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The Art of Culling—A Primer (Part 1)

By Dr. James C. Kroll, Ph.D.

On the wall just inside our house, my wife, Susie, and I have carefully positioned our coats-of-arms; Masters on the right, Kroll on the left. We have them there as reminders of our heritage and past. Mine is particularly appropriate, for it depicts a large stag rearing up inside a fence. You see, the surname Kroll is loosely interpreted as "King's huntsman," and sometimes as "game keeper." My family came from Prussia, and no doubt have a long history in hunting and game management.

Too often, we here in the States tend to believe we invented the wheel regarding many human endeavors, but none more so than game management. Four hundred years ago, my ancestors were discovering much about managing deer. There even is a patron saint of trophy management, St. Hubertus, who reportedly saved the red deer from deterioration and over-harvest in Europe. Speaking German, I translated one of the best books on the subject back in my graduate school days. It was written by a fellow named Ücker-mann, and its topic concentrated on the biology and management of roe deer, a diminutive cousin of the whitetail. These deer are prized by European hunters, but their small antlers would gain little attention from Boone and Crockett-fixated American hunters; the really good roe deer bucks have six points. They are quite interesting in that they breed in the summer, and then the doe holds onto the embryo until fall, when it is then implanted in the uterus. The book *Bambi* actually was written about roe deer. That is why Bambi's father had hardened antlers when he was born.

Long story short, what Ückermann taught me was that culling of deer to improve antlers is far more complicated than just killing a few "management" animals. It is a complex task requiring careful attention to detail and virtually *total* control by the manager over harvest. In this column, what I hope to accomplish is to better inform you about these principles, as well let you in on what I have learned about culling whitetails over the last three and a half decades. Hopefully, you will learn culling is a far more multifaceted practice than some would have you believe.

Recruitment Is Key

The cull involves two practices. The first is to remove excess animals as a means of controlling the herd. The second is to remove males with inferior antler traits for the purpose of improving antler quality.

In order to properly cull a herd, you first have to focus on how many animals should be on the range. But just knowing how many deer you have is a real chore, one you probably never will accomplish. So I generally let the herd tell me how it's doing by monitoring responses of the herd and habitat to harvest. *Crucial to this, and probably the most important aspect of deer management, is recruitment, defined as the number of offspring that live to one year of age.* Sounds simple, but recruitment is also probably the most misunderstood concept in whitetail management.

If you are doing a good job of record-keeping, you no doubt will have data on 1) the potential productivity of your herd, 2) the survival to weaning

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of offspring, and 3) the number or percentage of offspring reaching breeding age (usually one year of age). Frankly, it is irrelevant how many fetuses a doe is carrying or how many fawns you have in October. What really counts are the number actually recruited, i.e., making it to that one-year mark. So a well-managed herd has does removed at an intensity high enough to produce the highest recruitment. That translates to more bucks and greater genetic diversity. Hence, the cull *always* includes doe harvest.

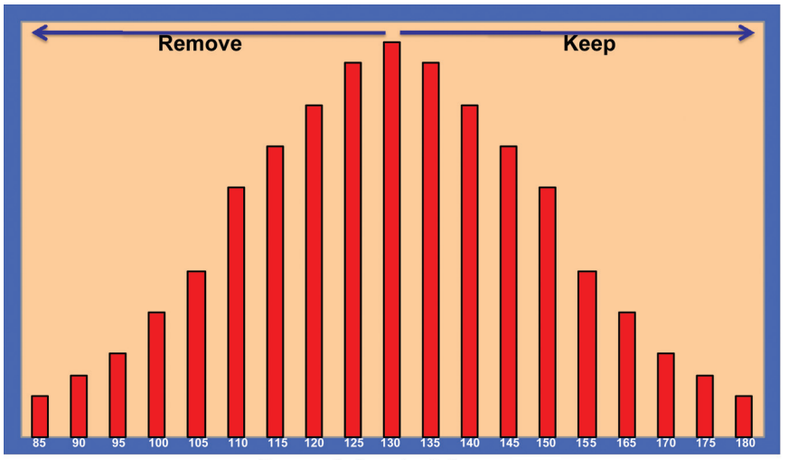
But which does should you remove? The answer may surprise you. It is actually the *older* does that need removing. They are the products of past years and practices and probably are not carrying the genetics from your better bucks that you want to increase. So a "perfect" doe herd pretty much truncates at 3½ years of age. Under these conditions you will have a fair percentage of doe fawns actually breeding, and a disproportionate number of their fawns will be males!

I often say you do not manage a deer herd, you fine-tune it! What I mean by this is that you impose a management practice, then measure the herd's response. If it is positive, you increase the activity until the result is negative. So, when I am asked how many does to harvest, I usually say, "shoot does until recruitment stops increasing."

What About The Boys?

When it comes to culling bucks, there is more to consider. My culling philosophy and practices really have not changed since I wrote the book *A Practical Guide to Producing and Harvesting White-tailed Deer*, in 1991. That book is now in its seventh printing, and sales remain, remarkably, at the same level as the day it came off the press. Here's what I recommended in that book and what I have documented since.

