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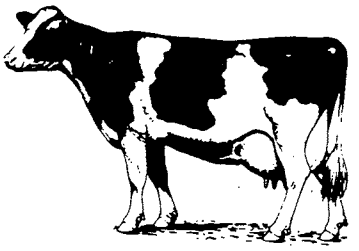

Dairy Update

FORAGE INVENTORY MANAGEMENT

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One key to achieving profitability in a dairy herd is by feeding adequate amounts of high quality forage. With feed representing more than 50% of the total cost of production, it is important to plan ahead for the amount and quality of forage needed in the dairy operation. Forward planning minimizes the risk of running out of forage and having to buy at inopportune times. Many times hay prices climb in the late winter and spring due, in part, to an increase in demand caused by livestock producers not anticipating their forage needs.

A good way to reduce the risk of purchasing hay at high prices is to determine forage requirements and supplies periodically throughout the year. This allows for the anticipation of shortages and gives them time to plan ahead. If shortages are discovered early, several options exist to remedy the situation:

1. Purchase hay or other forage
2. Reduce animal numbers
3. Re-balance rations, substituting some high fiber co-products for a portion of the forage
4. Re-balance rations, reallocating forages based on availability

In addition to determining amounts of forage and hay supplies, segregating forages by quality, especially in a year when forage is expensive may help increase farm profitability. For instance, if only prime quality hay is available and an inventory indicates a shortage of total forage exists, a lower quality hay for feeding to pregnant heifers can be purchased. This may prevent running out of hay and having to purchase prime hay for the cows. The recommended forage quality needs for different dairy animals is shown in Table 1.

A forage inventory should be done every three months. This will help avoid dramatic ration changes caused by poor allocation of forage (i.e., running out of hay and having to switch to an all corn silage ration). It is better to make small adjustments in rations than to run out and make a drastic change. Cows do not adjust well to dramatic ration changes, and planning ahead to anticipate change is the best way to avoid them.

Table 1. Forage Quality Needs of Cattle

Class of Livestock	Relative Feed Value
Cow, early lactation	140 or higher
Cow, middle and late lactation	125-145
Dairy calf	140-160
Heifer, 3-12 months	125-145
Heifer, 12-18 months	115-130
Heifer, 18-24 months	100-115
Dry cow	100-115

Developing A Forage Inventory

Three basic questions relate to developing a forage inventory:

1. What is the total forage supply available?
2. How much forage is required for all animals?
3. How can a feeding program be developed based on the forage supply available and the different forage needs of animals?

Using The Forage Inventory Planner

The attached Forage Inventory Planner worksheet will help you calculate forage surpluses or deficiencies.

Part I (Forage Requirement) will help you calculate the total forage needs for your herd. This section converts all dairy animals on the farm to animal units. It assumes that heifers are raised on the farm and evenly distributed from birth to two years of age. If your heifers are custom raised, you will have to make adjustments based on forage dry matter intake for the size that you are raising.

Part II calculates the current inventory of forage available. Table 1 will help adjust for the density change in vertical silos. Bunker, Piles and Bag capacities are based on average densities.

Part III determines the amount of hay forage available to meet animal needs during the feeding period. The feeding period should be at least until the next cutting of hay is available.

Part IV determines the amount of corn silage available to meet animal needs during the feeding period. If you feed corn silage during the summer, the feeding period will be different than the feeding period for hay forage.

Part V determines the forage surplus of deficit. It is equated to a hay equivalent basis. If you are going to purchase a wet forage, moisture adjustments will need to be made.

An Example Worksheet

John Dairyman has 100 lactating and dry cows along with 100 youngstock from birth to two years old. A November 1 inventory shows he has 100 large square bales weighing an average of 800 lb and 2000 small square bales weighing 45 lb. His upright silo (20x70 ft) still contains 50 feet of hay crop silage. John has a 100-foot long by 20-foot wide bunker for containing corn silage that averages 10 feet deep. He also bagged corn silage in an 8-foot diameter bag. The bag is still 70 feet long. John decides he will need hay until June 15 (225 days) and corn silage until October 1 (335 days).

Conclusions

John Dairyman's forage inventory indicates that he will be short about 5 lb of dry matter per animal unit per day. This translates into about 94 tons of hay equivalent until June 15. John can begin to investigate forage sources and prices to fill his needs. Another option might include feeding more corn silage until hay harvest, realizing that he will either run out of corn silage or need to feed considerable less during the summer months. The point is that by John doing an inventory early in the year, he has several options to avoid running out of forage in the spring.

