

OREGON FORAGE LIBRARY
Oregon State University
1998

Introduction

Winter feeding costs put Oregon beef producers at an economic disadvantage. Beef cattle producers in the Western United States, including Oregon, compete at an economic disadvantage relative to other regions in North America because of relatively high winter feed costs. Feeding 1.5 to 2.5 tons of hay to mature cows during the winter feeding period can represent more than 50% of the producer's input costs. The ability of cow-calf producers to compete with other regions of North America may relate to how effectively winter feed costs can be reduced while maintaining acceptable levels of beef cattle production.

Accurate forage analysis is critical to profitable winter feeding programs It has long been recognized that book value nutrient analyses for forages grown in other parts of the country do not accurately represent Oregon forages. To formulate winter beef diets, analyses for Oregon produced forages are needed. Therefore, over 30 forages grown in Oregon were selected for extensive analysis by researchers from Oregon State University. These forages were evaluated for protein, energy, fat, fiber, and mineral content (Tables 1 and 2). In addition, the OSU research team has also compiled dry matter, crude protein and acid detergent fiber results from hay surveys of over 400 forage samples to create the Oregon Forage Library (Table 3).

How do I use the Oregon Forage Library?

Table 1 contains complete analyses of 32 Oregon forages in TAURUS format. Ideally, producers should have their own forage tested each year for dry matter, crude protein, and acid detergent fiber. Compare their forage analysis with this table and use the estimates of energy for beef cattle (TDN, NEm and NEg) and the other analyses to formulate the rations. This information is in the format used in the TAURUS program. The mineral analyses are also included on this table.

Table 2 contains complete analyses of 32 Oregon forages in 1996 NRC Beef format. The units are metric and identical to those listed in the NRC. This table includes new assays such as NPN percent of soluble crude protein, ADFIP, NDFIP, starch as a percent of non-structural carbohydrates, etc.

Table 3 lists the DM, CP and ADF of hundreds of Oregon produced forages. Averages and ranges of forages for which we had multiple samples are printed in bold. The DM for the forages are all stated as 90% with a range of 88 to 92. If you do not have a forage analysis available, pick out the feed that most closely describes the producer's growing conditions and then turn to Tables 1 and 2 for estimates of chemical analyses. The nutrient requirements for various classes of cattle are available from several sources including text books, the Cow-Calf Management Handbook and several computer ration formulation programs.

Table 4 lists Oregon Byproduct Feeds. This table resulted from a study performed by Gene Pirelli and Dr. Kellems in the 1980s. Some of these products may no longer be available.

How did we calculate the energy values?

Commercial labs commonly use acid detergent fiber data to predict the energy content (NE or TDN) of forages. The ADF regression equations describe a statistical relationship rather than a biological one. Therefore, equations derived to predict the energy content of one forage, such as alfalfa, cannot be used to predict energy values for other forages, such as grasses.

We chose to use a theoretically-based model that could be used for legume and grass forages, as well as byproduct feeds and heat-damaged forages. The OARDC Prediction Model was developed at Ohio State University by Conrad in 1984 and revised by Weiss (1992). Forages are analyzed for protein, fat, soluble carbohydrates and fiber fractions and results are summed to estimate the energy. Instead of using ADF to predict TDN, a complication equation is used that includes analysis of crude protein, protein bound to the ADF, ether extract, neutral detergent fiber, lignin, protein bound to NDF, and ash (Weiss, 1995). The TDN values were converted to NEg and NEm by using a conversion table in the Beef Cow Ration Balancer from Kansas State University Extension Service.

Acknowledgments

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KEY

ADF, %DM	= acid detergent fiber on a dry matter basis - Table 1 ADF = cellulose and lignin
ADFIP, %DM	= acid detergent protein on a dry matter basis - Table 1 Unavailable protein bound to the ADF fraction
ADFIP, %CP	= acid detergent protein as a percent of crude protein on a dry matter basis - Table 2
As-Fed, %DM	= dry matter on an as-fed basis
Ash, %DM	= ash on a dry matter basis - Table 1
Ca, %DM	= calcium on a dry matter basis - Table 1
CP, %DM	= crude protein of the forage on a dry matter basis - Table 1 and 2
Cu, ppm	= copper, parts per million (mg/kg) on a dry matter basis - Table 1
DIP, %CP	= degradable intake protein, percent of CP on a dry matter basis - Table 1 and 2. See note under UIP, %CP.
DM, %As-Fed	= dry matter on an as-fed basis
EE, %DM	= ether extract on a dry matter basis - Table 1
Fat, % DM	= crude fat on a dry matter basis - Table 2
Fe, ppm	= iron, parts per million (mg/kg) on a dry matter basis - Table 1
K, %DM	= potassium on a dry matter basis - Table 1
Lignin, %DM	= lignin on a dry matter basis - Table 1
Lignin, %NDF	= lignin as a percent of neutral detergent fiber on a dry matter basis - Table 2
ME, Mcal/kg	= Metabolizable energy (Mcal/kg) - Table 2
Mg, %DM	= magnesium on a dry matter basis - Table 1
Mn, ppm	= manganese, parts per million (mg/kg) on a dry matter basis - Table 1
Mo, ppm	= molybdenum, parts per million (mg/kg) on a dry matter basis - Table 1
Na, %DM	= sodium on a dry matter basis - Table 1
NDF, %DM	= neutral detergent fiber on a dry matter basis - Table 1 and 2 NDF = hemicellulose, cellulose and lignin
NDFIP, %DM	= neutral detergent protein on a dry matter basis - Table 1 Unavailable protein bound to the NDF fraction
NDFIP, %CP	= neutral detergent protein as a percent of crude protein on a dry matter basis - Table 2
NEm, Mcal/kg	= net energy of maintenance (Mcal/kg) - Table 2
NEm, Mcal/lb	= net energy of maintenance (Mcal/lb) - Table 1
NEg, Mcal/kg	= net energy of gain (Mcal/kg) - Table 2
NEg, Mcal/lb	= net energy of gain (Mcal/lb) - Table 1
NFC, %DM	= nonfiber carbohydrate, also known as NSC or non-structural carbohydrates - Table 1 NFC = 100 - CP - (NDF - NDFIP) - EE - ash
NPN, %DM	= non-protein nitrogen on a dry matter basis - Table 1

KEY

NPN, %Sol CP	= non-protein nitrogen as a percent of soluble crude protein on a dry matter basis - Table 2
P, %DM	= phosphorus on a dry matter basis - Table 1
Se, ppm	= selenium, parts per million (mg/kg) on a dry matter basis - Table 1
Sol CP, %CP	= soluble crude protein as a percent of crude protein - Table 1
Starch, %DM	= starch on a dry matter basis - Table 1
Starch, %NSC	= starch as a percent of nonstructural carbohydrates on a dry matter basis - Table 2
TDN, %DM	= total digestible nutrients on a dry matter basis - Table 1 and 2
UIP, %CP	= undegradable intake protein as a percent of CP on a dry matter basis - Table 1 and 2 Also known as bypass protein. Based on an 18-hr in-situ study using 450 kg steers on a 80:20 meadow hay: corn diet. Analysis performed by Tim DelCurto at EOARC-Union, OR. Results appropriate for beef only and should not be used for dairy.
Zn, ppm	= zinc, parts per million (mg/kg) on a dry matter basis - Table 1

Comments

If you have any comments or would like to recommend specific forages be added to the Oregon Feed Library, please contact Ron Hathaway, Klamath Extension Service, (541) 883-7131 or Diane Carroll (541) 737-1898.

