

## A Guide to Llama Nutrition

*If your llama don't dance and your alpacas don't rock n' roll, maybe it's because they're not eating right.*

**William Sadler, Ph.D.**

Talk to any llama owner and you're sure to get an earful of anecdotes, similar to those shared by proud parents everywhere. The tendency of these endearing animals to display human-like characteristics makes it easy to forget that physiologically they are far different from humans. Why should it matter? Applying human nutritional guidelines may adversely affect the health and appearance of your beautiful animals.

### **A Breed Apart**

Llamas are *modified ruminants*. Unlike true ruminants such as cattle--that tend to graze, consume bulk quantities of food and look for a quiet, protected spot to lay down--llamas browse and nibble all day. This "snacking" tendency possibly results from the manner in which they evolved...protected from predators in the higher elevations of South America, and blessed with abundant availability of feedstuffs.

Another important fact that distinguishes llamas from true ruminants is that llamas do not have a traditional rumen (the first stomach compartment where cellulose is broken down) as found in sheep and cattle. Llama stomachs are made up of three compartments. The first two compartments of the llama stomach function similarly to those in true rumens by acting as mixing and fermentation vats where hundreds of species of microscopic organisms digest food for the llama to use.

While the concept of "bugs" in your llama's stomach may immediately conjure up images of parasites, the relationship of the organisms to the llama is genuinely symbiotic. In fact, the organisms are believed to be responsible for the llama's ability to adapt and thrive, despite feeding on less than nutritionally perfect forage.

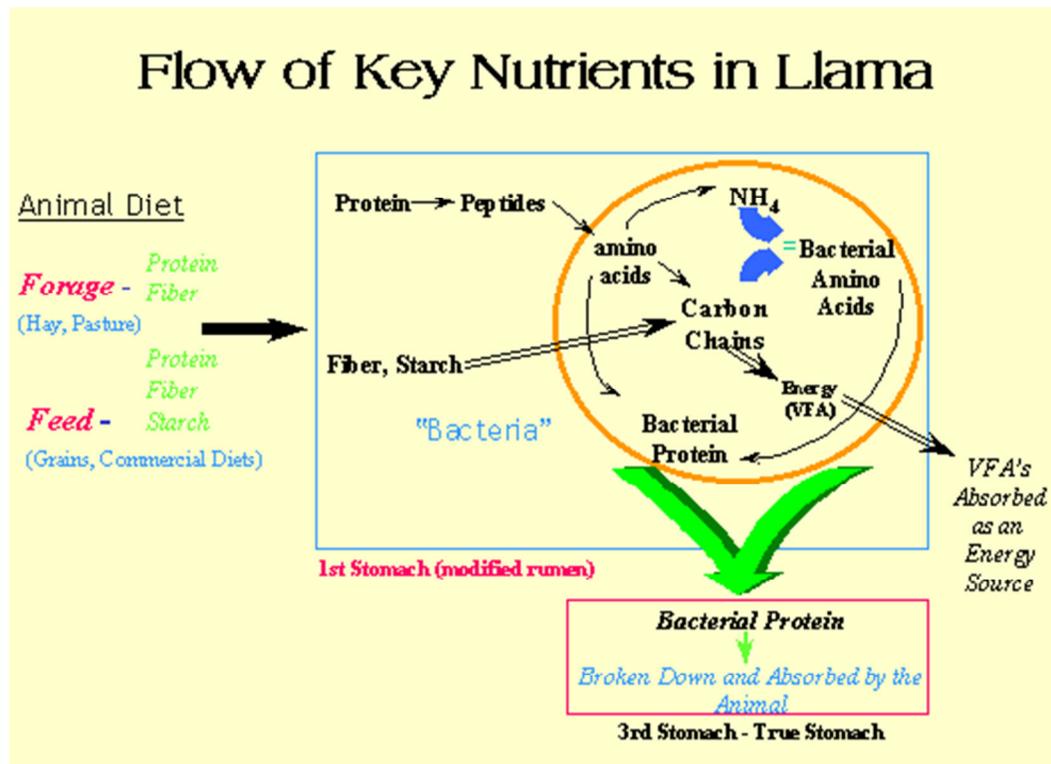
Obviously the microbiology of the llama's stomach also drastically sets it apart from human comparisons...because unlike humans, when you feed a llama, you're actually feeding the "bugs" that digest the food in its stomach. Each species of organisms work on specific components of the diet. For example, some bacteria digest starches, sugars, acids, lipids and proteins, while other produce ammonia (NH<sub>4</sub>) or methane. Still others synthesize vitamins.

