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MANAGING DAIRY FEED INVENTORY

Managing Dairy Feed Inventory

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Feed costs represent 40 to 60 percent of the cost of producing milk on Wisconsin farms. For economical production it is generally assumed that all of the forages and most of the grains will be produced on our Wisconsin dairy farms. To develop an efficient feeding program, dairy managers must know the quantity and quality of forages and grains which they have available as well as the nutrient needs of their livestocks during the intended feeding period.

A dairy manager must answer these three basic questions when managing the feed inventory:

1. What feed supply do I have available?
2. How much feed do I need?
3. How am I going to develop my feeding program based on the feed supply available and the nutrient needs of the livestock.

In determining the amount of feed nutrients available, the dairy manager must convert the quantities of hay, haylage, corn silage, or other ensiled crops to a dry matter basis. To help you do this, tables and figures are included in this publication along with a method to determine quantity of feed supply available. The Managing Your Feed Inventory Worksheets at the end of the text will help you figure out your own inventory requirements.

Having your forage sample analyzed for dry matter and protein is necessary to determine the quality of available feed. Ideally, these samples should be taken at harvest time so the results are available to you when you develop your feeding program.

The location and availability of your feed supply is also important. Feeds of various quality might be in storage in a silo or hay mow, but retrieval of the feed may not be possible due to its location.

Dairy managers must consider losses incurred in harvesting, storing and feeding of their home grown crops. Although these losses will vary from farm to farm, they could be in the following range.

Harvesting losses	**5% to 15%**
Storage losses	**5% to 15%**
Feeding losses	**5% to 15%**

Once you have established your feed inventory, adjustments must be made for storage and feeding losses.

Figuring forage dry matter required per cow times the number of cow equivalents (cows plus 0.5 X heifers) times the number of days in the feeding period will give you the forage dry matter requirement. Subtracting the forage dry matter requirement from the forage inventory supply will give you your forage dry matter surplus or deficiency for the intended feeding period.

If your calculation indicates a feed surplus, you could use this as a reserve, sell surplus forage and use cash to purchase grain or protein supplement, or make changes in your livestock numbers to utilize the additional feed.

A feed shortage requires some serious farm management decisions. Dairy managers should take a good look at the quality of livestock which they are feeding and consider a culling program to balance livestock and feed supplies. Another alternative would be to purchase additional feeds to meet the deficiency. If the price of forage is high in comparison to grains or concentrates, these could be substituted for forages.

Remember that two pounds of grain in dry matter may replace three pounds of dry matter from excellent forage and one pound of grain dry matter replaces two pounds of dry matter from fair or low quality forage. There are limitations when we substitute grain for forage. The total dry matter intake for ruminants must contain 1 to 1.5 lb. D.M./100 lb. live weight from forage to insure proper rumen function.

Your grain and protein requirements depend on level of production and quality of forage.

Some additional advantages of managing your feed inventory are:

1. Assisting you in your planting intentions.
2. Developing cropping strategies (example: corn as forage or for grain).
3. Assisting you in planning your storage facilities.

Table 1 Approximate Dry Matter Capacity of Silos[1]

