

## **A Year in the Life of the White-tailed Deer What's all this rubbing about?**

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Rising levels of testosterone circulating in the buck's blood toward the end of summer have caused the final maturation of the antler and the death of the antler velvet. In only a matter of days, the velvet covered antler is transformed into a polished weapon of competition. These rising testosterone levels (which will continue to rise until levels peak during November) result in a number of physiological and behavioral changes that prepare bucks for the competition for breeding privileges. Whereas bucks during the summer tend to be somewhat docile creatures content to 'hang out' with the guys within a fairly small home range, anticipation of the upcoming breeding season literally get 'in their blood'. Metabolism changes and muscle mass increases, particularly in the neck and shoulders. Sperm production increases. Behaviorally, bucks become more aggressive and increasingly intolerant of each other. Brief sparring matches begin to occur as bucks try out their new headgear, and test the strength and will of their future opponents. Activity of certain scent glands increases and bucks begin to make their presence known to other deer in the area. And, as a result, buck rubs begin showing up in the deer woods – to be followed later by scrapes.

Originally, hunters and biologist alike proposed that rubs were made primarily by bucks cleaning the dried velvet from their antlers. Others have suggested that rubs are made by bucks while mock fighting with a small tree, or that rubbing served to strengthen the neck muscles in preparation for later fights with other bucks. Although all of these may play a role in antler rubbing, we now know that buck rubs serve a much more important role.

Studies over the past two decades at a variety of universities, including The University of Georgia and Clemson University, have clearly demonstrated that bucks make rubs as visual and olfactory signposts that transmit some type of information to other bucks and does in the area. Anyone who has watched a buck make a rub certainly has noticed that, in many cases, his actions are very deliberate. A buck generally rubs the base of his antlers, and his forehead skin, against the tree. During the process, he often stops to inspect his progress either by smelling or licking the rubbed area.

A number of years ago, Dr. Larry Marchinton and his graduate students were able to demonstrate that some type of scent was being deposited on these rubs. He used trained dogs to identify these scents and found that the dogs could detect a scent on a rub for up to 3 days after the rub was made. A few years later, one of Larry's students, Dr. Tom Atkeson, found that the forehead skin between the antlers contained an abundance of scent producing skin glands called apocrine glands. These glands typically are inactive during the summer months, but in response to rising testosterone levels, they become increasingly active in the fall. Tom also found that the most active glands were found in mature dominant bucks. The glands were somewhat less active in younger subordinate

animals. Interestingly, forehead gland activity also tends to increase slightly in does during the fall.

More recently, one of my former graduate students, Dr. Jon Gasset, conducted a chemical analysis of the volatile chemicals associated with the forehead region and identified 57 different compounds. Interestingly there appeared to be marked differences in the chemical composition of secretions among different animals. Because of these differences, it is interesting to speculate that bucks may be able to identify which rubs are made by different deer. This suggestion is supported by the observation that following a sparring match between two bucks, the 'loser' or subordinate animal will frequently lick the forehead region of the dominant animal.

Early research suggested that most antler rubs were made during the pre-rut in September and that rubbing activity decreased as the peak of the rut approached. However, these studies frequently were conducted in areas where the deer were hunted – which means that the number of bucks in the population was decreasing through the study. More recently, Larry and I directed a study of the rubbing activity of bucks on an unhunted area in Clarke County, Georgia. In that study, the number of new rubs that were made each week remained relatively constant from early September through the peak of the rut until early December (Fig. 1). Significant scraping activity didn't start to occur until at least a month later.

The number of rubs on any piece of property is influenced by a number of factors. In our studies, we have recorded rub densities that range from less than 500 rubs/mi<sup>2</sup> to over 3,000 rubs/mi<sup>2</sup>. Obviously, one would expect that deer density (or at least buck density) will have a major influence on the number of rubs made on an area. However, while our studies have indicated that density has an impact, it is not a direct relationship. Rather, we have found that the number of rubs is more directly correlated with the density of older bucks (2.5+ year old) in the population. Researcher John Ozoga found similar results in his studies in Michigan. John's studies revealed that younger bucks make fewer than half as many rubs as did mature bucks, and that they tended to start rubbing much later in the fall. Therefore, because young bucks make few rubs in September or early October, an abundance of rubs during this pre-rut period will generally reveal the presence of an older buck in an area.

Our studies have also indicated that the number of rubs on an area may shift from year to year, depending on food availability. In the north Georgia Mountains, we recorded more rubs in years of good acorn production than in poor mast years, even though buck density did not change appreciably between years.

So, how many rubs will a buck make during the breeding season? That's a very difficult question to get an answer to, but we can make some quick calculations based on our estimates of rub density and buck density over a number of areas. From our studies, it appears that, on average, a buck may make anywhere from about 400 to over 800 rubs in a breeding season. If we acknowledge that yearling bucks make approximately 50 percent as many rubs as older bucks, our data suggests that on some area, older bucks

may be making more than 1200 rubs during the roughly 90 day rubbing period. That translated to about 15 rubs per day!

So, what is the purpose of all of these rubs? We'll never know for certain because we can't get inside a deer's head, but clearly there is some important information being passed among deer. Rubs certainly let other bucks know who is in the area. In addition, because dominant bucks tend to make many more rubs than subordinates, it is likely that dominant bucks mark their normal range with rubs that serve as signposts to advertise their presence and to announce their dominance.

Observations by Dr. Grant Woods while conducting his doctoral research at Clemson University suggest that certain types of rubs may serve special purposes. These 'traditional rubs' as he called them, were larger diameter trees that were rubbed in successive years. Grant only found these types of rubs on areas having an older age structure among the bucks. In an attempt to understand the role these traditional rubs play in deer communication, he used automatic cameras with infrared sensors to record any deer that approached these traditional rubs. Although he recorded some instances of investigation of these rubs by does, Grant found that numerous bucks interacted with these traditional rubs, either by smelling the rubbed area or by rubbing on the exposed area themselves. What role these traditional rubs play is still somewhat speculative, but clearly they are important in communication of presence or status among bucks.

Certainly we have a lot more to learn about why bucks make antler rubs. But for the deer hunter, antler rubs make one thing very clear – there is a buck in the area! But perhaps more importantly, the knowledge that mature bucks make more rubs, particularly early in the season, means that pre-season scouting can be critical for deer hunters seeking to harvest a mature animal.

Figure Caption:

Temporal distribution of buck rubs and scrapes along with known conceptions dates in a research forest in Clarke County, Georgia.