Attached is an inventory worksheet for your use. The purpose of a forage inventory is to determine quantities of feedstuffs available on the farm. Matched with animal numbers, decisions regarding an adequate supply of forage for the intended feeding period can be made. Because there can be a large amount of variation in forage density and dry matter intake, it is a good management practice to update the inventories every three months.

Name: John Dairyman Date: 11/1/96

Forage Inventory Planner

I. Forage Requirement

100	Number of Milking & Dry Cows	+	(.5 × 100)	Number of Heifers	=	150	**Number of Animal Units (A)**	

Animal Units (A)		Est. Forage DM per Day (Lb)		Feeding Period (Days)		DM (Lb)				Tons (DM)
(150	×	26[1]	×	225) (until June 15)	=	877,500	÷	2000	=	439

[1] Estimated average daily forage fed (including storage and feeding losses for a typical 1300 lb cow. Use your own daily DM amount if known.

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(B) Total Dry Matter Required per Day (Lb) 439 **(Tons)**

II. Current Inventory

1. Dry Hay

Quality	Bale Weight		Number of Bales		% DM				Tons (DM)
Excellent (135+ RFV)	800	×	100	×	.85	÷	2000	=	34
Fair (100-125 RFV)	2000	×	45	×	.85	÷	2000	=	38
Poor (<100 RFV)		×		×	.85	÷	2000	=	

(C) Total Dry Hay Inventory (Tons DM) 72

2. Haylage

	UPRIGHT SILOS[1]							
	Diameter & Height When Filled	Height of Silage Removed	Tons DM When Filled		Tons DM Silage Removed			Tons (DM)
Silo 1	20x70	20 (70-50)	198	–	33	=		165
Silo 2				–		=		
Silo 3				–		=		

[1] See Table 1 for capacities.

Haylage (continued)

---------- BUNKERS OR PILES ----------

	Length		Width		Avg Depth		Avg Density			Tons (DM)
Bunker or Pile 1	(_____	×	_____	×	_____	×	15 lb/DM/ft^3)	÷	2000 =	_____
Bunker or Pile 2	(_____	×	_____	×	_____	×	15 lb/DM/ft^3)	÷	2000 =	_____
Bunker or Pile 3	(_____	×	_____	×	_____	×	15 lb/DM/ft^3)	÷	2000 =	_____

---------- BAGS ----------

	Length of Bag (Feet)		DM, Tons per Foot[1]		Tons (DM)
Bag 1	(_____	×	_____	=	_____
Bag 2	(_____	×	_____	=	_____
Bag 3	(_____	×	_____	=	_____

[1] 8 ft diameter = .33; 9 ft diameter = .37; 10 ft diameter = .63

(D) Total Haylage Inventory (Uprights + Bunkers or Piles + Bags) = 165 **Tons (DM)**

(E) Total Hay and Haylage Inventory (C + D) = 237 **Tons (DM)**

3. Corn Silage

---------- UPRIGHT SILOS[1] ----------

	Diameter & Height When Filled	Height of Silage Removed	Tons DM When Filled		Tons DM Silage Removed		Tons (DM)
Silo 1	_____	_____	_____	–	_____	=	_____
Silo 2	_____	_____	_____	–	_____	=	_____
Silo 3	_____	_____	_____	–	_____	=	_____

[1] See Table 1 for capacities.

---------- BUNKERS OR PILES ----------

	Length		Width		Avg Depth		Avg Density			Tons (DM)
Bunker or Pile 1	(100	×	20	×	10	×	15 lb/DM/ft^3)	÷	2000 =	150
Bunker or Pile 2	(_____	×	_____	×	_____	×	15 lb/DM/ft^3)	÷	2000 =	_____
Bunker or Pile 3	(_____	×	_____	×	_____	×	15 lb/DM/ft^3)	÷	2000 =	_____

Corn Silage (continued)

	BAGS				
	Length of Bag (Feet)		DM, Tons per Foot[1]		Tons (DM)
Bag 1	(70	×	.33 (8 ft bag)	=	23
Bag 2	(_____	×	_____	=	_____
Bag 3	(_____	×	_____	=	_____

[1]8 ft diameter = .33; 9 ft diameter = .37; 10 ft diameter = .63

(F) Total Corn Silage Inventory (Uprights + Bunkers or Piles + Bags) = 173 **(Tons DM)**

