Antler Development in White-tailed Deer

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3 KEYS TO SUCCESS

There are 3 primary factors that influence the size of a whitetail's antlers. **Soils** provide the nutrients required for antler/mass development. **Genetics** will determine characteristics of the antlers. **Age** is also a factor with most deer maturing at **$4^{1/2}$** + years. While a combination of any 2 of these factors, and occasionally only 1, may produce a quality deer, it is a combination of all 3 that produce the trophies that many hunters desire.

AGE

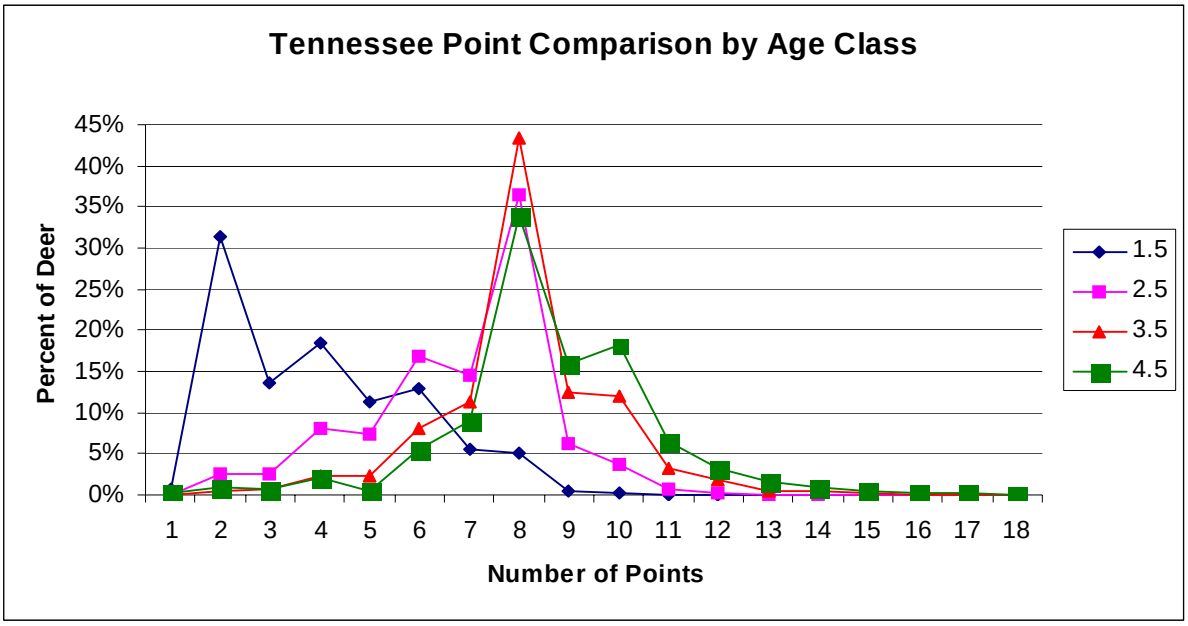
A deer will use available nutrients and minerals for body growth before antler growth. Thus, most deer in Tennessee will not begin to reach their genetic potential until $3^{1/2}$ years or older. Obviously, there are some deer that have enormous antlers at $2^{1/2}$ while others are mediocre at $4^{1/2}$+. Below is a good example of this…..

While poor nutrition and less desirable genetics may be the cause for an older deer to have small antlers, other factors may be involved. In Tennessee, these factors include, but are not limited to, an individual buck's health, stress, mast production, and injuries.

The attached chart shows it is uncommon (*less than 5%*) for a deer younger than $3^{1/2}$ in Tennessee to have more than 9 points. While 18% of $3^{1/2}$ and 31% of $4^{1/2}$+ have 10 points or more. However, over 1/3 (*37%*) of $2^{1/2}$ year old deer are 8 points. When talking with Tennessee hunters, one will realize very quickly that many hunters consider an 8 pointer a "quality" deer regardless of age. It should be noted that a point restriction of 3 or 4 points on a side would not protect most of these $2^{1/2}$ year old deer from legal harvest and potentially allow them to move the next age class.

Comparison of Age Classes (2004)		
State	Percent 1.5	Number of 2.5 +
TN	50%	40,445
IL	41%	44,509
KY	56%	22,353
OH	65%	27,690

Many people consider the percentage of $2^{1/2}$ + bucks in the antlered harvest as a measure of success when monitoring buck age structure. The table below compares Tennessee's age structure and number of $2^{1/2}$+ bucks to 3 other popular destinations of Tennessee hunters. While it is not uncommon to see large deer from these states, most hunters do not realize that these deer are not that much older that Tennessee deer. They just mature at a younger age. (see section on nutrition).



NUTRITION

HOW IMPORTANT ARE SOILS TO ANTLER DEVELOPMENT?