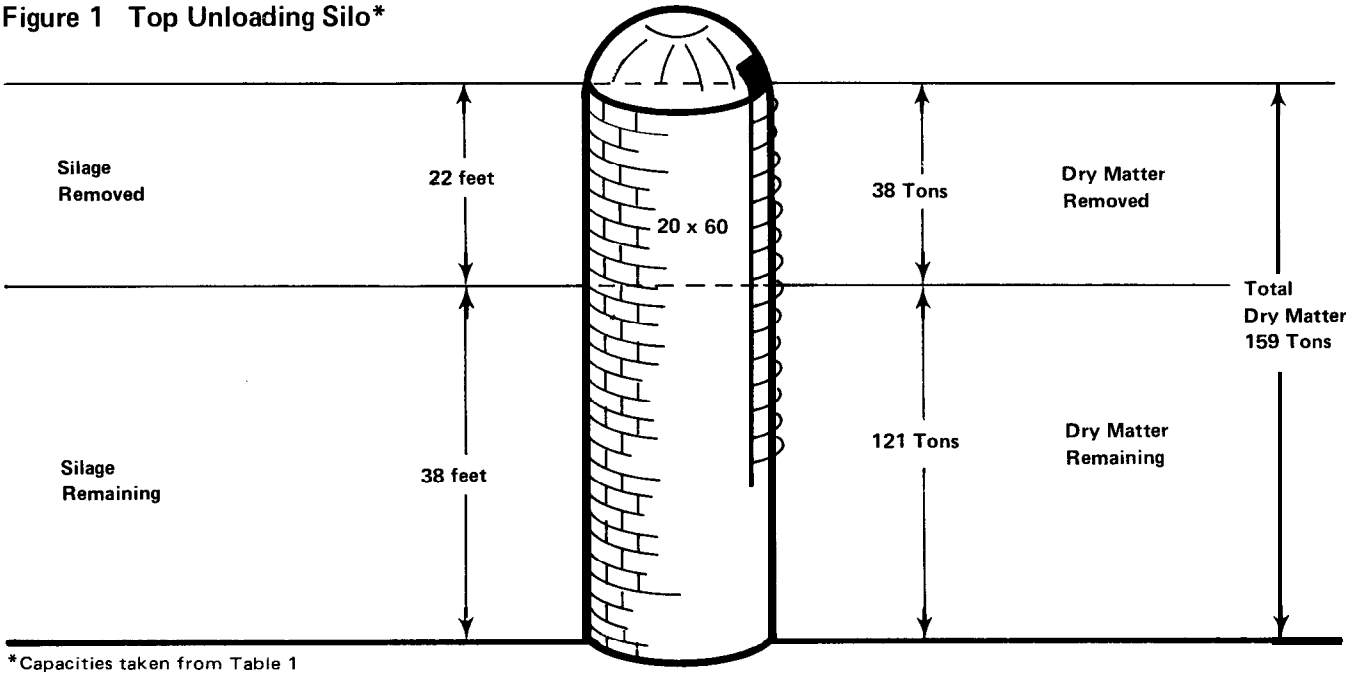
Depth of Settled Silage (feet)	Inside Diameter of Silo										
	10	12	14	16	18	20	22	24	26	28	30
2	0	1	1	1	2	2	2	2	3	3	4
4	1	2	2	3	4	5	5	6	8	9	10
6	2	2	3	4	5	7	8	10	11	13	15
8	3	4	5	7	9	11	13	16	18	21	24
10	4	5	7	9	11	14	17	20	24	28	32
12	5	7	9	11	14	18	22	26	30	35	40
14	5	8	11	14	17	22	26	31	36	42	48
16	6	9	12	17	21	26	32	37	44	51	58
18	7	11	14	19	24	29	35	42	49	57	65
20	8	12	16	21	27	33	40	47	56	65	74
22	9	14	19	24	30	38	48	54	64	74	85
24	11	15	21	27	34	43	52	61	72	83	96
26	12	17	23	30	38	48	58	68	81	94	107
28	13	19	26	35	44	53	64	76	90	104	119
30	15	21	29	38	47	59	71	84	99	115	132
32	16	23	32	41	52	65	78	93	109	127	145
34	18	25	34	45	57	70	85	101	119	137	158
36	19	28	37	48	62	76	92	109	129	150	172
38	21	30	41	53	67	82	100	118	139	161	185
40	22	32	44	57	72	89	107	127	150	173	199
42	24	34	47	61	77	95	115	137	161	186	214
44	26	37	50	65	82	102	123	146	172	200	229
46	27	39	53	69	88	108	131	155	183	212	244
48	29	42	56	74	93	115	140	166	195	226	260
50	31	44	60	78	99	122	148	175	206	239	274
52	32	47	64	83	105	129	157	186	219	254	291
54	34	49	67	88	111	137	165	197	231	267	306
56	36	51	71	93	117	144	174	207	243	282	324
58	38	54	74	98	123	151	183	218	261	297	339
60	40	56	78	102	129	159	192	228	273	309	357
62	To find the tons remaining				135	167	201	239	287	324	374
64	in a silo after part of the				142	174	210	250	301	339	391
66	silage is removed: (1) find				149	182	219	260	314	354	407
68	the tons of silage when the				155	190	228	271	328	369	424
70	silo was filled, (2) find				162	198	237	282	342	384	441
72	the tons in a silo filled to							293	356	400	458
74	the height equal to the depth							305	371	415	476
76	of silage removed, (3) subtract the number of							316	385	431	493
78	tons in Step (2) from the number of tons in							328	400	446	511
80	Step (1). Example: A 20 foot silo filled to							339	462	462	528
	a settled depth of 60 feet and 22 feet were fed off, (1) 20 x 60 equals 159 tons (2) 20 x 22 equals 38 tons (3) 159 minus 38 equals 121 tons remaining.										

[1] Adapted from the National Silo Association's Silo Dry Matter Capacity Tables.

Table 1A Bunker Silo Capacities

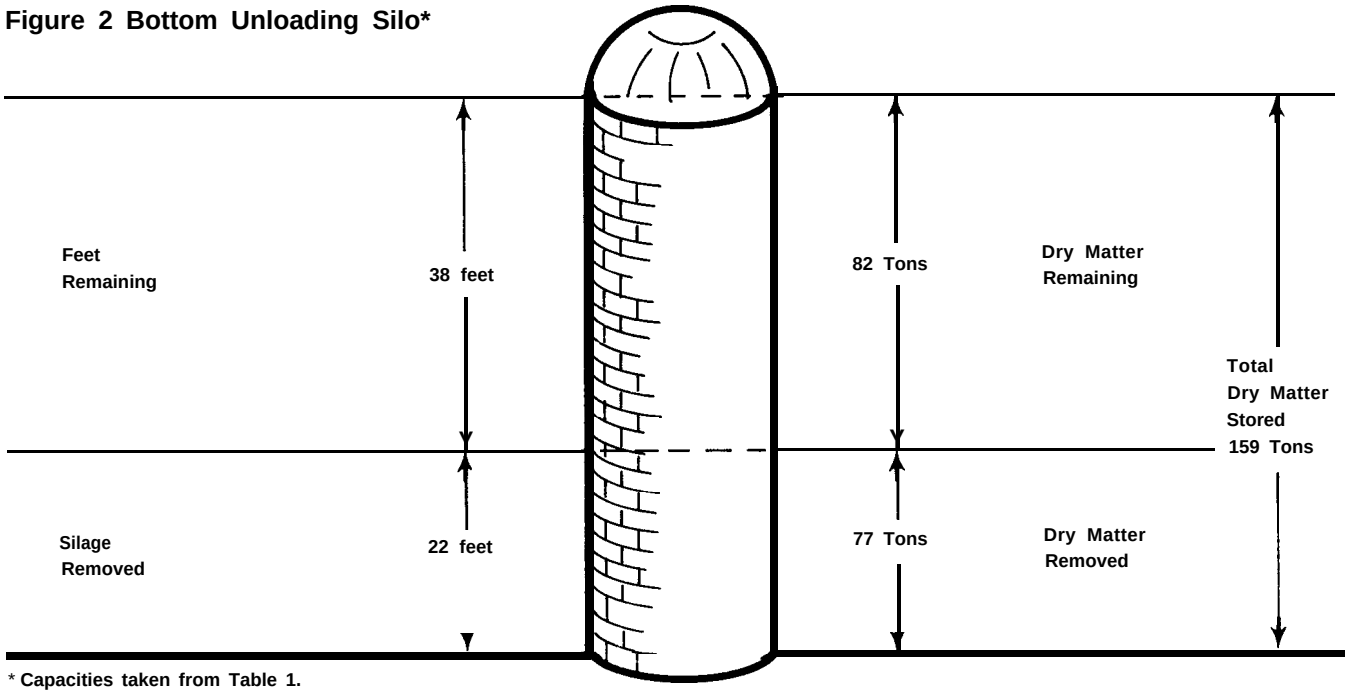
Average Width	Average Depth of Silage in Bunker 6 ft.	8 ft.	10 ft.	12 ft.	14 ft.	16 ft.	18 ft.	20 ft.
	Tons Dry Matter Per One Foot of Length							
12 feet	.4	.53	.66	.78	.93	1.1	1.2	1.3
15 feet	.5	.66	.83	1.0	1.2	1.3	1.5	1.7
20 feet	.7	.9	1.1	1.3	1.5	1.8	2.0	2.2
30 feet	1.0	1.3	1.7	2.0	2.3	2.6	3.0	3.3
40 feet	1.3	1.8	2.2	2.6	3.1	3.5	4.0	4.4
50 feet	1.7	2.2	2.7	3.3	3.9	4.4	5.0	5.5
60 feet	2.0	2.6	3.3	4.0	4.6	5.3	5.9	6.6
70 feet	2.3	3.1	3.8	4.6	5.4	6.2	6.9	7.7
80 feet	2.6	3.5	4.4	5.3	6.2	7.0	7.9	8.8
90 feet	3.0	4.0	4.9	5.9	6.9	7.9	8.9	9.9
100 feet	3.3	4.4	5.5	6.6	7.7	8.8	9.9	11.0

