The Management of Spike Bucks in a White-Tailed Deer Population

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As Texas Parks and Wildlife biologists, we often receive calls from hunters or land managers asking if they should or should not harvest spike bucks. The caller has usually read an article that says it is genetics or nutrition or being late born that causes deer to produce spike antlers. "If poor nutrition causes spikes," the article says, "then you shouldn't harvest spikes." The article may state that if a fawn is born late in the fawning season, it will probably be a spike.

The article may suggest that it is okay to shoot big spikes because genetic factors cause spikes in older deer, but it says to protect small spikes because that's a nutritional problem. The article usually closes by relating the experience of someone who raised a deer that was a spike and it grew up to be an eight-point buck. The article's conclusion is that maybe spikes shouldn't be killed at all.

Our answer to callers is that if they want to improve the overall antler development of their herd, then they should harvest spikes. We often say something like, "If two spikes walk out in front of you in a 2-buck county, shoot the smallest one first and don't let the second one get away."

Why do we give such radical advice? First, let's define the terms. We use the term "spike" for any deer at least a year old that has two hardened antlers that do not branch or fork. We don't use it to refer to a "nubbin buck" fawn that has skin covered knobs or bumps on its head. Buck fawns occasionally have a protrusion of chalky white bone tissue through the skin up to ½ inch long, but this is rare and we don't call them spikes.

White-tailed deer have their first set of hardened antlers when they are yearlings. While some ranchers and hunters use the term "yearling" to mean a 6 month old animal, biologists are referring to a deer between 1 and 2 years old. At the opening of hunting season a "yearling" would be 1 ½ years old.

What the Research Shows

When we discuss antler development in a deer herd, the discussion is about the antler performance of a *population,* not that of one or two individual deer.

Our conclusions about spike hunting are based on studies on antler growth published by researchers throughout the United States. Our primary source of information has been the deer research pens on the Kerr Wildlife Management Area. At that Hill Country facility, over 20 *generations* of deer have been scientifically studied and antler and genetic data analyzed by Texas A & M University geneticists and Texas Parks and Wildlife biologists. Studies in Louisiana confirm the findings on the Kerr. Many years of harvest data collected by biologists throughout Texas support the conclusions as well.

The following are our conclusions based on penned research:

1. **Antler development is genetically based. Not all deer have the same genetic potential.** All white-tailed deer are born with a genetic potential for antler development. This means that some deer have the genetic potential to produce big antlers while some deer don't. This potential is *limited by the environment*, so even if a deer is genetically programmed to produce big antlers and it doesn't get enough to eat, it may not produce big antlers. On the other hand, if the genetic potential is for small antlers, no amount of highly nutritious food will make does in pens, a high percentage of the male offspring were spikes, even when nutrition was good.

2. **Nutrition does affect antler growth.** In two deer which have the same genetic potential, the one receiving better nutrition will produce the better antlers. We consider good nutrition for white-tailed deer to be a 16 % protein diet with adequate amounts of calcium and phosphorus for maximum antler and bone growth. A simple fact is that deer are nutritionally deprived on many Texas ranges with mineral deficient soils and/or a shortage of food plants because of overpopulation.

3. **Early or late birth does not affect antler development if deer receive adequate nutrition.** The time of birth of a deer does not change its genetic potential. A deer with spike antlers could be born in May while a 6-point yearling may be born in July. In south Texas, where the largest bucks in the state are found, the average fawning date for deer is July, a month later than the birth date for Hill Country deer. Fawns born very late in the season (August or September) may very well become nutritionally deprived because their greatest energy need occurs during a poor forage production time, late summer and early fall. Energy intake is diverted to maintaining and growing body tissues first when nutrition is low. There will be little excess energy available for antler growth.

4. **The majority of yearling spike bucks will produce smaller antlers and fewer points in following years than will fork-antlered yearlings.** Two research studies, one conducted on the Kerr Wildlife Management Area and the other at the Louisiana State University Agricultural Center, demonstrated

this conclusively. There were a few exceptions to the rule, but the statement is true for the vast majority of deer (Table 1).