Without proper nutrition a buck will not reach its maximum potential (regardless of its age or genetic potential). Soils are what drive the nutritional availability in the food a deer consumes. Unfortunately, all soils are not the same. The maps to the right show the differences in soils across the United States.

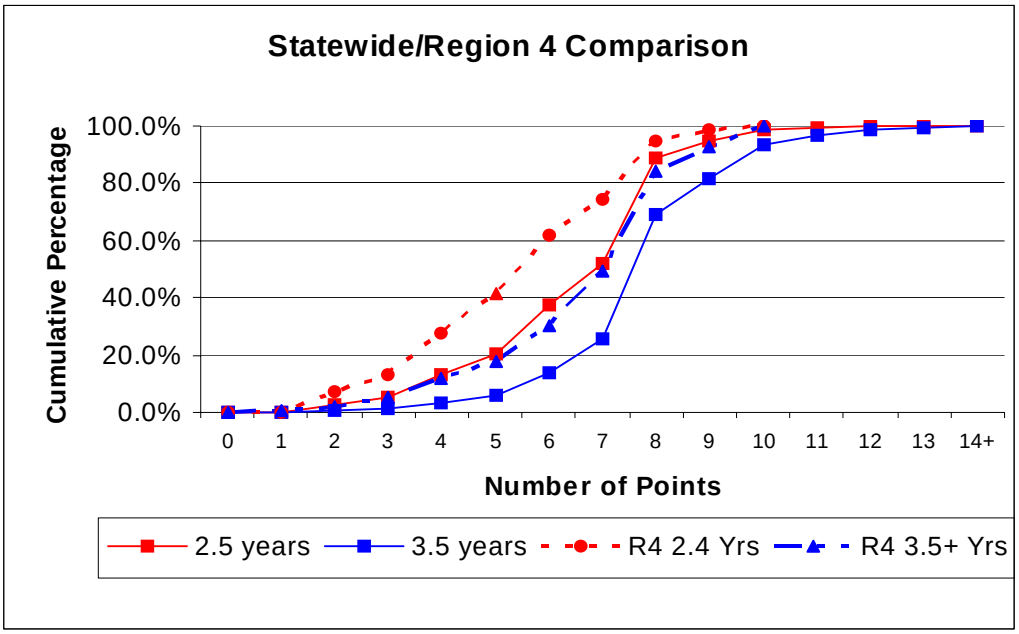
Soils order (type) is important. Ultisols are very old soils with low fertility. Conversely, Mollisols and Alfisols are 2 of the most productive soils in the world. As you can see, Tennessee is blessed with some Alfisols in the western and middle portions of the state. However, percentages are not very high and much of this area in middle Tennessee is highly urbanized. Notice Kentucky, while they are "just next door" look at the differences in percent of the good Alfisoils in the western part of their state compared to west Tennesee.

The number of bushels of grain that an acre of land is capable of producing is a good

indicator of soil fertility. Take a look at the mid-western states and compare them to Tennessee. It also is important to note that land use in the highly fertile soils is also important. While Tennessee has land that is capable of producing high yields, the land is located in an area that becomes more urban each year.

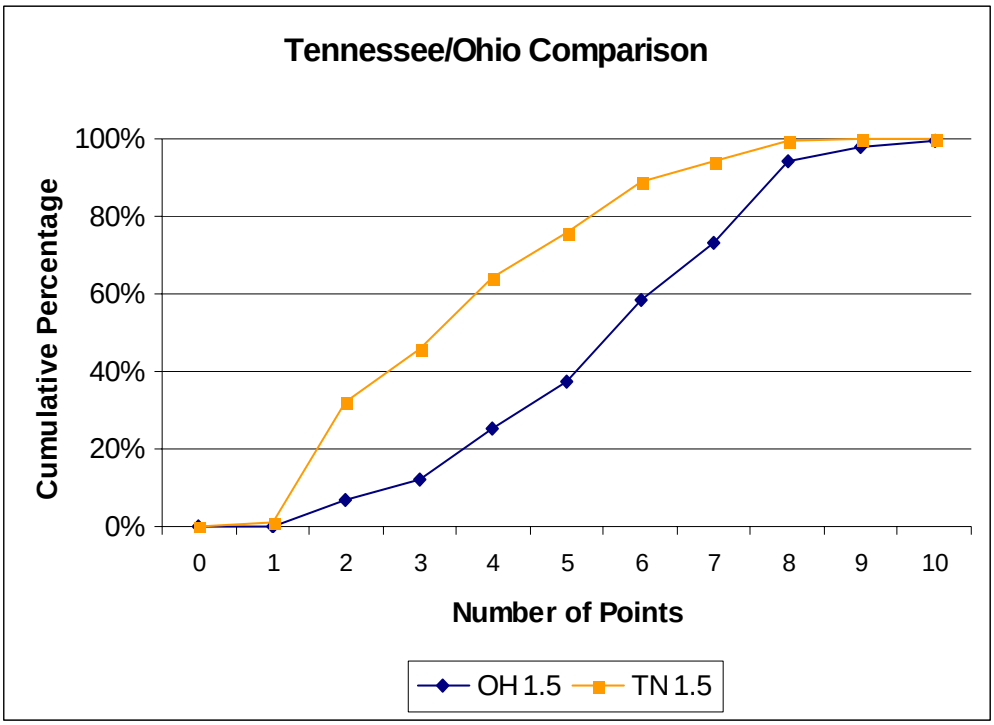
When comparing the soil and yield maps to a distribution map of Pope/Young and Boone/Crockett deer, a picture begins to unfold. The areas with the best soils produce the higher crop yields and more record book deer.