Figure 1 Top Unloading Silo*



*Capacities taken from Table 1

Figure 2 Bottom Unloading Silo*



* Capacities taken from Table 1.

Ensiled Forages

Record name of forage, silo diameter, settled depth after last filling, and remaining depth as indicated in Section II of the Managing Feed Inventory Worksheets for each silage. Estimate tons of dry matter (D.M.) remaining from Table I. Determine maximum settled depth and tons dry matter at that depth; then subtract tons dry matter corresponding to the feet of silage removed. Refer to Figures 1 and 2 as guides in estimating remaining dry matter in top and bottom unloading silos.

Silos filled with forage, partly fed, and refilled with another forage should be inventoried as follows. Calculate total dry matter initially stored and subtract the amount removed to determine the amount remaining. Any additional forage stored would be treated as another silo of the depth added.

Feed inventory for a 70-cow dairy herd plus 60 replacement heifers will be used throughout this material as the farm example. Enter the number of cows and heifers in Section I of the Worksheets.

The example farm has two top unloading forage silos. One silo is 20 ft. in diameter filled to 60 ft. with 38 ft. of haylage remaining (see Figure 1). From Table 1, a 20' x 60' silo contains 159 tons D.M. The top 22 feet removed from a 20' silo had 38 tons D.M. By subtracting 38 tons D.M. from 159 tons D.M. we find 121 tons D.M. in the 38' remaining. Enter the 121 tons D.M. in Section V of the Worksheets, the Forage Inventory Summary.

The second silo is a 20 ft. diameter silo filled to 70 feet of settled corn silage with 60 ft. remaining. Table 1 indicates 198 tons D.M. when the corn silage silo was full to 70 ft., and 14 tons D.M. in the 10 ft. already fed for a remainder of 184 tons D.M. Enter this in Section V of the Worksheets, the Forage Inventory Summary. Remember when using Table 1, for top unloading silos subtract material from the top of the table; for bottom unloading silos subtract material from the bottom of the table. Refer to Figure 2 for an example of computing remaining silage dry matter in bottom unloading silos.

Table 1A gives approximate tons dry matter capacity per foot of bunker, trench or stack silo length. Multiply the length of the silo times tons dry matter per foot for its average width and height. For example, a bunker silo 30 ft. wide filled to 12 feet average depth and 100 feet long has 2.0 tons dry matter (Table 1A) per linear foot or 200 tons dry matter.

Dry Forages

An inventory of dry forages requires an accurage count or estimate of the number of bales or stacks as well as a good estimate of weight of an average bale or stack. If possible, weigh several bales or stacks to get a reliable average weight.

Now to follow the inventory process for dry hay on the example farm.

Hay - 2nd crop

2,875 bales x 40 lbs/bale = 115,000 lb ÷ 2,000 lb. = 57.5 ton as fed
57.5 ton as fed x .887 D.M. = 51.0 ton D.M.
Analysis 20% Crude Protein (C.P.) .887 D.M.

Corn Stalks

One hundred stacks x 1,500 lb./stack -150,000 lb. ÷ 2,000 lb. = 75 Ton x 0.80% dry matter= 60 Ton D.M.
Enter the totals for all forages in Section V of the Worksheets.

The farm has a total of 356 tons of forage dry matter without including the corn stalks and 416 tons of dry matter with stalks included.

Forage Inventory Summary

Enter the tons of forage dry matter, number of cow equivalents (cows plus 0.5 x heifers) to receive each forage and the length of the feeding period for each forage.

