

# antler development

## Factors and Philo

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No wild species has had more study devoted to it than *Odocoileus virginianus*. One reason is that white-tailed deer occur in more states and provinces from Mexico to the United

States to Canada than any ungulate in North America. Over the last 20 years, populations have dispersed and in some cases, exploded, into habitats never before occupied, at least in recorded history. This phenomena will

to assuring that there are bucks in the herd with good antler development, year in and year out. These four include age, nutrition, herd sex ratio, and fawn survival. There is much interest in genetics and harvest strategies, but our

knowledge of their relative importance in herd management is minimal. The discussion that follows will no doubt be very basic to many readers, but it may help to at least reinforce what you already know. If I insult your intelligence, blame the editor.

Allowing a buck to live to an age at which he can de-

velop mature antlers is very important, if not the most important factor. Case studies on free-ranging deer suggest that the autumn after his fifth birthday is when white-tailed deer begin to reach antler maturity. In fact, research has demonstrated that there is a steady increase in antler development the first four years of life, but for south Texas bucks, there is a recognizable jump in antler measurements at 5-1/2 years of age compared with 4-1/2 years of age. And some deer do not add extra tines like kickers and drop-tines until they are 6-1/2 to 7-1/2 years old, or older. The steady increase in antler mass and tine length until about 4 or 5 years of age is because early in life, nutri-

## Factor One Age

precipitate even more research on this adaptable game animal. Because the literature is voluminous, it is not possible for me to give a thorough review of the biology and ecology of white-tailed deer. What I will try to do is paint with a rather broad brush, some of the philosophies and factors now involved in managing these ubiquitous deer to optimize antler development. My comments will primarily focus on free-ranging deer in Texas. It is worth noting that most deer herds in Texas are under free-ranging conditions.

Ultimately, there are four factors which are absolutely crucial



Photo by Tom Tietz



Photo by Tom Tietz

ents are needed for skeletal and body mass development. After those needs are met, nutrients can then go to antler development. So in order to optimize antler development, bucks must be allowed to live into older age classes. When

## Factor Two Nutrition

someone blames genetics for a complete lack of trophy-class bucks in their favorite hunting area, they should realize that more often the primary culprit is overharvest of males in the herd. Bucks simply are not given a chance to get to older age classes. To compare with elk, Dr. Gary Wolfe studied the Vermejo Park herd for 12 years and found that elk must be in the 7-1/2 to 10-1/2 age class to produce antlers with the greatest mass and tine length. We are fortunate we don't have to wait that long for white-tailed deer.

Nutrition is the next important factor, probably as important as age. If nutrients such as protein and energy are lacking, antler quality and development will be poor regardless of age. Research from the 50's and 60's suggest antler development is best achieved when diets are maintained at 16 percent crude protein and 2400 cal of energy per kg of forage consumed. Recent studies at the Caesar Kleberg Wildlife Research Institute suggest white-tailed deer in south Texas can develop antler quality at values less than that. Regardless of what the required levels are, free-ranging deer with no supplement are rarely if ever on a flat plane of protein and energy levels. There are obvious peaks and valleys. Clearly, good

## Factor Three Herd Sex

Background Photo by Neal and Mary Jane Mishler



# *Ratio*



Photo by Denver Bryan



Photo by Denver Bryan

nutrition during antler genesis and development is crucial. Since most deer shed their antlers in March, which immediately begins antler genesis, good nutrient levels in March through July are

leaves in spring which are typically high in these macro-minerals. In other areas of the U.S., minerals and mineral licks can be very important to white-tailed deer. Deer can also mobilize some minerals

looking for mature bucks five, six and seven years from now. Many times, when we have a down year in the number of trophy or mature bucks, we need only to look at what our fawn crop was 5 and 6

# Factory Farm Fawn Survival

important. On the Faith Ranch in south Texas, Stuart Stedman shows that Boone and Crockett antler scores are most highly correlated with rainfall the previous March and April. If his correlation holds, 1997 should be a banner year for white-tailed deer in south Texas. So look for more Boone & Crockett entries from Texas this year.

Nutrients such as minerals also are important in antler development. This is particularly true of phosphorus and calcium which, respectively makeup 11% and 22% of antler structure. Protein makes up about 45%. The rest of the hardened antler is inorganic material such as fluoride, chloride,

from skeletal bone if needed.

Excluding supplementation, there are only two ways to manage the nutrition of free-ranging deer. Of utmost importance is strict herd management which keeps the population at or below carrying capacity of the habitat. The single greatest competitor with white-tailed deer for food is another white-tailed deer. In south Texas, for example, most herd managers like to keep their pre-harvest deer population (number of deer observed during census) at 1 deer per 22 to 30 acres. You should consult your local wildlife biologist for optimum deer densities in your area.

The second way to improve the nutrition of a deer herd is through habitat management. There are many tools for the manager to use including soil disturbance, prescribed fire, creation of open areas in dense forest or brush canopies, and even agricultural crops.

Sex ratio of the herd is also very important in producing quality bucks. The more bucks in the herd, the more bucks which have a chance to make it to older age classes. Recall the first point I made. Sex ratios on successfully managed ranches in south Texas vary from 1 buck:1 doe to 1 buck:3 does. A skewed sex ratio in favor of females, say 1 buck:6-10 does, with even a light harvest on bucks will result in few males reaching 5-1/2+ years of age.

The last critical factor is fawn survival. To have the inventory necessary to keep deer in the pipeline is important when we are

years ago. During our October surveys, we like to see fawn crops in the range of 30-40 fawns at heel per 100 does, although in free-ranging south Texas herds we normally see fawn crops much lower than this, around 15-25%. But these low fawn crops have helped keep densities below carrying capacity for these deer herds.

