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NOTES

TWO-HEADED WHITE-TAILED DEER FETUS—On 6 April 2018 a female white-tailed deer (*Odocoileus virginianus dakotensis*) was hit and killed by a vehicle along HWY 1806 in rural Morton County, North Dakota, USA (N46° 38.617; W100° 42.901). Based upon dental eruption and wear (Severinghaus 1949), the female was estimated to be a >4.5 years-of-age. A male fetus with parapagus diprosopus (i.e., shared face) apparently was expelled from the adult female, and a domestic canine (*Canis lupus familiaris*) carried the fetus to a private residence. The resident contacted the North Dakota Game and Fish Department (NDGFD) to turn in the fetus. On 10 April 2018, NDGFD employees attempted to retrieve the carcass of the adult female; however, coyotes (*Canis latrans*) had scavenged most of the carcass, leaving only the head, spinal column, and legs.

Fetus measurements were as follows: total length (right head), 430 mm; chest girth circumference 245 mm; hindfoot length, 135 mm; left head circumference 200 mm; right head circumference 182 mm; combined head circumference 268 mm; and weight 1520 g. We estimated the fetus to be 136 to 143 days old, based upon hindfoot length and fetus weight, respectively (Short 1970). Duplication of the heads was incomplete, as they were joined laterally at the right mandible of the left head and the zygomatic arch of the right head, with the sagittal crests of the two heads forming an angle of about 60° (Fig. 1). Both heads shared an ear (Fig. 2). Radiography revealed the heads were jointly attached



Figure 1. Close-up photo of a two-headed male fetus recovered from a vehicle-killed adult female white-tailed deer in Morton County, North Dakota, April 2018.



Figure 2. Lateral full-body view of a two-headed male white-tailed deer fetus recovered from a vehicle-killed adult female white-tailed deer in Morton County, North Dakota, April 2018. Black lines on photo-board are at 10 cm intervals.

to the spinal column at the first cervical vertebra (Fig. 3). It is doubtful that this fetus could have survived birth, and it is possible it would have resulted in dystocia and death of the dam (D.M. Grove, DVM, personal observation). Diprosopus is a very rare congenital abnormality; in humans (*Homo sapiens*) conjoined twins occur at a rate of about 4 to 19 per 1,000,000 births, and diprosopus occurring about 2 per 1,000,000 births (Chih-Ping et al. 2011, Bidondo et al. 2016). It has been suggested this malformation, at least on occasion, is the result of a genetically imperfect embryo; that is most commonly accompanied by a non-functional heart or a competent brain (Spencer 2001).

There are no previously documented cases of two-headed deer from North Dakota (R.E. Johnson, Big Game Biologist (retired), NDGFD, personal communication). Conjoined twins in domestic livestock have been reported relatively frequently in the literature (Purohit et al. 2012). However, Kompanje and Hermans (2008) reported a total of only 20 cases of conjoined wild mammals in the scientific literature between 1671 and 2008. Of these, five were members of the deer family (1 moose [*Alces alces*], 3 elk [*Cervus canadensis*], and 1 white-tailed deer, which was a fetus with parapagus dicephalus [i.e., shared body with two separate heads] from Roscommon County, Michigan [Fay 1960]). Not reported in Kompanje and Hermans (2008) was another white-tailed deer fetus with parapagus dicephalus from Pennington County, South Dakota (Severson et al.



Figure 3. Radiograph of a two-headed male white-tailed deer fetus recovered from a vehicle-killed adult female white-tailed deer in Morton County, North Dakota, April 2018. Both heads attach to the spinal column on the first cervical vertebra.

1972). Recently, D'Angelo et al. (2018) reported a stillborn fawn with parapagus dicephalus found in Houston County, Minnesota. Thus, to our knowledge, the North Dakota fetus is only the fourth conjoined white-tailed deer reported in the literature. This fetus is preserved and stored in the Vertebrate Museum, Starcher Hall, University of North Dakota, Grand Forks (Accession No. UND4071).

We thank K. Graner for quickly notifying the NDGFD about this fetus. We also thank the reviewers for their helpful comments and suggestions.—*William F. Jensen, Daniel M. Grove, Ryan J. Herigstad, and William J. Haase, North Dakota Game and Fish Department, 100 North Bismarck Expressway, Bismarck, ND, 58501, USA. Corresponding author (bjensen@nd.gov).*

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Submitted: 14 June 2018. Accepted: 20 August 2018.

Associate Editor: Colter Chitwood