

Managing White-tailed Deer Collecting Data from Harvested Deer

Many hunters now practice what is known as quality deer management (QDM) on their properties. The level of involvement in QDM varies from hunt club to hunt club. Some hunting clubs may impose antler restrictions of various kinds, while others focus on doe harvest, food plots, camera surveys, habitat management, or a combination of these. All of these activities are an important part of taking an active role in managing local deer populations. But how do you know if it is working?

Surprisingly, many hunters and hunt clubs do not know if their QDM programs are working. Some hunters may think or feel that their deer herd is doing better, but how do they actually know? Wouldn't it be worthwhile to know if your investment in habitat improvement and harvest management is paying off? Many hunting clubs invest thousands of dollars and a substantial amount of time each year managing deer but forget the most essential part of any QDM program—collecting data from harvested deer. Without this data, hunting clubs will be at a significant disadvantage when making decisions regarding the management of their deer populations.

A number of techniques are available for gathering information about local deer herds. These include trail cameras, spotlight surveys, hunter observations, drive counts, pellet counts, and harvest data. These techniques, except for harvest data, only provide general estimates of density or sex ratio (and these estimates are often far from accurate) and are of limited use in judging the health of your herd. Density is difficult to measure accurately and changes constantly throughout the year—and from year to year, presenting a moving target for basing management decisions. Additionally, density is not always a good indicator of herd condition. Many other factors such as soils and habitat quality will play an important role in determining deer health at any given density. Data, therefore, should be collected directly from animals to best assess herd



Data collection is required to make sound deer herd management decisions.

condition, hence the need for recording data from harvested deer.

The simplest and most convenient way to evaluate herd condition is with an examination of harvest data. Clearly, it's better to manage a deer population based on real data than on gut feelings. Your success in deer management will partly depend on the data you collect and your use of those data to make adjustments to your QDM program. This publication provides practical suggestions for collecting biological data from harvested deer and insight as to what this data might mean about the health of your deer herd.

Collecting and Using Data

Collecting data from harvested deer is easy and takes only a small amount of time for the hunter. The goal of collecting harvest data is to document several characteristics of the deer herd; therefore, it is important to collect data from every deer harvested. This includes bucks, does, and fawns. Secondly and of equal importance, data must be collected every year. Deer weights



Is your deer management program working? You won't know unless you collect data from the deer you harvest.

vary considerably from year to year, so you need several years of continuous data to determine trends in deer herd condition.

For example, in figure 1 showing one-and-a-half-year-old doe weights for any given two- to three-year period, a different story could be told regarding the condition of does on the property (increasing or decreasing). However, the trend in doe weights steadily increasing is clearly evident.

Several uncontrollable factors may be responsible for short-term peaks and troughs in a data set. For example, mast (acorns, persimmons, muscadine, etc.) production may have been above average, resulting in heavier deer in 2001. Conversely, a severe drought in 2002 may have stunted natural browse, causing a decline in deer weights from 2001–2003. These are just some of the factors, other than your QDM program, that may influence year-to-year deer weights. As a result, several years of data collection are needed to uncover underlying trends in deer condition.

What to Collect

Data collection is not complex. Use a data sheet with a standard format for the information you will need and that will also help ensure that all necessary information is collected from each deer consistently. You will need a hanging scale, jawbone extractor, loppers, data sheets, and some paper tags and wire. The following is the data you will need to collect. An example data sheet is at the end of this publication.

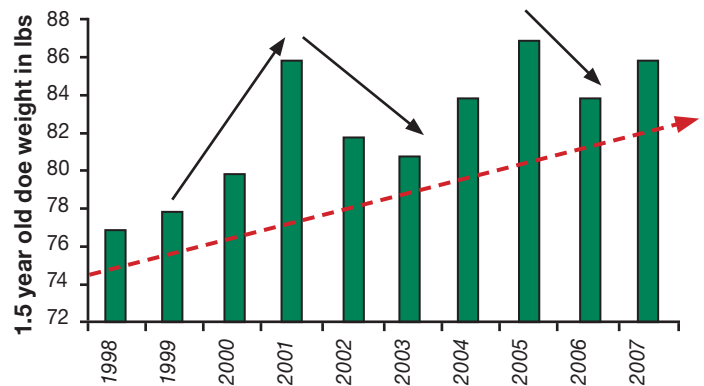


Figure 1. Several years of data are necessary to determine changes in the deer herd.

