



Feed Inventory for Dairy Cattle

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(This folder replaces Dairy Husbandry Fact Sheet No. 14.)

Feed and feed storage are an important part of any dairy operation. Feeds represent 50 to 60 percent of total milk production costs. Providing a nutritional, balanced ration year-round will maintain top milk production and help reduce total feed costs.

A simple feed inventory can help you make decisions regarding current and future feeding programs. By completing a feed inventory, you can:

- determine feed supply available;
- ensile more corn silage or purchase additional forages for needs or shortages;
- sell excess feeds (forage or grain);
- adjust feeding program early to compensate for any shortages before they occur;
- plan future cropping programs;
- accurately balance rations for milk cows, dry cows, and heifers.

Requirements and Feed Supply

The yearly nutrient requirements for a 1,300 pound cow producing various amounts of milk are given in table 1. Successful management of feed inventories requires matching nutrient requirements with nutrient supplies (feed). Table 2 provides forage requirements and table 3 provides concentrate requirements to meet the nutrient needs of a lactating cow for a full year. These tables should be used as a guideline and a check, when completing your feed inventory.

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Table 1. Yearly nutrient requirements of a 1,300 pound cow.

	305-day lactation	60-day dry period	365-day total
Milk production			
18,000 lb - 3.5% fat			
Net energy (Mcal)	8,600 (.71) ^a	790 (.51)	9,390 (.69)
Crude protein (lb)	1,800 (14.9) ^a	130 (8.3)	1,930 (14.2)
Total feed dry matter (lb)	12,050 (39.5) ^b	1,560 (26.0)	13,610 (37.3)
Forage: Concentrate (%)	56:44	90:10	61:39
15,000 lb - 3.5% fat			
Net energy (Mcal)	7,600 (.66)	790	8,390 (.64)
Crude protein (lb)	1,560 (13.5)	130	1,690 (12.8)
Total feed dry matter (lb)	11,600 (38.0)	1,560	13,160 (36.0)
Forage: Concentrate (%)	61:39	90:10	66:34
13,000 lb - 3.5% fat			
Net energy (Mcal)	6,980 (.64)	790	7,770 (.62)
Crude protein (lb)	1,390 (12.6)	130	1,520 (12.1)
Total feed dry matter (lb)	10,980 (36.0)	1,560	12,540 (34.4)
Forage: Concentrate (%)	67:33	95:10	72:28

^aValues in parentheses are content of ration dry matter.

^bValues in parentheses are averages for period.

Table 2. Yearly forage requirements of a lactating cow.^a

Item	Forage fed (lb/day)					
	Corn silage	60	45	30	15	0
Alfalfa hay ^b	---	5	12	18	23	
	----- tons/year ^c -----					
18,000 lb milk - 3.5% fat						
Corn silage	12.6	9.8	6.1	3.1	---	
Alfalfa hay ^b	---	1.1	3.5	3.6	4.8	
15,000 lb milk - 3.5% fat						
Corn silage	12.9	10.1	6.2	3.2	---	
Alfalfa hay ^b	---	1.1	2.6	3.8	5.1	
13,000 lb milk - 3.5% fat						
Corn silage	13.6	10.6	6.7	3.3	---	
Alfalfa hay ^b	---	1.2	2.7	4.0	5.3	

^aBased on a 1,300 lb cow; reduce amounts 10 to 20% for smaller cows.

^bMultiply by 2 if haylage is used.

^cAmounts of 35% dry matter corn silage and 86% dry matter alfalfa hay; includes dry period and 15% storage and feeding loss.

Table 3. Yearly concentrate requirements of a lactating dairy cow.^a

Item	Percent forage crude protein (100% dry basis)				
	18	16	14	12	10
	----- tons/year (100% dry basis) ^b -----				
18,000 lb milk - 3.5% fat					
Corn equivalents ^c	3.20	3.20	2.90	2.80	2.70
Soybean meal	.19	.34	.51	.64	.79
15,000 lb milk - 3.5% fat					
Corn equivalents ^c	3.10	3.00	2.90	2.70	2.60
Soybean meal	---	.06	.23	.38	.54
13,000 lb milk - 3.5% fat					
Corn equivalents ^c	2.60	2.60	2.50	2.40	2.20
Soybean meal	---	---	.05	.21	.39

^aBased on a 1,300 lb cow; reduce amounts 10 to 20% for smaller cows.

^bIncludes dry period and 5% storage and feeding loss.

^cDry matter equivalency factors: to adjust for grains other than shell corn multiply by 1.08 ear corn, 1.19 oats, and 1.1 barley.

Using the Feed Inventory Worksheet

A simple feed inventory worksheet is on the back of this folder. Enter your cattle inventory, feed needs, and feed resources there. A sample of the worksheet is filled out on this page to guide you. Tables 4 through 7 will help you convert silo capacities to tons of feed for various forages and grains.

Part I of the feed inventory worksheet (Cattle Inventory) converts cattle on the farm to animal units (cow equivalents).