The point data graphs also indicate how soils play a role. Compare the Tennessee statewide trends for $2^{1/2}$ and $3^{1/2}$ year olds to the Region 4 $2^{1/2}$ and $3^{1/2}$ year olds.

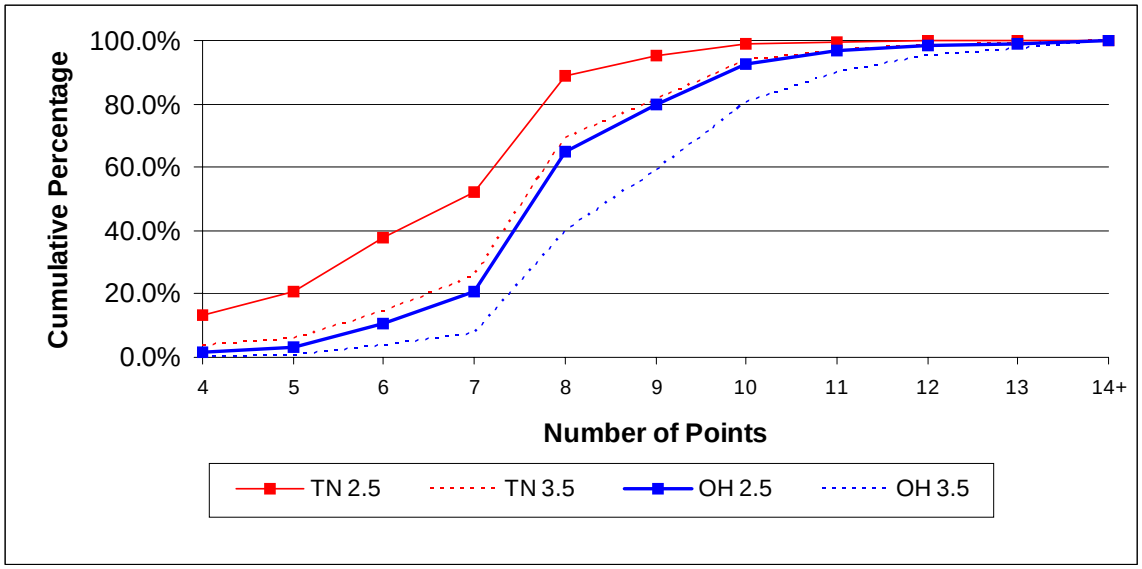


The Region 4 $3^{1/2}$ year age class is almost identical to the statewide $2^{1/2}$ year age class. On a statewide basis, about 80% of the $2^{1/2}$ year olds are 6 points or better. In Region 4, only 60% of the $2^{1/2}$ year olds are 6 points or better. While the genetic makeup of the herds is similar, poor soil fertility delays the manifestation of these characteristics in Region 4.

This trend is even more evident when comparing Tennessee's $1^{1/2}$ year age class to Ohio's $1^{1/2}$ year age class. While about 40% of Ohio $1^{1/2}$ year old deer are 7 points or better, only about 11% of Tennessee's $1^{1/2}$ year old deer are 7 points or better.



The graph below shows the difference between the $2^{1/2}$ and $3^{1/2}$ age classes in TN and OH. Notice that the TN $3^{1/2}$ and the OH $2^{1/2}$ ages are almost identical. Note: *This is not intended to infer that at $3^{1/2}$ deer in Tennessee would rival Ohio deer. It just shows that deer in TN take longer to achieve the larger number of points. Nutrition also affects mass and spread.* Notice that about 11% of TN $2^{1/2}$'s have more than 8pts, while 35% of OH's $2^{1/2}$'s have 8pts or better.

