Making Sense of Selective Buck Harvest

Once you achieve great buck age structure, harvesting only the highest-scoring middle-agers and leaving the others can lead to high-grading. Here's how to wisely pick your "green-light" bucks.

By **Dr. Steve Demarais** and **Dr. Bronson Strickland**

Selective deer harvest – we read about it all the time, don't we? In its most basic form, it may include selective preference toward does with the objectives being to improve an unbalanced sex ratio or lower deer density. For bucks, selective harvest often involves age: Younger bucks are protected to improve buck age structure. Some hunters with ideal management conditions reach an advanced level of QDM and produce an abundance of older bucks – more than enough to satisfy the recreational desires of the hunters involved. If these hunters harvest only the highest-scoring mature bucks and leave the rest alone, problems can arise if their objectives are to manage for optimal age-specific antler quality on their property. To avoid these problems, selective harvest can be used to increase the relative proportion of bucks on a property that have greater growth potential by decreasing the proportion of bucks with lesser growth potential.

Sounds simple enough, right? So, why is there so much confusion? Truth be told, the ins and outs of selective harvest are often misunderstood simply because the context is not clearly stated. So, let us break it down for you in context. There are two types of selective buck harvest based on antler size – as a means to improve the standing crop of the population or as a means to improve genetics. Simply put, standing crop management is feasible and genetic management of wild deer populations – or even of large enclosed populations, for that matter – is *not feasible*.

So what's the difference between standing crop management and genetic management, besides feasibility? Quite a lot! Let's take a look at each so you can avoid confusion between the two. You'll

then understand how selective harvest of the standing crop (existing deer) can be beneficial – and how to it can be achieved.

Context 1: Genetic Management

Selective harvest for the purposes of improving genetics focuses on changing the future population (deer that haven't been born yet). This type of selective-harvest approach wouldn't just change the current population of deer, it would actually increase the population-level gene frequencies that code for production of larger antlers and thus change the future population of deer. Sound complicated? Well, guess what – it is! Genetic management is much more difficult and complicated than standing crop management for a number of reasons.

Genetic composition can be manipulated only if you can do two things successfully. First, you have to be able to accurately judge the genetic potential of bucks and then significantly increase their reproductive success. Second, you must find a way to evaluate and alter the genetic composition of does.

Judging the comparative potential of young bucks to grow larger antlers is challenging but feasible. Complicating the impact of these decisions is the i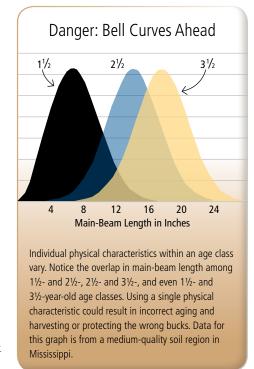mpossibility of visually judging the genetic heritability of an individual's antlers. Heritability, or the probability for specific antler characteristics to be passed onto the father's offspring, has been debated for years by wildlife research biologists. It's likely that average heritability ranges from 30 to 70 percent, depending on the specific antler feature. At the low end of the range, only one in three of a sire's offspring would be expected to have antlers similar to their sire. This is a problem, but it pales next to the larger issue of the does.

Our inability to judge a doe's genetic potential for antler development is a huge problem because this rules out our ability to genetically manage an entire half of the population. Because the genetic composition of does can't be directly controlled, it must come indirectly. The tending mating system of white-tailed deer further complicates this scenario. Because breeding opportunity is spread throughout the buck segment of the population and genetically "superior" bucks don't get to sire very many offspring, genetic changes are hampered. *Think about it.* If only the largest-antlered bucks had been doing all of the breeding over the eons, why does the average mature buck have only 8 points? We'll talk more about this in our next article.

Context 2: Standing Crop Management

Selective harvest that focuses on the "standing crop," or the current deer population, is similar to thinning lower quality trees from an over-stocked timber stand to increase availability of light and nutrients to grow the higher quality trees to mature timber. The standing crop of bucks can – and should – be managed if you have adequate numbers and age structure of bucks and if deer density has exceeded optimal carrying capacity. Many hunters are working hard just to improve buck numbers and age structure, and in these cases standing crop management is *not* applicable.