✓ Date of Harvest

To be able to analyze data effectively and detect potential trends in the data, you must record the date of harvest. For example, body weights of deer often fluctuate throughout the hunting season. Bucks can lose up to 20 percent of their body weight during the breeding season, and data analyses that do not account for date of harvest can generate misleading information. Additionally, examination of reproductive data from does (e.g., lactation) is dependent on knowing the date of harvest.

✓ Harvest Location

Knowing where each deer is harvested on your property is helpful for looking at differences across large (greater than 5,000 acres) properties. Harvest location may also serve as an indicator of where the “hot spots” are on a property for harvesting deer—or at least where hunting effort has been concentrated. Whether you name landmarks or divide the property into sections, it is important to record the harvest location for each deer.

✓ Hunter's Name

Hunter's name is important to record in case any questions arise. If guests frequently hunt the property, it may be worthwhile to also include their phone numbers or e-mail addresses.



Figure 2. Tags like this can be used to link entries on the data sheet to jaw bones that have been collected. Tag the jawbone immediately after removing it.

✓ Identification Number

Assign a unique number to each deer harvested. Number the deer consecutively to simplify record keeping. Keep in mind that you will be collecting harvest data for several years, so create a numbering system that will allow you to uniquely identify harvested deer from many seasons. An example of a numbering system is to use the year the season begins followed by a number that shows what order the deer were harvested. In this case, number 901 would be the first deer harvested in the hunting season that began in the fall of 2009. If you harvest more than 100 deer, you may want to number your deer as 2009-001, 2009-002, etc. Another numbering system may be similar to the above, but the unique identification number may end in a *B* for buck and *D* for doe. The first doe harvested would then be 2009-001D, and the first buck harvested would be 2009-001B. **Write this identification number on your data sheet AND on a tag, and attach it to the jawbone extracted from the deer (figure 2). See Age section.**

✓ Sex

The sex of the deer must be known in order for the weight data to provide meaningful information. Weight data is almost always examined separately for bucks and does because bucks tend to weigh more than does. Knowing the sex of the deer you have harvested will also allow you to go back through your data and assess antlerless harvest effort and the ratio of bucks to does in the harvest.

✓ Age

Knowledge of a deer's age is necessary to allow for worthwhile analysis of data on weight, antler characteristics, etc. Because antler size and body weight typically increase with age, deer managers usually examine trends in body characteristics for particular age classes of deer. The age of a deer is determined by tooth wear and replacement on the jaw teeth. To age a deer using the teeth, you must remove one side of the lower jawbone. You can extract the lower jaw using a knife and saw, but it is much easier to use a jawbone extractor (about \$16) and loppers. One side of the jawbone is usually sufficient for aging, but both can be collected if there is concern that injury or uneven wear patterns will affect the accuracy of aging. See the section on Jawbone Extraction to learn how to pull jawbones. After you have extracted the jawbone, attach an identification tag to it.

