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SURVIVAL OF WHITE-TAILED DEER FAWNS IN RELATION TO MATERNAL AGE

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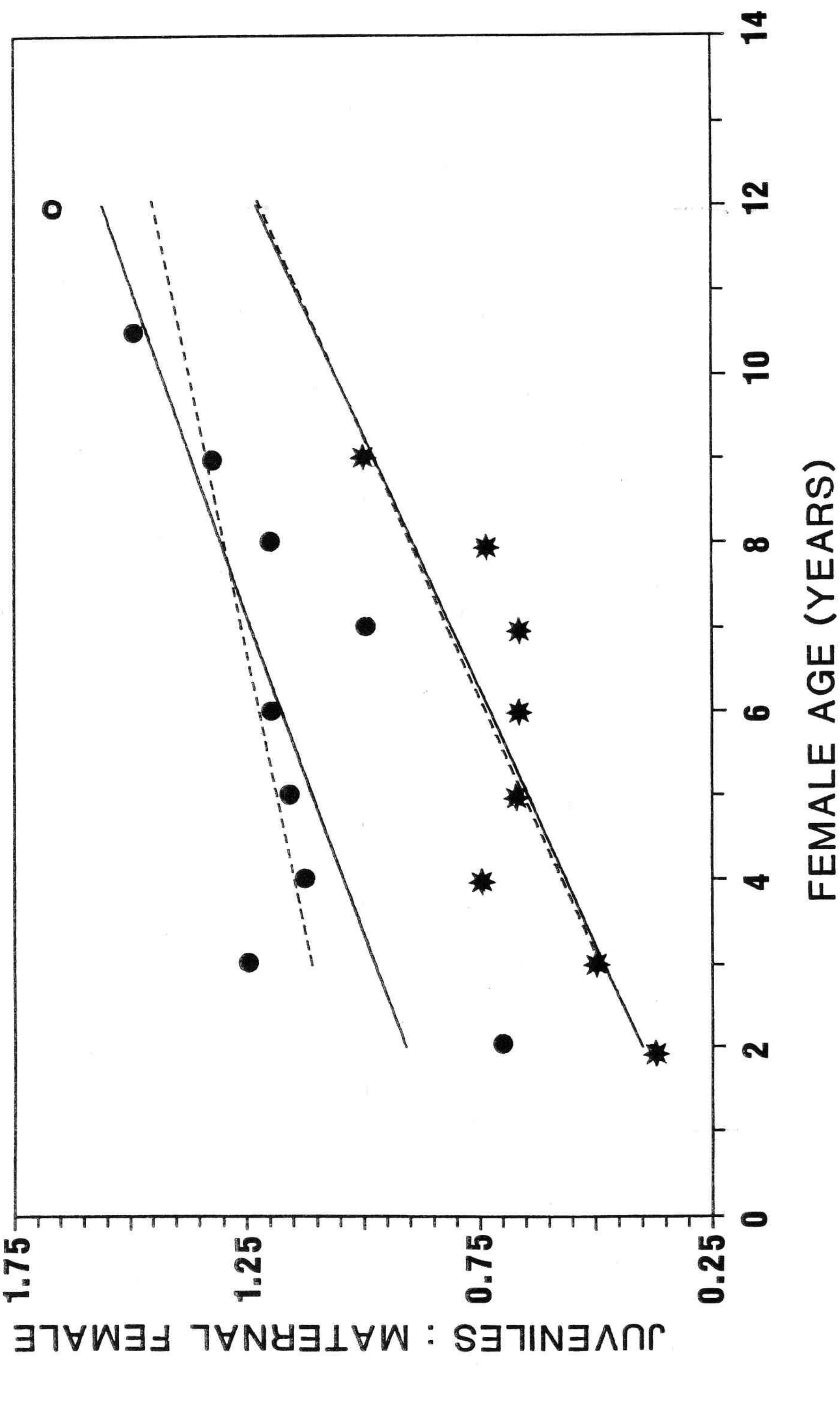
One of the factors affecting the survival of young ungulates is the ages of their mothers. For example, survival of wild red deer (*Cervus elaphus*) calves on the Isle of Rhum, an area free of large predators, is highest for those of middle-aged females (Clutton-Brock et al., 1982:88–89). For white-tailed deer (*Odocoileus virginianus*), in a 255-ha enclosure "... older experienced mothers are more successful in rearing fawns than [are] younger does, particularly when threatened by predation" (Ozoga and Verme, 1986:483). Thus, we tested the hypothesis that in an ecosystem containing the white-tailed deer's natural predator, the wolf (*Canis lupus*), fawn survival would be directly related to maternal age.