Calculate the pounds dry matter (D. M.) available per cow equivalent for each forage source and total the amount of forage available per cow. Record the calculation in Section V of the worksheet; then, compare forage availability with forage needs. Let's look at the forage summary for the example farm.

Hay Crop Silage

121 Ton D.M. ÷ 100 Cow equiv. x 2,000 lb. = 2,420 lb. D.M./cow ÷ 225 days= 10.8 lb D. M./day

Corn Silage

184 Ton D.M. ÷ 100 Cow equiv. x 2,000 lb. = 3,680 lb D. M./cow ÷ 340 days= 10.8 lb. D. M./day

Dry Hay

51 Ton D.M. ÷ 100 Cow equiv. x 2,000 lb. = 1,020 lb D. M./cow÷ 225 days= 4.5 lb. D. M./day/cow

Corn Stalks

60 Ton D.M. ÷100 cows= 0.6 Ton x 2,000 lb. = 1,200 lb. D. M./cow ÷ 340 days= 3.5 lb. D. M./cow/day

The total forage available, is 26.1 lb. D. M./cow/day without corn stalks. In our example, the dairy manager for the example farm would like to feed 28.8 pounds of forage dry matter per cow equivalent per day. This leaves a deficit of 2.7 lb. D. M./cow/day or 30.4 tons D.M. for 225 days. One should calculate the additional forage needed until next harvest. In this farm example, we have assumed 225 days until the next hay crop harvest and 340 days until next corn harvest. The example herd used is assumed to average 1400 lb weight and has experienced a feeding loss of about 10%. Reducing feeding losses by half to 5% would save some 17 tons of forage dry matter, about half of the deficit. The dairy manager must consider the options.

1. Reduce herd size to match forage supply.
2. Feed less forage and more grain.
3. Feed more corn silage during the 225 days until next hay harvest.
4. Utilize some corn stalks as forage for dry cows and older heifers.

The corn stalks will serve well to replace some of the hay or hay crop silage in the diet of dry cows and older heifers. There are 60 tons D.M. from corn stalks available which more than offsets the deficit of forages available.

Calculating Forage Percent Crude Protein

The dairy manager must calculate the percent crude protein in the forage fed in order to estimate the amount of grain and protein supplement needed. Use the percent crude protein in the forage fed the milking herd to aid in estimating protein supplement needs. In our example farm there is 10.8 lb. D.M. from both corn silage and haylage per day for a total of 21.6 lb. from the two silages. The second and third cut hay will be used to meet the remaining forage need of the milking cows. Taking 21.6 lb. from 28.8 lb. needed leaves 7.2 lb. forage D.M. from hay.

Remember that we had only 4.5 lb. of hay per cow equivalent for the entire herd (100 cow equivalents); but if the hay is used only for the milking cows, there would be 7.5 lb. D. M./cow for the 60 cows in milk (assuming 85% of cows in milk). The dry cows and heifers will be fed haylage, corn silage, and corn stalks to meet their forage needs.

The calculations of crude protein percent and intended feeding program for the example farm are as follows:

	Amount Fed	Lb. Crude Protein
Haylage	10.8 lb. D.M. X 0.19 C.P.	= 2.0 lb. C.P.
Corn Silage	10.8 lb. D.M. x 0.08 C.P.	= 0.9 lb. C.P.
Hay 2nd Crop	7.2 lb. D.M. x 0.20 C.P.	= 1.4 lb. C.P.
	28.8 lb. forage D.M./cow/day	**4.3 lb. C. P./ cow/day from forage**
		(includes 10% for waste)

4.3 lb. C.P. ÷ 28.8 lb. forage = 15% C.P. in intended feeding program. See Section VII of the Worksheets to calculate the percent protein in forages to be fed.

Ensiled Grains

Determine the ensiled grain in storage by completing Section III of the worksheet. You will need silo diameter and feet of grain remaining. Multiply the depth of ensiled grain in feet times the appropriate tons of capacity per foot from Table 2. High moisture barley should have a dry matter density in silos similar to ear corn. For our example farm, ear corn was stored in a 12 ft. silo filled to 50 feet with 34% moisture corn. From Table 2 we note 1.4 tons D. M./ft. of ear corn and times the 50 feet of height gives 70 ton of ear corn dry matter. Enter tons corn dry matter in Section VIII, the Grain Inventory Summary.

Dry Grains

Circular Storage Units

To estimate inventory amounts of grains stored in circular units, the following information is needed for use in Section IV, A of the Worksheets to figure inventory of grain in circular storage units.

One must first calculate cubic feet of oats in storage. The formula is:

$$\text{Volume in Cu. Ft.} = \left(\frac{\text{diameter}}{2}\right)^2 \times \text{height} \times 3.14$$

Table 2 Approximate Ensiled Grain Capacity of Tower Silos

	Silo Diameter							
	12	14	16	17	18	20	22	24
Ear Corn	Tons Dry Matter per Foot of Depth							
28% Moisture	1.5	2.1	2.8	3.1	3.5	4.3	5.1	6.0
30% Moisture	1.5	2.0	2.7	3.1	3.4	4.2	5.0	5.9
32% Moisture	1.5	2.0	2.7	3.0	3.4	4.2	4.9	5.8
34% Moisture	1.4	1.9	2.6	3.0	3.3	4.1	4.8	5.7
36% Moisture	1.4	1.9	2.6	2.9	3.2	4.0	4.7	5.6
38% Moisture	1.4	1.9	2.5	2.8	3.2	3.9	4.7	5.6
40% Moisture	1.4	1.9	2.5	2.8	3.1	3.8	4.6	5.5
Shelled Corn								
24% Moisture	1.9	2.6	3.5	3.9	4.4	5.5	6.6	7.9
26% Moisture	1.9	2.6	3.4	3.8	4.4	5.4	6.5	7.7
28% Moisture	1.9	2.6	3.4	3.7	4.3	5.3	6.4	7.6
30% Moisture	1.9	2.5	3.3	3.7	4.2	5.2	6.3	7.5
32% Moisture	1.8	2.5	3.2	3.7	4.1	5.1	6.2	7.4

Let's follow through calculating tons of oats dry matter in a 20 foot diameter bin filled to 12 feet of depth. $(20 \text{ ft. } \frac{\text{diameter}}{2})^2 \times 12 \text{ ft. height} \times 3.14 = 3.768$ cubic feet of oats.