Genetic manipulation, either through infusion of new genetic material or strategic harvest, has yet to be proven as a viable management practice. Heritability of antler characteristics tends to be low, according to Dr. Steven Lukefahr at Texas A&M University-Kingsville and Dr. Harry Jacobson at Mississippi State University. According to their analysis of data from studies over 17 years, antler trait expression in young deer is attributed more so to the buck's mother (e.g. milk production, maternal environment in which it was raised) as opposed to the buck's own genes. These results are from deer reared under confined conditions at Mississippi State University. The importance of genetics (heritability) is more pronounced as deer age (3-1/2 to 7-1/2 years of age). The same Mississippi study reported heritabilities of mature bucks .29, .39 and .43 for beam circumference, total antler points, and antler weight. To date, all results are from penned deer. We are not sure if bringing in "super" genes will overcome genes fixed in local genotypes, which also are influenced by their environment. The jury is still out on this idea.



Photo by Neal and Mary Jane Mishler

oxygen, and fat. To my knowledge, it has not been demonstrated in south Texas that free-ranging white-tailed deer are deficient in these nutrients except in drought years, in poor habitat, or on overpopulated ranges. This is because they eat mostly forbs (broad-leaf plants) and new-growth browse

Harvest strategies are another category of management where we are still awaiting a jury's decision. Ideas such as leaving some herd sires unharvested or leaving does unharvested in areas

where good bucks traditionally come from (saving the gene pool in the females) are being tried today. To prove this works in nature is extremely difficult, but the concept seems sound.

Selected harvest strategies to "cull" undesirable traits also remains uncertain and unproven. Fundamentally, there are five harvest strategies available, four of which are currently being applied in south Texas and all with success. One strategy is to harvest only old mature deer with no selected harvest on age classes 1 to 5 years. Another is to begin intense selection of undesirable bucks at 3 to 4 years of age, while at the same time, harvesting a quota of mature bucks 5+ years of age or older. In this example, bucks are given a chance to mature somewhat before someone decides to take them out of the herd or let them stay to maturity. A third strategy is to take spikes and mature (5-1/2+) deer — cull selectively at 1-1/2 years of age and simultaneously harvest top-end mature bucks. A fourth strategy is to harvest all deer which do not attain 8 antler points by 2-1/2 to 3-1/2 years. In this example, attempts are made to harvest every spike, forkhorn, and 6-point buck. This approach targets selection at 1-1/2 and 2-1/2 year old bucks, as well as harvesting a quota of top mature bucks. I am aware of four ranches within 100 miles of each other that are practicing these different strategies similar to the ones mentioned above. Year in and year out, all are producing deer that are 160+ Boone & Crockett points. So who is right? Maybe they all are. To sort out cause and effect of these harvest strategies would require carefully controlled studies over at least a 5-year time frame. At this time,

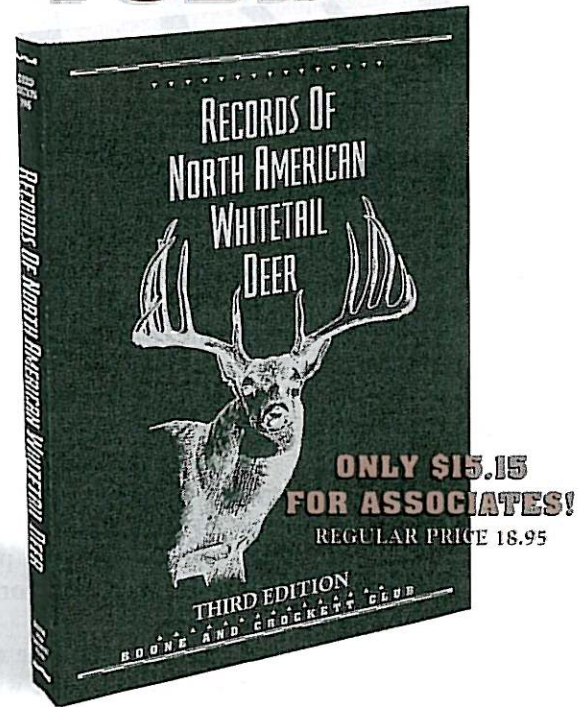
we have willing cooperators but lack the financial resources to undertake such a study.

A fifth strategy that should also be evaluated is to establish a quota of bucks to harvest and then stratify this harvest across all age classes. Let's say we have our harvest quota set at 15 bucks. We would attempt to select 3 bucks in each of the 1-1/2, 2-1/2, 3-1/2, 4-1/2, 5-1/2, age classes. Such an approach does not target any particular age classes as have the previous four I have described. This philosophy follows what Dr. Jim Peek mentioned in his moose article in *Fair Chase*, Summer 1997. To quote "We should seek to harvest segments of each category in order that the integrity of the social system be retained, for each group has a role to play that is different from the others, and each group contributes to the survival and persistence of the population as a whole". The effects of this strategy have yet to be tested with white-tailed deer

Selective harvest strategies assume we can age deer on the hoof, which is difficult for older deer even with a jawbone in hand to evaluate tooth wear. An example of this deficiency was illustrated by Ken Gee at the Samuel Roberts Noble Foundation in Oklahoma. He gave several noted biologists a test with 88 jawbones of known-aged deer. These biologists missed aging an average of 40 of these deer, or 45%. Current thinking is to place deer in categories of young, middle-age, and mature rather than trying to place deer in any one specific age class.

In summary, based only upon our observations here in south Texas, for any of these strategies to work, they all must fall within the framework of our four guiding principles: letting bucks age, providing good nutrition by keeping herds below carrying capacity, maintaining the correct sex ratio, and producing good fawn crops each year. Whether or not genetic manipulation or harvest strategies have a significant impact, is still out with the jury.

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