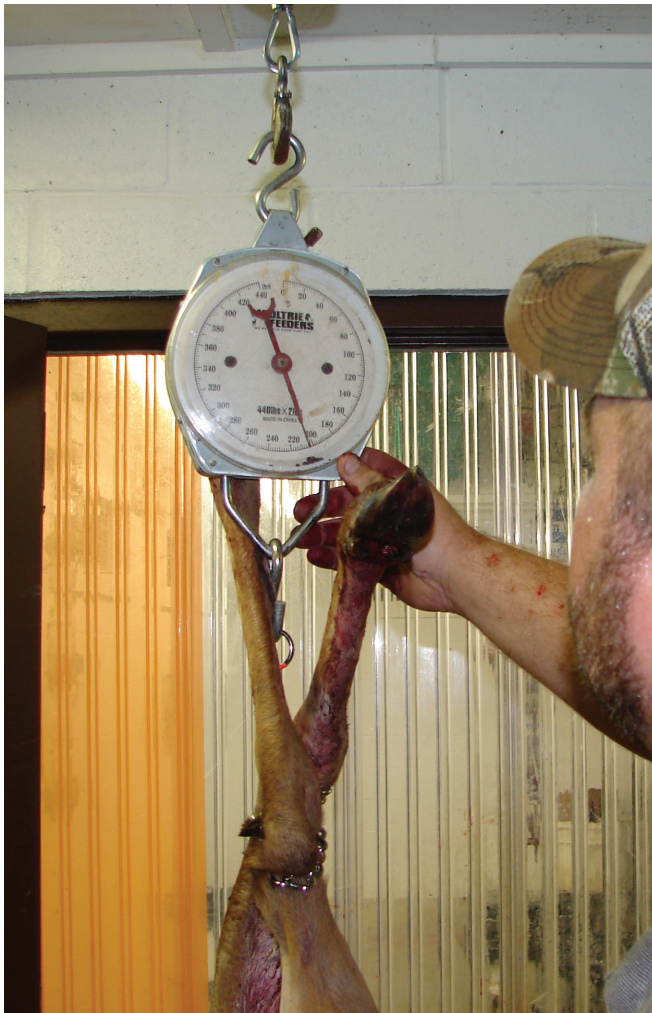


Figure 3. Use a hanging scale to weigh all harvested deer.

✓ *Weight*

The body weight of every harvested deer should be recorded because body weight (by age class) is one of the most important measures used to assess the condition of a herd. Hanging scales (figure 3) can be purchased for less than \$50 from a forestry supplier or sporting goods dealer. It is best to weigh each deer before field dressing (figure 4). However, if deer are weighed after field dressing, their approximate weight can be estimated using the chart in figure 5. Regardless of which approach you take for measuring deer weight (dressed or predressed), be as consistent as possible, because inconsistencies in these data will negatively affect your ability to draw logical conclusions about the condition of your deer herd.

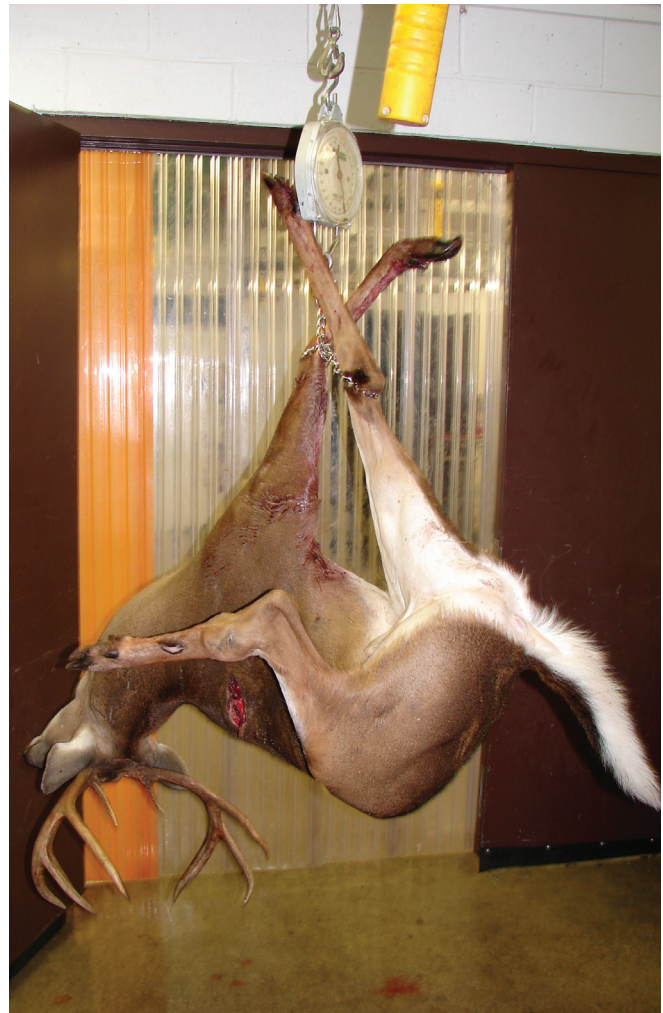


Figure 4. It is often more convenient to weigh deer by chaining together a front leg to the opposite rear leg before hoisting the scale so you don't have to stand on a stool or ladder to read the scale.