Oregon Forage Library

Table 1. Taurus version of forage analyses

Forages	As-fed % DM	CP %DM	ADF %DM	NDF %DM	TDN % DM	NEM Mcal/lb	NEG Mcal/lb	ADFIP %DM	NDFIP %DM	UIP %CP	DIP %CP	SoI CP % CP	NPN %DM
Alfalfa hay:													
1st cutting - Baker County	90	12.7	31	46	61	0.61	0.35	0.8	1.74	17	83	25	0.39
1st cutting - Harney County	90	15.1	36	47	60	0.60	0.34	1.0	1.81	15	85	30	0.50
1st cutting - Union County	90	15.2	34	47	61	0.61	0.35	0.9	1.89	14	86	32	0.59
2nd cutting - Baker County	90	20.7	31	37	64	0.66	0.39	0.8	1.09	12	88	33	0.78
2nd cutting - Harney County	90	20.4	29	36	67	0.70	0.43	0.7	1.20	11	89	33	0.85
2nd cutting - Union County	90	21.8	28	36	67	0.70	0.43	0.9	2.38	9	91	28	0.58
3rd cutting - Baker County	90	22.6	24	29	69	0.73	0.46	0.6	0.85	10	90	36	0.84
3rd cutting - Harney County	90	20.1	25	31	69	0.73	0.46	0.6	0.92	9	91	38	0.74
Klamath County	90	16.7	31	40	59	0.58	0.32	1.0	1.55	12	88	31	0.52
Umatilla County	90	19.6	30	39	63	0.64	0.38	1.1	1.97	10	90	38	0.85
Alfalfa mix hay:													
Low-protein range (8 - 11.9%)	90	9.6	37	56	61	0.61	0.35	0.8	1.81	22	78	20	0.30
Mid-protein range (12 - 14.9%)	90	13.6	36	50	59	0.57	0.31	0.9	2.38	13	87	23	0.42
High-protein range (15 - 17.0%)	90	15.7	35	52	61	0.61	0.35	0.7	2.96	12	88	20	0.36
Alfalfa silage													
Alfalfa silage	32	15.8	37	44	63	0.64	0.38	1.0	1.39	7	93	62	1.56
Barley hay	90	13.0	36	58	59	0.58	0.32	0.5	1.26	17	83	37	0.53
Corn silage	25	6.5	32	52	70	0.74	0.47	0.5	0.85	25	75	41	0.43
Fescue straw	90	4.3	48	80	49	0.42	0.18	0.6	1.04	58	42	21	0.14
Grass/clover mix hay	90	9.4	37	58	62	0.63	0.36	0.7	1.65	20	80	32	0.46
Grass screenings - pellets	92	12.4	30	49	56	0.54	0.28	0.8	2.30	16	84	8	0.15
Grass silage	30	6.0	37	53	65	0.67	0.40	0.6	0.93	30	70	47	0.45
Meadow hay:													
Low-protein range (4 - 8.9%)	90	7.7	39	58	57	0.55	0.29	0.6	1.23	25	75	20	0.23
Mid-protein range (9 - 11.9%)	90	10.7	36	58	62	0.63	0.36	0.7	1.58	18	82	18	0.30
High-protein range (12 - 16.0%)	90	13.2	38	57	58	0.57	0.31	0.7	2.33	17	84	26	0.47
Native Hay:													
Low-protein range (5 - 8.9%)	90	8.4	38	60	58	0.57	0.31	0.6	1.58	24	76	24	0.20
Mid-protein range (9 - 11.9%)	90	9.4	36	58	59	0.58	0.32	0.6	1.77	24	76	27	0.33
High-protein range (12 - 16.0%)	90	13.8	33	56	62	0.63	0.36	0.5	2.00	15	85	21	0.44
Oat hay	90	9.7	36	57	58	0.57	0.31	0.5	0.96	15	85	22	0.28
Orchardgrass hay - pre-head	90	9.1	30	45	66	0.69	0.42	0.4	2.76	13	87	21	0.22
Timothy hay - 1st cutting	90	7.7	35	59	59	0.58	0.32	0.6	1.09	23	77	17	0.21
Timothy hay - 2nd cutting	90	9.3	29	56	63	0.64	0.38	0.5	3.12	20	80	24	0.28
Timothy hay - post-head	90	6.3	41	64	57	0.55	0.29	0.5	1.04	33	67	18	0.18
Wheat hay	90	8.5	34	58	60	0.60	0.34	0.5	1.34	22	78	24	0.31

Oregon Forage Library

Table 1. Taurus version of forage analyses

Forages	NFC % DM	Starch % DM	Lignin % DM	EE % DM	Ash % DM	Ca % DM	P % DM	Mg % DM	K % DM	Na % DM	Cu ppm	Fe ppm	Mn ppm	Mo ppm	Se ppm	Zn ppm	
Alfalfa hay:																	
Baker County - 1st cutting	32.6	5.9	5	2.2	8.8	1.32	0.27	0.21	2.15	0.02	8	222	46	2	0.06	17	
Harney County - 1st cutting	28.5	4.0	5	2.4	9.1	1.11	0.19	0.22	2.24	0.12	7	1580	72	4	0.05	15	
Union County - 1st cutting	28.6		5	2.3	9.0	1.30	0.22	0.27	2.23	0.19	5	72	29	4	0.00	21	
Baker County - 2nd cutting	30.4	4.2	5	2.8	10.0	1.59	0.25	0.30	2.75	0.10	9	835	52	4	0.10	19	
Harney County - 2nd cutting	31.9	3.9	5	3.9	8.8	1.45	0.29	0.28	3.35	0.13	8	441	44	3	0.08	18	
Union County - 2nd cutting	35.1	5.6	4	1.8	7.7	1.56	0.28	0.25	3.39	0.01	8	273	46	1	0.01	17	
Baker County - 3rd cutting	38.7	4.1	4	2.5	7.9	1.60	0.29	0.31	3.58	0.03	9	275	36	3	0.02	19	
Harney County - 3rd cutting	37.2	6.4	4	3.8	8.5	1.62	0.36	0.30	3.42	0.02	9	286	37	3	0.02	17	
Klamath County	35.3	3.9	8	1.4	8.2	1.40	0.25	0.32	3.07	0.03	7	379	38	2	0.01	20	
Umatilla County	33.0	3.0	6	2.3	8.0	1.56	0.30	0.22	3.05	0.02	6	131	29	1	0.14	20	
Alfalfa mix hay:																	
Low-protein range (8 -11.9%)	26.1	4.6	4	2.1	8.1	0.60	0.21	0.16	2.01	0.03	6	141	53	2	0.04	16	
Mid-protein range (12 -14.9%)	26.8	2.9	6	2.3	9.2	1.20	0.26	0.19	2.47	0.03	10	412	48	2	0.03	16	
High-protein range (15 -17.0%)	21.8	4.0	5	3.4	9.7	0.93	0.26	0.22	2.70	0.26	6	191	73	2	0.03	17	
Meadow hay:																	
Alfalfa silage	29.1	4.2	7	5.0	7.9	1.72	0.34	0.35	1.98	0.05	8	278	34	2	0.21	30	
Barley hay	17.6		4	2.3	10.0												
Corn silage	33.2	21.6	2	4.0	4.7	0.23	0.19	0.10	0.91	0.00	4	229	44	<1	0.01	25	
Fescue straw	4.8		4	1.2	11.0	0.18	0.12	0.06	1.75	0.02	3	55	231	1	0.00	12	
Grass/clover mix hay	24.0	3.1	3	2.0	8.3	0.26	0.22	0.31	1.93	0.01	3	77	100	2	0.05	17	
Grass screenings - pellets	25.4	22.9	4	1.3	14.8	0.41	0.36	0.20	0.95	0.04	18	1740	87	2	0.01	28	
Grass silage	32.4	2.0	4	3.6	5.8	0.56	0.19	0.14	1.42	0.11	6	100	107	<1	0.39	19	
Native Hay:																	
Low-protein range (4 - 8.9%)	24.0	4.5	5	2.0	9.4	0.54	0.20	0.18	1.86	0.03	3	121	52	3	0.09	9	
Mid-protein range (9-11.9%)	21.3	2.2	3	2.5	9.1	0.35	0.24	0.18	2.20	0.20	6	80	83	2	0.09	15	
High-protein range (12-16.0%)	21.2	2.8	5	1.8	9.4	0.67	0.29	0.22	2.79	0.15	7	119	59	2	0.02	17	
Native Hay:																	
Low-protein range (5-8.9%)	22.1	2.2	4	2.2	9.1	0.38	0.24	0.16	1.96	0.06	3	104	64	2	0.06	15	
Mid-protein range (9-11.9%)	23.2	3.3	4	2.2	8.9	0.40	0.24	0.16	2.08	0.07	7	128	61	2	0.08	17	
High-protein range (12-16.0%)	18.1	2.8	3	3.9	10.4	0.34	0.32	0.18	2.95	0.07	5	90	50	4	0.02	16	
Oat hay	22.1	9.5	6	2.8	9.1	0.55	0.29	0.18	2.32	0.22	7	1010	69	4	0.32	19	
Orchardgrass hay - pre-head	37.1	3.7	4	3.3	8.3	0.48	0.17	0.34	1.61	0.05	2	102	97	2	0.01	10	
Timothy hay - 1st cutting	21.8	2.9	3	2.5	10.3	0.38	0.17	0.28	1.04	0.30	2	109	302	<1	0.01	30	
Timothy hay - 2nd cutting	25.6	4.7	3	3.2	9.2	0.44	0.27	0.24	1.06	0.01	3	82	59	1	0.01	28	
Timothy hay - post-head	18.7	2.5	5	3.2	8.6	0.22	0.18	0.10	1.92	0.04	2	535	95	1	0.01	14	
Wheat hay	23.1		3	2.0	10.0	0.19	0.24	0.16	1.04	0.11	6	210	36	4	0.00	13	

Oregon Forage Library

Table 2. Nutrient Requirements of Beef Cattle version of forage analyses.

