



## MULE DEER NUTRITION Fact Sheet #19

### OVERVIEW

Nutrition affects every aspect of mule deer population biology and ecology. Nutrition influences mule deer body condition, which in turn influences reproduction, recruitment, antler growth, home range size, seasonal movements, longevity, predator avoidance, and the ability to negotiate changing habitats. No other single factor has such an overriding effect on this species.

Mule deer are ruminant animals. Like other deer, mule deer are primarily browsers. Although they will eat forbs and grasses, especially nitrogen-rich new growth, they rely on shrubs and trees for much of their diets.

Ruminant animals have evolved with complex, multi-chambered stomachs to consume and make optimal use of vegetative diets. Their first chamber is the rumen where microbial bacteria break down cellulose following physical mastication (chewing) in the mouth. Microbes (bacteria, protozoans, and fungi) produce volatile fatty acids, which are the major source of energy for ruminants. Ruminants must reduce particle size of consumed forage to smaller than 5 mm in size before it can pass from the rumen into the digestive tract and remaining chambers. Old, decadent forage can be harder to digest due to high lignin content in cell walls, which also makes nutrients less accessible. Although ruminants use microbes to digest cellulose, lignin must be broken down through physical mastication. Consequently, as forage quality decreases, passage rate decreases as well. Very fibrous, lignified forage is not digested, but excreted over a long period of time. In poor rangeland, there may appear to be a great deal of dry forage on the landscape, but mule deer may benefit little from eating this forage because they cannot consume adequate quantities to meet their needs for energy, protein, or other nutrients.



Photo: Jason Loftus-Untamed Images



Ruminant animals can have difficulties adapting to rapid changes in their diet. The rumen microbial community must change with season, intake, and diet as specific types of microbes are associated with different kinds of forage. Rapid changes in diet during a wet spring or following a wildfire can result in short-term gastrointestinal disturbances. More frequently these rapid changes are human induced, such as translocation into new habitat or placement of novel food sources like alfalfa or grain. Grains placed as bait for hunting or trapping may result in over consumption and death from grain toxicity. Historically, well-intentioned emergency winter feeding of high-quality alfalfa to nutritionally stressed ungulates in deep snow



resulted in large numbers dying with full rumens that they were incapable of digesting. Ruminants may starve (or suffer from chronic malnutrition) with a rumen full of food—just food that was not possible to be digested adequately. Microbial communities typically require 2–4 weeks to adapt to changes in diets, and gradual dietary alterations over similar time periods are more favorable than are immediate or rapid changes in their diet.

The relative contribution of reproduction and recruitment are often difficult to separate in free-ranging populations, but both are influenced by the body condition and nutritional plane of the maternal female. Although conception is rarely influenced by nutrition except for does in extremely poor body condition, poor body condition in young females influences the likelihood of carrying fetuses through pregnancy and older does may produce more male fawns. Energy demands for adult females increase dramatically with lactation following the birth of fawns. High quality nutrition is important for fawn growth, maturation rate, and the ability to avoid predators. Summer ranges generally provide higher quality nutrition than do winter ranges and the influence on lactation and fawn survival is greater. Large antler size in male mule deer is related to older population age structure and genetic potential, but the nutritional content of the diet has a substantial influence on annual antler growth. Due to lower quality and quantity of forage on winter ranges and increased energetic demands during winter months with snow and cold temperatures, mule deer often lose body mass throughout the winter. Consequently, the condition in which they enter this period can have an overriding influence on their ability to survive winter demands.



Just as with fawn survival, nutrition plays an important role in adult survival. Animals on a high nutritional plane are generally more physically fit and better able to evade predation. Low-quality diets may predispose mule deer to injury, illness, increased overwinter mortality, or infirmities that may predispose them to predation. Mule deer on a consistently high nutritional plane can survive and reproduce longer than those consuming inadequate forage.

Nutritional demands that change throughout the year drive mule deer distributions and migration patterns. Home ranges for most species in high-quality habitat are smaller in size than those within relatively lower quality habitat; forage quality, quantity, and availability are important factors in determining habitat quality. High quality forage can mitigate factors like disturbance or habitat fragmentation in some situations. Oftentimes, mule deer become habituated or even conditioned to the presence of humans and human developments when high quality forage is available. The enticement of ornamental landscaping and some crops and orchards can result in nuisance or conflict situations with humans when vehicle collisions, aggressive individual deer, agricultural depredation, or unwanted foraging behavior develops.

Because nutrition affects every aspect of the mule deer life cycle, managers must consider these effects in virtually every management strategy. Harvest regulations, translocations, predation management, and habitat manipulation are only a few of the management actions in which nutrition must be carefully considered. High quality diets and good nutritional status provides for robust mule deer populations that all citizens can enjoy.

**More information on mule deer can be found at [www.muledeerworkinggroup.com](http://www.muledeerworkinggroup.com)**

---

*A product of the Mule Deer Working Group - Sponsored by the Western Association of Fish & Wildlife Agencies - Approved July 2016  
Produced with support from the Mule Deer Foundation ([www.muledeer.org](http://www.muledeer.org))*