

## **August 2006 - Social Stress of an Overpopulated Deer Herd** **By: Jason R. Snavely**

Whether they are willing to admit it or not, most deer hunters want high deer populations on the areas they hunt. This is a natural desire since frequent interactions with deer are what they seek. For this reason, hunters commonly plant food plots, provide supplemental feeds, conduct controlled burns, and undertake numerous other activities to increase the quality and carrying capacity of the land. The desire to maintain high deer populations also has added to the reluctance of some hunters to harvest an adequate number of female deer.

Have you ever wondered what would happen if this situation was taken to the extreme? What would happen if a deer herd (either fenced or unfenced) was provided with unlimited, high quality feed and allowed to grow unimpeded? Could deer be stockpiled like livestock at extremely high densities without detrimental effects? A landmark study conducted in Michigan nearly 20 years ago provided some answers to this very question. More on this study later.

While the impacts of nutritional stress associated with overpopulated deer herds have been well documented, the impacts of social stress in overpopulated herds is relatively poorly understood. White-tailed deer are highly social animals. Does form matriarchal groups with well-established pecking orders. In most cases, the oldest doe is the most dominant with her female offspring and their offspring holding lower social positions.

Well-established social positions minimize unnecessary energy expenditure and help maintain social order. For example, when food is scarce, the dominant doe will eat before subordinate does and yearling bucks. This type of behavior also is exhibited during the fawning period. The matriarchal doe seeks the most desirable and productive fawning areas to raise her offspring. Consequently, less dominant does are relegated to lower quality fawning areas. As doe numbers increase, the social structure of these groups becomes more complex and unstable.

A study to explore the effects of high density on social stress in white-tailed deer was conducted in Upper Michigan by researchers John J. Ozoga and Louis J. Verme. These researchers supplementally fed an enclosed deer herd until it resembled a wild herd that exceeded the carrying capacity of the land. They provided unlimited feed and allowed it grow to 10 times the acceptable carrying capacity (over 100 deer per square mile).

Interestingly, the researchers found that as deer density increased the survival rate of fawns decreased. In other words, while there were more does to raise offspring, fewer were successful at rearing young due to density-related stress. Keep in mind that access to high quality feed was unlimited. Ozoga states, "Density stress...independent of nutrition can alter a doe's rate of physical maturation and reproductive performance." There was a direct correlation between the fawning success of does and their social rank within the herd. Ozoga notes that, "Neonatal mortality was due primarily to fawn abandonment and imprinting failure as a result of territorial behavior at high densities."

Fawn mortality also was related to the age of the doe. For example, when comparing prime-aged does to 3-year-old does, to 2-year-old does, the corresponding fawn mortality rates were 6 percent, 24 percent, and 63 percent, respectively. Ozoga concluded that, "Neonatal losses were related to social status and the ability to establish fawning territories." In other words, the lack of fawn-rearing space for subordinate does resulted in higher fawn mortality. Therefore, even in situations with unlimited food, social stress can influence fawn survival, recruitment, and individual vigor.

In the Michigan study, increasing deer density also affected antler development. When the deer

density was low, yearling bucks did not exhibit short spikes. However, at higher densities, 22 percent of the yearling bucks grew short spikes as their first set of antlers. Keep in mind that proper nutrition was available even as densities increased to 10 times that which the natural habitat conditions could sustain. Ozoga and Verme concluded that, "Socially stressed male fawns experienced a physiological setback and probable sex hormone imbalance that impaired antler pedicle development." Pedicles are the bony protrusions on a buck's head on which antlers develop. A buck will grow his first set of antlers on these pedicles at 1.5 years of age. Ozoga states the obvious that, "Undersized pedicles resulted in smaller-than-normal antlers." While it is well documented that a lack of adequate nutrition will prevent a buck from reaching its full genetic potential, it is apparent that density related stress can produce similar effects. Biologists now believe that social stress may be affecting antler growth and fawn recruitment in some herds.

What are the management implications of this research? First, the study demonstrated that even with unlimited access to high quality feeds, social stress caused by overpopulation can have profound negative effects on a deer herd. At very high densities, the resulting social disorder increases competition for available food, increases energy expenditure, decreases fawn survival, decreases antler growth in bucks, and reduces the overall health of the herd. Second, deer are not livestock and should not be managed accordingly. While this statement appears obvious, many hunters on both fenced and unfenced properties across the whitetail's range currently manage according to these principles. Several such areas maintain deer densities at or above the level reported in this study (over 100 per square mile). The bottom line here is that regardless of whether a property is attempting to practice traditional deer management, quality deer management, or even trophy deer management, deer density must be considered independent of nutrition.

The results of this study also raise the question of a behavioral carrying capacity, or the number of deer that can be sustained in a given area with unlimited high quality feeds without causing detrimental effects to the herd. The problem from a management standpoint is identifying the population level at which social stress begins causing these impacts. Before getting too concerned about identifying this particular level, hunters should implement responsible management programs that prevent social stress (and other negative ramifications of overpopulation) from occurring in the first place. Simply controlling the deer density on your hunting area by harvesting an adequate number of adult does will prevent habitat damage, maintain herd health, maximize harvest opportunities, and eliminate the potential for social stress. Sound easy? Well, in most cases it is.

As the new millennium approaches, biologists are still debating the effects of social stress on white-tailed deer. Even if your deer herd has not reached a high enough level to cause "measurable" damage, don't we as responsible managers owe it to these wonderful animals to do all possible to allow them a healthy and natural existence? I think so.

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