5. **You can improve a herd by selectively removing inferior antlered deer and allowing the deer with good antlers to breed.** The question is: If all spikes were removed from a herd and only 6 point yearlings were left to do the breeding, would you or wouldn't you see improvement in antler development? Geneticists call this "heritability". If a trait is highly heritable then little improvement will be seen. Texas Parks and Wildlife and Texas A & M studies demonstrated that antler development in deer is a highly heritable trait. Antler traits are passed from one generation to the next. The mass or heaviness of the antler had the highest heritability. Main beam length and number of antler points are also highly heritable (Table 2).

6. **Does provide half of the genetic potential for antler development.** Each sex supplies 50% of the genetic material for antler potential. It is obviously not possible to tell if a doe is carrying spike-antlered or forked antlered genes, so most of the selectivity options are with our management of the bucks. The good news is that one buck breeds many does and a good buck's genes are passed to his progeny.

7. **Average yearling bucks on good range should have six points.** The vast majority of yearling deer harvested in Texas are fork antlered yearlings. Even on the worst abused ranges, some fork antlered yearling bucks will be produced and these are the ones that should be left for breeding. Unfortunately these are often the ones hunters most desire. If a buck is a spike, it is below the potential of most bucks (Table 3).

8. **Even when most bucks are spikes, removing them will not endanger the breeding potential.** There have been no reported cases of does not being bred in Texas because there were not enough bucks to do the breeding. In studies of captive deer, a single buck has been known to breed more than 40 does.

9. **Antler development improves with age up to a point.** In the Hill Country and much of the rest of the state, deer antlers improve up to about age 6 ½, after which the antlers decrease in quality. This may be related to decreased nutrition as tooth wear takes its toll on a deer's ability to process forage. Good antler mass usually can't be expected in young deer, but good habitat management improves the antler quality of even the young deer. You should expect bucks to have good antlers when they are 4 ½ to 6 ½ years old.

10. **The best time to manage for genetic improvement is during periods of nutritional stress.** Yearling bucks that perform well during stress and produce good antlers on abused ranges should be allowed to be the brood

bucks of the future. The best time to tell if antler development is below average (for whatever reason) is when a buck is a spike.

What this all means to the landowner and hunter…

It means that it is okay to harvest spikes. Don't worry if it's a "nutritional spike" or a "late born fawn". Remember, even on abused ranges there are forked-antlered yearlings.

Grown on same range, the odds are that the spike-antlered deer will NOT produce as good a set of antlers later in life as a fork-antlered counterpart. By saving that spike to become next year's big buck all you have really saved is a poor quality buck which will now be your brood stock.

Protecting spikes will insure that you will have spike bucks in the herd in the future, even if the one you protect produces fork antlers the next year. Consistently removing spikes from the herd will eventually improve the antler quality if the range is in good condition.

What is most important, nutrition, genetics or age?

People often try to rank the importance of genetics, nutrition, and age. That's like saying about a car, "Which is the most important - the transmission, the electrical system, or the carburetor?" They are all important. One does not work without the other. So it is in deer management. Without good nutritional management, deer cannot obtain their genetic potential. Without a good genetic base, good nutrition does not produce better antlers. Even with good nutrition and a good genetic base, improper harvest (overharvest of older age class males) will not allow deer to mature to reach the age of maximum antler potential.

Where do I start if I want to improve antler quality?

Deer management consists of good range management practices to produce adequate nutrition. The deer produced on those ranges must be kept in balance with their food supply. This is accomplished through harvest. If you are interested in seeing good antlers, those deer with the least antler potential should be removed from the range to allow deer with the better genetic potential to become the brood stock.

Begin by removing young deer with poor antler potential (yearling spikes) to allow the better antler potential deer (fork-antlered yearlings) to enter the breeding population. This has the added advantage of shifting hunting pressure away from older age class bucks thus improving age structure. On many Texas ranges, over 60% of the harvest is yearling males. Approximately 60% of those are fork-antlered (Table 3). Spikes are left to grow another year. When the yearling spikes are 2 ½, the ones that produced forks are then harvested. Those that don't are left to grow another year.