Forages	DM %As-fed	NDF %DM	Lignin %NDF	TDN %DM	ME Mcal/kg	NEM Mcal/kg	NEG Mcal/kg	CP %DM	DIP %CP	UIP %CP
Alfalfa hay:										
1st cutting - Baker County	90.00	45.51	11.67	61.00	2.20	1.34	0.77	12.67	83.01	16.99
1st cutting - Harney County	90.00	46.71	11.69	60.00	2.16	1.32	0.75	15.09	84.58	15.42
1st cutting - Union County	90.00	46.90	10.55	61.00	2.20	1.34	0.77	15.15	86.02	13.98
2nd cutting - Baker County	90.00	37.21	13.36	64.00	2.31	1.45	0.86	20.71	87.72	12.28
2nd cutting - Harney County	90.00	36.28	12.98	67.00	2.42	1.54	0.95	20.43	89.41	10.59
2nd cutting - Union County	90.00	35.99	11.50	67.00	2.42	1.54	0.95	21.80	91.15	8.85
3rd cutting - Baker County	90.00	29.16	15.12	69.00	2.49	1.61	1.01	22.61	90.44	9.56
3rd cutting - Harney County	90.00	31.31	14.18	69.00	2.49	1.61	1.01	20.11	90.59	9.41
Klamath County	90.00	39.95	19.72	59.00	2.13	1.28	0.71	16.74	87.57	12.43
Umatilla County	90.00	39.13	14.77	63.00	2.27	1.41	0.84	19.64	89.55	10.45
Alfalfa mix hay:										
Low-protein range (8 - 11.9%)	90.00	55.80	7.92	61.00	2.20	1.34	0.77	9.63	77.58	22.42
Mid-protein range (12 - 14.9%)	90.00	50.48	11.81	59.00	2.13	1.26	0.68	13.62	86.82	13.18
High-protein range (15 - 17.0%)	90.00	52.39	9.31	61.00	2.20	1.34	0.77	15.71	88.01	11.99
Alfalfa silage										
Barley hay	90.00	58.34	6.65	59.00	2.13	1.28	0.71	13.01	83.44	16.56
Corn silage	25.00	52.41	4.64	70.00	2.53	1.63	1.04	6.54	74.88	25.12
Fescue straw	90.00	79.68	5.58	49.00	1.77	0.93	0.40	4.29	41.68	58.32
Grass/clover mix hay	90.00	58.00	4.81	62.00	2.24	1.39	0.79	9.37	80.13	19.87
Grass screenings - pellets	92.00	48.51	7.52	56.00	2.02	1.19	0.62	12.37	83.95	16.05
Grass silage	30.40	53.20	8.12	65.00	2.35	1.48	0.88	5.95	69.78	30.22
Meadow hay:										
Low-protein range (4 - 8.9%)	90.00	58.11	9.03	57.00	2.06	1.21	0.64	7.72	75.09	24.91
Mid-protein range (9 - 11.9%)	90.00	58.07	4.53	62.00	2.24	1.39	0.79	10.65	81.59	18.41
High-protein range (12 - 16.0%)	90.00	56.79	8.36	58.00	2.09	1.26	0.68	13.16	83.50	16.50
Native Hay:										
Low-protein range (5 - 8.9%)	90.00	59.79	7.11	58.00	2.09	1.26	0.68	8.44	76.38	23.62
Mid-protein range (9 - 11.9%)	90.00	58.09	6.94	59.00	2.13	1.28	0.71	9.39	76.17	23.80
High-protein range (12 - 16.0%)	90.00	55.87	5.87	62.00	2.24	1.39	0.79	13.78	84.76	15.24
Oat hay	90.00	57.26	9.66	58.00	2.09	1.26	0.68	9.72	84.56	15.44
Orchardgrass hay - pre-head	90.00	45.01	8.31	66.00	2.38	1.52	0.93	9.10	87.00	13.00
Timothy hay - 1st cutting	90.00	58.77	5.79	59.00	2.13	1.28	0.71	7.70	77.29	22.71
Timothy hay - 2nd cutting	90.00	55.80	5.57	63.00	2.27	1.41	0.84	9.30	80.00	20.19
Timothy hay - post-head	90.00	64.23	8.30	57.00	2.06	1.21	0.64	6.25	67.01	32.99
Wheat hay	90.00	57.78	4.69	60.00	2.16	1.32	0.75	8.48	78.04	21.96

Table 2. Nutrient Requirements of Beef Cattle version of forage analyses.

Forages	SoI CP %CP	NPN %SoI CP	NDIFIP %CP	ADFIP %CP	Starch %NSC	Fat %DM	Ash %DM
Alfalfa hay:							
1st cutting - Baker County	24.78	77.63	13.73	6.31	18.16	2.16	8.8
1st cutting - Harney County	30.48	67.93	11.99	6.83	13.88	2.43	9.1
1st cutting - Union County	32.28	60.07	12.48	6.20		2.25	9.0
2nd cutting - Baker County	32.74	71.90	5.26	3.91	13.95	2.76	10.0
2nd cutting - Harney County	32.89	79.06	5.87	3.57	12.33	3.85	8.8
2nd cutting - Union County	27.98	51.23	10.92	3.94	16.06	1.84	7.7
3rd cutting - Baker County	35.84	64.81	3.76	2.83	10.65	2.47	7.9
3rd cutting - Harney County	37.89	60.70	4.57	3.18	17.26	3.77	8.5
Klamath County	30.93	72.22	9.26	4.39	11.07	1.41	8.2
Umatilla County	37.58	71.99	10.03	5.70	9.15	2.25	8.0
Alfalfa mix hay:							
Low-protein range (8 - 11.9%)	19.50	99.73	18.80	8.10	17.46	2.14	8.1
Mid-protein range (12 - 14.9%)	23.30	82.81	17.47	6.46	11.70	2.28	9.2
High-protein range (15 - 17.0%)	20.40	70.31	18.84	4.33	18.40	3.35	9.7
Alfalfa silage							
Alfalfa silage	61.83	100.00	8.81	6.34	14.39	5.02	7.9
Barley hay	36.51	69.74	9.68	3.46		2.29	10.0
Corn silage	41.13	100.00	13.00	7.65	64.92	3.97	4.7
Fescue straw	20.50	100.00	24.24	14.45		1.24	11.0
Grass/clover mix hay	31.70	96.67	17.61	7.79	12.98	1.98	8.3
Grass screenings - pellets	7.60	100.00	18.59	6.47	90.28	1.31	14.8
Grass silage	47.23	100.00	15.63	10.25	6.14	3.57	5.8
Meadow hay:							
Low-protein range (4 - 8.9%)	20.34	91.56	15.93	7.77	18.75	1.96	9.4
Mid-protein range (9 - 11.9%)	18.31	96.15	14.84	6.57	10.27	2.49	9.1
High-protein range (12 - 16.0%)	26.22	85.14	17.71	4.94	13.26	1.81	9.4
Native Hay:							
Low-protein range (5 - 8.9%)	23.60	62.81	18.72	6.64	9.73	2.18	9.1
Mid-protein range (9 - 11.9%)	27.10	81.20	18.85	6.18	14.03	2.16	8.9
High-protein range (12 - 16.0%)	20.97	95.16	14.51	3.34	15.48	3.85	10.4
Oat hay	22.22	81.02	9.88	5.04	43.13	2.79	9.1
Orchardgrass hay - pre-head	21.21	71.24	30.33	4.40	9.85	3.33	8.3
Timothy hay - 1st cutting	17.04	100.00	14.16	7.92	13.30	2.51	10.3
Timothy hay - 2nd cutting	23.55	79.91	33.55	5.70	18.51	3.23	9.2
Timothy hay - post-head	18.08	100.00	16.64	8.48	13.61	3.24	8.6
Wheat hay	23.58	96.88	15.80	5.54		2.00	10.0

Oregon Forage Library

Table 3. Dry matter, crude protein and acid detergent fiber levels.

