Effect of Fawning Date on Physical Development in Yearling Male White-tailed Deer

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Abstract: Antler measurements, weights, and estimated ages were collected from 529 male white-tailed deer (*Odocoileus virginianus*) harvested on the Campfield Hunt Club, Georgetown County, South Carolina, from 1984 to 1989. Yearlings ($N = 216$) were aged $\leq$17, 18, or $\geq$19 months of age according to premolar wear and replacement patterns. The 4-month hunting season was divided into 3 periods to test for differences in weight and antler development between the $\leq$17- and $\geq$19-month-old age groups. Mean number of points and mean weights of $\geq$ 19-month-old deer harvested during the first and second periods were greater ($P < 0.05$) than those of $\leq$ 17-month-old deer from any period. Mean antler spread of $\geq$ 19-month-old deer collected during the first period was greater than all $\leq$ 17-month-old deer. Percent spikes ranged from a low of 36.4% and 28.6% in $\geq$ 19-month-old deer harvested during the first and second periods, respectively, to a high of 83.9% and 81.2% in $\leq$ 17-month-old deer collected during the second and third periods, respectively. Management strategies that emphasize lower population density, balanced sex ratio, and an older male structure may increase the quality of the yearling male age class.

Proc. Annu. Conf. Southeast. Assoc. Fish and Wildl. Agencies 45:30–36

In many southeastern U.S. deer herds, an early pre-breeding hunting season and a heavy harvest of antlered males result in populations characterized by a young male age structure and an unbalanced sex ratio. These abnormal demographic and social characteristics may lead to delayed and prolonged breeding and fawning seasons (Guynn et al. 1986). In the Coastal Plain of South Carolina, Moore (1976) reported a breeding season from late August through mid-January with a mid-

November peak; resulting fawning dates varied from early March through early August, with a peak between mid-May and early June. Similar lengthy breeding and fawning seasons have been reported in Alabama (Lueth 1955, 1967), Louisiana (Roberson and Dennett 1966), Mississippi (Jacobson et al. 1979), and Texas (Harwell and Barron 1975).

Data on the effect of fawning date on physical development in white-tailed deer is scarce and the results contradictory. Zwank and Zeno (1986) reported significant differences in birth weights and subsequent weight gain among early, middle, and late born fawns in Louisiana. In contrast, Causey (1990) reported that captive 16-month-old bucks collected from the wild as fawns in Alabama demonstrated no correlation between weight, antler mass, or number of points and estimated date of birth.

This study was conducted to determine if estimated fawning date affects weight and antler development among yearling male deer in a wild population.

This study was funded by the South Carolina Wildlife and Marine Resources Department and Sport Fish and Wildlife Restoration Federal Aid Project W30-32-6. The authors wish to thank the members of the Campfield Hunt Club for their assistance with the collection of harvest data. R.L. Marchinton and R.J. Warren kindly reviewed an earlier draft of the manuscript.

Methods

We collected data between 1984 and 1989 on the 5,625-ha Campfield Hunt Club, Georgetown County, South Carolina. The property is located in the Atlantic Coastal Flatwoods subdivision of the Lower Coastal Plain physiographic region (Cooke 1936). The area consists of level uplands with depressions underlaid by clay sediments. Soils are in the Yauhannah-Yemessee Association (Fairey 1977). Elevations vary from 3.7 to 6.7 m above mean sea level. The climate is warm temperate with an average annual temperature of 18 C and an average annual frost-free growing season of 252 days. Precipitation averages 132 cm annually (Stuckey 1982). Major habitat types and plant communities consist of pine (*Pinus taeda*) plantations with natural pine stands (*P. palustris*) on the better drained sites, hardwood swamps, and tidal marsh.

Harvest data and lower jaws were collected by club members in cooperation with an antlerless deer quota program. Data collected included date of kill, sex, live weight, number of antler points ($\geq$ 2.54 cm), and outside beam spread. Lower jaws were assigned estimated ages by Game Division personnel of the South Carolina Wildlife and Marine Resources Department according to criteria published by Severinghaus (1949). In addition to routine aging standards, the yearling age class was subdivided into 3 groups according to premolar wear and replacement patterns: $\leq$17 months of age, 18 months of age, and $\geq$19 months of age (Harlow and DeFoor 1962, Sauer 1984).

