PARASITES OF WHITE-TAILED AND MULE DEER IN SOUTH DAKOTA [1]

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INTRODUCTION

Parasites of white-tailed deer, *Odocoileus virginianus,* and mule deer, *O. hemionus,* have been extensively surveyed and reported in North America. Anderson (1962a, 1962b) reviewed many of the works on white-tailed deer. Dikmans (1939), Herman (1945), Cowan (1946), Landram and Honess (1955), Honess and Winter (1956) and Senger (1963) authored some of the more extensive works on mule deer parasites. We found no previous record of helminth parasites from deer in South Dakota. Bequaert (1952-1956) reported a louse-fly, *Lipoptena depressa,* from white-tailed deer from the Black Hills. A survey for helminth and arthropod parasites was conducted during 1964 and 1965 by the authors for the purpose of recording the species present, the prevalence of parasites, and their distributions in the deer of South Dakota.

The following materials were examined from white-tailed deer: 75 visceral tracts, nine complete animals, and two skins. Materials examined from mule deer included 29 visceral tracts, one complete animal and one skin. Livers, hearts, and lungs often were not included with the samples.

Samples were collected from the following areas which represented diverse habitat types: Slim Buttes, a rough, dry area of coniferous forest surrounded by prairie in the northwest; Black Hills, a mountainous area of coniferous forest in the west; Badlands and White River breaks, a rough, pine-cedar-cottonwood association surrounded by prairie in the west central region; Missouri River breaks, deciduous forest and prairie in the south central region; Newton Hills, a deciduous forest in the southeast; and the prairie-pothole region of the northeastern counties (Figure 1). Areas were chosen for the diverse habitat types they provided. Each area had a resident deer population, often in close proximity to domestic livestock and crops. The white-tailed deer were found in all of the areas, and mule deer occurred in all except the Newton Hills and the prairie-pothole region of the east.

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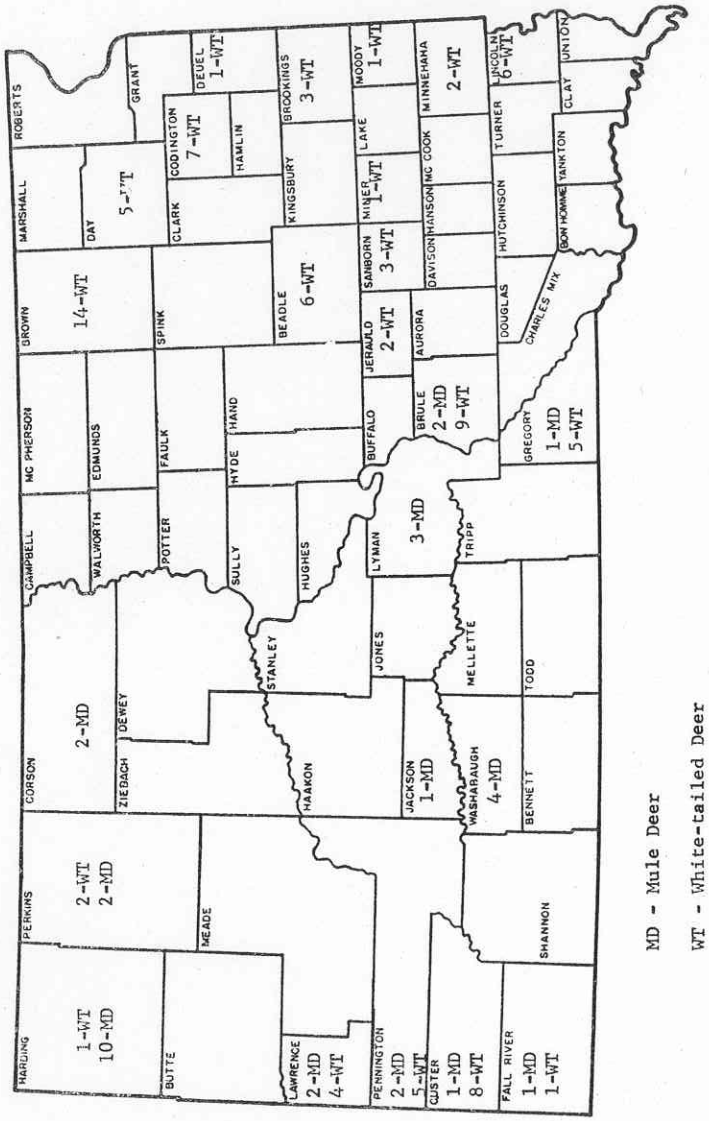


