In Defense of Alfalfa: the "Superstition Feed."

By Eric Hoffman

SUPERSTITION: any belief or attitude that is inconsistent with known laws of science or with what is generally considered in the particular society as true and rational: especially, such a belief in charms, omen, the supernatural, etc. - *Webster's New Twentieth Century Dictionary Unabridged, second edition 1979*

Comments made by breeders in regards to the use of alfalfa in their animals' diet:

"I heard alfalfa causes liver damage." -*California.*

"I don't feed alfalfa because my animals get sick on it," -*Oregon.*

"I heard alfalfa is too rich and it blows out the alpaca's fiber," -*Washington.*

Are these statements, provided to veterinarians from clients in the western states, based in science or do they better fit the definition of a superstition? Is alfalfa getting a bum rap?

Historical Perspective

During the last 25 years the raising of domestic camelids has gone from a primarily Andean phenomenon to an animal husbandry story that involves a much wider climatic and dietary spectrum than camelids had ever experienced in the Andes.

As alpacas and llamas settle into their new environments they are introduced to new forages. For the most part they adapt well, providing the forage has the correct nutritional ingredients. This may mean a domestic camelid living in northern California in a dry-lot environment, (one in which all food is consumed from feeding troughs that are filled each day), will have an entirely different culinary experience than a llama or alpaca grazing in bountiful summer pastures near Calgary, Canada. Dietary offerings are different in different locations so recommending a single type of forage becomes a somewhat regional exercise.

What Do You Feed Them?

Details aside, many newcomers to llama and alpaca ownership ask a fairly straightforward question. "What do you feed them?" A common answer to this question is to name a type of forage: Orchard grass hay, Bermuda grass, Ryegrass etc. Often the answer to the question is based on the dominant type of hay in a given region.

In Chapter 9, "Feeding the Alpaca," in *The Complete Alpaca Book*, Robert J. Van Saun DVM, MS, PhD, ACT/AVN produced nearly 55 pages of text on a myriad of dietary aspects of domestic camelids, including applied digestive anatomy, microbial fermentation, and glucose metabolism.

Dr. Van Saun is extraordinarily qualified to write about camelid nutrition. He's been studying it nearly 20 years and is board certified in nutrition. From Dr. Van Saun's chapter three tables (Tables: 9:19, 19:20, and 9:28, displayed on the following pages of this article) help in this discussion. Tables 9:19 and 19:20 name common forages and pastures found in North America and their general nutrient contents. Table 9:28 describes seven subgroups of alpacas and their nutrient requirements.

Forage: Content is the Key, Not the Particular Type

Naming a type of forage as an end-all for a dietary program has several pitfalls. To start with alpacas are browsers, who have adapted to their natural environment by sampling an assortment of plants, each having different nutritional contents. In this way they maximize the nutritional values available to them.

Secondly forages (or hays) of a particular species can differ widely in their nutritional content, depending on when the hay was baled relative to its growth cycle, weather patterns, nutritional content of the soil and other factors. Naming a particular forage as an end-all without running a forage analysis carries risks. For example, Orchard grass can range between 6 to 20 percent in crude protein content within the same growing season. A six percent protein hay is inadequate for camelids, while a 20 percent protein hay is more than adequate. There are, of course, other nutritional requirements, which can be discussed in a subsequent article.

More than one breeder has been surprised when he/she realized numerous animals in their herd were losing weight and not prospering when the hay troughs were full and the animals ate all day long. Often, the hay source and forage type hadn't changed. What had changed was the quality – perhaps the hay that had been 14% protein and was now 6% protein because it had been harvested after it went to seed. Not knowing the difference in a possible range in quality of a particular forage can literally mean life or death to high-

Table 9.19 Nutrient composition of various dried forages (grasses and legumes) available in the North America. All nutrient values, excluding dry matter, are on a dry matter basis.