One cow, two yearlings, or four calves equal one animal unit of feed needed. This keeps calculations simple. If you want to refine the form, enter the level of each feed (forage and grain) fed to each group of cattle (calves, yearling heifers, and cows).

Part II (Feed Needs) calculates the amount of feed needed based on amount fed per day, number of days of feeding, and number of animal units. Your DHI records can provide this information.

Part III (Feed Resources) summarizes the amount of feed available. Convert all feed to a ton basis.

Part IV (Summary) is a balance sheet to determine which feeds are in excess or in insufficient amounts.

A Sample Worksheet

John Dairyman has 40 milk cows, 20 yearlings (1 to 2 years of age), and 20 calves (less than 1 year). He feeds 18 pounds of hay, 20 pounds of corn silage, and 16 pounds of grain per cow per day. John fills out the form November 1. He needs a 200-day supply of hay (until June), a 300-day supply of corn silage, and a 365-day inventory of grain. Feed on hand as of November 1 is 3,000 bales of first crop (50-pound bale), 1,000 bales of second crop (40-pound bales), 40 feet of corn silage in a 50- by 16-foot silo, 500 bushels of oats, 1,000 bushels of ear corn, and 3,000 bushels of shelled corn.

Table 4. Estimated corn silage capacity in tower silos.^a

Depth of settled silage (ft)	Silo diameter (ft)											Average weight per cu ft (lbs)
	12	14	16	18	20	22	24	26	28	30	36	
	----- tons -----											
20	39	54	70	89	110	133	158	186	216	248	356	34.9
22	45	67	80	101	126	152	181	215	247	283	404	36.3
24	51	70	91	113	142	172	204	240	278	320	452	37.7
26	57	78	101	128	159	192	228	269	312	358	512	39.0
28	64	86	115	146	177	214	254	300	347	398	584	40.2
30	70	96	125	158	195	236	280	330	382	440	632	41.4
32	77	106	135	172	215	260	309	364	422	483	688	42.6
34	84	114	150	190	234	284	336	396	458	527	742	43.8
36	92	124	161	205	254	308	365	430	499	572	820	45.0
38	99	135	176	222	274	332	394	463	537	617	888	46.0
40	106	145	189	239	295	358	423	500	578	663	956	47.0
42	114	155	203	255	317	384	455	537	620	713	1020	48.0
44	122	166	217	274	339	410	487	573	665	763	1096	49.0
46	130	177	230	292	361	437	518	610	706	813	1168	50.0
48	139	187	246	311	384	465	552	650	753	865	1244	51.0
50	147	200	261	330	407	492	583	688	795	913	1320	52.0
52	155	212	277	350	431	522	620	730	845	970	1400	52.8
54	163	224	293	370	455	550	655	770	890	1020	1480	53.6
56	171	236	309	390	480	580	690	810	940	1080	1560	54.4
60	188	260	341	430	529	640	760	910	1030	1190	1720	56.0
65	---	---	391	483	593	716	855	1017	1161	1339	1934	57.6
70	---	---	416	539	660	790	939	1139	1279	1468	2148	59.2
75	---	---	---	---	716	867	1040	1230	1423	1637	2162	60.8
80	---	---	---	---	784	948	1129	1378	1538	1758	2356	62.4
85	---	---	---	---	---	---	---	1443	1685	1935	2790	64.0
90	---	---	---	---	---	---	---	1567	1816	2084	3004	65.6

^aCapacities are estimated for corn in dough or early dent stage.

Here is John's sample worksheet:

FEED INVENTORY WORKSHEET (for your use)

I. Cattle Inventory

Number of milk cows: 40 Number of yearlings divided by 2: 5
 Number of calves divided by 4: 10 Total number of animal units: 55

II. Feed Needs

	lb/day	x	days	=	lb/ animal unit	tons ^a / animal unit	x	animal units	=	tons needed
Hay	<u>18</u>		<u>200</u>		<u>3,600</u>	<u>1.8</u>		<u>55</u>		<u>99</u>
Hay Silage										
Silage	<u>20</u>		<u>300</u>		<u>6,000</u>	<u>3</u>		<u>55</u>		<u>165</u>
Grain	<u>16</u>		<u>365</u>		<u>5,840</u>	<u>2.92</u>		<u>55</u>		<u>161</u>

III. Feed Resources

A. Forage

	bales	x	lb/bale	=	lbs	tons ^a
Hay (1st crop)	<u>3,000</u>		<u>50</u>		<u>150,000</u>	<u>75</u>
Hay (2nd crop)	<u>1,000</u>		<u>40</u>		<u>40,000</u>	<u>20</u>

	silo size	depth settled silage	=	tons	correction factor	tons
Silage (corn)	<u>50x16</u>	<u>40ft</u>		<u>189</u>	<u>NONE</u>	<u>189</u>
Silage						
Silage						

B. Grain

	bushels	x	lb/bu	=	lbs	tons ^a
Oats	<u>500</u>		<u>32</u>		<u>16,000</u>	<u>8</u>
Ear corn	<u>1,000</u>		<u>70</u>		<u>70,000</u>	<u>35</u>
Shelled corn	<u>3,000</u>		<u>56</u>		<u>168,000</u>	<u>84</u>
Barley			<u>48</u>			

