Management and Conservation Article

Juvenile-to-Adult Antler Development in White-Tailed Deer in South Texas

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ABSTRACT Past studies using penned deer provide conflicting results on the age when reliable predictions about antler growth potential in white-tailed deer (*Odocoileus virginianus*) can be made. We captured wild whitetail males via aerial net gun on 12 ranches in 5 counties in south Texas, USA, from 1999 to 2007 to determine if a reliable juvenile-to-adult relationship in antler development existed. We individually marked and released captured animals at the trap site after we took antler and body measurements. We recaptured marked animals as possible in subsequent years or until we obtained final measurements after legal harvest. Amount of growth in the first set of antlers in whitetail males was a poor predictor of antler growth at maturity. By 4.5 years of age there were no differences ($P > 0.05$) in antler measurements regardless of the amount of development of the first set of antlers at 1.5 years. We concluded culling of yearling males based on number of antler points would have little positive effect on overall antler quality in future years. (JOURNAL OF WILDLIFE MANAGEMENT 72(5):1109–1113; 2008)

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Determining if there is a predictable juvenile-to-adult relationship in antler growth in white-tailed deer (*Odocoileus virginianus*) has been a point of controversy among deer managers. Results of various studies on captive whitetails have produced recommendations ranging from removing all spike-antlered yearlings as inferior to complete protection of all yearling males despite the amount of antler growth exhibited (Armstrong et al. 1994, Jacobson 1998). Inferior, in this case, refers to an animal perceived to have less potential for future antler growth than other cohort members.

Most studies on predicting antler growth potential in whitetails were conducted using penned animals in an attempt to isolate genetic effects from environmental effects (e.g., nutrition, health status) that may influence antler growth. In Texas, USA, Williams et al. (1994) concluded spikes on yearling whitetails were highly heritable and were an antler morphotype exhibiting low potential for high-antler quality in future years. Data from Williams et al. (1994) suggested substantial progress could be attained in overall antler quality in the future by intentionally culling spike-antlered yearlings. In contrast, Lukefahr and Jacobson (1998) found spike antlers on yearlings in Mississippi had low heritability, were related to many factors besides genetics, and could not be used reliably to predict antler growth potential. Conclusions from Lukefahr and Jacobson (1998) indicated little or no improvement in future antler quality could be expected by culling based on yearling antler traits.

It often is difficult to directly extrapolate results from studies on confined animals with a known history, held at unnaturally high densities, and fed a high-quality diet ad libitum to wild animals born under varying range and management conditions. Hence, more studies similar to those on captive populations need to be conducted on a large scale with wild populations to determine efficacy of management recommendations when applied to those populations as a whole. Our objective was to determine if a whitetail male's first set of antlers was a good predictor of antler growth at maturity (≥4.5 yr old) in wild populations.

STUDY AREA

We conducted our study from 1999 to 2007 on 12 private ranches in south Texas, USA, located in Dimmit, Duval, McMullen, Webb, and Zavalla Counties. With one exception, all ranches in the study were fenced with 2.4-m-tall net-wire fencing to restrict movement of deer across property boundaries. High-fenced ranches ranged in size from approximately 485 ha to 6,070 ha. The low-fenced property was approximately 3,642 ha.

Counties on our study area were located in the South Texas Plains vegetational area, which is described as level to rolling with numerous ephemeral drainages (Gould 1975). Flora on the ranches was typical of the area with numerous herbaceous species and an overstory of various small trees, shrubs, subshrubs, and cacti as described in Everitt and Drawe (1993). Mean annual precipitation varied from 40 cm in the western to 76 cm in the eastern part of the region. Annual precipitation typically was bi-modal with peaks in May–June and September (Correll and Johnston 1979).

Although livestock were present on some of the ranches, primary management focus for all ranches was white-tailed deer. All ranches planted small fields of cool-season cereal grains, primarily oats (*Avena sativa*), as a supplemental forage crop and for attracting animals for hunting. Likewise, timed feeders dispensed shelled corn to attract animals during the hunting season. Feed stations offered a commercial, pelleted deer feed all year to supplement native forage but were not the primary food source (L. Wheeler and others [see Acknowledgments], ranch owners, personal communication). Deer densities ranged from 1 deer/8.5 ha to 1 deer/12.5 ha and were considered normal for the habitat

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Table 1. Means (±SE) by age class for antler measurements of white-tailed deer males that had ≤3 or ≥4 antler points as yearlings, captured in south Texas, USA, from 1999 to 2007.