	DM	NDF	Lignin	TDN	ME	CP	NFC	Fat	Ash	Ca	P	Mg	K	Na	S
Grasses	%	% DM	% NDF	% DM	Mcal/kgg	% DM									
Bahiagrass Hay	90	72	11.11	51.0	1.84	8.2	9.7	1.6	11	0.5	0.22	0.19	0	0	0
Bermudagrass Late Vegetative	91	76.6	8.57	49.0	1.77	7.8	7.6	2.7	8	0.26	0.18	0.13	1.3	0.08	0.21
Brome Hay Prebloom	88	55	7.69	60.0	2.17	16	21.4	2.6	10	0.32	0.37	0.09	2.32	0.02	0.2
Brome Hay Midbloom	88	57.7	6.06	56.0	2.02	14.4	19.3	2.2	10.9	0.29	0.28	0.1	1.99	0.01	0
Brome Hay Late bloom	91	68	11.11	55.0	1.99	10	13.8	2.3	9	0	0	0	0	0	0
Brome Hay Mature	92	70.5	11.27	53.0	1.92	6	16.2	2	7.2	0.26	0.22	0.12	1.85	0.01	0
Fescue Meadow Hay	88	65	10.77	56.0	2.02	9.1	18.3	2.4	8	0.37	0.29	0.5	1.84	0	0
Fescue Alta Hay	89	70	9.29	55.0	1.99	10.2	10.8	2.2	10	0.39	0.24	0.23	2.38	0	0
Fescue K31 Hay	91	62.2	6.35	61.0	2.21	15	13.4	5.5	9	0.51	0.37	0.27	2.3	0	0.18
Fescue K31 Hay Full bloom	91	67	7.46	58.0	2.10	12.9	11.2	5.3	8	0.43	0.32	0.17	2.3	0	0.26
Fescue K31 Mature	91	70	10.00	44.0	1.59	10.8	11.4	4.7	6.8	0.41	0.3	0.16	1.96	0.02	0
Meadowgrass Hay	90.7	65.9	9.80	62.0	2.24	6.6	18.0	2.8	7.5	0.22	0.13	0.15	1.71	0.389	0.15
Meadow Hay	90	67.6	5.00	60.0	2.17	13.4	5.3	3	11	0.26	0.15	0	0	0	0
Oat Hay	91.9	51	16.50	68.0	2.46	7.8	30.8	3.8	7.38	0.16	0.18	0.12	1.55	0.346	0.15
Oat Straw	92.2	74.4	20.00	45.0	1.63	4.4	14.5	2.2	7.8	0.23	0.06	0.17	2.53	0.42	0.22
Orchardgrass Hay Early bloom	89	59.6	7.70	65.0	2.35	12.8	20.2	2.9	8.5	0.27	0.34	0.11	2.91	0.01	0.26
Orchardgrass Hay Late bloom	90.6	65	11.40	54.0	1.95	8.4	15.7	3.4	10.1	0.26	0.3	0.11	2.67	0.01	0
Prairie Hay	91	72.7	6.00	48.0	1.74	5.3	11.1	3	8	0.35	0.14	0.26	1	0	0
Reed Canarygrass Hay	89	64	6.25	55.0	1.99	10.3	15.8	3.1	10	0.36	0.24	0.22	2.91	0.02	0
Ryegrass Hay	88	41	4.88	64.0	2.31	8.6	40.9	2.2	10	0	0	0	0	0	0
Ryegrass Hay Mature	92	68	16.20	58.0	2.10	7	14.7	2.5	8.5	0.28	0.17	0.08	1.7	0.005	0.12
Sorghum Sudan Hay	91	66	6.06	56.1	2.03	11.3	15.8	1.8	9.6	0.51	0.31	0.37	2.08	0.02	0.06
Timothy Hay Early bloom	89	61.4	6.56	59.0	2.13	10.8	22.6	2.8	5.7	0.51	0.29	0.13	2.41	0.01	0.13
Timothy Hay Full bloom	89	64.2	8.82	56.0	2.02	8.1	22.1	2.9	5.2	0.43	0.2	0.09	1.99	0.07	0.14
Timothy Hay Late Vegetative	89	55	5.45	62.0	2.24	14	24.3	3	8	0.45	0.4	0.11	3.05	0.07	0.13
Timothy Hay Midbloom	89	63.7	7.46	57.0	2.06	9.7	19.9	2.7	7	0.48	0.23	0.13	1.82	0.01	0.13
Timothy Hay Seed Stage	89	72	12.50	47.0	1.70	6	15.9	2	6	0	0	0	0	0	0
Wheat Straw	89	78.9	16.47	41.0	1.48	3.5	9.0	2	7.7	0.17	0.05	0.12	1.41	0.14	0.19
Wheatgrass Crest Hay	92	65	9.23	53.0	1.92	9	17.5	2.3	9	0.26	0.15	0	0	0	0
Legumes															
Alfalfa Hay Early Vegetative	91	36	14.72	67.0	2.42	23.4	30.9	3.2	10	1.5	0.33	0.21	2.51	0.12	0.54
Alfalfa Hay Late Vegetative	91	39	16.67	64.0	2.31	21.7	29.6	3	10	1.5	0.33	0.21	2.51	0.12	0.54
Alfalfa Hay Early Bloom	91	42	16.90	62.0	2.24	19.9	29.6	2.9	9.2	1.63	0.22	0.21	2.51	0.12	0.54
Alfalfa Hay Midbloom	91	49	18.91	60.0	2.17	17	27.3	2.39	8.57	1.39	0.24	0.35	1.56	0.12	0.28
Alfalfa Hay Full Bloom	91	51	20.39	56.0	2.02	13	29.0	1.8	9	1.19	0.24	0.27	1.56	0.07	0.3
Alfalfa Hay Late Bloom	91	55	22.18	53.0	1.92	12	27.4	1.6	8	1.19	0.24	0.27	1.56	0.07	0.3
Alfalfa Hay Mature	91	58	24.83	50.0	1.81	14	24.7	1.3	7	1.18	0.21	0.22	2.07	0.08	0.25
Alfalfa Hay Seeded	91	70	24.30	45.0	1.63	12	14.3	1	7	1.18	0.21	0.22	2.07	0.08	0.25
Alfalfa Hay Weathered	89	58	25.86	48.0	1.74	10	28.5	0	8	2.29	0.23	0.27	2.42	0.06	0
Alfalfa Meal Dehydrated 15% CP	90	55.4	26.00	59.0	2.13	17.3	19.3	2.4	9.9	1.38	0.25	0.29	2.46	0.08	0.21
Birdsfoot Trefoil Hay	91	47.5	19.15	59.0	2.13	15.9	31.1	2.1	7.4	1.7	0.23	0.51	1.92	0.07	0.25
Clover Ladino Hay	89	36	19.44	60.0	2.17	22.4	32.9	2.7	9.4	1.45	0.33	0.47	2.44	0.13	0.21
Clover Red Hay	88	46.9	17.86	55.0	1.99	15	33.1	2.8	7.5	1.38	0.24	0.38	1.81	0.18	0.16
Vetch Hay	89	48	16.67	57.0	2.06	20.8	26.4	3	7	1.36	0.34	0.27	2.12	0.52	0.15