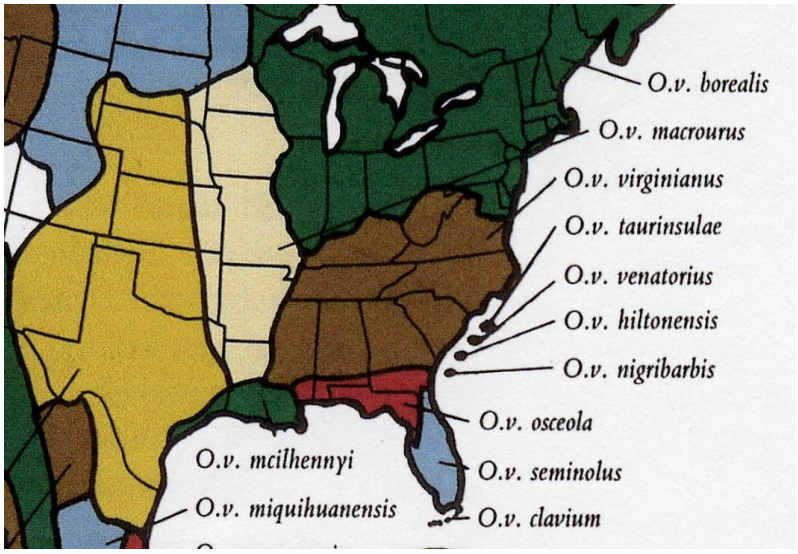


GENETICS

Genetics also play an important role in antler development. While age can be

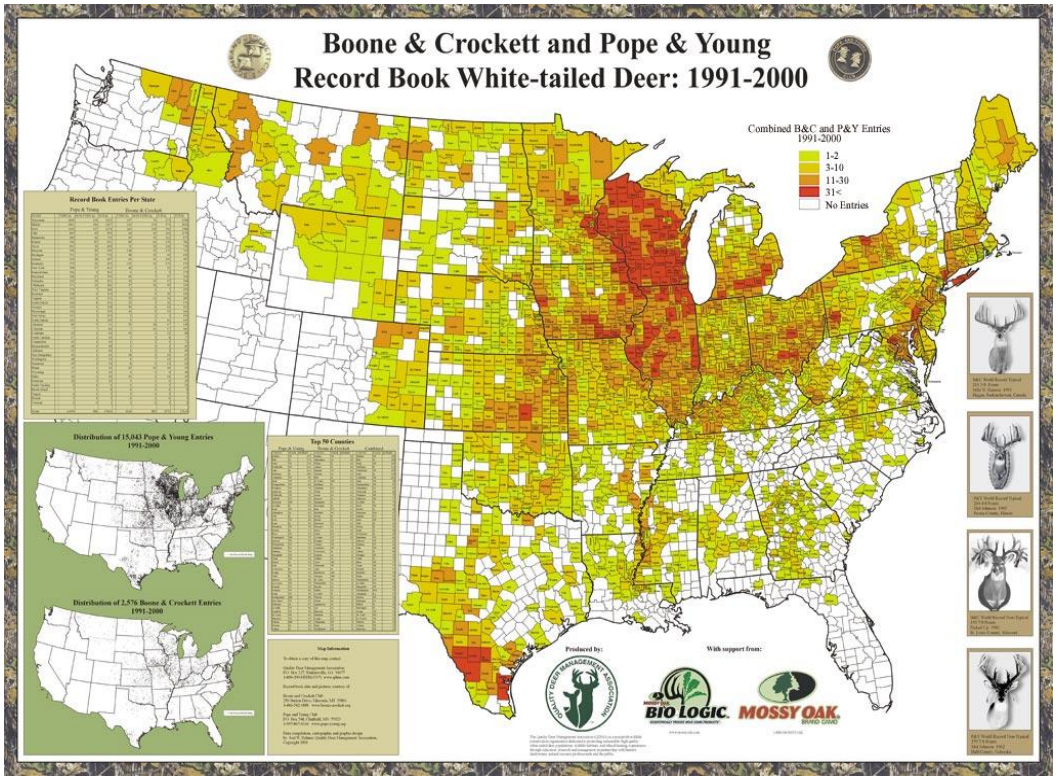
managed to an extent and nutrition can be supplemented on a local scale, genetic makeup of a deer population is very difficult, if not impossible, to influence. Some clubs attempt to "cull" bucks with "undesirable" genes. They do this by monitoring deer over time and comparing their antler characteristics to deer the same age on the same range.

Subspecies may have some influence on genetics. The map below shows the "historical" distribution of each subspecies.