MD - Mule Deer

WT - White-tailed Deer

Figure 1. Distribution of Mule and White-tailed Deer Samples

PARASITES RECOVERED

Cestodes

Moniezia benedeni, a tapeworm commonly reported from cattle, infested white-tailed deer from Fall River and Brown Counties and was found in a mule deer from Harding County (Figures 2 and 3). Landram and Honess (1955) and Honess and Winter (1956) reported this species from mule deer in Wyoming, and Senger (1963) found it in mule deer from Montana.

The fringed tapeworm, *Thysanosoma actinioides,* was found in the small intestine of one white-tailed deer and in 16.7% of the mule deer distributed as shown in Figures 2 and 3. This tapeworm was of special interest since it has been reported as a common and serious parasite of domestic sheep in western United States. Boddicker and Hugghins (1969) have reported this species from elk *(Cervus canadensis)* and pronghorn antelope *(Antilocapra americana)* of South Dakota. The species has been reported from mule deer in Wyoming (Landram and Honess, 1955), and in Montana (Senger, 1963).

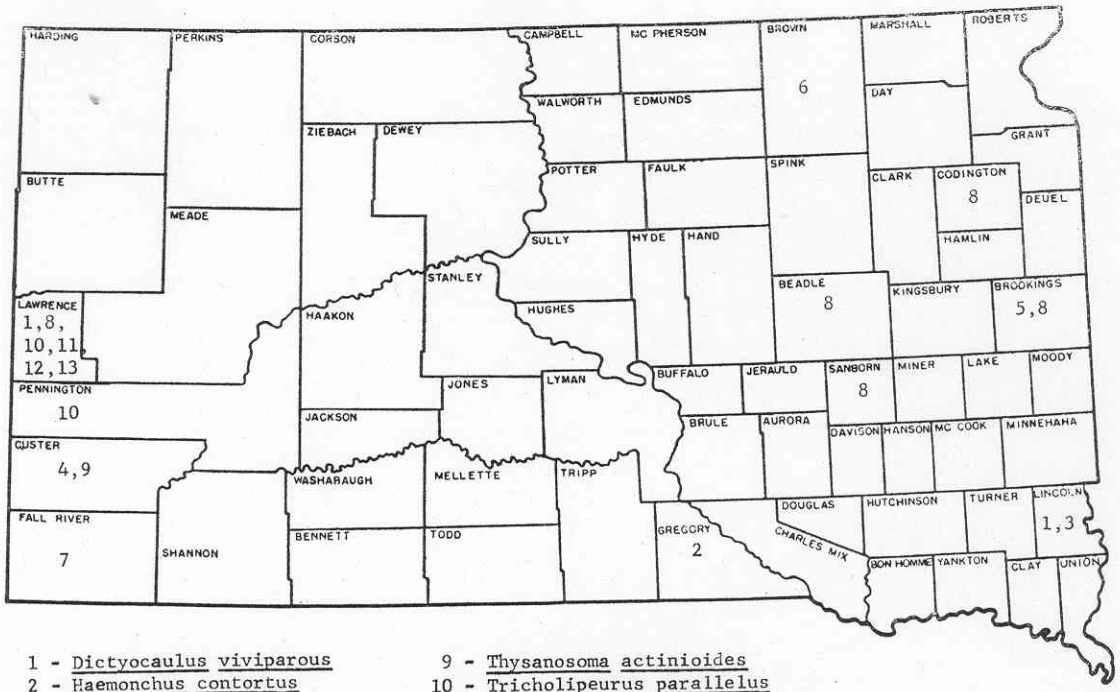
Cysticerci of *Taenia hydatigena* were collected from 6.0% of the white-tailed deer and 13.3% of the mule deer and showed wide distribution in the state (Figures 2 and 3). These bladderworms usually were attached to the greater omentum. This cysticercus has been reported from white-tailed and mule deer over most of the United States and Canada.