Source: Modified from feed composition tables in National Research Council, 1996 (reference 97).

Table 9.20 Nutritional composition of pastures (grass, legume, mixed) in North America. All nutrient values, excluding dry matter, are on a dry matter basis.

	DM	NDF	Lignin	TDN	ME	CP	NFC	Fat	Ash	Ca	P	Mg	K	Na	S
	%	% DM	% NDF	% DM	Mcal/kg	% DM									
Bahiagrass 30% DM	30	68	10.29	54.0	1.95	8.9	12.3	2.1	10	0.46	0.22	0.25	1.45	0	0
Grass Pasture Spring	23	47.9	6.00	74.0	2.68	21.3	19.5	4	10.4	0.55	0.45	0.32	3.16	0	0.2
Grass Pasture Summer	25	55	7.00	67.0	2.42	15	20.9	3.7	9	0	0	0	0	0	0
Grass Pasture Fall	24	67	6.50	53.0	1.92	22	0.9	3.7	10	0	0	0	0	0	0
Leg Pasture Spring	20	33	8.00	79.0	2.86	28	29.1	2.7	10	1.71	0.3	0.36	2.27	0.21	0.36
Leg Pasture Summer	23.2	38	8.50	66.0	2.39	22.2	29.4	2.9	10.2	1.71	0.3	0.36	2.27	0.21	0.36
Meadow Spring	15	53	8.00	44.8	1.62	20.3	14.1	3	10	0.26	0.15	0	0	0	0
Meadow Fall	20	52	8.00	51.9	1.88	13.4	21.9	3	10	0.26	0.15	0	0	0	0
Mix Pasture Spring	21	41.5	7.00	79.0	2.86	26	22.3	3.2	10.25	0	0	0	0	0	0
Mix Pasture Summer	22	46.5	7.80	67.0	2.42	19.5	23.8	3.2	9.4	0	0	0	0	0	0
Napiergrass Fresh 30d	20	70	14.29	55.0	1.99	8.7	10.2	3	9	0.6	0.41	0.26	1.31	0.01	0.1
Napiergrass Fresh 60d	23	75	18.67	53.0	1.92	7.8	11.0	1	6	0.6	0.41	0.26	1.31	0.01	0.1
Pangolagrass Fresh	21	70	11.40	55.0	1.99	9.1	13.2	2.3	7.6	0.38	0.22	0.18	1.43	0	0
Range June Diet	20	65.6	5.00	64.9	2.35	11	13.0	3	10	0.26	0.15	0	0	0	0
Range July Diet	20	67.7	5.50	62.3	2.25	10.5	11.3	3	10	0.26	0.15	0	0	0	0
Range August Diet	20	63.7	8.00	59.4	2.15	9.7	15.9	3	10	0.26	0.15	0	0	0	0
Range September Diet	20	66.6	9.00	57.3	2.07	6.9	15.2	3	10	0.26	0.15	0	0	0	0
Range Winter	80	66.1	11.00	50.5	1.83	4.7	17.3	3	10	0.26	0.15	0	0	0	0
Red Top Fresh	29	64	12.50	63.0	2.28	11.6	15.3	3.9	8	0.62	0.37	0.25	2.35	0.05	0.16
Sorghum-Sudan Pasture	18	55	5.45	65.0	2.35	16.8	20.3	3.9	9	0.49	0.44	0.35	2.14	0	0.11