Forages	OR County	Ave/Range	As-fed % DM	CP % DM	ADF % DM
Alfalfa cubes	Western OR		90	14.8	37
Alfalfa hay	Malheur		90	14.7	33
Alfalfa hay	Polk	Average	90	18.0	35
2 samples		Range	88 to 92	17.0 to 18.9	32 to 39
Alfalfa hay	Wheeler		90	19.5	33
Alfalfa hay - 1st cutting	Baker	Average	90	17.6	32
13 samples		Range	88 to 92	13.0 to 21.3	26 to 38
Alfalfa hay - 1st cutting	Grant		90	15.0	30
Alfalfa hay- 1st cutting	Harney	Average	90	16.2	35
3 samples		Range	88 to 92	15.1 to 17.2	31 to 37
Alfalfa hay - 1st cutting	Jefferson		90	16.6	39
Alfalfa hay - 1st cutting	Klamath		90	12.1	36
Alfalfa hay - 1st cutting	Malheur		90	17.8	32
Alfalfa hay - 1st cutting	Umatilla		90	19.6	29
Alfalfa hay - 1st cutting	Union	Average	90	14.7	34
9 samples		Range	88 to 92	13.0 to 17.4	37 to 39
Alfalfa hay - 1st cutting	Wheeler	Average	90	13.5	32
2 samples		Range	88 to 92	9.0 to 16.7	31 to 33
Alfalfa hay - 2nd cutting	Baker	Average	90	19.6	33
8 samples		Range	88 to 92	14.0 to 22.9	30 to 37
Alfalfa hay - 2nd cutting	Grant	Average	90	16.6	33
3 samples		Range	88 to 92	11.4 to 20.3	30 to 36
Alfalfa hay - 2nd cutting	Harney	Average	90	18.4	33
7 samples		Range	88 to 92	16.5 to 20.9	30 to 37
Alfalfa hay - 2nd cutting	Jefferson		90	16.5	38
Alfalfa hay - 2nd cutting	Klamath		90	18.2	31
Alfalfa hay - 2nd cutting	Malheur	Average	90	18.2	31
3 samples		Range	88 to 92	16.8 to 19.2	27 to 33
Alfalfa hay - 2nd cutting	Umatilla		90	19.3	29
Alfalfa hay - 2nd cutting	Union	Average	90	18.3	31
7 samples		Range	88 to 92	15.0 to 22.0	25 to 41
Alfalfa hay - 2nd cutting	Wallowa	Average	90	15.0	42
2 samples		Range	88 to 92	14.8 to 15.2	41 to 42
Alfalfa hay - 2nd cutting	Wheeler	Average	90	19.0	30
3 samples		Range	88 to 92	17.4 to 20.3	29 to 34
Alfalfa hay - 3rd cutting	Baker	Average	90	22.5	27
3 samples		Range	88 to 92	21.9 to 22.6	26 to 28
Alfalfa hay - 3rd cutting	Grant		90	16.1	33
Alfalfa hay - 3rd cutting	Harney	Average	90	20.8	27
4 samples		Range	88 to 92	20.1 to 21.4	26 to 28
Alfalfa hay - 3rd cutting	Jefferson		90	18.3	37
Alfalfa hay - 3rd cutting	Wheeler	Average	90	19.6	30
2 samples		Range	88 to 92	18.2 to 20.9	29 to 30
Alfalfa hay - 4th cutting	Malheur		90	21.9	31

Oregon Forage Library

Table 3. Dry matter, crude protein and acid detergent fiber levels.

Forages	OR County	Ave/Range	As-fed % DM	CP % DM	ADF % DM
Alfalfa mix hay	Baker	Average	90	13.6	36
15 samples		Range	88 to 92	8.1 to 17.0	29 to 39
Alfalfa mix hay	Jefferson		90	17.5	38
Alfalfa mix hay	Klamath	Average	90	15.4	36
2 samples		Range	88 to 92	14.7 to 16.1	31 to 40
Alfalfa mix hay	Malheur	Average	90	15.8	33
2 samples		Range	88 to 92	12.6 to 18.9	33 to 34
Alfalfa mix hay	Union	Average	90	10.8	37
24 samples		Range	88 to 92	7.0 to 17.2	29 to 43
Alfalfa mix hay	Wallowa	Average	90	11.1	38
12 samples		Range	88 to 92	8.0 to 14.0	33 to 42
Alfalfa mix hay	Wheeler	Average	90	13.3	34
4 samples		Range	88 to 92	10.2 to 16.9	31 to 35
Alfalfa silage	Yamhill	Average	33	16.7	35
2 samples		Range	30 to 36	16.5 to 16.9	31 to 40
Barley hay	Baker		90	11.0	33
Barley hay	Union		90	13.0	34
Barley hay	Western OR		90	9.1	35
Barley hay	Wheeler		90	10.6	34
Barley hay - damp	Western OR		77	11.9	38
Bentgrass straw	Jefferson	Average	90	7.6	35
2 samples		Range	88 to 92	6.7 to 7.6	35 to 35
Bluegrass hay	Union		90	7.0	48
Bluegrass hay	Wheeler		90	8.5	35
Bluegrass straw	Baker		90	7.1	43
Bluegrass straw	Jefferson		90	11.6	40
Bluegrass straw	Umatilla		90	8.3	36
Bluegrass straw	Wallowa		90	8.4	39
Brome straw	Polk	Average	90	5.0	38
4 samples		Range	88 to 92	4.3 to 5.6	37 to 39
Clover hay, red	Polk		90	14.3	32
Clover silage, red	Yamhill	Average	55	11.3	33
2 samples		Range	50 to 59	11.3 to 11.3	31 to 35
Corn silage	Western OR		23	8.4	30
Corn silage			25	8.7	31
Corn silage, sweet	Western OR		19	7.9	39
Fescue hay	Western OR	Average	90	6.8	32
6 samples		Range	88 to 92	6.1 to 9.5	29 to 35
Fescue straw	Wheeler		90	4.3	40
Fescue straw, tall	Umatilla		90	5.5	39
Grass/clover hay	Grant	Average	90	8.2	35
8 samples		Range	88 to 92	6.6 to 11.9	31 to 36
Grass/clover hay	Polk		85	6.8	38
Grass hay	Grant	Average	90	6.8	35
2 samples		Range	88 to 92	6.2 to 7.4	35 to 35

Oregon Forage Library

Table 3. Dry matter, crude protein and acid detergent fiber levels.

Forages	OR County	Ave/Range	As-fed % DM	CP % DM	ADF % DM
Grass hay	Klamath	Average	90	11.2	35
2 samples		Range	88 to 92	9.6 to 12.9	32 to 38
Grass hay	Malheur	Average	90	11.9	37
2 samples		Range	88 to 92	9.6 to 13.5	36 to 41
Grass hay	Polk	Average	90	6.2	35
4 samples		Range	88 to 92	3.9 to 7.3	34 to 40
Grass hay	Umatilla		90	7.6	35
Grass hay	Wheeler		90	7.7	35
Grass hay	Polk		87	3.9	34
Grass hay - damp	Western OR	Average	81	11.8	37
4 samples		Range	78 to 83	8.2 to 15.6	34 to 40
Grass screenings	Marion		92	11.6	32
Grass screenings - pellets	Jefferson		95	13.1	37
Grass silage	Polk	Average	NA	10.2	34
3 samples		Range	NA	6.6 to 12.8	33 to 34
Grass silage	Western OR	Average	30	13.8	39
2 samples		Range	30 to 31	13.4 to 14.1	38 to 40
Grass silage	Yamhill		37	12.0	42
Grass straw	Western OR	Average	90	3.8	52
4 samples		Range	88 to 92	3.1 to 4.4	50 to 53
Meadow hay	Baker	Average	90	8.6	36
73 samples		Range	88 to 92	5.7 to 16.0	31 to 43
Meadow hay	Grant	Average	90	8.4	36
6 samples		Range	88 to 92	5.9 to 11.0	32 to 39
Meadow hay	Harney		90	9.3	38
Meadow hay	Malheur	Average	90	9.5	36
9 samples		Range	88 to 92	7.6 to 15.9	33 to 38
Meadow hay	Umatilla		90	6.8	39
Meadow hay	Union	Average	90	9.4	37
9 samples		Range	88 to 92	5.0 to 16.0	33 to 41
Meadow hay	Wallowa	Average	90	7.8	39
14 samples		Range	88 to 92	3.0 to 13.6	32 to 51
Meadow hay	Wheeler	Average	90	6.8	33
2 samples		Range	88 to 92	6.3 to 7.2	33 to 33
Meadow hay - improved	Baker	Average	90	9.3	36
19 samples		Range	88 to 92	6.0 to 15.0	31 to 40.7
Meadow hay - improved	Union	Average	90	9.7	37
14 samples		Range	88 to 92	6.3 to 17.5	32 to 42
Meadow hay - improved	Wallowa	Average	90	9.5	37
4 samples		Range	88 to 92	7.0 to 11.0	34 to 40
Oat hay	Baker	Average	90	10.2	36
3 samples		Range	88 to 92	8.2 to 13.3	32 to 41
Oat hay	Malheur	Average	90	8.9	36
2 samples		Range	88 to 92	8.5 to 9.3	34 to 38
Oat hay	Union		88	7.1	36

Oregon Forage Library

Table 3. Dry matter, crude protein and acid detergent fiber levels.