Yearlings $\leq$17 months of age were identified by lower jaws in which the third molar was partially or fully erupted and all 3 temporary premolars were still present.

The 18-month-old age group was defined by lower jaws in which at least 1 temporary premolar had been lost and permanent premolar(s) were erupting. Yearlings ≥19 months of age had all 3 permanent premolars fully or almost fully erupted and exhibited light staining. Premolars and molars of this group demonstrated negligible wear.

Harvest data for the 18-month-old age group were not included in statistical analyses. Field observations indicate that the 18-month-old age group, as described in this study, is ephemeral. Transitions from 17 to 18 and 18 to 19 months of age appear to be completed quickly and are not always synchronous between left and right sides of jaws.

The 4-month (1 Sep–1 Jan) deer season was divided into 3 41-day periods to allow comparisons between yearling age groups within comparable time intervals. Analysis of variance procedures were used to test for differences in weight, number of points, and outside antler spread of the ≤17- and ≥19-month-old yearling age groups over all periods (SAS Institute, Inc. 1982).

Results

During the 6-year study period, 761 deer were reported harvested on the Campfield Club; 596 were antlered males, 7 were male fawns, and 158 were females. Lower jaws and estimated ages were available for 529 (88.8%) of the reported antlered buck harvest of which 216 (40.8%) were yearlings. Within the yearling age class, 134 (62.0%) were estimated to be ≤17 months of age; 42 (19.4%), 18 months old; and 40 (18.5%), ≥19 months of age.

As expected with a mid-May through early June peak in fawning, the majority of yearlings (62 of 85, 72.9%) harvested during the first period (1 Sep–10 Oct) were estimated to be ≤17 months of age. Harvest totals for the ≤17-month-old age group for the second period (11 Oct–21 Nov) was 56. Less than one-third of the yearlings harvested during the third period (22 Nov–1 Jan) (16 of 52, 30.8%) were estimated to be ≤17 months of age.

The majority of yearlings harvested during the third period (22 of 52, 42.3%) were estimated to be ≥19 months of age. In addition, the majority of ≥19-month-old animals harvested over the entire season (22 of 40, 55.0%) were taken during the last period. Harvest totals for the ≥19-month-old age group for each period were 11, 7, and 22, respectively.

We detected differences in weight and antler development between the ≤17- and ≥19-month-old age groups among periods (Table 1). Mean live weights and mean number of antler points of ≥19-month-old deer harvested during the first and second periods were greater ($P < 0.05$) than those of ≤17-month-old deer from any period. Mean outside antler spread of ≥19-month-old yearlings collected during the first period was greater ($P < 0.05$) than all ≤17-month-old deer.

We observed that the percentage of spikes varied among yearling age groups between periods. Percent spikes ranged from a low of 36.4% and 28.6% among ≥19-month-old yearlings harvested during the first and second periods, respectively,

Table 1. Sample size, weight, antler development, and spiking incidence for ≤17 and ≥19 months of age yearling males harvested on the Campfield Hunt Club, Georgetown County, South Carolina, 1984–1989.

	Period		
	1[a]	2	3
Sample size (*N*)			
≤17 months of age	62	56	16
≥19 months of age	11	7	22
Mean weight (kg)			
≤17 months of age	43.06	42.21	45.30
≥19 months of age	50.63[b]	49.89[b]	43.87
Mean number antler points (≥2.54 cm)			
≤17 months of age	2.72	2.29	2.44
≥19 months of age	4.09[b]	3.86[b]	2.82
Mean outside spread (cm)			
≤17 months of age	16.71	14.00	15.74
≥19 months of age	21.03[b]	18.13	16.71
Number spikes (%)			
≤17 months of age	45(72.6)	47(83.9)	13(81.2)
≥19 months of age	4(36.4)	2(28.6)	14(63.6)

[a]Period 1 = 1 Sep–10 Oct, Period 2 = 11 Oct–21 Nov, Period 3 = 22 Nov–1 Jan.
[b]Within periods, mean values for yearlings ≥19 months of age are significantly greater ($P < 0.05$) than the ≤17 month age group.

to a high of 83.9% and 81.2% among ≤17-month-old yearlings harvested during the second and third periods, respectively (Table 1).