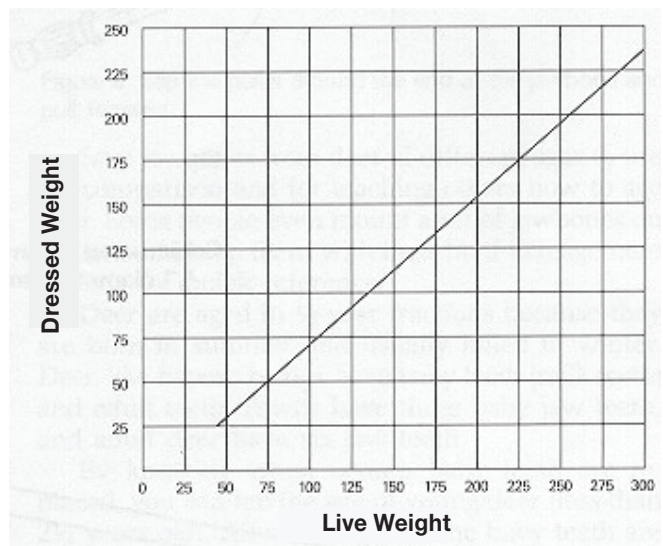


Figure 5. Live weights of dressed deer can be estimated using the above chart.



Figure 6. Lactation can easily be determined by squeezing a teat.

✓ *Lactation Status*

Lactation status can be an indicator of nutritional condition and productivity of a herd. Does harvested early in the season are more likely to have fawns young enough to still be nursing, and squeezing a teat may produce milk. Later in the season and when does are drying up, it becomes necessary to cut into the udder to determine whether the doe had been lactating. The presence of yellowish to brownish liquid indicates that the doe was lactating that year (figure 6). It is advised that you cut into the udder of every doe to confirm lactation status and minimize the likelihood of incorrectly assigning lactation status.

✓ *Antler Measurements*

At the very least, you should (1) count the number of points on each antler, (2) measure the basal circumferences of both main beams, (3) measure the lengths of both main beams, and (4) measure the inside spread of the antlers. If desired, additional measurements such as the lengths of individual tines, circumferences of the tines, and the overall Boone & Crockett (B&C) score can be recorded. Measure antlers using a flex-



Figure 7. A tape should be used to take antler measurements to the closest 1/8 inch.

ible measuring tape to the nearest 1/8 inch (a simple half-inch wide flexible sewing tape works well; figure 7). On properties where yearling bucks are harvested, record the diameter of yearling antlers measured 1 inch above the burr. The diameter of the antler can be calculated from the circumference measurement by dividing the circumference by 3.14.

✓ *Comments*

A comments section allows you to record any other pertinent data that isn't included in any of the other categories. For example, poor body condition, injuries, or signs of parasites and disease are important to document for management purposes.

Extracting a Jawbone

To extract a jawbone, you will need a pair of long-handled pruning shears, or loppers, and a jawbone extractor. Forestry supply companies and some hardware stores stock them. Loppers can be purchased at most hardware stores. A welder can make the puller using the dimensions shown in figure 1.

Removing one of the jawbones is a fairly simple process. Figures 9 through 14 show the steps involved. This process is safe even if you plan to have the deer head mounted. Simply go through the first steps of cutting the back of the jawbone with the loppers, use the extractor to separate the skin from the jawbone up to the diastema (the section of the jaw with no teeth between the molars and incisors), and cut the jawbone at that point using the loppers. This will ensure that you do not accidentally tear the lip by extracting the full jawbone. Taxidermists do not object to taking a deer head with a jawbone removed because it is not used in mounting.

