

QDMA Articles: Mineral Supplementation—Necessity or Never Mind?

By: Brad Howard and Brian Murphy

What can we do to help the deer on our property? How can we help our bucks grow bigger antlers? Are they missing something in their diet? These are just a few of the questions commonly asked by hunters. The answers to some of these questions are simple, but many lack a clear yes or no answer. One of the most common questions concerns the use of salt/mineral mixes to improve antler development and deer health.

Should hunters and landowners establish mineral licks on their properties for deer? Before addressing this question, it should first be pointed out that hunting over salt/mineral licks is considered baiting in many states and is therefore illegal. Furthermore, studies have documented that close to 90 percent of the use of mineral licks occurs in spring and summer. Therefore, not only would you get a ticket for hunting over bait, you would probably be wasting your time.

Antler Growth

No discussion about ways to increase antler production should begin without first discussing what is known about antler growth. During spring, the onset of antler growth is triggered by changes in photoperiod (day length). What follows is a complicated process of hormone release and changes in the deer's body to enable the rapid transfer of nutrients and minerals to the growing antlers. This process continues until late summer when a sharp increase in the male hormone, testosterone, stimulates antler hardening and velvet shedding. This whole process occurs in about 5–6 months.

Chemical Composition of Antlers

Growing antlers are comprised mostly of proteins (80 percent by weight); whereas, mature (hardened) antlers are comprised of roughly equal amounts of proteins and minerals. Studies have shown that calcium and phosphorus are by far the two most common minerals in deer antlers comprising nearly 30–35 percent of the mature antler by weight. However, they are not the only minerals present. A University of Georgia study (Miller et al. 1985) detected 11 different minerals in the whitetail's antlers. In addition to calcium (19.01 percent) and phosphorous (10.13 percent), the next two most common elements reported in the Georgia study were magnesium (1.09 percent) and sodium (0.50 percent). Lesser amounts of other minerals were found including potassium, barium, iron, aluminum, zinc, strontium, and manganese. Other than calcium and phosphorous, little is known about the role of these other minerals in antler growth.

Mobilization of Minerals During Antler Growth

Clearly minerals are important in antler development. Because of the large quantities of minerals required for antler growth, whitetails actually deposit calcium and phosphorous in their skeletons prior to the onset of antler growth and then transfer these minerals during active growth (Stephenson and Brown 1984). However, these body sources of calcium and phosphorous provide only a portion of that needed for optimum antler growth. The remainder must come directly from their diet while their antlers are actively growing. Therefore, supplementation of these minerals prior to and during antler growth may be beneficial. While deer have the ability to "stockpile" calcium and phosphorous, this is not true for the majority of other minerals found in antlers. As in humans, many "trace minerals" such as barium, aluminum, zinc, and strontium are toxic in large quantities and must be excreted from the deer's body. As a result, these minerals must be consumed in very small quantities (parts per million) on a regular basis. Despite their presence in antlers, the role of trace minerals in antler growth is largely unknown.

The Research

Research on several species of domestic livestock has documented numerous benefits of mineral supplementation including increased forage intake, improved forage digestion, and increased reproductive success. In contrast, most studies on mineral supplementation in whitetails have focused on the impacts on body weight and antler development. In Mississippi, Jacobson (1984b) found a strong correlation between soil mineral content (primarily phosphorous) and body size, although no correlation with adult antler size was found. He concluded that soil phosphorous levels were the best indicator of body size, probably because phosphorous deficient soils are common throughout much of the Southeast (and much of the United States).

The level of daily phosphorous intake required for optimum antler growth in whitetails has been reported to range from 0.14 percent to 0.56 percent (French et al. 1956, Jacobson 1984a, Grasman and Hellgren 1993). Grasman and

Hellgren (1993) predicted that the normal dietary intake of phosphorous by adult bucks was 0.12 percent. These studies suggest that in areas where soils are highly deficient in phosphorous and where additional phosphorous was not provided through fertilized food sources (e.g., food plots), phosphorous supplementation may increase antler growth. A classic study on the mineral needs of deer was conducted at Penn State University in the 1950s (French et al. 1956). In this study, researchers did detect a difference in yearling buck antler development between supplemented and unsupplemented groups. However, these herds were fed a nutritionally deficient diet below what most whitetails would have access to in the wild. Furthermore, when the same deer were examined the following year as 2.5-year-olds, no differences were detected between the two groups.

In a similar study conducted at Auburn University (Causey 1993), researchers tried to detect differences in body and antler size between an unsupplemented and supplemented group. The difference in this study and the Penn State study was that both herds were fed a nutritionally complete diet. In addition, one group was provided a commercial mineral supplement. Over a 4-year period the researchers were unable to detect any differences between the two deer herds.

