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A PRELIMINARY REPORT ON WHITE-TAILED AND BLACK-TAILED DEER CROSSBREEDING STUDIES IN TENNESSEE

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ABSTRACT

Hybridization of white-tailed and black-tailed deer was investigated over a three year period in Tennessee. White-tailed deer were placed in pens with black-tailed deer of the opposite sex, and hybrid deer were readily obtained. Hybrids were placed in pens with fertile, purebred white-tailed and black-tailed deer of the opposite sex. None of the hybrids produced young during their first year of life. During their second year of life, 50 percent of the hybrids produced young of which 66 percent were stillborn. Previous to this, all white-tailed, black-tailed hybrids were reported to be sterile. Hybrids could not be distinguished from blacktails, and white-tailed characteristics were lost.

INTRODUCTION

This paper presents the results of three years of closely controlled experiments with penned animals where matings would not be questioned to determine: (1) how readily black-tailed deer (*Odocoileus hemionus columbianus*) and white-tailed deer (*Odocoileus virginianus*) will cross-breed; (2) the fertility of hybrid offspring; and (3) recognition features of hybrids.

The Tennessee Game and Fish Commission has proposed introducing the black-tailed deer into Tennessee. During the fall of 1966 and 1967, the Commission obtained 68 pen-reared black-tailed fawns from the State of Oregon. These deer are presently held in a 4,600 acre pen with an eight foot high fence at the Volunteer Ordinance Plant located near

Chattanooga, Tennessee. Plans are to allow the population in the pen to build to the point where a surplus can be captured and relocated in areas without natural or man-made barriers.

If blacktails are introduced in Tennessee, their intermingling with native white-tailed deer is certain. As to whether hybridization between blacktails and whitetails will occur in the wild is not known, but if it should happen, the result could be hazardous to both species. If all or any portion of the hybrids are sterile, the birth rates of both species could be seriously retarded. If the hybrids are fertile either or both species could lose their identity as a species.

Cowan (1956) reported hybridization between a black-tailed buck and white-tailed doe in a deer park in British Columbia. These matings took place in the absence of female blacktails and male whitetails and produced six offspring. The three female offspring from these matings were all sterile and the three male offspring were also thought to be sterile. Cowan also reported that blacktails and mule deer (*Odocoileus hemionus*) frequently hybridize where their breeding ranges overlap in Washington and Oregon.

As far as can be determined, Cowan's report is the only information in the literature on black-tailed and white-tailed hybrids. The small number of animals involved and the fact that they were closely related casts some doubt on whether the observation is generally valid for all cases. In view of the possible hazards that could result from introduction of the blacktails, a considerable amount of investigation was needed.

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PROCEDURE

Black-tailed does and white-tailed bucks were confined together in one acre pens at the Buffalo Springs Game Farm located near Rutledge, Tennessee. Black-tailed bucks and white-tailed does were confined together in one acre pens on the Cheatham Wildlife Management Area located near Nashville, Tennessee. Some hybrid does were confined in pens with proven, purebred black-tailed bucks; others with proven, purebred white-tailed bucks. Each hybrid buck was placed in an individual pen containing proven, purebred white-tailed does.

Measurements of the metatarsal and preorbital glands, hind foot, ear, tail, and total lengths were recorded for each deer in the study. Bi-annual photographs were taken of each deer, and the type of gait and tail carriage exhibited by each deer was recorded.

Races of deer were used for identification purposes rather than for scientific classification. The races were determined by ancestral stock. For example, deer described as belonging to the Texas race were taken from a herd in Tennessee whose ancestral stock came from Texas. While they are probably accurate, they are not infallible.

RESULTS

Black-tailed buck, white-tailed doe matings

Two adult black-tailed bucks were placed in the Cheatham pen with one yearling and three fertile, adult white-tailed does on October 19, 1968. One of the adult does was of the *Odocoileus virginianus borealis* race. One older and one yearling doe were of the *O. v. texanus* race and the other adult was from a herd composed of a mixture of the *O. v. virginianus*, *O. v. osceola*, and *O. v. borealis* races. On May 19, 1969, 212

days later, twin doe fawns were born to the older *O. v. texanus* doe. Two days later, a single buck fawn was born to the *O. v. borealis* doe. On June 18, 242 days later, the "mixed" doe gave birth to two doe fawns. The young doe gave birth to a single buck fawn two days later on June 20, 1969. All of the fawns were healthy and vigorous.