You can determine the age of a deer by examining the teeth for wear and replacement. This technique is fairly simple and relatively accurate. With a little practice, almost anyone can age a deer by looking at the jawbone.

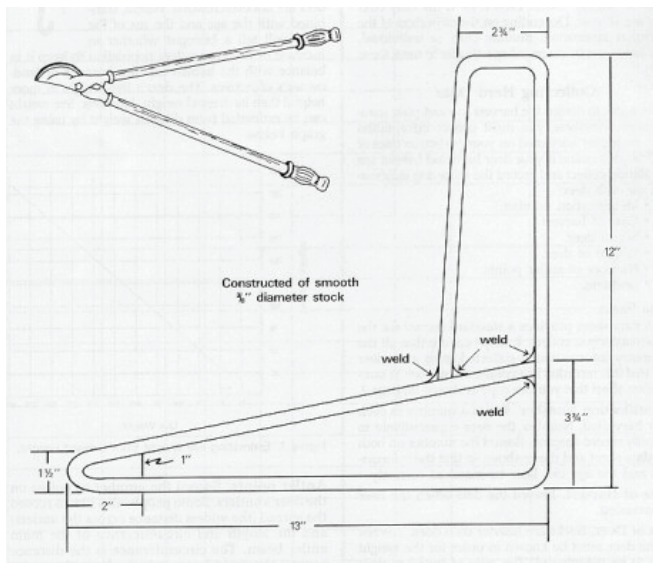


Figure 8. To extract a jawbone, you need pruning shears (loppers) and a jawbone puller. A jawbone extractor and loppers are used to remove the lower jaw.



Figure 9. If the deer's jaw is locked shut, use the jawbone puller to pry open the mouth.



Figure 10. Use the jawbone puller to loosen the muscles and membrane between the teeth and cheek by inserting the puller and twisting.

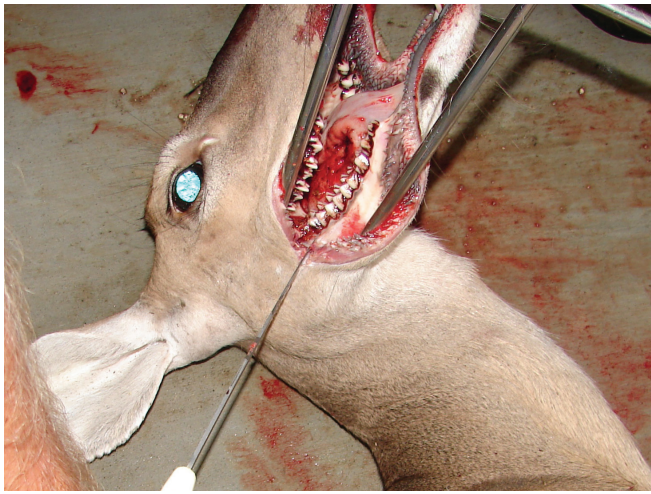


Figure 11. Use the loppers to cut the jawbone. If you are unfamiliar with the location of the jawbone, you may need to use a knife to cut the cheek skin to fully expose the jawbone (top photo). *If the deer is to be mounted, do not make this cut.* Using the loppers, cut through the back of the jawbone. *Be careful not to break the tops of the back teeth.*



Figure 12. After cutting the jawbone, insert the smaller, rounded end of the extractor through the cut. With your fingers, push the back point of the lower jaw through the small end of the puller. Loop the small end of the extractor around the lower jawbone where it was cut with the loppers.



Figure 13. Anchor the deer's head by placing your foot across the throat and give the extractor a quick tug. The extractor will slide along the bottom edge of the jawbone, breaking the connective tissue. Separate the two jawbones in the front where they meet. Give the extractor a quick, hearty tug to remove the jawbone.



Figure 14. Use a knife to clean muscle and connective tissue from the jawbone. Attach the identification tag immediately.