A bushel of oats is assumed to occupy 1.25 cubic feet. It is necessary to then divide 1.25 cu. ft./bu. into the 3,768 cu. ft. in storage to get the number of bushels of oats in the bin. Oats may vary from 28 to 42 lb. per bushel measure (1.25 cu. ft.). Weigh a measure of known volume to estimate bushel weight of oats or barley. If bushel weight is not known, use 32 lb. per bushel. The oats in the bin test 38 lb/bu. By dividing 3,768 cu. ft. by 1.25 we see that the bin holds 3,014 bushels of oats. Multiplying 3,014 bushels by the 38 lb/bu., we calculate there is 114,532 lb. in the bin. By dividing pounds in the bin by 2,000 we get tons in the bin or 57.3 tons on an as fed basis. The percent dry matter is 90%(10% moisture) in the oats, so 0.9 x 58.3 tons as fed equals 51.5 tons of oats dry matter. Enter the amount of oats dry matter in Section VIII of the Worksheets in the Grain Inventory Summary.

Rectangular Storage Units

The first step in determining amount of grain stored in a rectangular bin or crib is to obtain cubic feet in the structure. The formula for volume in cubic feet is length x width x height. Now to our example farm. Shelled corn at 15.5% moisture is stored in a bin 8 feet wide, 10 feet deep and 24 feet long; so, 8 x 10 x 24 totals 1,920 cubic feet. Shelled corn weighs 56 lb. per bushel at 15.5% moisture (from Table 3) and occupies 1.25 cubic feet. Therefore, the 1,920 cu. ft. in the bin divided by 1.25 cu. ft. gives 1,536 bushels times 56 lb/bu. equals 86,016 lb at 15.5% moisture. Pounds corn divided by 2,000 lb is 43 tons as fed times 84.5% dry matter equals 36.3 tons of corn dry matter in the bin. Enter the tons of shelled corn dry matter in Section VIII of the Worksheets in the Grain Feeding Summary.

Table 3 Storage Space for Wet Corn, Shelled or Ground Ear*
Weight and Volume of a Bushel of Shelled or Ear Corn at Varying Moisture Contents[a]

Moisture content			Weight per bushel		Volume per Bushel[c]	
Kernel	Cob[b] %	Ear Corn[b]	Dry Matter Shelled Corn	plus Water Ear Corn	Shelled Corn cu. Ft.	Ear Corn Cu. Ft.
15.5	18	16	56.0	70.0	1.25	1.94
16.0	20	17	56.3	70.7	1.26	1.96
17.0	22	18	57.0	71.7	1.27	1.97
18.0	26	20	57.7	73.2	1.28	2.00
19.0	30	21	58.4	74.8	1.29	2.02
20.0	34	23	59.1	76.5	1.30	2.05
22.0	40	26	60.7	79.8	1.32	2.10
24.0	44	29	62.3	82.8	1.35	2.15
26.0	48	32	63.9	86.0	1.38	2.20
28.0	51	34	65.7	89.2	1.41	2.25
30.0	53	36	67.6	92.1	1.44	2.30
32.0	54	38	69.6	94.6	1.47	2.34
34.0	56	40	71.6	97.5	1.50	2.38
36.0	57	42	73.9	100.6	1.54	2.43

[a] Based on a standard bushel of ear corn with kernel of 15.5% moisture, 58.8 lbs of dry matter (47.32 lbs in kernels and 11.48 in cob), and 11.2 lbs water.

[b] Cob and ear corn moistures are rounded to the nearest whole percent.

[c] A bushel of ground ear corn at 15.5% kernel moisture is assumed to occupy 1.944 cubic feet, based on 36 pounds per cubic foot–water .179 cubic foot and dry matter 1.765 cubic feet

* From: "Wet Corn–Shelled or Ground Ear," Velmar W. Davis, U. Ill, USDA, ERS, FPED, 3-'64.

Table 4. Forage Dry Matter Needed per Cow in Storage[1]

	Dry Matter/Cow/Day				
	Dry Matter	Feeding Losses			
Cow Size	Intake	5%	10%	15%	20%
1100	20.4	21.5	22.7	24.0	25.5
1200	22.2	23.4	24.7	26.1	27.8
1300	24.1	25.4	26.8	28.4	30.1
1400	25.9	27.3	28.8	30.5	32.4
1500	27.8	29.3	31.9	32.7	34.8

[1] If planning forage to harvest and store, include allowance for harvest and storage losses.

Table 5. Corn Equivalent Needs for Dairy Cows[1]

	Annual Production Levels			
Forage Crude Protein	12,000 lb milk or 450 lb fat	14,000 lb milk or 525 lb fat	16,000 lb milk or 600 lb fat	18,000 lb milk or 675 lb fat
%	lb Corn Equivalent Dry Matter Needed per Cow/Day			
9	6.5	7.6	8.9	10.2
11	7.6	9.1	10.4	11.7
13	8.9	10.1	11.4	12.7
15	9.4	11.1	12.4	13.7
17	9.7	11.1	12.9	14.2

[1] Corn equivalent per day calculated per day and includes dry period but does not include corn equivalent for replacement heifers.