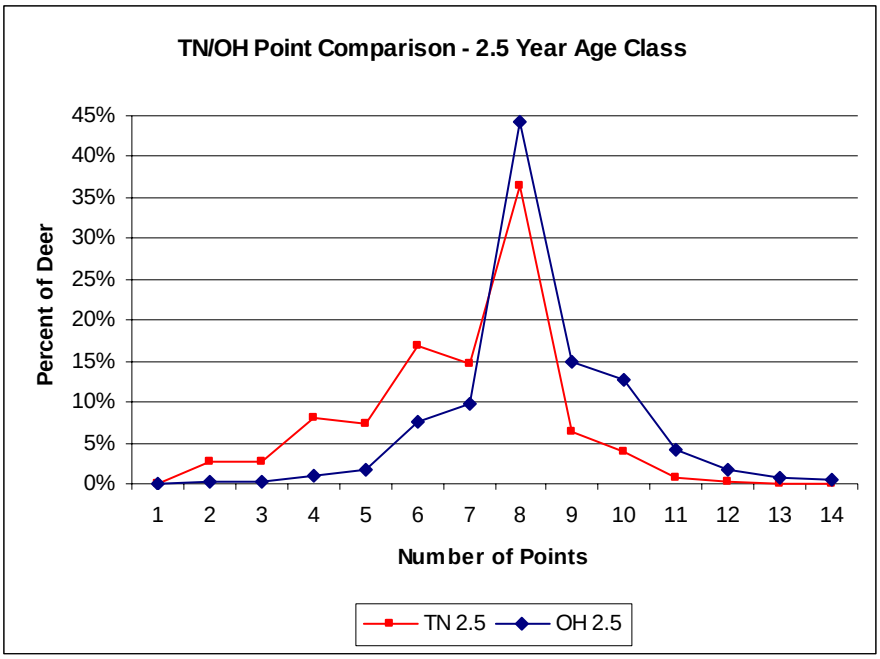


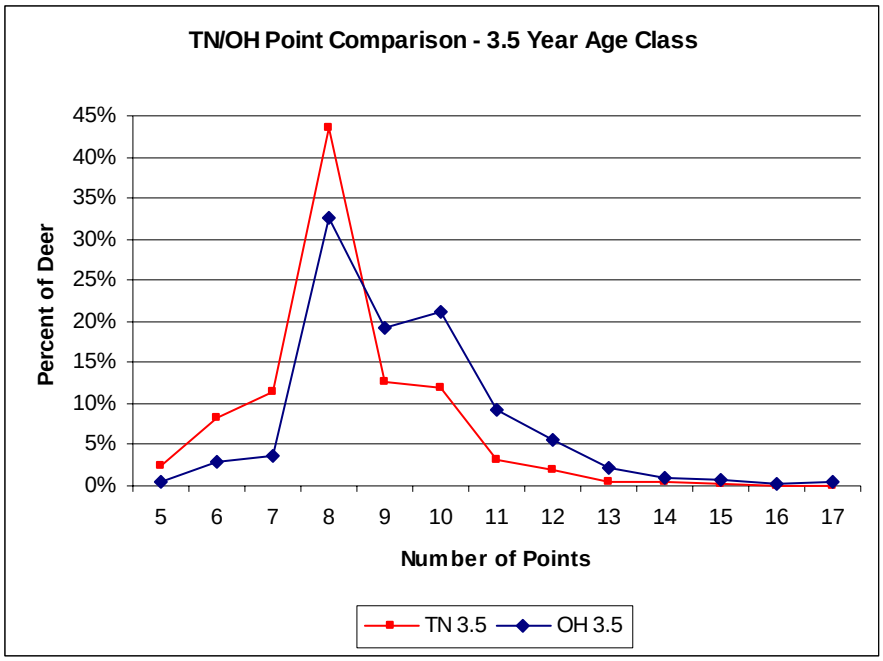
It should be noted that Kentucky used *borealis* subspecies in their restoration efforts and their herd is highly influenced, if not driven, by that subspecies. The TN deer herd is composed of *virginianus* and *texanus* subspecies. TN did use limited numbers of *borealis* during our deer restoration. However, they did not do well. If there is any influence of this subspecies remaining in TN it is probably in the Scott, Morgan, Campbell, and surrounding counties area.