Forages	OR County	Ave/Range	As-fed % DM	CP % DM	ADF % DM
Oat hay		Average	90	7.3	34
5 samples		Range	88 to 92	5.8 to 9.1	31 to 37
Oat hay - damp	Western OR		81	7.8	41
Oat silage	Yamhill		42	4.5	21
Oat silage			38	8.4	43
Orchardgrass hay	Jefferson		90	12.0	34
Orchardgrass hay		Average	90	7.1	38
3 samples		Range	88 to 92	5.7 to 8.2	37 to 38
Pea-vine hay	Umatilla		90	9.7	33
Pea-vine hay			90	10.6	30
Pea/oat hay	Baker		85	10.1	38
Pea/oat hay	Grant		88	13.0	36
Pigweed	Union		NA	10.1	31
Quack grass hay	Klamath	Average	90	7.9	38
3 samples		Range	88 to 92	6.9 to 8.6	35 to 38
Rye hay	Western OR		90	6.0	41
Rye silage	Western OR		29	8.4	42
Ryegrass straw	Benton	Average	90	5.4	44
20 samples		Range	88 to 92	2.7 to 7.7	40 to 52
Ryegrass straw	Umatilla		90	5.2	41
Ryegrass/fescue straw	Polk		90	5.2	33
Sorghum/sudangrass hay	Western OR		90	11.0	42
Sorghum/sudangrass silage	Western OR		29	14.0	39
Sudangrass hay	Umatilla		90	14.1	30
Sudangrass hay			90	9.4	40
Sudangrass hay - damp	Western OR		77	13.9	39
Timothy hay	Polk		90	5.8	35
Timothy/clover hay	Klamath		90	8.1	33
Triticale silage			22	6.9	52
Wheat hay	Polk		90	6.5	40
Wheat hay	Union	Average	90	8.5	31
2 samples		Range	88 to 92	8.0 to 9.0	31 to 31
Wheat hay	Wallowa		90	7.0	30
Wheat hay		Average	90	9.4	30
3 samples		Range	88 to 92	8.4 to 11.1	27 to 33
Wheat hay	Polk	Average	90	6.8	36
2 samples		Range	88 to 92	5.7 to 7.8	36 to 36
Wheat silage			38	12.0	32
Wheat straw	Klamath		90	3.9	40

Oregon Forage Library

Table 3. Dry matter, crude protein and acid detergent fiber levels.

Forages	Oregon County	Average/Range	As-fed % DM	CP % DM	ADF % DM
Alfalfa cubes	Western OR		90	14.8	37
Alfalfa hay	Malheur		90	14.7	33
Alfalfa hay	Polk	Average	90	18.0	35
2 samples		Range	88 to 92	17.0 to 18.9	32 to 39
Alfalfa hay	Wheeler		90	19.5	33
Alfalfa hay - 1st cutting	Baker	Average	90	17.6	32
13 samples		Range	88 to 92	13.0 to 21.3	26 to 38
Alfalfa hay - 1st cutting	Grant		90	15.0	30
Alfalfa hay - 1st cutting	Harney	Average	90	16.2	35
3 samples		Range	88 to 92	15.1 to 17.2	31 to 37
Alfalfa hay - 1st cutting	Jefferson		90	16.6	39
Alfalfa hay - 1st cutting	Klamath		90	12.1	36
Alfalfa hay - 1st cutting	Malheur		90	17.8	32
Alfalfa hay - 1st cutting	Umatilla		90	19.6	29
Alfalfa hay - 1st cutting	Union	Average	90	14.7	34
9 samples		Range	88 to 92	13.0 to 17.4	37 to 39
Alfalfa hay - 1st cutting	Wheeler	Average	90	13.5	32
2 samples		Range	88 to 92	9.0 to 16.7	31 to 33
Alfalfa hay - 2nd cutting	Baker	Average	90	19.6	33
8 samples		Range	88 to 92	14.0 to 22.9	30 to 37
Alfalfa hay - 2nd cutting	Grant	Average	90	16.6	33
3 samples		Range	88 to 92	11.4 to 20.3	30 to 36
Alfalfa hay - 2nd cutting	Harney	Average	90	18.4	33
7 samples		Range	88 to 92	16.5 to 20.9	30 to 37
Alfalfa hay - 2nd cutting	Jefferson		90	16.5	38
Alfalfa hay - 2nd cutting	Klamath		90	18.2	31
Alfalfa hay - 2nd cutting	Malheur	Average	90	18.2	31
3 samples		Range	88 to 92	16.8 to 19.2	27 to 33
Alfalfa hay - 2nd cutting	Umatilla		90	19.3	29
Alfalfa hay - 2nd cutting	Union	Average	90	18.3	31
7 samples		Range	88 to 92	15.0 to 22.0	25 to 41
Alfalfa hay - 2nd cutting	Wallowa	Average	90	15.0	42
2 samples		Range	88 to 92	14.8 to 15.2	41 to 42
Alfalfa hay - 2nd cutting	Wheeler	Average	90	19.0	30
3 samples		Range	88 to 92	17.4 to 20.3	29 to 34
Alfalfa hay - 3rd cutting	Baker	Average	90	22.5	27
3 samples		Range	88 to 92	21.9 to 22.6	26 to 28
Alfalfa hay - 3rd cutting	Grant		90	16.1	33
Alfalfa hay - 3rd cutting	Harney	Average	90	20.8	27
4 samples		Range	88 to 92	20.1 to 21.4	26 to 28
Alfalfa hay - 3rd cutting	Jefferson		90	18.3	37
Alfalfa hay - 3rd cutting	Wheeler	Average	90	19.6	30
2 samples		Range	88 to 92	18.2 to 20.9	29 to 30
Alfalfa hay - 4th cutting	Malheur		90	21.9	31
Alfalfa mix hay	Baker	Average	90	13.6	36
15 samples		Range	88 to 92	8.1 to 17.0	29 to 39

Oregon Forage Library

Table 3. Dry matter, crude protein and acid detergent fiber levels.

Forages	Oregon County	Average/Range	As-fed % DM	CP % DM	ADF % DM
Alfalfa mix hay	Jefferson		90	17.5	38
Alfalfa mix hay	Klamath	Average	90	15.4	36
2 samples		Range	88 to 92	14.7 to 16.1	31 to 40
Alfalfa mix hay	Malheur	Average	90	15.8	33
2 samples		Range	88 to 92	12.6 to 18.9	33 to 34
Alfalfa mix hay	Union	Average	90	10.8	37
24 samples		Range	88 to 92	7.0 to 17.2	29 to 43
Alfalfa mix hay	Wallowa	Average	90	11.1	38
12 samples		Range	88 to 92	8.0 to 14.0	33 to 42
Alfalfa mix hay	Wheeler	Average	90	13.3	34
4 samples		Range	88 to 92	10.2 to 16.9	31 to 35
Alfalfa silage	Yamhill	Average	33	16.7	35
2 samples		Range	30 to 36	16.5 to 16.9	31 to 40
Barley hay	Baker		90	11.0	33
Barley hay	Union		90	13.0	34
Barley hay	Western OR		90	9.1	35
Barley hay	Wheeler		90	10.6	34
Barley hay - damp	Western OR		77	11.9	38
Bentgrass straw	Jefferson	Average	90	7.6	35
2 samples		Range	88 to 92	6.7 to 7.6	35 to 35
Bentgrass - see also ryegrass					
Bluegrass hay	Union		90	7.0	48
Bluegrass hay	Wheeler		90	8.5	35
Bluegrass straw	Baker		90	7.1	43
Bluegrass straw	Jefferson		90	11.6	40
Bluegrass straw	Umatilla		90	8.3	36
Bluegrass straw	Wallowa		90	8.4	39
Brome straw	Polk	Average	90	5.0	38
4 samples		Range	88 to 92	4.3 to 5.6	37 to 39
Canary grass hay - 1st cutting	Coos		90	11.3	34
Clover hay, red	Polk		90	14.3	32
Clover hay - see also grass hay or ryegrass hay					
Clover silage, red	Yamhill	Average	55	11.3	33
2 samples		Range	50 to 59	11.3 to 11.3	31 to 35
Corn silage	Western OR		23	8.4	30
Corn silage			25	8.7	31
Corn silage, sweet	Western OR		19	7.9	39
Fescue hay	Western OR	Average	90	6.8	32
6 samples		Range	88 to 92	6.1 to 9.5	29 to 35
Fescue straw	Wheeler		90	4.3	40
Fescue straw, tall	Umatilla		90	5.5	39
Grass hay - 1st cutting	Coos		90	9.3	33
Grass hay	Grant	Average	90	6.8	35
2 samples		Range	88 to 92	6.2 to 7.4	35 to 35
Grass hay	Klamath	Average	90	11.2	35
2 samples		Range	88 to 92	9.6 to 12.9	32 to 38

Oregon Forage Library

Table 3. Dry matter, crude protein and acid detergent fiber levels.