Converting Grain Inventory to Corn Equivalent and Estimating Grain Needs

In order to compare oats to shelled corn one must adjust for the lower energy value of oats. The corn equivalent (C.E.) factors in Section VIII of the Worksheets will adjust amounts of different grains in the inventory to a common basis. On the example farm, the 70 tons of ensiled ear corn dry matter x 0.93 corn equivalent factor equals 65.1 tons of C. E.; plus 51.5 ton oats dry matter x 0.84 factor gives 43.3 tons C. E.; plus the 36.3 tons C.E. from shelled corn total 144.7 ton of C.E. dry matter in the inventory.

One must use the forage protein level and an estimate of herd production to estimate C.E. needs in Section IX of the worksheet for the dairy herd. Forage protein level was calculated for the example herd. The herd production is 16,000 lb. milk and 600 lb. fat. From Table 5 we see that 12.4 lb C.E. dry matter is needed per cow per day. The values in Table 4 were developed from the Wisconsin Enterprise Budgets for Dairy Cows and include 5% for feeding loss. Multiply the 70 cows, milking plus dry, times the 12.4 lb C.E. dry matter to get dairy C.E. needs of 868 lb C.E. dry matter x 340 days, until next corn harvest, divided by 2,000 gives 147.6 tons C.E. dry matter needed for the cows. In addition, we must add to that 1.6 lb C.E. dry matter/heifer/day to get total C.E. needs. For example, 1.6 lb times 60 heifers times 340 days divided by 2,000 lb equals 16.3 tons C.E. dry matter for the heifers. Thus, we have a total need of 163.9 tons corn equivalent dry matter.

By difference, we calculate a shortage of 19.2 tons C.E. dry matter or 22.6 tons corn equivalent at 15% moisture. The deficit amount of grain could be put into the inventory at any time a good buy on grain is found. The lowest market price for grains usually is found at harvest. Remember that you should add to grain purchase price, interest and storage costs to accurately compare price at harvest versus purchase at feeding time.

Table 6. 44% Crude Protein Supplement Needed per Cow per Day[1]

Forage Crude Protein	Level of Production			
	12,000 Milk 450 Fat	14,000 Milk 525 Fat	16,000 Milk 600 Fat	18,000 Milk 675 Fat
%	44% Supplement/Cow/Day			
	lb/day	lb/day	lb/day	lb/day
9	3.3	4.1	4.7	5.6
11	2.0	2.5	3.3	4.1
13	0.8	1.4	2.2	3.0
15	0.3	0.3	0.8	1.6
17	....	0.3	0.3	0.6

1 Based on shelled corn. Increase supplement 5% if ear corn is used. Reduce supplement 5% for each 10% oats used in the grain-supplement mixture.

Estimating Protein Supplement Needed

We have calculated forage protein percent and have noted the 16,000 lb milk and 600 lb fat production level. Our example farm has 70 cows. In Table 6 we find that for a 15% C.P. forage and 16,000 lb production level we need 0.8 lb of 44% C.P. supplement/cow/day. This totals 56 lb/day for the 70 cows and 6.3 tons for the 225 days until next hay harvest. If one wishes to use a 36% protein supplement, calculate the amount of that needed as shown in the Worksheets Section IX, B. Dividing the 44% by 36% C.P. desired supplement gives an adjustment factor of 1.22 times the 6.3 tons 44% supplement needed equals 7.7 tons of 36% supplement.

Table 7. Feed and Inventory Needs for Replacement Heifers by Age - Amounts Needed per Day[1,2]

	0 to 3 months	3 to 12 months	12 to 24 months	Total/Day 2 yr. basis	Amounts/Day Over 24 men.
44% Prot. Supp.[3]	.56 lb	0.74 lb	0.14 lb	0.41 lb	0.33 lb
Corn Equiv. As Fed	1.90 lb	2.70 lb	1.20 lb	1.80 lb	1.90 lb
Corn Equiv. D.M.	1.60 lb	2.30 lb	1.00 lb	1.60 lb	
Forage D.M.	1.40 lb	10.00 lb	25.00 lb	16.40 lb	25.00 lb
Di Cal	0.90 oz	1.50 oz	1.30 oz	1.30 oz	2.00 oz
T.M. Salt	0.50 oz	1.30 oz	1.10 oz	1.10 oz	1.10 oz

1 Feed inventory needs are for large breed heifers. Reduce inventory amounts 15 to 20% for small breed heifers.

2 Amounts of forage includes 25% for storage and feeding loss and 5% waste of other feeds.

3 Amount of protein supplement needed will vary with protein level of forage. Requirements shown are based on 11-12% crude protein forage.

Feed Inventory Needs for Replacement Heifers

Refer to Table 7 when more precise feed needs are required for replacement heifers. Under normal conditions, multiply total number of heifers by 0.5 to get their cow equivalents. This method may result in a slight overestimate of forage needs.

Summary

The main purpose of a feed inventory is to determine quantities of forage and grains available on the farm. Based on your livestock numbers you can determine if you have an adequate supply of feed for your intended feeding period. It would be a good management practice to allow for a 10 to 15 percent surplus feed inventory to compensate for variations in determining your feed inventory.

