EVALUATION OF BIAS IN ANTLER MEASUREMENTS OF HARVESTED WHITE-TAILED DEER ON A SOUTH TEXAS RANCH

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ABSTRACT

I evaluated bias in antler measurements of harvested white-tailed deer (Odocoileus virginianus) aged by the tooth replacement and wear method. Antler measurements of harvested deer were compared to measurements of randomly captured deer aged by the cementum annuli technique on a south Texas ranch. There was little difference in the antler measurements of harvested versus captured deer.

Key words: Antlers, deer harvest, Odocoileus virginianus, white-tailed deer

INTRODUCTION

Age-class antler measurements from harvested bucks are important in white-tailed deer management programs (Brothers and Ray, 1975:145). Such records allow the manager to assess trends in antler quality through time. These trends may be correlated with the population's relationship with carrying capacity. Antler measurements also permit comparison of the performance of different populations.

When managers collect age-class antler measurements, they assume deer are aged without bias and represent the age class structure of the population. Recent research has cast doubt on the validity of both assumptions (DeYoung, 1989; DeYoung, unpublished data).

Typically, harvested deer are aged by the tooth replacement and wear technique (Severinghaus, 1949). DeYoung (1989) demonstrated that this technique results in overaging of young deer and underaging of older deer and suggested the cementum annuli technique had less bias. Additionally, bucks harvested in quality or trophy management programs may not be representative of their age-class. DeYoung (unpublished data) found antler measurements of bucks over 2.5 years overlapped significantly. Thus, when managers protect small-antlered bucks with the goal of letting them attain mature age, mature bucks with small antlers are protected as well. Antler measurements of harvested, mature bucks may be greater than the same-aged bucks in the population because small-antlered, mature bucks are not in the harvested sample.

To determine if the antler size of deer in harvest records are representative of the population, I evaluated antler measurements of harvested bucks aged by tooth replacement and wear versus bucks live-caught at random from the same population and aged by the cementum annuli technique.

MATERIALS AND METHODS

Deer sampled in the study came from the 7,500-acre Zachry Randado Ranch 25 mile southwest of Hebbronville in Jim Hogg and Zapata counties. The ranch supports a diversity of shrubs generally less than 10 feet tall and with an average canopy coverage of 35% (Drawe and Higginbotham, 1980). Common shrubs were whitebrush (Aloysia lycoiodes), honey mesquite (Prosopis glandulosa), guajillo (Acacia berlandieri), and creosote bush (Larrea divaricata). Common herbaceous species included buffelgrass (Cenchrus ciliaris), Riddel daisy (Aphanostephus riddellii), lantana (Lanatana macropoda), and false ragweed (Parthenium confertum). The ranch is enclosed by an 8-foot high fence that limits deer movement.

The deer herd is managed for trophy bucks using the guidelines described in Brothers and Ray (1975). Harvested bucks (N = 118) were killed by hunters from 1979-1986. Although the range of years differed in the harvest versus live-caught samples (1985-1987), there was no evidence that antler development differed due to varying rainfall or other effects on nutrition. Additionally, mature bucks, whose antler growth is less effected by enviroment, predominated in the harvest samples. Harvested bucks were aged by experienced persons using the tooth replacement and wear method (Severinghaus, 1949). Antler measurements were made with a flexible tape and included number of points over 1 inch, inside spread, left main beam length, and left basal circumference (Nesbitt and Wright, 1981:351). The ranch does not keep records on yearling bucks because only those with spike antlers were killed. Therefore, bucks considered in this study were 2.3-years-old or older.

Bucks were also sampled by live-capture using a helicopter and drive net (Beasom et al., 1980) or net gun (DeYoung, 1988). Before each capture, the helicopter pilot was briefed on the purposes of the study and carefully instructed to always capture the first buck encountered, regardless of size. Leon et al. (1987) found no age bias in deer encountered during low-level helicopter surveys in south Texas. Because the search pattern and altitude employed in the captures was similar to that used by Leon et al. (1987), the capture samples should approach a random sample of the population.

An incisor tooth was extracted from each captured buck, and age was determined by the number of cementum annuli by Matson's Laboratory, Milltown, MT. Antler measurements were made as described above and the bucks subsequently were released at the capture site. Bucks were caught during October 1985, 1986, and 1987, and during January 1987. For comparison with the harvest sample, only bucks 2.3 years and older (N = 87) were considered.

For each age class and antler measurement combination, means from the harvest sample and the live-caught sample were compared using t-tests. Additionally, for each antler measurement the harvest sample and the live-caught sample were tested for differences among age classes using one-way ANOVA. Tukey's test was used for post-hoc comparsions.

RESULTS AND DISCUSSION

Points in 6-year-old and basal circumferences for 3- and 7- year-old deer differed ($P < 0.05$) for harvested versus live- caught bucks (Table 1). All of the remaining comparisons for antler measurement-age combinations were not significant ($P > 0.05$). Five of eight 6-year-old bucks in the live-captured (population) sample had 8 or fewer points.

Overall there was little difference between antler measurements for harvested and live-caught bucks. This seemed inconsistent with the results of DeYoung (1989), where bias in wear aging was demonstrated, and DeYoung (unpublished data), where an unrepresentative harvest of mature deer was predicted. It appears that the lack of much difference between the buck samples resulted from the fact that antler measurements differ little among many of the age classes (Table 1).

All of the ANOVAs showed a significant ($P \leq 0.001$) effect of age-class on antler measurements. However, in each analysis, many of the means did not differ (Table 1). For example, for points of harvested deer, there was no difference ($P > 0.05$) between 3-year-old and older deer. Thus, I concluded that although there is bias in the

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Table 1. Antler measurement means by age class of male white-tailed deer harvested by hunters (1979-1986) and captured at random from the population (1985-1987) on the Zachry Raandado Ranch, south Texas. Means within rows followed by the same letter are similar (P > 0.05).

Sample[a]	2	3	4	5	6	7	7+
Points (number)							
Harvest	7.5A	9.0AB	9.7B	10.8B[b]	11.0B	10.4B	10.4B
Population	7.9A	9.9BC	9.3ABC	10.4B	8.6AC	9.6ABC	9.0ABC
Spread (inches)							
Harvest	12.9A	15.0AB	16.5BC	17.6C	18.7C	17.6C	17.6C
Population	13.4A	16.6B	16.4B	17.5B	18.3B	18.7B	18.9B
Beam (inches)							
Harvest	15.7A	18.1B	19.6BC	21.7CD	22.5D	21.8D	21.8D
Population	15.4A	19.0B	20.0BC	21.5BC	21.1BC	21.6C	20.3BC
Base (inches)							
Harvest	3.3A	3.6A[b]	4.1B	4.6C	4.7C	4.3BC[b]	4.5BC
Population	3.5A	4.2B	4.2B	4.6BC	4.5BC	4.6BC	4.8C
Sample size							
Harvest	8	12	16	29	14	23	16
Population	28	7	18	11	8	11	4

[a]Age based on tooth replacement and wear for harvested bucks and cementum annuli for population (live-captured) bucks.
[b]Antler measurement means differed (P < 0.05) between harvest and population samples within this age class.

frequency of deer among age-classes in the harvest, there is little difference in the antler measurements versus live-caught deer because many of the age- classes do not differ from each other.

Antler measurements of harvested bucks need to be evaluated on additional areas. However, on the Zachry Ranch, it appears that these measurements differ little from the measurements of the population.

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