For those hunters who have achieved great buck age structure and manage a high-density population, failure to include buck harvest as part of population control will perpetuate the existence of older bucks with lower body weights and antler scores. Imagine a scenario where hunters are saving their tags only for high-scoring adult bucks and letting below-average-scoring bucks survive season after season, and you can see how the standing crop, or current population, is affected. If antlers are the only harvest criteria, the high-scoring

Danger: Bell Curves Ahead

1½   2½   3½

4   8   12   16   20   24
Main-Beam Length in Inches

Individual physical characteristics within an age class vary. Notice the overlap in main-beam length among 1½- and 2½-, 2½- and 3½-, and even 1½- and 3½-year-old age classes. Using a single physical characteristic could result in incorrect aging and harvesting or protecting the wrong bucks. Data for this graph is from a medium-quality soil region in Mississippi.
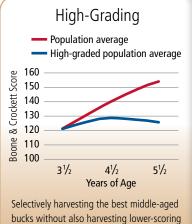
bucks being selected may even be younger deer, which leads to high-grading.

You have to be careful, though, because management of the standing crop of a population can result in both positive and negative effects, depending on the approach to selective harvest. The Mississippi State University (MSU) Deer Lab proved this fact in modeling exercises and by evaluating the effects of Mississippi's statewide four-point antler regulation back in 2001. On state Wildlife Management Areas, harvest of the larger-antlered yearlings and protection of smaller-antlered young deer reduced antler size of harvested deer at 2½ and 3½ years of age simply because the best yearling bucks were harvested year after year while the smaller-antler yearlings were allowed to grow older.

For managers who have a developed buck age structure and a surplus of bucks, the standing crop can be manipulated to improve the average antler size of bucks in older age classes. As part of population control, you should selectively harvest bucks that have less chance of growing larger antlers at older age classes. There are two positive results from this approach: someone is going to enjoy more recreational opportunity, and removing these bucks leaves more nutritional resources for bucks that have greater potential to grow

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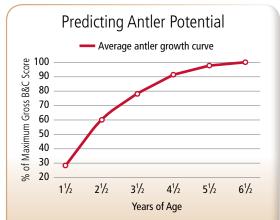larger antlers. However, *you must have the ability to make the right harvest decisions.*

Intensive standing crop management requires the hunter to estimate age and then evaluate antler size relative to others within that age class. Although overall antler size can be a general indicator of age, each animal's antlers should be evaluated after age is estimated, so you shouldn't rely too much on antler size to determine age. In fact, some antler characteristic may be possessed in equal measure among both younger and older deer (see the bell curve illustration on the previous page). A portion of younger deer with above average antlers and older deer with below average antlers actually have similar antler characteristics, which makes antlers an inefficient tool for managing the buck age structure of your standing crop of bucks. In fact, intense selective removal of younger animals can easily backfire. You could end up accidentally removing higher-quality young bucks while protecting lower-quality older bucks, and eventually decrease the average antler size of your

High-Grading

Population average

High-graded population average

Selectively harvesting the best middle-aged bucks without also harvesting lower-scoring bucks can lead to "high-grading" of the standing crop. This example shows how average antler size of the remaining buck population can be influenced by removing the best bucks at 3½ and 4½ years.

Predicting Antler Potential

Average antler growth curve

This chart shows the average percentage of maximum lifetime antler size (gross Boone & Crockett score) whitetail bucks reach at each year of age from 1½ to 6½. On average, a buck reaches nearly 80 percent of his antler potential by age 3½ and 90 percent by age 4½. At these ages, the predictive relationship between a buck's current set of antlers and his future antlers is strong enough to make reliable selective harvest decisions. The weak link is our ability to estimate age and antler size. (Based on research by Dr. Harry Jacobson at Mississippi State University and Dr. Mickey Hellickson at Texas A&M University-Kingsville)

population rather than increase it (see the "High-Grading" graph on this page). Actually, this is exactly what happened after five years of the statewide 4-point antler restriction in Mississippi.