MANAGING YOUR FEED INVENTORY WORKSHEETS

I. Farm Information

A. Name _____ Address _____ City _____ Date of Inventory _____

B. _____ Number of Milking and Dry Cows + .5 X _____ Number of Heifers = _____ Number of Cow Equivalents

II. My Farm Forage Inventory

A. Ensiled Forage Inventory[1]

	Forage Name	Silo Diameter	Settled depth after final filling	Remaining Depth	Dry Matter when full	Depth removed	Dry Matter removed	Dry Matter Remaining
Silo 1	_____	_____ ft	_____ ft	_____ ft	_____ Tons	_____ ft	_____ Tons	_____ Tons
	Analysis		_____ % Crude Protein in Dry Matter			_____ % Dry Matter		
Silo 2	_____	_____ ft	_____ ft	_____ ft	_____ Tons	_____ ft	_____ Tons	_____ Tons
	Analysis		_____ % Crude Protein in Dry Matter			_____ % Dry Matter		
Silo 3	_____	_____ ft	_____ ft	_____ ft	_____ Tons	_____ ft	_____ Tons	_____ Tons
	Analysis		_____ % Crude Protein in Dry Matter			_____ % Dry Matter		
Silo 4	_____	_____ ft	_____ ft	_____ ft	_____ Tons	_____ ft	_____ Tons	_____ Tons
	Analysis		_____ % Crude Protein in Dry Matter			_____ % Dry Matter		
Silo 5	_____	_____ ft	_____ ft	_____ ft	_____ Tons	_____ ft	_____ Tons	_____ Tons
	Analysis		_____ % Crude Protein in Dry Matter			_____ % Dry Matter		
Silo 6	_____	_____ ft	_____ ft	_____ ft	_____ Tons	_____ ft	_____ Tons	_____ Tons
	Analysis		_____ % Crude Protein in Dry Matter			_____ % Dry Matter		

Total Hay Crop Silage Dry Matter _____ Tons

Total Corn Silage Dry Matter _____ Tons

[1]Calculate silo capacities as separate silos when different forages such as haylage, corn silage or oatlage are stored in the same silo. See Figures 1 and 2 for method of calculating forage remaining.

B. My Farm Dry Forage Inventory

	Name of Forage	no. bales or stacks		Wt/bale or stack	Total as fed basis		Total Tons as fed		Dry Matter		Total Dry Matter
1.	_____	_____	x	_____	lb = _____ lb ÷ 2,000	=	_____ Tons	X	_____ %	=	_____ Tons
	Analysis			_____	% C.P. Dry Matter Basis		_____ % Dry Matter				
2.	_____	_____	x	_____	lb = _____ lb ÷ 2,000	=	_____ Tons	X	_____ %	=	_____ Tons
	Analysis			_____	% C.P. Dry Matter Basis		_____ % Dry Matter				
3.	_____	_____	x	_____	lb = _____ lb ÷ 2,000	=	_____ Tons	X	_____ %	=	_____ Tons
	Analysis			_____	% C.P. Dry Matter Basis		_____ % Dry Matter				
4.	_____	_____	x	_____	lb = _____ lb ÷ 2,000	=	_____ Tons	X	_____ %	=	_____ Tons
	Analysis			_____	% C.P. Dry Matter Basis		_____ % Dry Matter				

Total Dry Forage [ ] Tons Dry Matter

III. My Farm Grain Inventory

A. Ensiled Grain Inventory

	Name of Grain	Silo Diameter	Remaining Depth	Dry Matter Capacity/ft[1]	Remaining Grain Dry Matter
Silo 1	_____	_____ ft	_____ ft x	_____ Tons =	_____ Tons
	Analysis	_____ % C.P.	_____ % D.M.	_____ % Moisture	
Silo 2	_____	_____ ft	_____ ft x	_____ Tons =	_____ Tons
	Analysis	_____ % C.P.	_____ % D.M.	_____ % Moisture	

Total Ensiled Grain [ ] Tons Dry Matter

[1] See Table 2 for dry matter capacity per foot of capacity

IV. Dry Grain Inventory

A. Circular Storage Units

Grain Name _____ **Structure Diameter** _____ **Height** _____

1. _____ (_____ ft)^2 X _____ ft X 3.14 = _____ Cu. Ft. ÷ _____ Cu. Ft./bu[1]
   2 Capacity

   = _____ bushels X _____ As fed Wt/bu[1] = _____ Total lb as fed wt. ÷ 2,000 = _____ Tons as fed X

   _____ % Dry Matter = [ ] Tons Dry Matter

   Analysis _____ % C.P. Dry Matter Basis _____ % Dry Matter

2. _____ (_____ ft)^2 X _____ ft X 3.14 = _____ Cu Ft. ÷ _____ Cu. Ft./bu[1]
   Capacity

   = _____ bushels x _____ As Fed Wt/bu[1] = _____ Total lb as Fed ÷ 2,000 = [ ] Tons X

   _____ % Dry Matter = _____ Tons Dry Matter

   Analysis _____ % C.P. Dry Matter Basis _____ % Dry Matter

B. Rectangular Storage Units

Grain _____ **Storage Unit Dimensions** **Length** _____ **Width** _____ **Height** _____

1. _____ _____ ft X _____ ft X _____ ft = _____ Cu. Ft. ÷ _____ Cu. Ft./ = _____ Bu. in X
   Capacity bu[1] Unit

   _____ lb/bu[1] = _____ lb Total as fed in unit ÷ 2,000 = _____ Tons as fed X _____ % D.M. = [ ] Tons D.M.

2. _____ _____ ft X _____ ft X _____ ft = _____ Cu. Ft. ÷ _____ Cu. Ft./ = _____ Bu. in X
   Capacity bu[1] Unit

   _____ lb/bu[1] = _____ lb Total as fed in unit ÷ 2,000 = _____ Tons as fed X _____ % D.M. = [ ] Tons D.M.

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[1] See Table 3 for as fed weight and cubic feet per bushel of grain

