

## SEX CHARACTERISTICS OF BLACK-TAILED DEER HOOVES

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*Abstract:* Measurements of hooves of 106 freshly killed black-tailed deer (*Odocoileus hemionus*) indicated that sexual differences exist in hooves, and hence tracks. Total length and arc width (width across the toe on an arc described at one-third of the total length from the tip) were measured to the nearest 0.5 millimeter. Deer were aged by tooth replacement and wear. No significant differences existed between sexes in fawns, but arc width differences in yearlings were significant at the 5 percent level. In adults both length and arc width differences between the sexes were significant at the 5 percent level, with ranges for arc width hardly overlapping. Thus tracks of most adult males, as well as the larger yearling males, can be told with a high degree of certainty. The results have not been extended to other *Odocoileus* species or subspecies.

The argument between sportsmen and biologists over whether or not the sex of a deer can be determined from its tracks has persisted despite frequent denials by the biologists. The objective of this study was to determine if such differences do indeed exist in hooves (and hence tracks) and to express such differences in quantitative terms.

The investigation was prompted by considerably better success at predicting sex while following fresh tracks to bedded deer in western Oregon than pure chance would indicate. One obviously important clue is size. Also my general impression was in agreement with the report of Linsdale and Tomich (Linsdale, J. M., and P. Q. Tomich. 1953. *A herd of mule deer*. University of California Press, Berkeley and Los Angeles. 567pp.) that there is a difference in form, the hooves of males tending to be wider towards the front than those of females. This impression was further substantiated by measurements of deer tracks found in Strawberry Canyon, near Berkeley, California. When histograms were plotted of the track width taken at one-third of the length back from the tip, two separate and fairly distinct peaks emerged. To extend these results to animals of known sex and approximate age, measurements of hooves were obtained from black-tailed deer, freshly killed in a

special hunt held in late October and November, 1961, near Corvallis, Oregon. I have not had the opportunity to extend the study to include white-tailed deer (*Odocoileus virginianus*) or other subspecies of the mule deer group. Thus the application of the results of this study to these forms must be provisional. Limited observations of Inyo mule deer tracks in the field suggest that the results are probably valid for this form.

### METHODS

As animals were brought through a check station, measurement of each toe was made to the nearest 0.5 millimeter with a dial caliper. Measurements taken were total length and maximum width at the front one-third of the toe. The latter, hereafter referred to as arc width, was taken by setting the calipers at one-third of the total length and describing an arc on the bottom of the toe with one caliper point while the other was held at the tip of the toe. The width where the two ends of the arc met the edges of the toe was recorded. Broken or malformed toes, which occurred occasionally, were omitted.

Deer were aged by tooth replacement and wear into fawn, yearling, and adult age-classes. Francis Ives, Howard Horton, and Merle Wischnofske aided in collection of data.

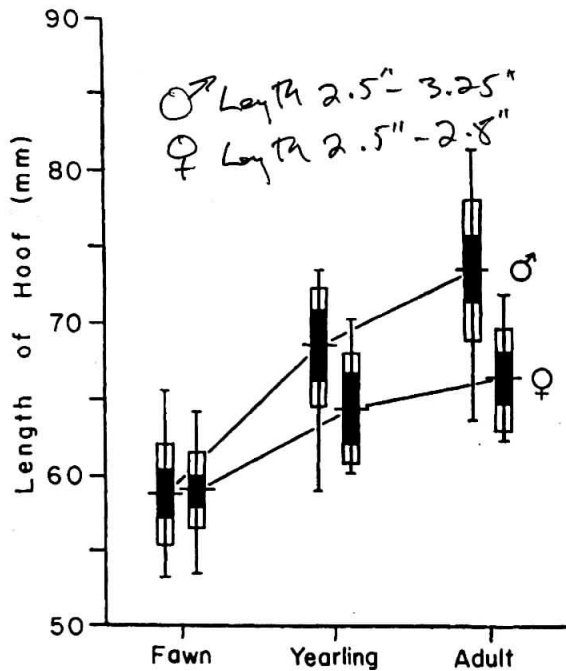


Fig. 1. Comparison of hoof length by age and sex of deer. Horizontal lines indicate the means; solid bars, two times the standard errors of the means; open bars, the standard deviations; and vertical lines, the ranges. Non-overlap of solid bars indicates statistical significance at the 5 percent level.