The two original bucks used in this experiment died during May and June of 1969. One died as a result of being struck by lightning, and the other died of complications resulting from a systemic mycotic infection (Kistner, 1969).

On September 26, 1969, one of the original black-tailed bucks from Oregon was captured in the Volunteer Ordinance Plant and transferred to the Cheatham pens. No fawns were born in the Cheatham pens during the spring and summer of 1970 despite the fact copulation had been observed several times during the fall and winter of 1969-70. This buck died of an overdose of cap-chur-barb on June 6, 1970, following a serious illness and weight loss due to internal parasites (Kellog, 1970).

Two more black-tailed bucks were secured from the Volunteer Ordinance Plant during the fall of 1970. A yearling buck was transferred to Cheatham pen on September 25 and a two and one-half year old buck was transferred on October 20. Both of these bucks had been born and reared in Tennessee. On May 27, 1971, the *O. v. borealis* doe gave birth to triplets—two bucks and a doe. On June 27, 1971, the two *O. v. texanus* does and the "mixed" doe all gave birth to twins. The older *O. v. texanus* gave birth to twin doe fawns. The younger *O. v. texanus* gave birth to twin buck fawns. The "mixed" doe gave birth to one buck and one doe fawn. All the fawns were healthy and vigorous.

All parturitions occurred between 244 and 274 days following the introduction of the yearling buck and 219 and 249 days following the introduction of the older buck.

The gestation period recorded for white-tailed deer is 187 to 222 days and is 187 to 212 days for black-tailed deer (Cowan, 1956, and Severinghaus and Cheatum, 1956). During the first year, all does produced fawns within a period of 212 to 244 days following the mixture of the two species. Fawns were produced the third year between 244 and 274 days following exposure. Since the same does were used in all the experiments and all produced young during the first and third year, it is believed that the buck used during the second year was sterile. Apparently then, black-tailed bucks and white-tailed does will readily crossbreed and are capable of producing vigorous young.

White-tailed buck, black-tailed doe matings

On October 20, 1968, one yearling black-tailed doe was placed in a pen at the Buffalo Springs Game Farm with two adult white-tailed bucks. During July, 1969, 276 days later, this doe gave stillbirth to a male fawn. Associated complications left her in a permanent squat or stooped position.

On September 18, 1969, two wild, adult black-tailed does were transferred to the Game Farm pen. On May 23, 1970, one of the does gave birth to one male and one female fawn. The other wild doe gave birth to twin doe fawns on June 14, 1970. The stooped doe did not conceive young during the 1970 fawning season. All the fawns were healthy and vigorous and were born between 248 and 277 days following the mixing of the two species.

The same deer were bred again during the 1970-71 fawning year. Both wild does gave birth to twins. One gave birth to twin doe fawns on May 19, 1971, and the other gave birth to one male and one female fawn on June 11, 1971. The stooped doe's second pregnancy again resulted in stillbirth of a male fawn on July 5, 1971. Apparently white-tailed bucks and black-tailed does will readily cross-breed and produce vigorous young.

Hybrid matings

Two basic types of hybrids had been obtained—those from mating black-tailed bucks with white-tailed does and those from mating white-

tailed bucks with black-tailed does. No live young of the latter type were obtained during the first year of the experiments. Three (one buck and two does) were obtained during the second year. They were continually exposed to adult members of the opposite sex during their first year of life and no fawns were produced.

A total of six hybrids (two bucks and four does) resulting from black-tailed buck, white-tailed doe matings were obtained during the first year of the study. One of these does died of handling injuries before reaching breeding age. The three remaining does and two bucks were continually exposed to adult members of the opposite sex during their first year of life and no fawns were produced. One of the bucks died of handling injuries when one year old. The remaining buck was placed with three adult white-tailed does during his second year of life and no fawns were produced. Two of the hybrid does were placed with two proven black-tailed bucks. The other doe was placed with three proven white-tailed bucks. On April 23, 1971, the first second generation hybrid was born to this doe. The fawn was healthy and vigorous. The full sister to this doe that had been bred to a black-tailed buck produced stillborn twin fawns on July 2, 1971. One of the fawns was piebald and the other was unusually dark. No young were born to the other hybrid doe.