IV. Summary

	hay	silage	silage	grain	grain
Amount needed (tons)	<u>99</u>	<u>165</u>		<u>161</u>	
Amount available (tons)	<u>95</u>	<u>189</u>		<u>127</u>	
Shortage (tons)	<u>4</u>			<u>34</u>	
Excess (tons)		<u>24</u>			

^aTons = lbs ÷ 2,000

Conclusions and Strategies

Now that we have evaluated John Dairyman's needs and resources, we can make some suggestions:

- Using the current feeding program, John is short of hay but has an excess 24 tons of corn silage. By substituting 3 pounds of corn silage for 1 pound of hay, the hay deficit is corrected and an excess 12 tons of corn silage is available.
- Increasing corn silage (higher in energy than hay) to the milk cows can reduce the amount of grain (ear corn and oats) needed, but some grain must be purchased. Grain needs of yearling heifers should be reevaluated. Reformulating the ration could save several tons of grain.
- As corn silage is increased in the ration, additional protein will be needed. John should consider adding urea to complement the corn silage forage program and look for a good protein buy.
- Selective culling of some livestock is another possibility. Consider culling for your farm. It can make a difference.

Your Inventory

After reviewing the sample feed inventory worksheet, complete the form for your herd. Table 4 will help you determine corn silage capacities of different-sized tower silos. However, if your silo was filled but now is only partly full, the

bottom part will contain more feed than the top part because of the greater compaction of silage at the bottom of the silo. The correct method to determine remaining silage is to subtract the amount fed from the original volume of silage (see example).

Example:

A silo 20 ft x 60 ft contains 529 tons of settled corn silage when full (table 4).
 If 24 ft is fed off, the amount fed off is
 20 ft x 24 ft = 142 tons (table 4).
 Thirty-six (36) ft of silage remain. The amount remaining is 529 - 142 = 387 tons.

If you had used the table value for the remaining 20 feet by 36 feet of silage, you would have predicted only 254 tons of silage, underestimating the true amount because of compaction.

Table 5. Correction factors for estimating hay crop silage capacity in tower silos (in table 4).

Percentage dry matter	Multiply appropriate figure in table 4 by:
25	1.10
30 - 35	1.00
40	.90
50	.75

Table 6. Silage capacity of horizontal silos.^a

Average silo width (ft)	Depth 6 ft	Depth 8 ft	Depth 10 ft
	----- tons/foot of silo length -----		
8	0.96	1.28	1.60
12	1.44	1.92	2.40
16	1.92	2.56	3.20
20	2.40	3.20	4.00
24	2.88	3.84	4.80
32	3.84	5.12	6.40

^aBased on packed silage density of 40 lb/cu ft.

Table 7. Capacities of tower silos.

Settled depth (ft)	High-moisture ground ear corn or high-moisture whole shelled corn Inside diameter in feet						
	10	12	14	16	18	20	22
	----- tons -----						
20	37	---	---	---	---	---	---
25	47	68	---	---	---	---	---
30	56	81	111	144	183	226	272
35	65	95	129	168	213	264	318
40	75	108	147	192	243	302	363
45	84	122	166	216	274	339	409
50	---	135	184	240	304	377	454
55	---	---	203	264	335	415	499
60	---	---	---	288	365	452	545

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FEED INVENTORY WORKSHEET (for your use)

I. Cattle Inventory

Number of milk cows: _____ Number of yearlings divided by 2: _____

Number of calves divided by 4: _____ Total number of animal units: _____

II. Feed Needs

	lb/day	x	days	=	lb/ animal unit	x	tons ^a / animal unit	x	animal units	=	tons needed
Hay	_____		_____		_____		_____		_____		_____
Hay	_____		_____		_____		_____		_____		_____
Silage	_____		_____		_____		_____		_____		_____
Silage	_____		_____		_____		_____		_____		_____
Grain	_____		_____		_____		_____		_____		_____

III. Feed Resources

A. Forage	bales	x	lb/bale	=	lbs	=	tons ^a
Hay (1st crop)	_____		_____		_____		_____
Hay (2nd crop)	_____		_____		_____		_____

	silo size	x	depth settled silage	=	tons	x	correction factor	=	tons
Silage (corn)	_____		_____		_____		_____		_____
Silage	_____		_____		_____		_____		_____
Silage	_____		_____		_____		_____		_____

B. Grain	bushels	x	lb/bu	=	lbs	=	tons ^a
Oats	_____		32		_____		_____
Ear corn	_____		70		_____		_____
Shelled corn	_____		56		_____		_____
Barley	_____		48		_____		_____

IV. Summary

	hay	silage	silage	grain	grain
Amount needed (tons)	_____	_____	_____	_____	_____
Amount available (tons)	_____	_____	_____	_____	_____
Shortage (tons)	_____	_____	_____	_____	_____
Excess (tons)	_____	_____	_____	_____	_____

^aTons = lbs ÷ 2,000