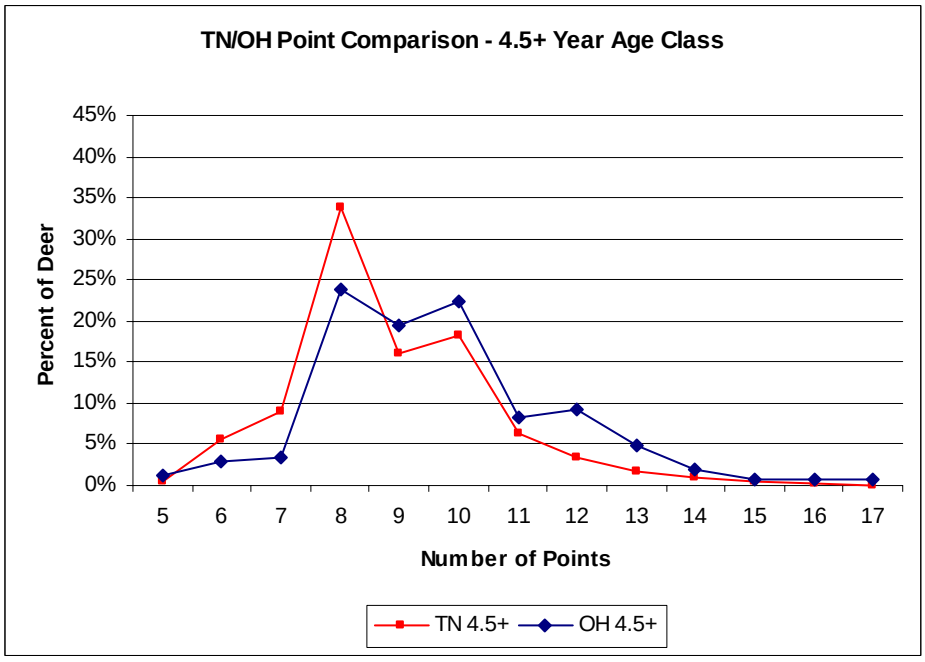
If you study the B&C and P&Y records you see that not many deer less than 11 points make the book (23% in TN and 30% in OH).



When comparing numbers of 11+ point deer killed in the 2 states, one sees that TN can provide these animals at 3*1/2* and 4*1/4* years. However, OH provides higher percentages at younger years. Notice once you get past 13 points on any age class, there is no difference, regardless of subspecies.





