



Inquiries on Skin Diseases and Eating Problems

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In this column I am taking the opportunity to respond to two questions submitted to the editors. The readers are encouraged to continue to submit specific questions or suggestions for future nutrition or feeding management topics.

Question 1: Zinc Supplementation and Skin Lesions

The first inquiry is a very common one for many llama and alpaca owners, skin lesions and what to do with them. First a disclaimer, I am not a board-certified dermatologist, but the question was more about feeding zinc to address this issue. As many owners are aware, llamas and alpacas have a propensity for unusual crusts and thickened skin that seems to be responsive to zinc supplementation. However, it must be emphasized that there are many other causes of skin disease in llamas and alpacas that are not responsive to zinc.

In this particular situation, the lesions are described as hard leathery skin primarily located on the ventral abdomen, inside of the legs and on the face. This lesion distribution is consistent with a number of dermatologic conditions, including parasitic disease and idiopathic hyperkeratotic dermatosis (zinc-responsive). One question to ask is if the animal seems pruritic (“itchy”). Parasitic diseases are most typical pruritic in nature. Idiopathic hyperkeratosis is commonly seen dermatologic disease in llamas and alpacas and may comprise a number of somewhat interrelated, or different, syndromes somewhat responsive to large doses of

dietary zinc. Diagnosis is best made by skin biopsy to identify the physical changes and thickening of the keratin layer.

Zinc has been associated with skin health in many different species. Classical zinc deficiency disease in pigs and other species is parakeratosis, a unique hyperkeratotic disease where the nuclei of keratin cells are retained rather than being lost. Parakeratosis in pigs and poultry has been associated with overfeeding of calcium in the diet, as calcium interferes with zinc availability in the intestine. A true zinc deficiency has not been definitively characterized with dermatologic lesions seen in llamas and alpacas, though it has been implied. A confounding issue is blood zinc concentrations in llamas and alpacas are lower than other species and they have been interpreted to be deficient. This point emphasizes the need for good llama and alpaca reference values for the proper interpretation of diagnostic tests. However, suprathysiologic doses of zinc (dietary supplementation in excess of requirements) could have a therapeutic effect, independent of a deficiency state. Role of zinc in the pathogenesis of hyperkeratotic dermatosis in llamas and alpacas remains elusive and requires further study.

In the situation at hand, I would consult with your veterinarian to ensure you do not have some other dermatologic disease process. If the diagnosis is a zinc-responsive dermatosis, then consider supplementation. The easiest method of supplementation is to find a commercial product with high zinc content. Dr. Norm Evans’ llama/alpaca pellet is a good example, though there are

others. Dr. LaRue Johnson has advocated a mineral mix containing 50 lb trace mineralized salt, 50 lbs steamed bone meal, 50 lb dry molasses and 10 lb zinc methionine (Zin-Pro 100[®]) containing approximately 5500 parts per million (ppm) zinc. At an expected intake of 1 oz per day, this mineral mix provides 150 mg zinc. As you and many other owners have found out, zinc supplements are not very palatable and simple top-dressing is not always successful. One could hide the zinc supplement in a tasty treat (applesauce) and hand feed, but this is labor intensive. You could mask the supplement in your grain by adding some molasses. If only one animal is involved, these may be feasible solutions.

How much zinc is necessary and from what source? We really do not have an answer at this time to these questions. Zinc can be supplemented in inorganic (zinc carbonate, zinc oxide or zinc sulfate) or organic (zinc methionine, zinc proteinate) forms. Questions remain as to whether the organic forms are superior or if inorganic forms can be supplemented at slightly higher levels with equal response. Current recommendations are to provide 1 g zinc sulfate (364 mg zinc) or 2 (200 mg zinc) to 4 (400 mg zinc) g zinc methionine (Zn-Pro 100[®], 10% zinc). As one can see, there is a wide range in recommended supplement amounts, but the actual amount of elemental zinc being delivered is between 200 and 400 mg per day. Zinc delivery from the Johnson mineral is slightly less and from the Evans' pellet slightly more than this range. Across all recommendations, response to daily zinc supplementation is slow, occurring over a 2 to 3 month period. If one is going to supplement at the higher rates, it is suggested that an organic zinc form be used as a large portion (40-60%) of the zinc supplement. Excessive zinc intake can interfere with other minerals (e.g., copper, iron, selenium) and may induce other

disease problems. Use of organic mineral forms will reduce these negative interactions. Don't fall into the trap of: "if a little is good, a lot more is better".