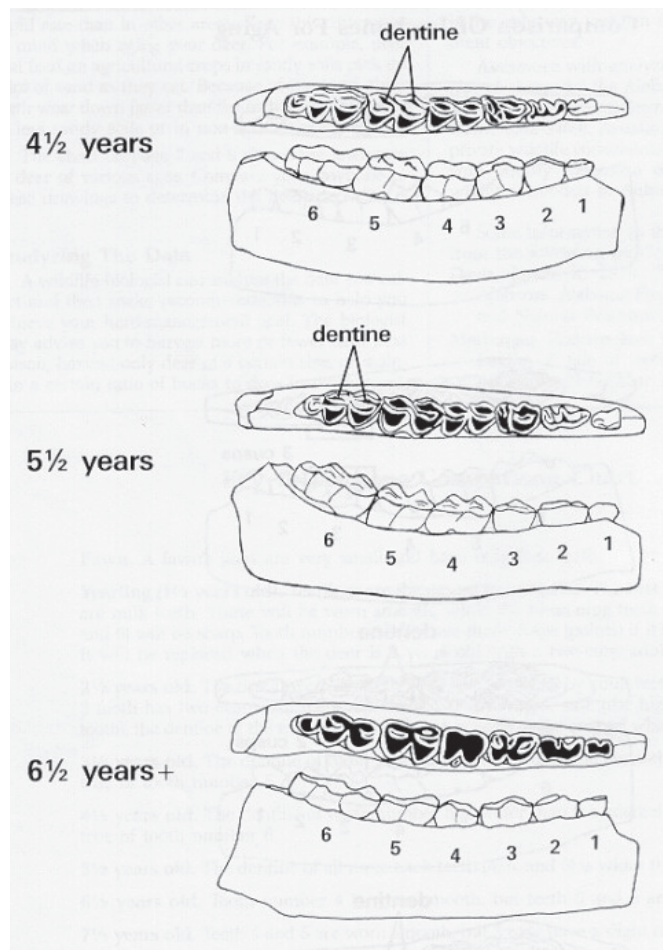
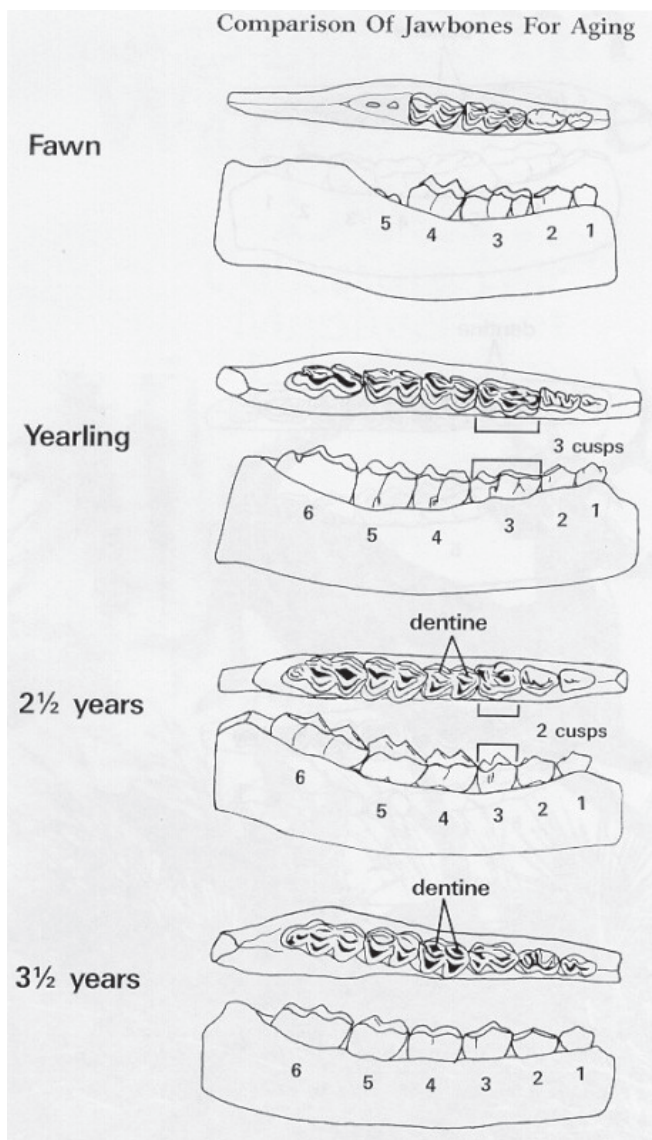


Figure 15. Tooth replacement can be used to reliably age deer to 2.5 years of age. The relative amounts of dentine and enamel visible can be used to estimate the age of deer 2.5 years and older. However, this method is far from 100% accurate.