V. Forage Inventory Summary - From Section II

	Total Tons Dry Matter		No. Cow Equivalents		D.M./ Cow Equiv.		D.M. Available per cow equivalent		Feeding Period	
A. Hay Crop Silage	_____	÷	_____	=	_____ Tons X 2,000 =		_____ lb	÷	_____ days	=
					[ ] lb D.M. per Cow Equivalent per day					
B. Corn Silage	_____	÷	_____	=	_____ Tons X 2,000 =		_____ lb	÷	_____ days	=
					[ ] lb D.M. per Cow Equivalent per day					
C. Dry Hay	_____	÷	_____	=	_____ Tons X 2,000 =		_____ lb	÷	_____ days	=
					[ ] lb D.M. per Cow Equivalent per day					
D. Other Forage	_____	÷	_____	=	_____ Tons X 2,000 =		_____ lb	÷	_____ days	=
					[ ] lb D.M. per Cow Equivalent per day					

Total Forage D.M./Cow Equivalent (A + B + C + D)	[ ]	lb/day
Forage D.M. Needed in Storage/Cow (From Table 4)	[ ]	lb/day
Subtract Needed Forage From D.M. Available to get Surplus or deficit)	[ ]	lb/day

VI. Calculating Surplus or Deficit Forage Supply for Feeding Period

A. Determining Tons Hay Surplus or (Deficit)

_____ lb surplus or (deficit) D.M./cow/day X _____ No. Cow Equiv. = _____ lb surplus or (deficit)/herd per day X _____ Days in Feeding Period =

_____ lb Total D.M. ÷ 2,000 = _____ Tons D.M. surplus or (deficit) ÷ 0.9 = _____ Tons surplus or (deficit) as Hay Equivalent

B. Determining Cow Number Reduction to Match Available Forage

_____ lb Deficit for Herd/Day ÷ _____ lb D.M. needed per cow/day = _____ Reduction of cows to match available forage inventory

VII. Calculating Percent Crude Protein in Forage Dry Matter of Intended Feeding Program

	Amount to be fed	Name of Forage					Name of Forage
1.	_____ lb D.M./day	_____	X	_____ % C.P. in D.M.	=	_____ lb C.P.	_____
	_____ lb D.M./day	_____	X	_____ % C.P. in D.M.	=	_____ lb C.P.	_____
	_____ lb D.M./day	_____	X	_____ % C.P. in D.M.	=	_____ lb C.P.	_____
	_____ lb D.M./day	_____	X	_____ % C.P. in D.M.	=	_____ lb C.P.	_____
	_____ lb D.M./day	_____	X	_____ % C.P. in D.M.	=	_____ lb C.P.	_____
	_____ lb Total Forage Dry Matter per cow/day (From Table 4)					_____ lb Crude Protein From Forage	
	_____ lb C.P. Forage Dry Matter ÷	_____ lb Total Forage Dry Matter Fed		X 100	=	[ ]	% Forage Crude Protein Dry Matter Basis

VIII. Grain Inventory Summary

Grain	Dry Matter		Corn Equivalent Factor		Corn Equivalent Tons
Ensiled Ear Corn	_____ Tons	X	.93	=	_____ Tons
Ensiled Shelled Corn	_____ Tons	X	1.00	=	_____ Tons
Ear Corn	_____ Tons	X	.93	=	_____ Tons
Shell Corn	_____ Tons	X	1.00	=	_____ Tons
Oats	_____ Tons	X	.84	=	_____ Tons
Barley	_____ Tons	X	.91	=	_____ Tons
Other	_____ Tons	X	----	=	_____ Tons

Total Available Corn Equivalent [ ] Tons D.M.

IX. Calculating Corn Equivalent and Protein Supplement Needed by the Dairy Herd

A. Corn Equivalent Needed for the Dairy Herd

1. _____ no. Cows X _____ lb Corn Equiv. D.M./day (From Table 5) = _____ lb D.M. Needed for herd/day X _____ no. days in Feeding period

= _____ lb Corn Equiv. D.M. Needed for feeding period for cows ÷ 2,000 = [ ] Tons Corn Equiv. D.M. Needed/Feeding period for cows

2. _____ no. Heifers X 1.6 lb Corn Equiv. D.M./day (From Table 6) = _____ lb Corn Equiv. Needed for Heifers X _____ no. Days in Feeding period

= _____ lb Corn Equiv. Needed for Feeding Heifers ÷ 2,000 = [ ] Tons Corn Equiv. D.M. Needed for Feeding period for heifers

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Total Corn Equiv. Needed for Feeding Period [ ] Tons D.M.

Total Corn Equiv. Available from Inventory [ ] Tons D.M.

Subtract Needed Corn Equiv. from Available

Surplus or (Deficit) [ ] Tons D.M.

_____ Deficit or Surplus Tons Corn Equivalent Dry Matter ÷ .85 (%D.M.) = [ ] Tons Corn Equivalent Surplus or (Deficit) on as fed basis

B. Protein Supplement Needed for the Dairy Herd

1. _____ no. Milking plus Dry Cows X _____ lb 44% C.P. Supplement[1] = _____ lb Needed per day/herd ÷ 2,000 = _____ Tons needed per day

X _____ no. Days in Feeding period = [ ] Total Tons 44% Supplement Needed

2. If Supplement to be fed is not 44% Crude Protein, as fed basis.

44 ÷ _____ % C.P. in Supplement used = _____ Adjustment Factor X _____ Tons 44% Supplement Needed = [ ] Adjusted Tons Supplement Needed

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[1] See Section V for forage % Crude Protein and Table 6 for amount per cow

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COOPERATIVE EXTENSION PROGRAMS UWEX

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