _____ = average head fed hay all year

Step 3: Calculate the total amount of feed that needs to be purchased or raised after accounting for feeding and storage losses.

Your Herd

Table 3. Yearly forage needs.

Dairy cattle identification and assumptions	Before losses	Factor for feeding and storage losses¹	After feeding and storage losses
Milking cows			
<i>Forages (as fed)</i>			
<i>Commodities (as fed)</i>			
Dry cows			
Heifers under 1 year of age			
Heifers over 1 year of age			

¹ Factors to account for feeding and storage losses can be obtained from Information Table 2 listing the feeding and storage losses associated with different methods of storing forages.

Step 4: Calculate total tonnage or number of acres of each forage or purchased feed needed.

Your Herd

Table 4. Total amount of feed needed.

Feed	Tonnage needed for the year by different groups of dairy cattle				Total tonnage needed
	Milk cows	Dry cows	Heifers under 1 year age	Heifers over 1 year age	

Step 5: Convert tonnage needed into acreage to be planted.

Your Herd

Table 5. Total number of acres needed.

Feed	Total tonnage needed	Average net yield (tons/acre)	Acreage needed

Actual acreage needed will vary due to differences in yields due to weather and other agronomic factors. These calculations are to be used as a planning tool to estimate acreage needed.