The study was conducted in the central Superior National Forest of northeastern Minnesota, described in detail by Nelson and Mech (1981). Deer were livetrapped in Clover traps and rocket nets from January through April, 1973–1985, radiotagged, and radio-tracked from aircraft (Nelson and Mech, 1981). An incisorform tooth was pulled from each and age was determined by counting annuli in tooth sections (Gilbert,


JUVENILES : MATERNAL FEMALE
1.75
1.25
0.75
0.25
FEMALE AGE (YEARS)
0
2
4
6
8
10
12
14

1966). From November through April each year, the radiotagged maternal females were observed from aircraft, and the number of fawns accompanying them was noted. Simple linear regressions with observations weighted by sample size were performed on mean juvenile:maternal-female ratios for each adult age class for December and April. Because productivity of 2-year-old females may be less than that of older females, we also excluded 2-year-olds in one regression analysis. Females older than 2 years generally produce maximally (Verme and Ullrey, 1984:97).

Significant positive relationships were found between maternal age and mean number of fawns per adult female for both the December and April (Fig. 1) samples, with and without 2-year-olds. These results support the hypothesis that fawns born of older females tend to survive longer. Because fawns comprise most of the diet of the wolf, and because wolf predation is the single greatest natural mortality factor in the study area (Nelson and Mech, 1981, 1986), these results also suggest that ability to protect and defend fawns against predation is a function of maternal age and experience, as indicated by Ozoga and Verme (1986).

The relationship between fawn survival and weight is a possible confounding factor in this hypothesis because the weight of fawns may also be a function of maternal age, a conclusion supported by the findings of Blaxter and Hamilton (1980), Clutton-Brock et al. (1982), and Mitchell et al. (1976) for red deer. Possibly both fawn weight and maternal age and experience contribute to survival.

To determine the effect of maternal age on fawn survival from December through April, we examined juvenile:maternal-female ratios in females for which we had both December and April data. The April ratios were significantly lower (F-test; $P < 0.05$), indicating that a significant number of fawns died during winter. However, the December-to-April differences were not significantly related to maternal age (F-test; $P > 0.10$). Conceivably there is a positive relationship between the age of a female deer and the number of offspring produced. Evidence against this explanation, however, comes from Verme and Ullrey (1984:97).

We believe our findings support the work of Ozoga and Verme (1986) that older female white-tailed deer are better able to protect and defend their fawns from predation. In any event, it is clear that, under the conditions of our study, older deer contribute more fawns per individual to the population than younger females.

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Fig. 1.—Relationship between maternal age and average juvenile:maternal-female ratios of white-tailed deer in the Superior National Forest, Minnesota, based on linear regressions weighted by sample size. Upper plot (filled circles) is for December: solid line, $r^2 = 0.57$, $P < 0.05$, $y = 0.782 + 0.065x$; excluding 2-year-olds, dashed line, $r^2 = 0.39$; $P < 0.10$; $y = 1.001 + 0.037x$. Lower plot (stars) is for April: solid line, $r^2 = 0.54$, $P < 0.05$, $y = 0.231 + 0.083x$; excluding 2-year-olds, dashed line indistinguishable from solid line, $r^2 = 0.45$, $P < 0.05$, $y = 0.248 + 0.081x$. (Open circle represents a point common to both December and April samples.)