A Louisiana study (Schultz and Johnson 1991) compared supplemented and unsupplemented wild herds in similar habitats. Although problems always arise when studying wild populations, they were unable to show any differences in body size or antler development using mineral supplementation.

Use of Mineral Licks by Deer

Without question deer need minerals and will readily use mineral licks. In fact, many licks 15 feet or more in diameter and several feet in depth have been documented. Why do deer use these licks and why is their use restricted primarily to the spring and summer? Many hunters mistakenly believe that it is simply because deer need the minerals for antler and body growth. However, several studies have shown that while deer will readily use mineral licks high in salt, they rarely, if ever, use pure mineral supplements. If deer were lacking minerals, why wouldn't they use the pure mineral supplement even if salt wasn't present? While the answer to this question is unknown, it is probably because minerals like calcium and phosphorus, by themselves, are bitter. Could the use of salt/mineral mixes be due to an increased need for salt? According to research, the most likely answer is yes. During the spring and early summer, deer operate at a sodium deficiency due to the high potassium and water content of the forage (Weeks and Kirkpatrick 1976). This interferes with efficient sodium conversion in the body and increases the need for sodium intake. This makes deer actively seek out concentrated sources of sodium such as natural or man-made licks. Almost all soils more than 25–50 miles from a seacoast are low in sodium (Weeks 1995). Therefore, in these areas, salt may be as necessary as calcium and phosphorous to whitetails during the spring and summer.

Putting It All Together

The results of these studies suggest that mineral supplementation (especially calcium, phosphorous, and sodium) may provide some benefit in situations where deer are nutritionally deprived or areas with mine rally-deficient soils. In other areas, adding minerals to a deer's diet would not be expected to affect antler growth. Age and nutrition are arguably the two most important ingredients for producing large antlered bucks. Regardless of the quality of the diet and intensity of mineral supplementation, a yearling buck will still be a yearling buck. Bucks must live long enough to reach physical maturity and have access to good nutrition to achieve maximum antler growth. These are undisputed facts that hunters and managers can do something about. The ultimate answer is to balance your deer herd while improving habitat and protecting young bucks.

Selecting a Mineral Supplement

If you are interested in establishing mineral licks on your property, the first step is selecting the right mineral mix. When selecting a mix, there are several things you should consider. The first is the calcium to phosphorus ratio. The mix should contain as much of these minerals as possible while containing enough salt to encourage use by deer. In general, there should be at least 1.5–2.0 times as much calcium as phosphorus. This is the approximate ratio of these minerals in mature antlers. Many of the new commercial mineral mixes meet or exceed this ratio and also contain a wide range of trace minerals and even certain vitamins that may provide some benefit to deer.

As with any product, read the label carefully before deciding which one to purchase. Most of the better mineral mixes contain less than 50 percent salt with some containing as little as 25 percent salt. Without added sweeteners, however, deer generally will not utilize mineral mixes containing less than 25 percent salt. Therefore, you may have to start with a relatively high concentration of salt then reduce it over time until deer use starts to decline. Your long-term goal should be to provide as much mineral as you can with the lowest concentration of salt

Establishing a Mineral Lick

Once you have selected a mineral mix, you should determine the number and locations of licks you wish to establish. In most areas, one lick per 100–200 acres is considered sufficient. Since the peak use of licks is during spring and early summer, licks should be established during late winter or early spring. When possible, select sites that are relatively level, well drained, and have a high concentration of clay in the soil. Clay is important because it decreases leaching and increases the evaporative concentration of the minerals. Also, avoid placing licks near roads or areas of high human activity to reduce poaching and encourage deer use during daylight hours. When establishing a lick, mix the salt/mineral mix directly into the soil. This is the most natural presentation and generally maximizes the use by deer. In most areas it will be necessary to “re-charge” the lick with additional salt/mineral once per year.

A Final Note

Everyone wants a quick “fix.” With QDM, there is no quick fix. It takes time, patience, and persistence to produce quality deer. Will mineral supplementation help improve the quality of deer on your property? The jury is still out. While the advantages have not been clearly documented, neither have any disadvantages. Creating a lick is certainly fun, inexpensive, and watching deer respond to and use these licks can be an enjoyable activity. Mineral licks also provide a great place to view and photograph deer during the spring and summer months. If you have already addressed the larger concerns of habitat and herd management, mineral supplements can be another tool in your overall management plan. The key is to have realistic expectations. Do not expect to see trophy bucks walking around next season just because you gave them a mineral boost.

Brad Howard is a wildlife biologist with the Virginia Department of Game and Inland Fisheries. He works closely with landowners and hunters to improve the quality of their deer herds. This is Brad’s first contribution to Quality Whitetails. Brian Murphy is a wildlife biologist and the Executive Director of the Quality Deer Management Association.