Source: Modified from feed composition tables in National Research Council, 1996 (reference 97).

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energy use camelids, such as lactating mothers or growing adolescent animals.

This allegiance to hay type with disregard to its nutritional content deserves closer scrutiny. One west coast farm, with no pasture and only dry lot conditions, fed their animals a rye/orchard grass mix. The first two years they took core samples of their hay, sent the sample to a laboratory, and found it to be optimum in protein levels at about 14 % protein and adequate in other key nutritional requirements. By the third year they didn't bother to test the hay because it looked like earlier shipments and came from the same source. They noticed their lactating females spent an inordinate amount of time eating from the feeding areas and began losing weight. Two of these moms suddenly took ill and died. Necropsies concluded both animals had died from fatty lipidosis. (See Michelle Ing DVM's article, "Case Study: Hepatic Lipidosis" in this issue of CQ.)

The entire herd was tested and other animals that were dangerously near the threshold of this dreaded disease were discovered. The hay was analyzed. The protein level was only 7.5 %, entirely inadequate for lactating females, adolescent animals and third trimester females, and a barely adequate maintenance level for adult males. The lesson here is that knowing the nutrient levels of your hay is important. In this case the hay had been subjected to late rains that washed away fertilizers and, although the resulting hay looked similar to earlier shipments, the nutritional value was substantially lower.

Had this hapless alpaca raiser known about the low nutritional value in his hay, he could've supplemented or replaced his forage with nutritionally richer hay to achieve the necessary protein levels. In most situations that supplemental forage would be alfalfa. Alfalfa is a legume, not a grass. In general, legumes are higher in protein than grasses and the world over, alfalfa is the legume of choice for many types of livestock.

Advantage in Blending Forages

Dr. Van Saun in Chapter 9 of *The Complete Alpaca Book*: "Often the question of forage type is asked relative to feeding

llamas and alpacas. Is alfalfa better than grass or vice a versa? There is no simple answer. Alfalfa hay has received much negative press relative to feeding camelids, often associated with causing obesity or perceptions of detrimental effects of high calcium intake. …[Because] of a llama's and alpaca's keen ability to select high-quality plant components, one can understand the potential of overeating concerns with alfalfa. However, unless grass is effectively managed to maintain a moderate to high-quality product, it too can be just as deleterious."

Dr Van Saun goes onto say, " Most non-mature pastures will maintain a protein level that meets or exceeds the protein content of alfalfa hay (see Table 9:20). Grasses, especially the mature ones, will have plenty of difficulty in being able to meet the energy or protein needs of the lactating or late pregnant animal without additional supplements. In most instances, a blend of alfalfa and grass hay may best match the nutrient requirements of the animal without supplementation." Dr. Van Saun goes onto explain how to calculate the mix based on nutritional contents of the hays involved.

What About Fiber Blow Out and Rich Hay ?

Veterinarians reporting thin adult animals, particularly lactating females, often cite the owner's desire to keep the micron count low as a possible contributing factor to the animal's poor body condition. Sometimes alfalfa is identified as the cause of coarse fibers, because of its high protein.