Forages	Oregon County	Average/ Range	As-fed % DM	CP % DM	ADF % DM
Grass hay	Malheur	Average	90	11.9	37
2 samples		Range	88 to 92	9.6 to 13.5	36 to 41
Grass hay	Polk	Average	90	6.2	35
4 samples		Range	88 to 92	3.9 to 7.3	34 to 40
Grass hay	Umatilla		90	7.6	35
Grass hay	Wheeler		90	7.7	35
Grass hay	Polk		87	3.9	34
Grass hay - damp	Western OR	Average	81	11.8	37
4 samples		Range	78 to 83	8.2 to 15.6	34 to 40
Grass/clover hay - 1st cutting	Coos	Average	90	8.0	37
2 samples		Range	88 to 92	7.4 to 8.6	36 to 37
Grass/clover hay	Grant	Average	90	8.2	35
8 samples		Range	88 to 92	6.6 to 11.9	31 to 36
Grass/clover hay	Polk		85	6.8	38
Grass screenings	Marion		92	11.6	32
Grass screenings - pellets	Jefferson		95	13.1	37
Grass silage	Polk	Average	NA	10.2	34
3 samples		Range	NA	6.6 to 12.8	33 to 34
Grass silage	Western OR	Average	30	13.8	39
2 samples		Range	30 to 31	13.4 to 14.1	38 to 40
Grass silage	Yamhill		37	12.0	42
Grass straw	Western OR	Average	90	3.8	52
4 samples		Range	88 to 92	3.1 to 4.4	50 to 53
Meadow hay	Baker	Average	90	8.6	36
73 samples		Range	88 to 92	5.7 to 16.0	31 to 43
Meadow hay	Grant	Average	90	8.4	36
6 samples		Range	88 to 92	5.9 to 11.0	32 to 39
Meadow hay	Harney		90	9.3	38
Meadow hay	Malheur	Average	90	9.5	36
9 samples		Range	88 to 92	7.6 to 15.9	33 to 38
Meadow hay	Umatilla		90	6.8	39
Meadow hay	Union	Average	90	9.4	37
9 samples		Range	88 to 92	5.0 to 16.0	33 to 41
Meadow hay	Wallowa	Average	90	7.8	39
14 samples		Range	88 to 92	3.0 to 13.6	32 to 51
Meadow hay	Wheeler	Average	90	6.8	33
2 samples		Range	88 to 92	6.3 to 7.2	33 to 33
Meadow hay - improved	Baker	Average	90	9.3	36
19 samples		Range	88 to 92	6.0 to 15.0	31 to 40.7
Meadow hay - improved	Union	Average	90	9.7	37
14 samples		Range	88 to 92	6.3 to 17.5	32 to 42
Meadow hay - improved	Wallowa	Average	90	9.5	37
4 samples		Range	88 to 92	7.0 to 11.0	34 to 40
Oat hay	Baker	Average	90	10.2	36
3 samples		Range	88 to 92	8.2 to 13.3	32 to 41

Oregon Forage Library

Table 3. Dry matter, crude protein and acid detergent fiber levels.

Forages	Oregon County	Average/Range	As-fed % DM	CP % DM	ADF % DM
Oat hay	Malheur	Average	90	8.9	36
2 samples		Range	88 to 92	8.5 to 9.3	34 to 38
Oat hay	Union		88	7.1	36
Oat hay		Average	90	7.3	34
5 samples		Range	88 to 92	5.8 to 9.1	31 to 37
Oat hay - damp	Western OR		81	7.8	41
Oat silage	Yamhill		42	4.5	21
Oat silage			38	8.4	43
Orchardgrass hay	Jefferson		90	12.0	34
Orchardgrass hay		Average	90	7.1	38
3 samples		Range	88 to 92	5.7 to 8.2	37 to 38
Orchard grass hay - see also ryegrass					
Pea-vine hay	Umatilla		90	9.7	33
Pea-vine hay			90	10.6	30
Pea/ oat hay	Baker		85	10.1	38
Pea/ oat hay	Grant		88	13.0	36
Pigweed	Union		NA	10.1	31
Quack grass hay	Klamath	Average	90	7.9	38
3 samples		Range	88 to 92	6.9 to 8.6	35 to 38
Rye hay	Western OR		90	6.0	41
Rye silage	Western OR		29	8.4	42
Ryegrass/bentgrass/clover/fescue hay - 1st cutting	Coos		90	9.4	33
Ryegrass/bentgrass/clover/fescue hay - 2nd cutting	Coos		90	13.5	30
Ryegrass/bentgrass/orchard/vetch hay - 1st cutting	Coos		90	7.9	40
2 samples			88 to 92	7.4 to 8.4	39 to 40
Ryegrass/bentgrass/vetch grass hay - 1st cutting	Coos		90	8.6	40
Ryegrass/clover hay - 2nd cutting	Coos		90	11.1	36
Ryegrass/clover/bentgrass hay - 2nd cutting	Coos		90	12.1	32
Ryegrass/clover/bentgrass/vetch hay - 1st cutting	Coos		90	7.3	38
Ryegrass/clover/orchard/vetch hay - 1st cutting	Coos		90	9.1	38
Ryegrass/clover/orchard/fescue hay - 2nd cutting	Coos		90	12.2	35
Ryegrass straw	Benton	Average	90	5.4	44
20 samples		Range	88 to 92	2.7 to 7.7	40 to 52
Ryegrass straw	Umatilla		90	5.2	41
Ryegrass/fescue straw	Polk		90	5.2	33
Sorghum/sudangrass hay	Western OR		90	11.0	42
Sorghum/sudangrass silage	Western OR		29	14.0	39
Sudangrass hay	Umatilla		90	14.1	30
Sudangrass hay			90	9.4	40
Sudangrass hay - damp	Western OR		77	13.9	39
Timothy hay	Polk		90	5.8	35
Timothy/clover hay	Klamath		90	8.1	33
Triticale silage			22	6.9	52
Wheat hay	Polk		90	6.5	40
Wheat hay	Union	Average	90	8.5	31
2 samples		Range	88 to 92	8.0 to 9.0	31 to 31

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Table 3. Dry matter, crude protein and acid detergent fiber levels.

Forages	Oregon County	Average/ Range	As-fed % DM	CP % DM	ADF % DM
Wheat hay	Wallowa		90	7.0	30
Wheat hay 3 samples		Average Range	90 88 to 92	9.4 8.4 to 11.1	30 27 to 33
Wheat hay 2 samples	Polk	Average Range	90 88 to 92	6.8 5.7 to 7.8	36 36 to 36
Wheat silage			38	12.0	32
Wheat straw	Klamath		90	3.9	40

Oregon Forage Library
Analysis of Coos County hays - analyzed by New York DHI . Energy values estimated from ADF.