Determining Age

Tooth replacement can reliably age deer as fawns, yearlings, and 2.5+ since the loss and replacement of immature premolars and molars with permanent adult teeth in deer is very predictable during the first two years of life (figure 15).

Deer are aged in half-year fractions because they are born in summer and usually killed in winter. Deer, like human beings, have baby teeth (milk teeth) and adult teeth. Fawns will have four or five molars in the jaw, and adult deer have six molars.

By knowing when certain baby teeth are replaced, you can determine the age of young deer (less than two and a half years old). After this age, all baby teeth are gone, and you must look at tooth wear to determine age.

✓ Fawns to 2.5-Year-Olds

Fawns are born with three premolars, called “milk teeth,” and one molar on each side. In addition, the first two milk teeth are bicuspid (having two points) while the third milk tooth is tricuspid (having three points; see jawbone comparison in figure 15). At about 12 months of age, two permanent molars erupt

at the back of each side of the lower jaw. For this reason, a harvested deer with fewer than five teeth per side and a tricuspid third premolar is a fawn.

Yearlings will have five to six teeth and will still have the tricuspid third milk tooth (see jawbone comparison on page 8). During the second year of life, the milk teeth are replaced with permanent adult premolars. Unlike the milk teeth, all of the adult premolars are bicuspid, so deer harvested with six teeth and a bicuspid third premolar are two years or older

✓ **2.5 Years and Older**

There is debate among biologists as to whether tooth wear can accurately age deer older than 2.5 years of age. However, analysis of wear patterns in the teeth will allow skilled personnel to get close to the correct age. While some of the age estimates in older deer are far from 100 percent accurate, they will be close and will be better than simply classifying them into the same age class as 2.5-year-olds.

Deer teeth are made of two materials: enamel, the light-colored substance covering the outside of the tooth, and dentine, the dark-colored substance inside the enamel layers. Because the dentine is wider at the base of the tooth than at the top, more and more dentine shows as a deer's tooth wears down. A comparison of the width of the dentine with the width of the enamel indicates the deer's age as seen in figure 15.

In some areas of the state, wear occurs at a more rapid rate than in other areas. Keep this difference in mind when aging deer. For example, deer that feed on agricultural crops in sandy soils pick up a lot of sand as they eat. Because of the sand, their teeth wear down faster than the teeth of deer feeding in less sandy soils or in nonagricultural areas.

Save jawbones from deer of different ages to use for comparison and for teaching others how to age deer. Some people even mount a set of jawbones on a board and keep them with their herd management records for quick reference.

✓ **Interpreting Harvest Data**

Seeking the assistance of an experienced deer biologist can pay big dividends when analyzing your data. Select a wildlife biologist who knows the deer in your area, the habitat conditions on your property, and the previous deer harvest on the property. They can help you better interpret the data you collect and then make recommendations to help you achieve your herd

management goal. These recommendations may be to harvest more or fewer deer next season, harvest only deer of a certain size, or maintain a certain ratio of bucks to does in the harvest depending on your management objectives. After you are comfortable interpreting your data, you should be able to make sound management decisions on your own.

The most valuable method for interpreting harvest data (and to put together before meeting with your wildlife biologist) is to simply display the data in a graph. Almost always the data are separated by sex and into the following age classes: 0.5, 1.5, 2.5, and 2.5+. It is also important to note the number of deer used to estimate each statistic.

The following list of graphs will be important to have when meeting with your wildlife biologist:

Females

- Average weight by age class
- Percentage of lactating females by age class

Males

- Average weight by age class
- Average main beam length by age class
- Average inside spread by age class
- Average main beam circumference by age class

Discrete numbers, like the average body weight of 2.5-year-old bucks for a single year, have little or no meaning without the context of the same measurement from other years. Therefore, it is best to analyze the data as trends over time. It generally takes two to three years or longer after a new management strategy is implemented for changes to become evident in the data, making consistency in data collection important so data from previous years can be compared with current data.