(G) Total Forage Available (E + F) = 410 **(Tons DM)**

Total Forage DM Needed (B) = 439 **(Tons)**

Difference (G – B) = -29 **(Tons DM)**

III. Hay/Haylage Available to Meet Forage Needs

Forage	Tons Available		Lb Available	Animal Units (A)	Feeding Period	Lb/Day/ AU (DM)	% DM	Lb/Day/ AU as Fed
Hay (C)	72	× 2000 =	144,000	÷ 150	÷ 225 days	= 4.3	÷ .85	= 5
Haylage (D)	165	× 2000 =	330,000	÷ 150	÷ 225 days	= 9.8	÷ .50	= 20

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(H) Total Lb Hay Forage DM per Animal Unit per Day (C + D) = 14.1 **Lb DM/AU/day**

IV. Corn Silage Available to Meet Forage Needs

Forage	Tons Available (G)		Lb Available	Animal Units (A)	Feeding Period	Lb/Day/ AU (DM)	% DM	Lb/Day/ AU as fed
Corn Silage	173	× 2000 =	346,000	÷ 150	÷ 335 days (until Oct 1)	= 6.9	÷ .35	= 19.7

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(I) Total Lb Corn Silage Forage per Animal Unit = 6.9 **Lb DM/AU/day**

V. Forage Surplus or Deficit

Hay/Haylage Available (**H**)		Corn Silage DM Available (**I**)		Est. DM Requirement per Day (Lb)		Surplus (Deficit)	
(14.1	+	6.9)	–	26	=	-5	**Lb DM/AU/day (J)**

Forage Balance (**J**)		Animal Units (**A**)		Feeding Period (Days)			Balance
(-5 lb/day	×	150	×	225)	÷	2000	= -84.3

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(K) Total Forage Surplus or (Deficit) for the Feeding Period = -84.3 **(Tons DM)**

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(L) Hay Equivalent Surplus or Deficit = -94 **(Tons)**

TABLE 1. APPROXIMATE DRY MATTER CAPACITY OF SILOS[1]

Depth of Settled Silage (Feet)	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	55	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	89	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 in a silo after part of				135	167	201	239	287	324	374
64	the silo is removed: 1) find the tons of silage				142	174	210	250	301	339	391
66	when the silo was filled; 2) find the tons in a				149	182	219	260	314	354	407
68	silo filled to the height equal to the depth of				155	190	228	271	328	369	424
70	silage removed; 3) subtract the number of tons				162	198	237	282	342	384	441
	in Step 2 from the number of tons in Step 1.										
72	*Example:* A 20 foot silo filled to a settled depth							293	356	400	458
74	of 60 feet and 22 feet were fed off							305	371	415	476
76	1) $20 \times 60 = 159$ tons							316	385	431	493
78	2) $20 \times 22 = 38$ tons							328	400	446	511
80	3) $159 - 38 = 121$ tons remaining							339	414	462	528

[1] Adapted from W.T. Howard, V. Wagner, and H. Larsen, Managing Dairy Feed Inventory, Univ. of Wisconsin.

*Name:*_____ *Date:*_____

Forage Inventory Planner

I. Forage Requirement

_____	Number of Milking & Dry Cows	+	(.5 × _____)	Number of Heifers	=	_____	**Number of Animal Units (A)**

Animal Units (A)		Est. Forage DM per Day (Lb)		Feeding Period (Days)		DM (Lb)				Tons (DM)
(_____	×	26[1]	×	_____)	=	_____	÷	2000	=	_____

[1] Estimated average daily forage fed (including storage and feeding losses for a typical 1300 lb cow. Use your own daily DM amount if known.

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(B) Total Dry Matter Required per Day (Lb) _____ **(Tons)**

II. Current Inventory

1. Dry Hay

Quality	Bale Weight		Number of Bales		% DM				Tons (DM)
Excellent (135+ RFV)	_____	×	_____	×	.85	÷	2000	=	_____
Fair (100-125 RFV)	_____	×	_____	×	.85	÷	2000	=	_____
Poor (<100 RFV)	_____	×	_____	×	.85	÷	2000	=	_____

(C) Total Dry Hay Inventory (Tons DM) _____

2. Haylage

	UPRIGHT SILOS[1]					
	Diameter & Height When Filled	Height of Silage Removed	Tons DM When Filled		Tons DM Silage Removed		Tons (DM)
Silo 1	_____	_____	_____	–	_____	=	_____
Silo 2	_____	_____	_____	–	_____	=	_____
Silo 3	_____	_____	_____	–	_____	=	_____

[1] See Table 1 for capacities.