Forages	Location	Irrigated	As-fed % DM	CP %DM	Sol CP % CP	ADF %DM	NDF %DM	NSC % DM	TDN % DM	NEM Mcal/lb	NEg Mcal/lb
Canary grass hay - 1st cutting	Bandon	Yes	90.7	11.3	22.0	33.8	57.8	20.9	58	0.58	0.32
Grass hay - 1st cutting	Gaylord	No	91.3	9.3	24.0	33.1	57.1	23.6	59	0.58	0.32
Grass/clover hay - 1st cutting	Myrtle Pt.	No	91.0	8.6	29.0	37.4	59.1	22.3	58	0.58	0.32
Grass/clover hay - 1st cutting	Myrtle Pt.	Yes	90.7	7.4	26.0	36.1	59.8	22.8	58	0.57	0.31
Ryegrass/bentgrass/clover/fescue hay - 1st cutting	Broadbent	No	90.6	9.4	33.0	32.8	53.6	27.0	59	0.60	0.34
Ryegrass/bentgrass/clover/fescue hay - 2nd cutting	Broadbent	Yes	89.5	13.5	24.0	29.5	43.8	32.7	62	0.64	0.37
Ryegrass/bentgrass/orchard/vetch grass hay - 1st cutting	Bandon	No	91.5	7.4	28.0	40.2	63.6	19.0	57	0.56	0.30
Ryegrass/bentgrass/orchard/vetch grass hay - 1st cutting	Bandon	No	90.9	8.4	27.0	39.2	61.7	19.9	57	0.57	0.31
Ryegrass/bentgrass/orchard/vetch grass hay - 1st cutting	Catching	No	91.4	8.6	24.0	39.8	63.7	17.7	57	0.56	0.30
Ryegrass/clover hay - 2nd cutting	Coos Bay	No	90.8	11.1	23.0	36.2	57.3	21.6	59	0.58	0.32
Ryegrass/clover/bentgrass hay - 2nd cutting	Coquille	Yes	90.8	12.1	19.0	32.1	54.4	23.5	59	0.60	0.34
Ryegrass/clover/bentgrass/vetch hay - 1st cutting	Bandon	No	90.5	7.3	25.0	37.5	58.8	23.9	58	0.58	0.32
Ryegrass/clover/orchard/vetch hay - 1st cutting	Catching	No	89.7	9.1	25.0	37.7	57.6	23.3	58	0.58	0.32
Ryegrass/clover/orchard/fescue hay - 2nd cutting	Lee Valley	Yes	90.9	12.2	27.0	35.0	56.2	21.6	59	0.59	0.33

Forages	Location	As-fed % DM	CP %DM	Sol CP % CP	ADF %DM	NDF %DM	NSC % DM	TDN % DM	NEM Mcal/lb	NEg Mcal/lb
1st cutting vs 2nd cutting										
1st cutting	Coos	90.8	8.7	26.3	36.8	59.3	22.0	58	0.58	0.32
2nd cutting	Coos	90.5	12.2	23.3	33.2	52.9	24.9	60	0.60	0.34
Canary vs grass/clover vs ryegrass mixes										
Canary grass hay - 1st cutting - 1 sample	Coos	90.7	11.3	22.0	33.8	57.8	20.9	58	0.58	0.32
Grass/clover - 1st cutting - 2 samples	Coos	90.9	8.0	27.5	36.8	59.5	22.6	58	0.58	0.32
Ryegrass mixes - 1st cutting - 6 samples	Coos	90.8	8.4	27.0	37.9	59.8	21.8	58	0.58	0.32

Oregon Forage Library
Analysis of Coos County hays - analyzed by New York DHI . Energy values estimated from ADF.

Forages	Fertilized	Grazed	Key
Canary grass hay - 1st cutting	urea	Yes	Waterman-c
Grass hay - 1st cutting	None		McWilliam
Grass/clover hay - 1st cutting	?		Windsong
Grass/clover hay - 1st cutting	None		Grant
Ryegrass/bentgrass/clover/fescue hay - 1st cutting	urea		Wiley
Ryegrass/bentgrass/clover/fescue hay - 2nd cutting	urea		Mast
Ryegrass/bentgrass/orchard/vetch grass hay - 1st cutting	16-16-16		Utsey
Ryegrass/bentgrass/orchard/vetch grass hay - 1st cutting	16-16-16		Utsey
Ryegrass/bentgrass/vetch grass hay - 1st cutting	Sewage S		McCarthy
Ryegrass/clover hay - 2nd cutting	urea/triple 16		Rooke
Ryegrass/clover/bentgrass hay - 2nd cutting	urea		Trolard
Ryegrass/clover/bentgrass/vetch hay - 1st cutting	20-0-14	Yes	Waterman-R
Ryegrass/clover/orchard/vetch hay - 1st cutting	None		Kennedy
Ryegrass/clover/orchard/fescue hay - 2nd cutting	16-16-16		Morey

Table 4. Oregon Byproduct Feed Analyses

Byproduct feed	Description	Company	Location	As-fed %DM	CP %DM	ADF %DM	Ash %DM	IE %DM
Apples	Seed and pulp after juice extraction	Smuckers	Woodburn	34.3	8.7	49.2	1.1	16.2
Apples	Whole	Snokist	Yakima, WA	8.9	7.9	30.6	0.04	9.0
Apples, mix	Whole - pears and apples	Snokist	Yakima, WA	9.5	6.1	30.1	0.1	7.2
Bean, wax	Whole	Stayton Canning Co.	Salem	6.4	16.9	21.2	7.7	1.3
Bean, wax	Mainly leaves	Stayton Canning Co.	Salem	19.6	16.9	29.4	21.5	2.1
Bean, wax	Mainly stems	Stayton Canning Co.	Salem	14.2	16.4	29.5	17.8	
Beans, green	Whole, wormy and moldy beans from the belt	Northwest Packing	Vancouver, WA	8.1	19.4	17.8	9.8	1.8
Beans, green	Whole - some dirt mixed in	Northwest Packing	Vancouver, WA	13.6	12.1	43.0	50.6	
Beans, green	Whole - floor sweepings	AGRIPAC	Salem	16.8	12.9	44.0	48.1	
Beans, green	Stems and leaves only	AGRIPAC	Salem	13.9	13.6	38.7	35.7	2.6
Beans, green	Cleaned and chopped	AGRIPAC	Salem	8.8	17.1	25.1	6.6	
Beans, green	Whole	Stayton Canning Co.	Salem	8.6	20.0	20.1	6.5	
Beans, green, mix	Green beans and broccoli	Stayton Canning Co.	Salem	8.3	23.6	18.5	7.1	3.9
Blackberries	Presscake	Kerr Concentrates	Salem	30.8	8.1	57.9	2.0	5.3
Blackberries	Whole	Conroy Packing	Woodburn	28.3	10.3	26.6	7.8	7.4
Blackberries	Whole	Conroy Packing	Woodburn	26.5	11.4	22.8	4.8	
Blackberries	Whole	National Preserve	Salem	20.3	14.3	41.5	3.7	
Blackberries	Screenings from water filter	National Preserve	Salem	17.1		37.3	3.4	
Blackberries	Presscake	Kerr Concentrates	Salem	51.4	9.3	62.4	1.2	
Blackberries, mix	Cherries, blue & blackberries - floor sweepings	National Preserve	Salem	13.9	11.9	43.9	2.5	8.9
Blackberries, mix	35% evergreen berries:65% blackberries	Smuckers	Woodburn	56.2	11.5	58.9	2.0	17.0
Blueberries	Whole	Oregon Fruit Product	Salem	14.4	7.7	13.3	1.3	8.2
Blueberries	Whole, moldy	Oregon Fruit Product	Salem	12.6	6.9	16.7	1.6	
Blueberries	Presscake	Kerr Concentrates	Salem	39.6	5.3	59.0	0.7	4.3
Blueberries	Seed and pulp after juice extraction	Smuckers	Woodburn	43.2	14.8	45.1	1.2	10.4
Blueberries, mix	Cherries, blue & blackberries - floor sweepings	National Preserve	Salem	13.9	11.9	43.9	2.5	8.9
Boysenberries	Seed and pulp after juice extraction	Tualitan Valley	Cornelius	46.8	13.6	17.3	3.3	14.7
Boysenberries	Presscake	Kerr Concentrates	Salem	44.8	11.0	52.4	3.1	7.9
Boysenberries	Seed and pulp after juice extraction	Townsend Farms	Portland	31.4	10.8	38.7	2.2	
Broccoli	Whole	Stayton Canning Co.	Salem	11.3	24.8	15.9	9.0	4.8
Broccoli, mix	Green beans and broccoli	Stayton Canning Co.	Salem	8.3	23.6	18.5	7.1	3.9
Cabbage	Whole	Reser's Fine Foods	Beaverton	10.3	12.6	16.6	10.0	2.4
Carrots mix	Cauliflower and carrots mix	Stayton Canning Co.	Salem	8.2	22.5	20.4	6.4	2.5
Carrots, mix	Cauliflower, peas and carrots	Stayton Canning Co.	Salem	9.6	22.4	28.3	13.7	1.8
Cauliflower	Whole	General Foods	Woodburn	6.5	24.9	23.3	12.9	1.9
Cauliflower, mix	Cauliflower, peas and carrots	Stayton Canning Co.	Salem	9.6	22.4	28.3	13.7	1.8
Celery	Presscake	Kerr Concentrates	Salem	14.9	8.0	71.1	0.1	1.0
Cherries, red tart	Seed and pulp after juice extraction	Smuckers	Woodburn	34.2	12.4	44.8	1.2	8.3
Cherries, black	Stems and leaves only	National Preserve	Salem	15.5	15.6	40.9	4.8	12.2
Cherries, black	Pits only	National Preserve	Salem	26.0	9.2	59.7	2.3	4.5
Cherries, mix	Cherries, blue & blackberries - floor sweepings	National Preserve	Salem	13.9	11.9	43.9	2.5	8.9
Cherries, red	Presscake	Kerr Concentrates	Salem	47.8	9.1	62.5	1.4	3.7
Cherries, yellow	Brined whole with stems	Allen Fruit Co.	Salem	19.6	6.6	48.7	4.4	3.3
Coleslaw	Outdated	Reser's Fine Foods	Beaverton	21.4	4.3	6.6	4.8	39.6