Natural variability from year to year will appear in your data set. Don't worry if deer body weights go down during the second year of data collection. It may just be a year of drought or a mast failure that is causing body weights to be lower—or last year may have been a bumper mast crop causing body weights to be greater than normal. In most cases, biologists will tell you that you need at least five years of data to confidently document a trend, but you may be able to get an idea of progress with less data if that is all that is available.

What Your Data May Be Telling You

Below are a few examples of what your data may be telling you about the deer herd on your property. Keep in mind that no single measurement can tell the complete story. Wildlife biologists make their recommendations based on multiple sources of information including harvest data, habitat conditions, observed browsing pressure, and so forth.

Though there are countless ways of arranging and analyzing harvest data, a handful of graphs are particularly useful. Doe harvest analyzed by percentage in each age class (0.5, 1.5, 2.5, and 3.5+ years) plotted over multiple years is a useful graph for predicting fawn survival and recruitment. For example, if yearling doe harvest is unusually low one year, it could signal low fawn survival for that year.

In addition, the percentage of does harvested at 4.5 years and older can be examined to determine the age structure and removal rates for does. About 25 to 30 percent of the doe harvest being does 4.5+ is generally regarded as normal; lower than that could indicate a young age structure and high removal rate. A doe harvest rate greater than that could indicate an older age structure, reduced removal rate, or possibly poor fawn survival.

In order to know whether available nutrition is adequate, look at the relative changes in weight, because a normal weight for does is specific to a location and difficult to determine. Instead, look to see if weight remains constant at a level appropriate for your area or management objectives. If you are unsure of what an average weight for does in your area should be, consult a competent, trained wildlife biologist. Decreasing weight could indicate that there is not enough high-quality forage available (or that deer density is too high); whereas an increase in weight may indicate a successful harvest or habitat management strategy.

Lactation rates of does by age class over multiple years are a useful graph, because it measures herd health and healthy deer produce more fawns. This measurement is most accurate if does are harvested earlier in the season when their fawns are still likely to be nursing. Typically, 3.5-year-old does are the most productive age class, and a 70 to 80 percent lactation rate is considered good for does 2.5 years and older. As with the average weight of does, lactation rates should be examined for trends.

It is also beneficial to separate yearling lactation rates over multiple years, because it is an even stronger indicator of available nutrition. Does that are lactating as yearlings were bred as fawns, and doe fawns must be 70 to 80 pounds to reach sexual maturity. So, if the available nutrition is good, there will be more lactating yearlings. Habitat that provides good nutrition and good fawn survival can have yearling lactation rates around 30 to 50 percent, but fawn lactation rates less than 5 percent are not necessarily indicative of poor conditions.

Antler characteristics and measurements can be analyzed in many ways, but the value of yearling antler beam diameter tends to be overlooked. On properties where yearling bucks are harvested, yearling antler beam diameter should be graphed over multiple years because it is a strong indicator of deer health and nutrition. Yearling antler beam diameter measures how much antler the yearlings can nutritionally afford to produce and is not likely to be strongly influenced by other factors such as poor body condition from the previous breeding season's efforts. Poor nutrition can lead to yearling antler beam diameters of 0.39 inches or less, while excellent nutrition can lead to yearling antler beam diameters near 0.80 inches.

It should be clearly evident from the above examples that if you aren't collecting data from harvested deer, you are missing a lot of important information that you can use to manage deer in your area. Without this important information, deer management becomes a guessing game. Would you prefer to manage by guesswork, or would you rather manage with data and get it right?

Managing a deer herd is much more successful when you can accurately assess the health and condition of the deer. The key is to take advantage of harvest data. It's free and only takes a little time to collect, but it provides a wealth of information. Harvest data can be the most complete and convenient way to evaluate the health of your deer herd, but it must be consistently collected from every deer the same way.



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