There are some historical events worth mentioning in this regard. When the screening of alpacas for export from South America began in 1995, a herd was presented that consisted of underweight animals who were mostly emaciated and scored no higher than 2 on a 1 to 5 body scoring system. The exporter explained that animals were on reduced feed to make sure their fiber stayed fine for the fiber-testing requirement for screening. From this lesson the registry involved made it a requirement that all animals must be in a good body condition at the time their fiber is sampled for testing purposes. It is worth noting since this incident approximately 20,000 alpacas have been exported from South America to points around the globe whose body weight was above 105 pounds (minimum adult size) or higher, with body scores of 2 (slightly under-condition), 3 (optimum), or 4 (slightly heavy, but not obese). This proved that healthy young adults with adequate body conditions could also possess good fiber quality. In the case of screening, the range was usually between 17 and 23 microns with a standard deviation of 3.5 to 5.5. Besides being inhumane, starving animals isn't necessary.

Aiding Recovery

Michelle Ing DVM of Loomis, CA: "I have seen my share of pregnant and lactating females whose body score is worrisome. In some cases these animals are in a pre-fatty lipidosis state and are very close to slipping into a critical care situation. In such cases I often have turned to alfalfa to help restore the alpaca to good health. We need to always keep in mind the alpaca's health is the top priority. Alfalfa may not be optimum in all conditions but as a source for high protein it is readily available to help correct diseases of deficiently low protein diets. Lactating females and older females are particularly vulnerable groups. Some animals need high protein diets to cope with aging, pregnancy and lactation. The challenge is identifying what the animal needs to be healthy and providing it."

In assessing your alpaca's nutritional needs, don't overlook the nutritional benefits of alfalfa because of "something you have heard".

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About the Author

Eric Hoffman is the primary author of the second revised edition The Complete Alpaca Book, (Bonny Doon Press, 2006). He wrote the first scientifically based alpaca registry (today known as ARI) in the world and is author of hundreds of articles on all four species of camelids. His articles have appeared in International Wildlife, Animals, Pacific Discovery, California Living, Wildlife Conservation and many other publications. His speaking engagements on camelids have taken him to many places including Australia, New Zealand, Sweden, Switzerland, Peru, Germany and England in recent times.

Table 9.21 **Suggested feeding groups based on physiologic state and nutrient requirements.[1]**

Group	Physiologic State	Feeding Plan	Dietary Guidelines[2]
Nursing dams with crias	Lactation	Highest nutrient requirements, feed best-quality forages, with energy/protein supplements	60-70% TDN, 12-14% crude protein, 0.45-0.62% Ca, 0.32-0.45% P[3]
Weanlings up to 1½ years	Growth	Highest nutrient requirements, feed best-quality forages, with energy/protein supplements	55-65% TDN, 14-16% crude protein, 0.53-0.73%Ca, 0.27-0.38% P[3]
Males over 1 year	Maintenance	Low requirements unless working, then adjust accordingly, low-to-moderate quality forage	55-60% TDN, 8-10% crude protein, 0.3-0.48% Ca, 0.21-0.28% P[3]
Pregnant females 1 - 8 months	Maintenance	Low requirements, but ensure no loss of body condition, adequate protein, minerals and vitamins	50-55% TDN, 8-10% crude protein, 0.2-0.24% Ca, 0.12-0.2% P
Pregnant females 9 - 11 months	Pregnancy	Moderate to high forage quality with supplement for additional mineral and vitamin needs	55-70%TDN, 10-12% crude protein, 0.45-0.56% Ca, 0.28-0.33% P[3,4]
Breeding females	Maintenance	Low to moderate; ensure do not become fate or lose condition	50-55% TDN, 8-10% crude protein, 0.2-0.24% Ca, 0.12-0.2% P
Obese females	Submaintenance	Low'; low-quality forages with mineral/vitamin supplement unless pregnant	40-50% TDN, 8-9% crude protein, 0.2-0.24% Ca, 0.12-0.2% P

[1] More precise dietary needs will be determined by level of production (milk, rate of growth), environmental conditions, and desired changes in body condition.
[2] Ensure adequate available water and free choice of salt. White salt should be used when trace minerals are included in a supplement. Otherwise trace mineral salt should be available.
[3] These feeding groups require higher amounts of trace minerals and vitamins, preferable delivered by a supplement.
[4] Dietary energy and crude protein content may need to be increased further in later pregnancy if dry matter intake drops below 1.5 percent of body weight.