**RESULTS**

The hooves of 106 deer with the following distribution were measured:

	FAWNS	YEARLINGS	ADULTS
Males	16	21	21
Females	20	10	18.

The measurements of a single hoof closely approximated the mean for all four. Sometimes individual toes varied considerably in size, but disproportionately small toes were usually balanced by the opposing toes being disproportionately large. Front hooves were approximately 3 percent larger than hind hooves for both sexes and all ages.

Hoof lengths based on the mean values for each animal are compared in Fig. 1, and arc widths in Fig. 2. No difference exists between the sexes in fawns. However, with age the hooves begin to differentiate. This difference is already apparent on the aver-

age in yearlings and is statistically significant at the 5 percent level for arc width. In adults, both length and arc width of hooves are significantly different between the sexes, with the difference in arc width being highly significant (at the 0.5 percent level;  $t = 9.89$  with 36 df). Indeed, the ranges for width barely overlap.

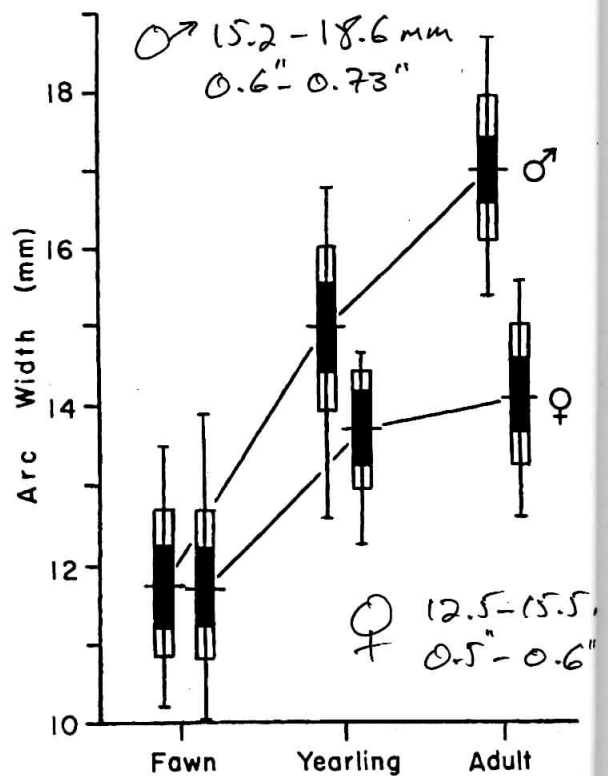


Fig. 2. Comparison of hoof width at one-third of the length back from the tip, by age and sex of deer. Legend as in Fig. 1.

**DISCUSSION**

Although differences by sex in the hooves of yearling and older deer have been clearly demonstrated on a quantitative basis by these results, the amount of overlap means that a person encountering an individual set of tracks in the wild would not be able to determine sex in most cases. However, the vast majority of adult males, as well as

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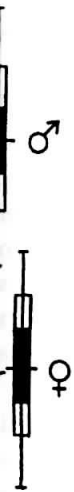
the larger yearling males, can be told with a high degree of certainty, and this is the class of deer with the greatest interest to sportsmen.

Researchers working on deer in areas of heavy cover, such as western Oregon, usually encounter a great many more tracks than deer. In this situation, deriving even a slight amount of additional information,

such as sex of part of the animals involved, from reading signs is worthwhile. It should also be mentioned that broken and malformed hooves are often so distinctive as to constitute individual recognition marks, and their potential in determining individual movements from tracks should not be overlooked.

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