Haylage (continued)

---------- BUNKERS OR PILES ----------

	Length		Width		Avg Depth		Avg Density				Tons (DM)
Bunker or Pile 1	(_____	×	_____	×	_____	×	15 lb/DM/ft^3)	÷	2000	=	_____
Bunker or Pile 2	(_____	×	_____	×	_____	×	15 lb/DM/ft^3)	÷	2000	=	_____
Bunker or Pile 3	(_____	×	_____	×	_____	×	15 lb/DM/ft^3)	÷	2000	=	_____

---------- BAGS ----------

	Length of Bag (Feet)		DM, Tons per Foot[1]		Tons (DM)
Bag 1	(_____	×	_____	=	_____
Bag 2	(_____	×	_____	=	_____
Bag 3	(_____	×	_____	=	_____

[1] 8 ft diameter = .33; 9 ft diameter = .37; 10 ft diameter = .63

(D) Total Haylage Inventory (Uprights + Bunkers or Piles + Bags) = _____ Tons (DM)

(E) Total Hay and Haylage Inventory (C + D) = _____ Tons (DM)

3. Corn Silage

---------- UPRIGHT SILOS[1] ----------

	Diameter & Height When Filled	Height of Silage Removed	Tons DM When Filled		Tons DM Silage Removed		Tons (DM)
Silo 1	_____	_____	_____	–	_____	=	_____
Silo 2	_____	_____	_____	–	_____	=	_____
Silo 3	_____	_____	_____	–	_____	=	_____

[1] See Table 1 for capacities.

---------- BUNKERS OR PILES ----------

	Length		Width		Avg Depth		Avg Density				Tons (DM)
Bunker or Pile 1	(_____	×	_____	×	_____	×	15 lb/DM/ft^3)	÷	2000	=	_____
Bunker or Pile 2	(_____	×	_____	×	_____	×	15 lb/DM/ft^3)	÷	2000	=	_____
Bunker or Pile 3	(_____	×	_____	×	_____	×	15 lb/DM/ft^3)	÷	2000	=	_____

Corn Silage (continued)

---------- BAGS ----------

	Length of Bag (Feet)		DM, Tons per Foot[1]		Tons (DM)
Bag 1	(_____	×	_____	=	_____
Bag 2	(_____	×	_____	=	_____
Bag 3	(_____	×	_____	=	_____

[1]8 ft diameter = .33; 9 ft diameter = .37; 10 ft diameter = .63

(F) Total Corn Silage Inventory (Uprights + Bunkers or Piles + Bags) = _____ (Tons DM)

(G) Total Forage Available (E + F) = _____ (Tons DM)

Total Forage DM Needed (B) = _____ (Tons)

Difference (G – B) = _____ (Tons DM)

III. Hay/Haylage Available to Meet Forage Needs

Forage	Tons Available		Lb Available	Animal Units (A)	Feeding Period	Lb/Day/ AU (DM)	% DM	Lb/Day/ AU as Fed
Hay (C)	_____	× 2000 =	_____	÷ _____	÷ _____days	= _____	÷ .85	= _____
Haylage (D)	_____	× 2000 =	_____	÷ _____	÷ _____days	= _____	÷ _____	= _____

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(H) Total Lb Hay Forage DM per Animal Unit per Day (C + D) = _____ Lb DM/AU/day

IV. Corn Silage Available to Meet Forage Needs

Forage	Tons Available (G)		Lb Available	Animal Units (A)	Feeding Period	Lb/Day/ AU (DM)	% DM	Lb/Day/ AU as fed
Corn Silage	_____	× 2000 =	_____	÷ _____	÷ _____days	= _____	÷ _____	= _____

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(I) Total Lb Corn Silage Forage per Animal Unit = _____ Lb DM/AU/day

V. Forage Surplus or Deficit

Hay/Haylage Available (**H**)		Corn Silage DM Available (**I**)		Est. DM Requirement per Day (Lb)		Surplus (Deficit)	
(_____	+	_____)	–	26	=	_____	**Lb DM/AU/day (J)**

Forage Balance (**J**)		Animal Units (**A**)		Feeding Period (Days)			Balance
(_____ lb/day	×	_____	×	_____)	÷	2000	= _____

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(K) Total Forage Surplus or (Deficit) for the Feeding Period = _____ **(Tons DM)**

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(L) Hay Equivalent Surplus or Deficit = _____ **(Tons)**

TABLE 1. APPROXIMATE DRY MATTER CAPACITY OF SILOS[1]

Depth of Settled Silage (Feet)	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	55	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	89	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
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64	the silo is removed: 1) find the tons of silage				142	174	210	250	301	339	391
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