The whitetail buck "wants" to have eight points and score 130 inches Boone and Crockett (B&C) (see graph). We recently validated this during our landmark study on antler development in free-ranging deer. Previously, Dr. Charles DeYoung—in my opinion, one of the greatest minds in deer biology—also showed the same trend during his studies. In fact, if we were to capture every mature buck in Texas and graph the distribution of points and B&C scores, the result would be a bell-shaped, or normal, curve distributed about these average numbers. On the left side of the curve are the very poor-antlered bucks, while the right side contains the top-end types. (Of course, in some local herds, the curve does not include the right tail due to years and years of over-harvest. I once worked with a herd in Mississippi, where the average mature buck had less than eight points—10-pointers seemed to have disappeared!)



If we capture all the mature bucks in South Texas and graph the percentages of bucks for different B&C scores, the mean (average) would be around 130, with lower proportions as you move to the left or right of this average. Since it is well documented that each buck produces only a handful of offspring, it can be seen that the high numbers of individuals in the "average" middle group have far greater impact on the genetics of the herd than those on either tail. In the same vein, removing a small number of bucks from the left side has less impact than removing a like number on the higher B&C-scoring right side.

Notice there are only a small portion of bucks residing on the right or left tails of the curve. That is good for the sorry bucks, but not so good for the best ones. The impact of taking just one of these best individuals from the herd is far greater than taking several from the average. Another herd I worked with back in the 1990s contained a handful of 12-pointers when we first started. Unfortunately, the landowner succumbed to taking these bucks for several years, and they virtually disappeared from the herd. (I will discuss this important point later in more depth.) So how do we cull and what really works? What do we need to know?

More than 35 years of experience have taught me a great deal about the breeding system of whitetails. What follows are nine basic generalizations, and I'm here to tell you each one of these represents a serious pitfall to the manager. Let's take them one at a time.

Whitetails Do *Not* Have Harems

Bucks normally do not try to bring several females under their control at any one time. Consequently, bucks must find, pursue, and tend one doe at a time. How bucks find does is not certain, but it may involve chemical as well as visual cues. This means they will not have the opportunity to breed very many does, or other does while they are attending a single doe.

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Bucks Fight For Dominance

Bucks fight for dominance, a known fact. They also attain dominance throughout the year and throughout their lives in very subtle ways. Since bucks (and does) want to be dominant, there must be some advantage(s) to that. These might include better access to mates, space, and food. Since dominance is most obvious during the rut, there must also be a reproductive advantage.

Home Ranges

Whitetails have fairly large home ranges, with bucks' larger than does'. I spent the first 20 years of my career radio-tracking deer (and that was not easy in those days), primarily mature bucks. I learned the same thing many other scientists did: bucks generally have home ranges twice as large as those of does. I also discovered home range was a function of habitat quality; deer with diverse, high-quality habitats had smaller home ranges. We also learned young bucks (fawns and yearlings), tended to migrate away from their birth place. This makes total sense, because doe groups are highly related, and migration reduces inbreeding. Once relocated, however, some bucks tend to stay put, especially after their second year.

There appear to be two types of dominant bucks, residents and "floaters." The resident dominant bucks know every other buck in the area and exercise considerable control over them. The floaters move sometimes many miles, know very few of the residents, and, consequently, have to be the best fighters.

Common sense dictates that the larger the home range, the more difficult it will be to find females, especially in low-density populations. Also, broken habitats, such as those found in agricultural or urban areas, would require more searching time, and, presumably, less does would be bred by a particular buck.

The Rut Is Seasonal And Finite

Whitetails are seasonal breeders, with a relatively short breeding season of about 120 days (although does have been shown to cycle for as many as 180 days). That said, even at 120 days there are only a limited number of breeding days available to each buck.

Long before DNA studies proved me right, I pointed out that logic dictated a buck would be lucky if he produced more than three or four fawns a year. *That makes the individual impact of any one buck fairly low.* This especially is true if there is a skewed sex and age structure. My earlier calculation was based on a buck having to spend some amount of time searching for a receptive doe. Once found, he will stay with her for up to 36 hours, effectively taking him out of the breeding pool. Thus, there is a finite number of does a buck can breed in any one rutting season.

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Timing Estrus

The timing of when a doe comes into estrus is affected by many factors, including social status and body condition. In crowded conditions, the older does breed first. In less-crowded situations with a more natural age distribution, younger does are most apt to breed early. Body condition and how long it's been since a doe has weaned her last offspring are the two greatest determiners to when she breeds.

Timing Breeding

Finally, the timing of when a doe is bred will determine her contribution to recruitment, again, defined as the number of offspring reaching one year of age. Whitetail gestation is about 198 days. A fawn born in early June (the result of an early November breeding) will have a much greater chance of living to one year of age than one born 60 days later (the result of a January breeding). Complicating this is that, if there are not enough bucks to go around, a doe may not become pregnant for one or two estrous cycles.