If you have a choice between a spike and fork-antlered yearling, take the spike. If you have a choice between a small yearling spike and a large yearling spike, take the small spike rather than the big spike. By shifting hunting pressure to the bottom segment of the herd, age as well as antler quality can be improved.

Doe harvest is also important to producing good antlered males. The doe carries 50% of the genetic material for antler development. You cannot look at a doe and tell

what her genetic potential is. You can, however, manage for that genetic potential. Male deer because they breed many does, influence the herd's genetic makeup more so than the does. If bucks with poor antler potential (spikes) are removed from the herd, this leaves more of the bucks with higher antler potential to do the breeding. Both male and female offspring from these bucks are more likely to carry the potential for fork antlers.

By removing older does from the range, you can increase the odds that matings will be between the better antlered males and females with better antler-producing genes. Over time, the selection will cause a better antler potential gene pool in the doe segment of the herd. Doe harvest had an added benefit in that it helps maintain deer numbers in balance with food supply so nutrition will improve, fawn survival will be greater, and antler growth better. Proper doe harvest is important to improving antler development in the herd.

Quality deer management is an integrated management system. It consists of range, livestock, and deer herd management. Harvest of spike bucks and proper doe harvest are important components of that system.

When people tell you about that spike that grew up to be a big deer, ask about the other spikes that didn't and ask about how the forked antler yearling turned out. Remember, on well managed (even mediocre) ranges, there are lots of forked antlered yearlings out there. When a deer is removed from a herd, the genetics of that herd is altered. It does not matter why that deer is taken. If you protect fork-antlered yearlings from harvest long enough to allow them to mature, you can improve antler quality in the herd through proper range and herd management.

Frequency distribution of total antler points for 64 white-tailed deer at 1.5 vs. 3.5 years of age

Points at 3.5 years	Total antler points at 1.5 years									
	2	3	4	5	6	7	8	9	10	Total
12+	15 deer				1	30 deer				1
11					1			1		2
10				1	3	3	1			8
9	2		1	2	1	2	1			9
8	7	1	4	6	4	1	1		1	25
7	3		1							4
6	3	1								4
5	4									4
4	5									5
3	19 deer									0
2	2									2
Total	26	2	6	9	10	6	3	1	1	64

Table 1. This chart compares the number of deer and their antler points at 3.5 years of age to the number of points produced at 1.5. For instance, all 30 deer that produced 5 or more points at 1.5, produced 8 or more points at 3.5. Of the 34 deer that were 4 points or less at 1.5, 15 produced 8 or more points at 3.5. The 15 deer in the upper left quadrant are those deer that cause the most controversy when the subject of spikes is discussed. Mention of the deer in the other quadrants is often ignored.

Heritability Estimates	
Antler Characteristics	
Number of Points	0.46
Spread	0.32
Basal Circumference	0.77
Main Beam Length	0.54
Weight	0.70
Body Characteristics	
Body Weight	0.74

Table 2. Heritability estimates for antler characteristics and body weight. Heritability is measured from 0 to 1. The closer a number is to 1, the more heritable the trait. Heritability estimates above 0.3 are generally considered practical for management.

Incidence of Spike and Forked Antler Yearlings 1989-1990 Hunting Season			
Ecological Area	**Total**	**Percent Spikes**	**Percent Forked**
Pineywoods	212	31.1	68.9
Gulf Prairies	34	38.2	61.8
Post Oak Savannah	164	22.6	77.4
Cross Timbers	143	24.5	75.5
South Texas Plains	121	66.9	33.1
Edwards Plateau	244	46.3	53.7
Rolling Plains	96	34.4	65.6
Texas	1017	37.2	62.8

Table 3. Incidence of spike-antlered and fork-antlered yearlings in the 1989-1990 white-tailed deer harvest by ecological region.