Yearling point category	*N*	No. of points		Inside spread (cm)		Beam length (cm)		Tine length (cm)		Circumference (cm)		Gross B&C[a] (cm)	
		$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE
2.5 yr old													
≤3 points	180	6.9	0.11	30.5	0.13	72.6	0.29	42.4	0.52	48.5	0.17	194.1	0.95
≥4 points	166	8.2	0.08	34.5	0.14	83.1	0.30	65.0	0.57	55.9	0.19	238.5	1.01
Total	346												
P-value[b]		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001	
3.5 yr old													
≤3 points	85	8.4	0.10	37.8	0.23	91.2	0.44	72.4	0.79	63.0	0.51	264.4	1.43
≥4 points	89	9.0	0.14	39.4	0.19	96.8	0.43	86.4	0.97	65.3	0.26	287.8	1.52
Total	174												
P-value		<0.001		0.038		<0.001		<0.001		0.099		<0.001	
4.5 yr old													
≤3 points	41	9.0	0.18	41.1	0.32	103.4	0.76	91.9	1.44	70.4	0.36	306.8	2.20
≥4 points	49	9.0	0.17	42.2	0.30	102.1	0.51	96.8	1.42	73.4	0.73	314.7	2.27
Total	90												
P-value		0.845		0.264		0.584		0.357		0.190		0.320	
≥5.5 yr old													
≤3 points	24	9.8	0.18	46.5	0.42	114.0	0.58	115.3	2.18	78.0	0.50	354.1	2.82
≥4 points	32	9.7	0.20	45.0	0.40	111.0	0.83	122.7	1.86	79.0	0.46	357.4	2.84
Total	56												
P-value		0.880		0.332		0.271		0.318		0.557		0.745	

[a] Boone and Crockett score converted from Imperial to metric for publication.
[b] *t*-test.

By 4.5 years of age there were no differences in any antler measurements regardless of the yearling antler-point category (Table 1). Smaller antlered yearlings had attained a mean antler size equal in width, mass, length, and number of points as their larger antlered cohorts. The same relationship continued through the age class ≥5.5 years old.

Yearling antler-point category did not appear to affect percentage of males reaching the long-term mean B&C score for the area of 330 cm ($\chi^2_1 = 0.003$, $P = 0.956$) or our arbitrarily assigned trophy B&C score of 381 cm ($\chi^2_1 = 0.282$, $P = 0.596$). Slightly less than half the yearlings from each antler point category reached the long-term mean score (Table 2). Approximately 1 of 6 and 1 of 8 yearlings with ≤3 or ≥4 antler points, respectively, achieved our designated trophy score.

Some males were harvested as cull males throughout the study. As it could be argued the observed lack of differences in antler measures at maturity could have been influenced by this practice, we examined these animals as a subset of our data. Gross B&C score showed a positive relationship to number of antler points at 1.5 years for the 49 deer culled at 2.5 years of age ($t_1 = 3.55$, $P = 0.001$; Fig. 1). However, the low determination value (0.211) indicated a wide variation in score based on number of yearling points. Yearlings with ≤3 antler points made up most of the 2.5-year-olds harvested but also had the lowest and highest B&C scores.

For the 45 deer culled at 3.5 years of age, gross B&C score showed a positive relationship with the number of antler points at 1.5 years ($t_1 = 2.10$, $P = 0.042$; Fig. 1). However, predictability of score from antler points indicated only a small portion ($r^2 = 0.093$) of the variability in B&C score was accounted for by number of yearling antler points.

For deer culled at either 4.5 years ($n = 35$) or at ≥5.5 years of age ($n = 29$) the slope of the relationship between gross B&C score and number of antler points at 1.5 years was not different from zero ($t_1 = -0.52$, $P = 0.608$, and $t_1 = 1.89$, $P = 0.070$, respectively; Fig. 1). Low determination values (0.012 for 4.5 yr old and 0.116 for ≥5.5 yr old) for both mature age classes also indicated poor predictability based on number of yearling antler points.

Table 2. Number and percent of yearling white-tailed deer males captured from 1999 to 2007 in south Texas, USA, with ≤3 or ≥4 antler points that reached either ≥330 cm or ≥381 cm of gross Boone and Crockett[a] score at ≥4.5 years of age.

Category	No. of points at 1.5 yr old	
	≤3	≥4
No. of M	65	81
No. of M that scored ≥330 cm	31	39
% of M that scored ≥330 cm	47.7	48.1
No. of M that scored ≥381 cm	10	10
% of M that scored ≥381 cm	15.4	12.3

[a] Boone and Crockett score converted from Imperial to metric for publication.

DISCUSSION

Number of antler points and B&C antler measurements increased for all males as they matured. However, it appeared smaller antlered yearlings exhibited a higher amount of antler growth in succeeding years than did their larger antlered cohorts resulting in smaller antlered yearlings being statistically equal in number of antler points and all B&C measurements by their fourth year (Table 1). Thus, truncating age classes at 5.5 years did not appear to affect

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