During the two year period, none of the hybrids produced young their first year of life. During their second year 50 percent produced young and 66 per cent of those young were stillborn.

Anatomical and physical characteristics

Various measurements were taken of all the deer involved in these experiments (Table 1). Cowan (1956) reported that the metatarsal and preorbital glands were larger in black-tailed deer. Data in this study indicate that ear and tail length can also be used to separate the two species. The ears of blacktails are longer and their tails are shorter. A comparison of these distinguishing characteristics with the same hybrid characteristics indicated that the black-tailed characteristics predominated in all the hybrid offspring. In fact, hybrid measurements were so similar to blacktailed measurements that they could not be separated. Both, however, could be easily distinguished from white-tailed deer.

TABLE 1. Average Measurements Taken from Adult Black-tail, Adult White-tail, and Yearling Hybrid Deer Used in This Study

Species	Average Measurements in Centimeters					
	Ear	Hind Foot	Glands		Tail Length	Total Length
			Pre-orbitals	Meta-tarsal		
			L. x W.			
Black-tail	18.1	40.5	1.6 x 1.6	4.7	17.8	155.6
Hybrid	16.8	40.4	1.6 x 1.7	4.0	19.0	143.0
White-tail	13.1	40.8	1.2 x 0.3	2.1	24.1	166.5

Measurements taken of hind foot and total body length indicated that blacktails, whitetails, and hybrids were all very similar in size.

Antler form in blacktails differ from whitetails in that the branching of blacktails is dichotomous in nature whereas whitetails possess a single main beam from which tines protrude. Cowan (1956) reported a hybrid buck offspring from a black-tailed buck and a white-tailed doe that had antler characteristics similar to whitetails. The yearling hybrid from a black-tailed buck and white-tailed doe in this study produced antlers with dichotomous branching.

The antlers were quite large for a yearling. Each of the antlers had three points, was one inch in diameter at the base, measured one inch above the hairline and was twelve and one-half inches from the base to the farthest tip.

Visual characteristics

Bi-annual color photographs were made of each hybrid. Comparisons of notes and photos kept on body coloration indicated that there was no significant difference in body coloration between blacktails, whitetails, and hybrids. It was discovered that the color as well as the length of the metatarsal gland could be used to separate blacktails from whitetails. The hairs covering the metatarsal gland were reddish-brown on blacktails and white on whitetails. The gland coloration of all the hybrids was identical to that found on the blacktails.

Cowan (1956) reported that the dorsal view of the tail and the rump could be used to separate blacktails from whitetails. The tails and rumps of all but one of the hybrids were identical to black-tailed deer. White-tailed deer run with their tails up whereas black-tailed deer run with their tails down. Every hybrid deer did both. The running gait of blacktails differs from whitetails in that blacktails hop along with stiff legs whereas whitetails run with a smooth gait similar to that of a horse. All of the hybrids in this study were masters of both gaits.

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PRELIMINARY STUDY OF THE EFFECTS OF DOGS ON RADIO-EQUIPPED DEER IN A MOUNTAINOUS HABITAT

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ABSTRACT

A study was conducted on Mt. Mitchell Wildlife Management Area in western North Carolina to determine the effects of dogs on movement patterns, behavior and mortality of radio-equipped deer in a rugged, mountainous habitat. Data were obtained from 11 of 15 radio-instrumented deer. Six were radio-monitored during the raccoon, bear and deer seasons and although four were legally harvested no mortality could be related to the effects of dogs. From February to July, eight of the radio-instrumented deer were subjected to 20 experimental chases by hunting hounds. Chases averaged 54 minutes in duration and 2.36 miles in distance with maximums of 165 minutes and 6.77 miles recorded. The chases were generally downhill and streams were crossed repeatedly. Chased deer quickly left their home ranges but returned in all cases where mortality did not occur. Three cases of mortality among radio-instrumented deer occurred during the period of experimental harassment, two deer being killed by the hounds, and one by a bobcat. One of the deer killed by dogs was caught within 3 minutes after release from a live trap. These and two non-instrumented deer in which dogs were

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