Table 4 agon Byproduct Feed Analyses

Byproduct feed	Description	Company	Location	As-fed %DM	CP %DM	ADF %DM	Ash %DM	EE %DM
Corn	Mulch from a water filter screen	Flavorland	Forest Grove	12.4	13.2	19.2	3.5	8.3
Corn	Cannery	Stayton Canning Co.	Salem	20.9		25.4	3.9	
Corn	Cannery	Flavorland	Forest Grove	19.5	10.6	27.5	5.7	3.2
Corn	Cannery	AGRIPAC	Salem	14.0		23.7	2.6	
Corn	Cannery	General Foods	Woodburn	17.4		26.9	2.6	
Corn water	Corn kernels chopped off the cob	Flavorland	Forest Grove	2.9	2.0	6.1	4.6	2.0
Evergreen berries	Seed and pulp after juice extraction	Townsend Farms	Portland	27.3	9.7	45.1	2.3	9.0
Evergreen, mix	35% evergreen berries:65% marionberries	Smuckers	Woodburn	51.5	9.0	55.0	1.4	13.9
Evergreen, mix	35% evergreen berries:65% blackberries	Smuckers	Woodburn	56.2	11.5	58.9	2.0	17.0
Grapes	Seed and pulp after juice extraction	Smuckers	Woodburn	34.2	7.2	51.4	1.6	11.6
Marionberries	Seed and pulp after juice extraction	Townsend Farms	Portland	18.9	10.2	13.6	2.7	9.5
Marionberries	Seed and pulp after juice extraction	Townsend Farms	Portland	26.2	10.7	34.4	2.1	
Marionberries, mix	35% evergreen berries:65% marionberries	Smuckers	Woodburn	51.5	9.0	55.0	1.4	13.9
Onions	Tops and skins	Spada	Brooks	68.9	6.2	42.1	10.7	3.0
Onions, mix	Pepper and onion washout from mixer	Reser's Fine Foods	Beaverton	19.3	8.5	6.0	5.8	17.1
Onions, red	Whole	Spada	Brooks	10.9	14.9	9.4	5.3	1.0
Onions, white	Whole - Fiesta Washington	Spada	Brooks	11.0	10.7	12.3	5.3	1.3
Onions, white	Whole - Progress	Spada	Brooks	11.1	10.1	8.6	4.8	0.7
Peaches	Whole	Snokist	Yakima, WA	9.0	8.5	37.1	3.3	6.4
Peaches, mix	Whole - peaches and pears	Snokist	Yakima, WA	11.4	6.8	52.5	2.2	5.6
Peaches, mix	Whole - peach and plums	Snokist	Yakima, WA	11.8	7.7	45.9	2.4	7.2
Pears	Filtrate from water filter	Northwest Packing	Vancouver, WA	7.0	8.3	43.6	2.5	5.6
Pears	Seed and pulp chunks	Northwest Packing	Vancouver, WA	24.5	7.6	32.8	2.1	6.7
Pears	Slurry waste	Snokist	Yakima, WA	25.0	6.4	42.7	2.2	4.7
Pears	Whole	Snokist	Yakima, WA	11.3	8.1	43.3	2.9	5.0
Pears	Waste sludge - black and pulpy	Snokist	Yakima, WA	8.1	35.0	8.5	0.4	1.1
Pears, mix	Whole - peaches and pears	Snokist	Yakima, WA	11.4	6.8	52.5	2.2	5.6
Pears, mix	Whole - pears and apples	Snokist	Yakima, WA	9.5	6.1	30.1	0.1	7.2
Peas, mix	Cauliflower, peas and carrots	Snokist	Yakima, WA	9.6	22.4	28.3	13.7	1.8
Peppers, mix	Pepper and onion washout from mixer	Stayton Canning Co.	Salem	19.3	8.5	6.0	5.8	17.1
Plums	Whole	Reser's Fine Foods	Beaverton	19.3	7.7	50.8	3.9	6.2
Plums, mix	Whole - peaches and plums	Snokist	Yakima, WA	11.8	7.7	45.9	2.4	7.2
Potato salad	Outdated	Snokist	Yakima, WA	28.8	7.1	1.8	7.4	28.6
Potatoes	Peeled	Reser's Fine Foods	Beaverton	16.7	14.6	3.5	4.5	0.3
Potatoes	Peels only	Reser's Fine Foods	Beaverton	8.3	20.5	48.3	5.4	1.9
Potatoes	Screening waste	Lamb-Weston	Yakima, WA	17.2	8.5	9.6	2.4	4.0
Raspberries	Seed and pulp after juice extraction	Townsend Farms	Portland	31.9	11.0	47.1	2.2	
Raspberries	Seed and pulp after juice extraction	Townsend Farms	Portland	14.1	7.5	21.9	2.2	9.1
Raspberries, black	Seed and pulp after juice extraction	Smuckers	Woodburn	54.1	10.2	47.3	1.7	16.7
Raspberries, red	Presscake	Kerr Concentrates	Salem	49.3	8.7	62.9	1.3	8.1
Strawberries	Whole, nonripe and overripe	Flavorland	Forest Grove	9.1	6.2	9.9	2.3	4.1
Strawberries	Whole, moldy swept off the floor	Flavorland	Forest Grove	8.6	7.5	8.8	3.7	
Strawberries	Presscake	Kerr Concentrates	Salem	43.2	4.8	75.6	0.1	2.2
Strawberries	Presscake	Smuckers	Woodburn	65.4	7.3	61.4	2.1	9.6

Component	Low-protein (5 - 8.9%)	Mid-protein (9 - 11.9%)	High-protein (12 - 16%)
Crude Protein (%)	6.9	9.9	12.5
Acid Detergent Fiber (%)	42	39	37
Neutral Detergent Fiber (%)	66	64	57
Total Digestible Nutrients (%) (Energy)	56	58	60
Percentage of Samples	64%	28%	8%

COMPONENT	ALFALFA-GRASS HAY	ALFALFA HAY
CRUDE PROTEIN(%)	17 - 20	16 - 20
ACID DETERGENT FIBER (%)	31 - 38	34 - 43
NEUTRAL DETERGENT FIBER (%)	43 - 50	41 - 53
TOTAL DIGESTIBLE NUTRIENTS (%) (Energy)	59 - 61	56 - 60

Table 1. Survey of Mineral Content of Grass & Clover Hay in Douglas County (Douglas County Hay Survey. 1998. Shelby Filley, OSU Extension Service and Rex Heard, DC Farmers Cooperative).

Minerals	Average (range) of 40 samples
Calcium (%) ^a	0.43 (.23 - .70)
Cobalt (ppm)	Not done
Copper (ppm)	5.60 (4-7)
Iodine (ppm)	Not done
Iron (ppm)	153.00 (49-726)
Magnesium (%)	0.20 (.14-.29)
Manganese (ppm)	172.13 (34-366)
Molybdenum (ppm)	1.20 (<1-1.9)
Nickel (ppm)	Not done
Phosphorus (%)	0.22 (.15-.29)
Potassium (%)	1.78 (1.6-2.5)
Selenium (ppm)	Not done, widely deficient
Sodium (%)	0.09 (.02-.27)
Sulfur (%)	Not done
Zinc (ppm)	20.50 (15-28)

^a ppm = parts per million (1 ppm = 0.0001%; 1% = 10,000 ppm) and 1 mg/kg = 1 ppm.