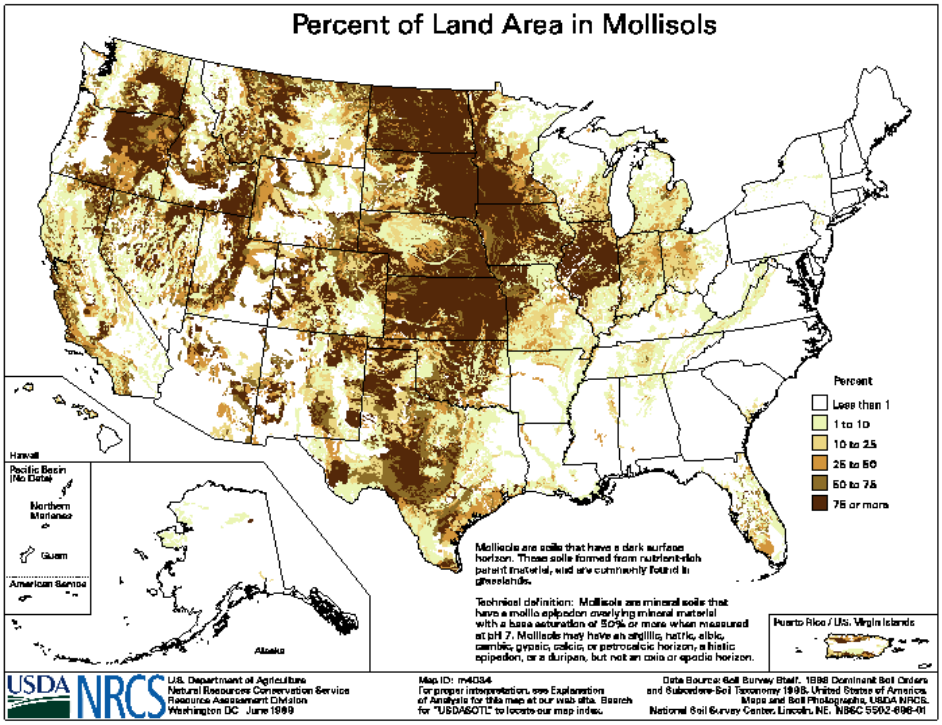


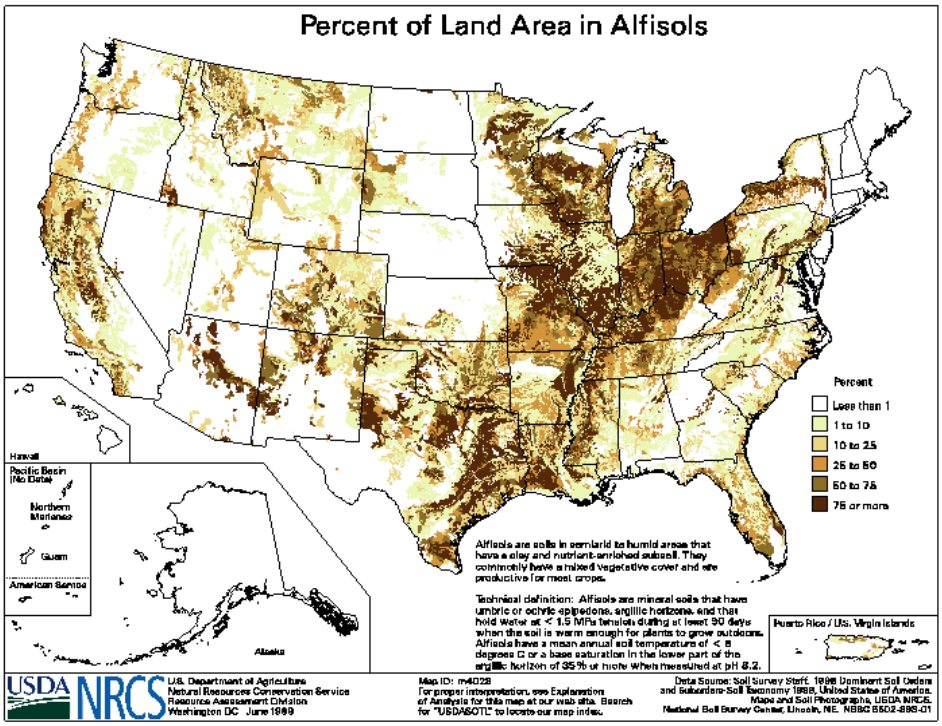
The non-typical class is a different matter. These deer are genetic anomalies and comprise a small percentage of the population. However, these deer still need sufficient age and nutrition in order to manifest their unique genetic potential to its maximum.

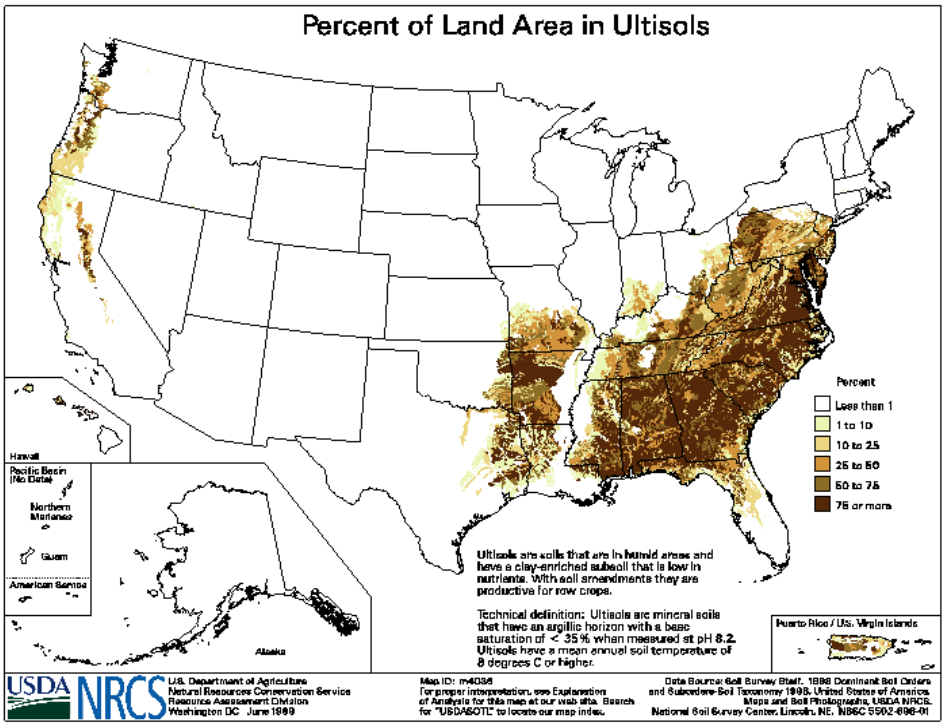
Does Subspecies Matter?

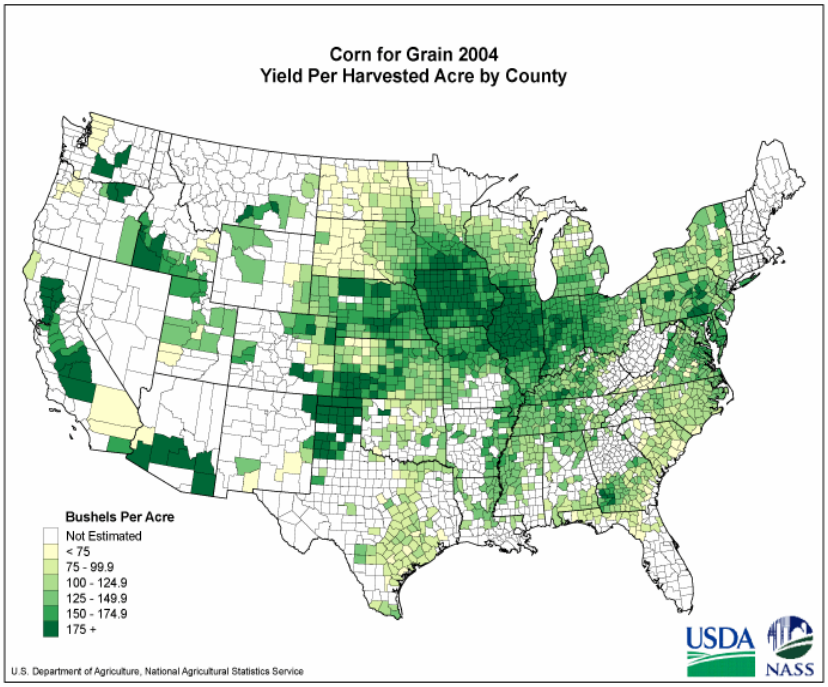
Let's compare Ohio to Pennsylvania. OH has had 149 typical deer entered in B&C. PA has had 19 *(2 less than TN)*. Both have the *borealis* subspecies. So what is the

