ESCAPE GAITS OF WHITE-TAILED DEER, MULE DEER AND THEIR HYBRIDS: GAITS OBSERVED AND PATTERNS OF LIMB COORDINATION

by

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(With 3 Figures)

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Summary

1. The escape gaits of white-tailed deer, mule deer and hybrid white-tailed x mule deer from Alberta were examined to investigate two hypotheses: 1) that the distinctive security patterns of white-tailed deer and mule deer underly their traditional habitat segregation, and 2) that interbreeding between white-tailed deer and mule deer results in disrupted security patterns for hybrid progeny. The first step is investigating these hypotheses, and the goals of this paper, were to identify gaits used by each type of deer and to compare characteristics of limb coordination in these strides.

2. High speed cinematography was used to record the fast escape gaits to captive white-tails, mule deer and hybrids. HILDEBRAND's (1977) method for analyzing asymmetrical gaits were adapted to examine characteristics of limb coordination.

3. All groups galloped at times, but only white-tails galloped for escape when most alarmed. Mule deer stotted and F1 hybrids (with white-tail and with mule deer mothers) bounded when seemingly most alarmed. Gaits of F1 hybrids were similar among individuals. Although gaits of 3/4- and 7/8-mule deer were variable, these backcrosses largely...
failed to reproduce the specialized mule deer gaits. The consistency of white-tail, mule deer and F1 hybrid gaits indicates that these patterns have a strong genetic basis and could have evolved in response to different selective pressures.

4. Galloping white-tails tend to have two brief suspensions in their strides, whereas galloping mule deer tend to have prolonged suspension after the hind limb departure and more overlap between the hind and fore limbs. In part due to these characteristics, galloping white-tails attain faster speeds than galloping mule deer or hybrids. Hybrids are intermediate, but much more similar to mule deer.

5. Limb timing data were plotted on three-dimensions with the axes fore lead, hind lead and midtime lag to consider the range of strides employed by deer. Strides of the purebred gallops and mule deer stott fell into discrete regions of this figure, indicating these gaits are qualitatively distinct for contemporary white-tails and mule deer. Mule deer strides that were intermediate between the gallop and stott had large overlap between the fore and hind limbs (i.e. small midtime lag) relative to the amount of overlap between the right and left fore limb (i.e. fore lead), perhaps reflecting gait forms that were evolutionary transitions to the stott.

Introduction

The security behavior of white-tailed deer (*Odocoileus virginianus*) and mule deer (*O. hemionus*) is recognized as one of the largest differences between these species (*Seton, 1909; Eslinger, 1976; Geist, 1981*), a difference which has not been examined in detail. White-tails gallop to avoid predators, whereas mule deer stott. White-tails are wary and tend to avoid predators at large distance; mule deer tend to be calm and often approach disturbances. *Geist* (1981) suggested that white-tails and mule deer occupy different habitats to meet their distinct needs for security. *Klein* (1985) reviewed complementary evidence to illustrate how the threat of predation can influence habitat use by various species of deer.

The escape behavior of white-tailed deer (*O. v. dacotensis*), Rocky Mountain mule deer (*O. h. hemionus*, further in this text called mule deer), and hybrid white-tail x mule deer was examined to investigate two hypotheses. First, that distinctive security patterns underly the traditional habitat segregation of white-tailed deer and mule deer (*Geist, 1981*) and second, that interbreeding between white-tails and mule deer results in disrupted security behavior. If these hypotheses are true, differences in security patterns could serve to separate white-tailed deer and mule deer, both ecologically and genetically.

The gaits of inexperienced, captive white-tails and mule deer and the effects of interbreeding on these behaviors will indicate whether differences in these behaviors have a genetic basis. If so, and if they are adapted to different ecological conditions, these behaviors have probably evolved in response to different selective pressures (*e.g. Arnold, 1981a, 1981b; Riechert & Hedrick, 1990*). Identification and description of the coor-