Batting Order

Intuitively, the length of time over the breeding season a buck has dominance may affect his genetic impact. In other words, if a buck is dominant early in the rut, he will have a larger impact, i.e., he will have higher recruitment due to the timing of his offsprings' births. He also will breed the most fit does, leaving the less fit females to bucks that breed later. Therefore, if a buck gains dominance later in the rut, he will have less impact on recruitment; he will produce fawns, but will have much lower recruitment due to post-weaning mortality.

The genetic impact of a particular buck, then, is highly variable, depending on the overall health of the herd; demographics; disposition of the buck; social position of the buck (especially early in the rut); and the social position of the doe. The most successful buck, therefore, is one that not only lives to

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maturity (4½-plus years), but also one that gains dominance early in the rut *and* lives more than one year thereafter *and* lives in an area where home ranges are relatively small and habitat is uniform.

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These are the conclusions I have come to in the last 35 years, but what about some of the more recent findings of other deer biologists? The study done in Mississippi that I spoke of earlier has been given a lot of ink in the popular press over the last couple years. In that study, conducted over breeding pens by Randy DeYoung, et al., bucks and does were confined in six pens over three years (two pens per year). Pen No. 1 housed a 3½-year-old buck and a 5½-year-old buck. The former was initially subordinate, then became dominant, the latter the reverse. Pen No. 2 housed does and three bucks, to wit, a yearling buck (subordinate), a 3½-year-old buck (dominant), and a 5½-year-old buck (subordinate). Pen No. 3 contained does with two yearling bucks (both subordinates) and a 2½-year-old dominant buck. Pen No. 4 had does confined with two yearlings (again, subordinates) and a dominant 2½-year-old buck, and Pen No. 5 housed two yearling bucks (both subordinates) and another 2½-year-old buck. Finally, Pen No. 6 had a yearling buck (subordinate), a 3½-year-old buck (subordinate, then dominant) and a 6½-year-old buck (dominant, then subordinate). Stay with me on this!

DeYoung, et al., concluded the following:

1. Breeding was not exclusive to social dominance.

2. Dominance ranks may not be predictable or stable.

3. Factors that determine male mating success are not clearly understood.

All three of these conclusions are reasonable, in my opinion; however, it was a *penned* deer study, with very small sample sizes. The experimental



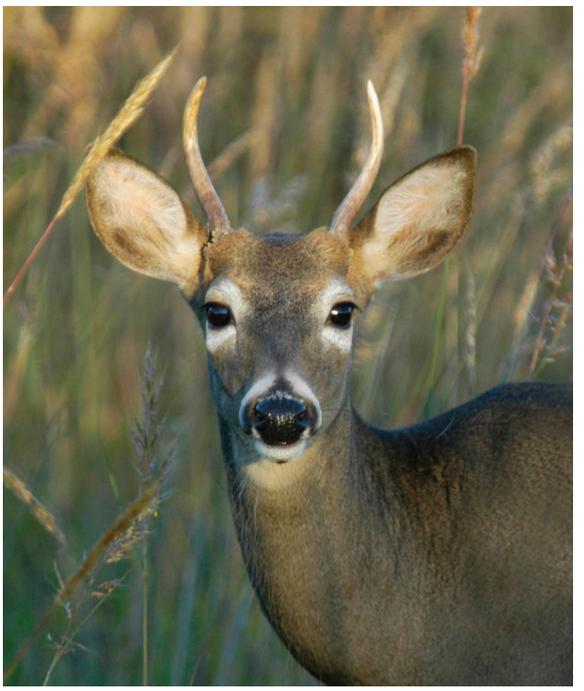
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design introduced a great deal of potentially confounding factors, among which were confinement of deer in unnatural densities, *presumed* natural estrus activity, and elimination of the need for bucks to search out does. *Yet the study's observations were similar to what we have seen during our research on wild deer.*

This especially is true when you consider some points not fully made by the scientists.

First, dominance remained constant in four of the six pens. Too, the social status of a buck affected the total number of offspring for each buck in pens with constant dominance. Dominant bucks produced almost eight times more fawns. In the two pens where dominance shifted during the breeding season, the number of fawns sired reflected this shift. That translated to differential birthing of fawns from the two bucks. Incomplete dominance also produced split offspring paternity during the social transition. This has been commonly reported in fallow deer, which normally tend to lose dominance through the rut. Lastly, and I believe very importantly, *no yearling buck ever gained dominance*.

My research has shown that, in pens with two or more bucks (one staying dominant throughout the breeding season), when more than one doe comes into estrus at the same time, there is a tendency of the dominant buck to defend only one of the does. This leaves the others open to service. Even buck fawns with hardened antler tips will breed does while a buck is guarding another doe. But, and I stress the "but," the pen is not a natural situation. Stay tuned, there's much more to come.



To cull or not to cull, that is the question. Conventional management practices generally say spikes should go, but is that the be-all end-all solution to producing bigger-antlered deer?

Editor's Note: This is the first in a two-part series. Be sure to look for Part 2 in the November/December issue of The Journal.