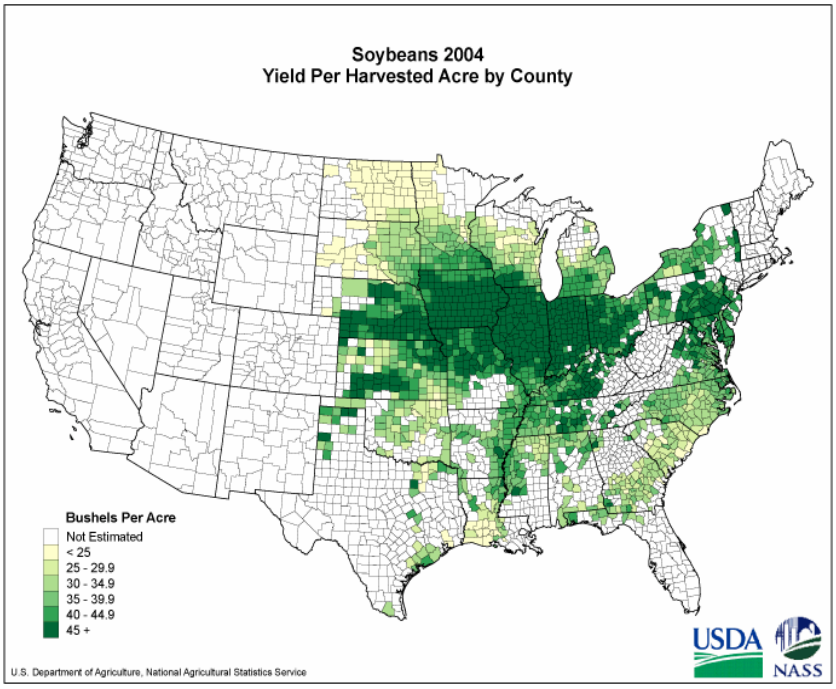
difference? Look at the soil maps.






Percent of Land Area in Ultisols
Percent
Less than 1
1 to 10
10 to 25
25 to 50
50 to 75
75 or more
Hawaii
Pacific Basin (No Data)
Northern Marianas
Guam
American Samoa
Alaska
Puerto Rico / Us. Virgin Islands
Ultisols are soils that are in humid areas and have a clay-enriched subsoil that is low in nutrients. With soil amendments they are productive for row crops.
Technical definition: Ultisols are mineral soils that have an argillic horizon with a base saturation of < 35% when measured at pH 8.2. Ultisols have a mean annual soil temperature of 8 degrees C or higher.
USDA NRCS
U.S. Department of Agriculture
Natural Resources Conservation Service
Resource Assessment Division
Washington DC June 1999
Map ID: nr4036
For proper interpretation, see Explanation of Analysis for this map at our web site. Search for "USDASOTL" to locate our map index.
Data Source: Soil Survey Staff. 1998 Dominant Soil Orders and Suborders-Soil Taxonomy 1998, United States of America. Maps and Soil Photographs, USDA NRCS. National Soil Survey Center, Lincoln, NE. NSSC 5502-498-01


Corn for Grain 2004
Yield Per Harvested Acre by County
Bushels Per Acre
Not Estimated
< 75
75 - 99.9
100 - 124.9
125 - 149.9
150 - 174.9
175 +
USDA NASS
U.S. Department of Agriculture, National Agricultural Statistics Service



Most of PA is comprised of Ultisols which have low native fertility. PA's numbers are more similar to TN. In addition, PA and TN antler characteristics are more similar. When you compare areas of PA that have a high percentage of Alfisols (western PA), the numbers of B&C entries are higher that areas comprised mostly of Ultisols.

Which Key is Critical?

When comparing TN's antlers to other states, which factor is driving the difference? We've seen that TN has an excellent age structure comparable to other states. We've also established that the genetics in Tennessee are suitable for producing trophy deer. That leaves us with nutrition. You can have an old deer with great genetics. However, you need the nutrition to manifest these 2 characteristics.