Free choice mineral supplements should contain a minimum of 5,500 ppm zinc. This number can typically be found on the product label under the guaranteed analysis. Zinc content of pellet or grain supplements will depend upon amount expected to be fed and how its mineral content complements the mineral supplement, if any is to be fed. Assuming all trace minerals coming from a supplement and not a mineral mix, a reasonable zinc content for a pellet supplement to be fed at a rate of 1 lb per day would be between 440 and 880 ppm to deliver 200 and 400 mg zinc per day, respectively. Use these numbers as guidelines in evaluating possible products for use in correcting this condition. Remember, it may require up to 2 to 3 months for a response to be seen. Work with your veterinarian to determine the proper diagnosis and proceed from that point.

Question 2: Problems following grain consumption

The second inquiry is in reference to a 3-year old male llama that seems to regurgitate food after eating. This is a more disconcerting issue as there is potential that this might indicate an untreatable, and ultimately, debilitating disease. There are two primary disease processes to differentiate in this scenario, choking and megaesophagus. This second disease is the worse case scenario.

Choking can be the result of abnormal feeding behavior, inappropriate feed form or some combination. Symptoms of gagging, coughing and regurgitation immediately following food consumption are associated with choking. One can often observe a "bolus" of food lodged

somewhere along the length of the esophagus along the right side of the neck. This is often a problem in cattle consuming apples where the apple is swallowed whole and lodges in the esophagus. Horses are often affected by choke when consuming pelleted feed and have limited access to water. Choke in llamas and alpacas is similar to that of horses in that it is associated most often with pellet consumption and rapid rate of intake. However, choke can also occur with grain, alfalfa cubes, and apples in llamas and alpacas. Smaller diameter and firm consistency pellets are less conducive to these problems. More times it is feeding behavior or facilities that are the cause of the choking problem.

Food blockage inducing choke can occur anywhere along the length of the esophagus, starting at the pharynx, and can involve the trachea (more appropriately termed “aspiration”). Complete obstruction is an immediate emergency requiring application of methods to relieve the blockage, or other extreme measures to ensure the animal’s ability to breathe or eructate fermentation gases until the blockage can be corrected. In less severe blockages, food material in the esophagus may be gently massaged upward to relieve the obstruction. Be sure no food or water is available to an animal experiencing choke until after the blockage has been resolved. Aspiration of food materials or water can lead to more severe secondary complications.

Other than pellet consistency, feeding management and facilities can be modified to prevent the problem. From a feeding management perspective, make sure there is sufficient feeding space for animals to consume without being intimidated by others. Aggressive pellet consumption may be due to a dominant animal attempted to “eat it all” or a timid animal trying to get

what they can as quickly as possible. As was stated in your inquiry, adding large rocks and layering pellets with hay can help reduce consumption rate. Review the design of your feeding facilities. If pellets are provided in a deep bowl or trough, this may facilitate animals consuming large mouthfuls and predisposing them to choke. Provide pellets in a shallow vessel or long shallow trough to limit amount consumed in one bite.

The other disease issue to be ruled out in this situation is megaesophagus. The Merck Veterinary Manual (www.merckvetmanual.com) defines megaesophagus as a moderate to severe distention of the esophagus with no known cause. Observed symptoms include difficult swallowing (dysphagia), salivation, and regurgitation; similar to what was described for choking. However, the clinical presentation is very variable with megaesophagus. Secondary signs of nasal discharge, cough, and fever may be resultant of aspiration of regurgitated food. A published review of 15 cases of megaesophagus in llamas describes age of onset ranging from 13 months to 9.5 years with duration of observed signs from 1 week to 5 years (Watrous et. al., 1995). Most affected animals become unthrifty, are smaller in size, and progressively decline to a point where they can no longer be managed.

Definitive diagnosis of megaesophagus must be done by a veterinarian using special contrast radiography to observe esophageal function. Many local veterinarians will not have the equipment to complete these studies and may need to refer you to a veterinary teaching hospital. There is no known treatment to correct esophageal function and long term prognosis in most cases is poor. Feeding the animal on an incline to take advantage of gravity in moving a food bolus

down the esophagus has been advocated. Feeding highly digestible feeds frequently and in small meals may help to maintain body weight over a period of time. I truly hope this is not the diagnosis for your animal, but you need to find out for certain. Make some of the changes suggested to prevent choking to see if the problem resolves. If not, contact your veterinarian to initiate the diagnostic workup to determine if megaesophagus is present.

References

Watrous, B. et al., Megaesophagus in 15 llamas: a retrospective study (1985-1993). J Vet Intern Med. Mar-Apr;9(2):92-99, 1995.