Each group of "bugs" has its own special requirements for survival. Any disease, management or diet change may affect, or even destroy, a specific population of bacteria resulting in potential nutritional imbalance, which is why good intentions of adding specific vitamins, minerals or nutrients to your animal's diet based on human nutritional guidelines can actually cause harm.

### **Protein and Energy Digestion**

Bacteria fermentation produce volatile fatty acids (VFA) to meet the energy requirements for llamas. During this process, both protein and fiber are broken down to

short carbon chains where they are further metabolized to energy or are converted to bacterial protein.



The protein requirement for any animal is directly related to its energy requirement. One of the most unique aspects of llama nutrition is the manner in which they digest and metabolize fiber protein and energy in their diets.

Specifically, the "bugs" or bacteria in the llamas' stomachs are uniquely able to extract a great deal of energy from forages through fermentation. Because the bacteria are capable of producing all the essential and non-essential amino acids from basic building blocks, llamas do not actually have a direct dietary amino acid requirement. This enables them to consume forages with low quality proteins and convert it to higher quality value. The bacteria then leave the rumen area where they are digested further down the tract and the nutrients are absorbed into the tissues.

This creates a challenge of sorts since higher quality proteins are also reduced because the bacteria create only the protein they need. This effect is known as "protein leveling."

Forage typically lacks other key minerals and vitamins that are vital to the growth and health of your animal. In fact, forages have the potential to yield variable amounts and qualities of carbohydrates, protein, fat, minerals and vitamins.

Protein, energy, vitamins and minerals must be maintained in the proper ratio...since an increase in one nutrient can offset the effectiveness of another. Compounding the problem is the fact that your llama's requirements for these nutrients also varies depending on its body size, age, activity level, weight, pregnancy, lactation and even environmental temperatures. Mineral and vitamin requirements in the llama diet will be the subject of another article.

## **An Added Measure of Control**

So how do you keep your llamas happy and healthy? The answer is found by examining food sources that have enabled llamas to thrive...and manufacture them in strictly controlled portions that achieve an optimum nutritional balance.

Specially formulated llama diets, like the Mazuri<sup>®</sup> brand developed by Purina Mills, are the most reliable method of providing the nutrients your animal needs in the precise proportions.

Partnering with a feed supplier that understands animal nutrition requirements also provides better...and easier...maintenance of animal nutrition throughout life stages. Nutritional requirements are vastly different during lactation, growth, gestation and maintenance. In fact, baby llamas are not even born with a functional rumen...they develop it later.

Feeds developed specifically for llamas balance nutrients and take the guesswork out of feeding with specific instructions on quantities and frequency. Llamas are notoriously aggressive feeders who prevent other animals from coming to the feeder--so be sure to give them plenty of space.

## **Water, Water Everywhere**

Llamas suck in water with their mouths slightly opened. In domestic situations they have learned to drink from all types of waterers. Running streams are their natural source of water; however, they are extremely fastidious and may refuse to drink polluted water. Like all animals, your llama requires adequate amounts of good-quality water to sustain life, reproduce, and produce fiber and milk.

Unlike camels, llamas are not able to conserve body fluids as efficiently...which means their requirement for water can increase significantly in warm temperatures. They should be given unlimited free-choice of clean water. If water is restricted, your llama will eat less, lactation will slow down or even stop, and in extreme cases, hyperthermia may result.

Selecting a quality diet for your llama has never been easier or more rewarding. It's a difference that can add years to your animal's life...and life to its years.

**For more information, please contact:**

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