Discussion

We acknowledge that the ≤17-, 18-, and ≥19-month-old ages assigned to yearling bucks in this study are not exact. Yearling age groups used in this study are meant to represent relative age within comparable time periods. Within this context 2 separate groups were distinguished: early-born and late-born fawns.

Early fawns were identified as yearlings ≥19 months of age and harvested during the first or second period. Physical development criteria among these animals were higher for all parameters measured. Early-born fawns averaged 50.3 kg, 4.0 antler points, and 33.3% were spike antlered. As defined, early-born fawns comprised 8.3% (18 of 216) of all yearlings harvested.

Late-born fawns were identified as yearlings ≤17 months of age and harvested during the second or third period. Physical development data among these animals were lower for nearly all parameters measured. Late-born fawns averaged 42.9 kg, 2.3 antler points, and 83.3% were spike antlered. Late-born fawns comprised 33.3% (72 of 216) of all yearlings harvested.

Weight and antler development for ≤17-month-old animals harvested during the first period and ≥19-month-old animals harvested during the third period were

conspicuously similar. A ≤17-month-old animal not harvested during the first or second period would, by the third period, have advanced into the ≥19-month-old age group.

Factors which influence weight and antler development in male white-tailed deer include age, nutrition, and genetics. Sauer (1984) reported positive correlations between age class and beam diameter and number of points. Within the yearling age class, beam diameter and length are positively correlated with nutritional condition as reflected in mean dressed carcass weight (Severeinghaus and Moen 1983).

The impact of genetics on weight and antler development in white-tailed deer has been inconclusive and controversial. The relative influence of nutrition and environment (Jacobson and White 1985) versus genetics (Harmel et al. 1988) as it relates to the incidence of spike antlers among yearling males has been debated. Scribner et al. (1984) reported that higher levels of genetic variability appeared to be related to greater antler development in older age classes. However, no relationship was detected between genetic heterozygosity and antler development or the incidence of spike antlers among yearling males.

Significantly higher weights and antler development among deer that were estimated to have originated as early-born fawns in this study are probably due to a combination of age and nutritional influences. Early-born fawns would have theoretically benefited nutritionally from foraging during the spring "green-up." Numerous browse species used by deer are more palatable, digestible, and of a higher nutritional value during early growth stages. As the fawning season continued into summer, phenology of plant communities would have progressed and browse items become less palatable and nutritious (Blair and Halls 1967, Laycock and Price 1970).

Maternal age, physical condition, social status, previous reproductive status, fawn birth weight, and litter size also may be contributing factors to later physical development. Verme and Ullrey (1984) reported that single fawns typically gain weight faster than twins and that insufficient nutritional intake lowers milk yield.

Management Implications

Paramount importance has been attributed to weight and antler data in the yearling male age class by deer hunters, deer biologists, and population modelers. Physical development parameters of this age class are mentioned frequently and used as the most sensitive and reliable indicators of overall deer herd health and management success or failure.

Results from this study indicate that fawning date may have a significant impact on physical development characteristics in yearling males. It is therefore important that care be taken in selecting a yearling male sample when evaluating herd health or management impacts and interpreting the results.

For years, resource managers and deer biologists have advised sportsmen that spike yearlings were the result of poor nutrition and/or inferior genetics. However, results from this study indicate that protracted breeding seasons and subsequent late

fawning may play a critical role in the incidence of spike antlers in yearling male white-tailed deer.

Population management strategies which emphasize lower population densities, balanced sex ratios, and an older male age structure may advance and shorten the breeding season in white-tailed deer (Gruver et al. 1984, Guynn et al. 1986). Our results indicate that an additional benefit of these "quality" management techniques is a potential increase in weight and antler development in the yearling male age class.

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