Selective harvest for standing crop management should be age-dependent for

a very good reason. On average, a buck has reached 75 percent of his antler potential by age 3½ and 90 percent by age 4½ (see "Predicting Antler Potential" on this page). At these ages, the predictive relationship

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between a buck's current set of antlers and his future antlers is strong enough to make reliable harvest decisions. The weak link is our ability to estimate age and antler size.

For some properties any and all bucks of a given age are the harvest goal. In such cases a simple strategy of selecting all bucks of a certain age for harvest regardless of antler quality decreases the likelihood of having mature bucks with below-average antlers. Standing crop management is not a viable option for these situations, because only age, not antlers, is considered.

Forming a Strategy

So, how do you form a workable selective harvest strategy based on the combination of age and antler size? First, you need good information about the deer you are hunting and managing.

The distribution of antler characteristics within an age class (such as total antler points, beam length, inside spread, or gross Boone & Crockett score) looks like a bell-shaped curve. This means that in an age class there are fewer individual bucks that exhibit either extremely large or very small values for a particular antler characteristic, while most bucks in the age class possess average antler characteristics. Years of extensive data collection from your managed population will yield age-specific distributions of antler characteristics. Then, these distributions can be used as the basis for formulating age-appropriate selective-harvest strategies to shape the distribution of antler characteristics of a population's standing crop. What it boils down to is that selective-harvest programs should always be based on site-specific data. Given the wide use of trail-cameras today, hunters now have the ability to inventory the bucks on a given property and study them carefully, before or during hunting season. The MSU Deer Lab's product Buckscore (Buckscore.com) provides a means of estimating age and antler size of photographed bucks for data collection. Combined with site-specific data from previously harvested bucks, photographs enhance the ability to make accurate selective-harvest choices.

The goal of a selective harvest strategy in most cases will be to harvest 3½- and 4½-year-old bucks on the left side of the bell-curve. Selective harvest focused on the left side of an age-specific distribution will improve the average size of that antler characteristic in that group of bucks (or cohort) in the future, whether you are selecting for fewer antler points, narrower spread, smaller main beam length, or lower gross B&C score. Obviously, a buck that is on the left side of the bell curve for several or all of these criteria is the ideal candidate for selection.

Keep in mind that selection intensity (or, the proportion of deer within an age class removed) affects how the average antler size of the population standing crop is altered. In a computer simulation, we determined that a significant number of bucks that met a certain antler size criterion had to be harvested to result in any meaningful change in the average antler size in the population. However, if there is an overpopulation of bucks, every buck removed that is a well-below-average antler producer is a contribution to population control.

Of course, the environment plays a role too. An unpredictable environment (like drought-prone areas where rainfall is highly variable) makes it hard to tell what changes in your population result from

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selective harvest or just changes in habitat quality. Vice versa, a stable environment makes selective harvest more effective and your population's response to it more measurable. And, let's not forget the question of time – effective selective harvest requires a long-term commitment. Your population standing crop will start reverting to its original characteristics as soon as your selective harvest program ends.

Finally, the success of this strategy also depends on the protection of 3½- and 4½-year-old bucks on the *right side* of the bell-curve. These bucks have above-average antlers and may test a hunter's commitment to the strategy! If either property size or hunter commitment do not consistently yield older-aged bucks (4½ or older), then selective harvest for standing crop improvement will not work. Again, we emphasize, this is for advanced QDM'ers!

Selective Harvest as a Management Tool

Selective harvest has been and will continue to be an important tool for Quality Deer Managers. We've used it to protect does when deer populations were being restored during the latter half of the 1900s. Selective harvest of bucks has been a hallmark of QDM – "Let him go so he can grow." A more specific selective-harvest process within your buck population's standing crop can and should be a part of any program that has an adequate adult sex ratio and a need to control buck population growth. But always remember to qualify the context when you use this terminology. Selective harvest to improve buck "genetics" is *not feasible* and should not be confused with management of the standing crop. Selective harvest to improve the quality of the standing crop of a population is a viable option for well-informed hunter-managers.

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