Nematodes

Two white-tailed deer, one from Lawrence and the other from Lincoln County, were infested with *Dictyocaulus viviparous,* a lungworm. This species was recovered from white-tailed deer in neighboring Minnesota by Erickson *et al.* (1961) and has been reported from mule and white-tailed deer generally over the continental United States.

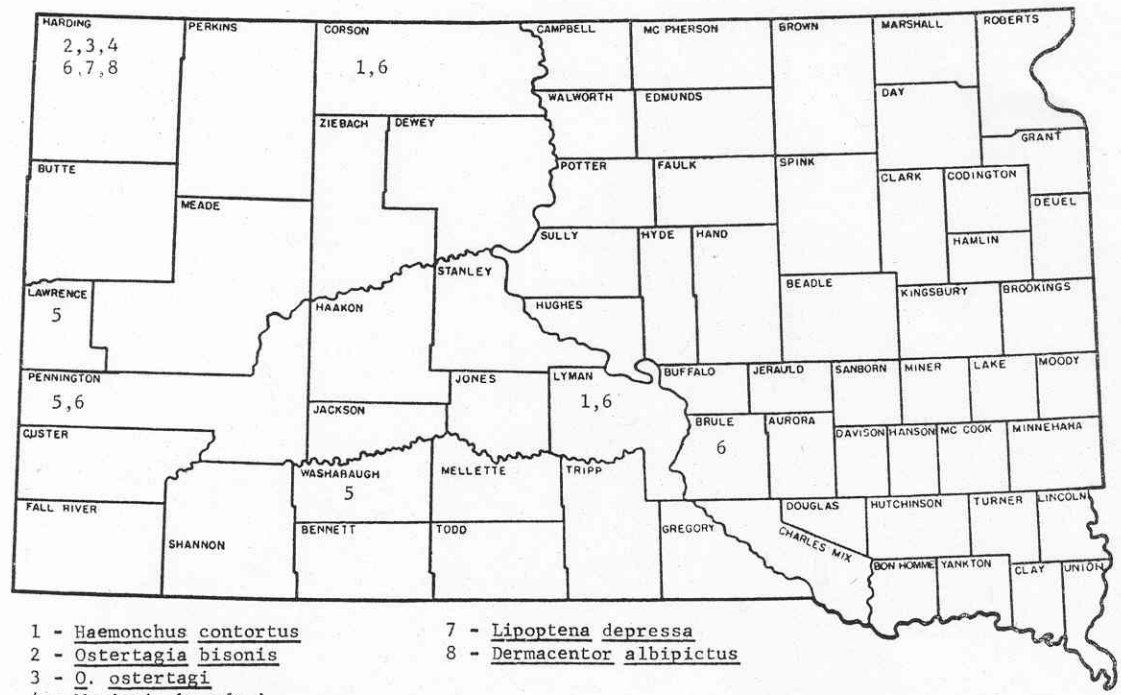
The twisted stomach worm, *Haemonchus contortus,* which has been reported from the abomasum of a wide range of domestic and wild ruminants, infested a white-tailed deer from Gregory County. Four mule deer were infested with this species, three from Lyman County and one from Corson County. This parasite has been reported to cause severe debilitation and death in heavily infected sheep, according to Morgan and Hawkins (1949).

A white-tailed deer from Brookings County was infected with *Setaria cervi,* which was found in the body cavity on the greater omentum. This slender worm is about three inches long. Erickson, *et al.,* (1961) reported this species from white-tailed deer of Minnesota. It has been reported from mule deer in California by Her-



1 - Dictyocaulus viviparous
2 - Haemonchus contortus
3 - Ostertagia odocoilei
4 - Ostertagia sp.
5 - Setaria cervi
6 - Moniezia benedeni
7 - Moniezia sp.
8 - Taenia hydatigena (cysticerci)
9 - Thysanosoma actinioides
10 - Tricholipeurus parallelus
11 - Lipoptena depressa
12 - Cephenemyia phobifera
13 - C. jellisoni

Figure 2. Distribution of Parasites of White-tailed Deer in South Dakota



1 - Haemonchus contortus
2 - Ostertagia bisonis
3 - O. ostertagi
4 - Moniezia benedeni
5 - Taenia hydatigena (cysticerci)
6 - Thysanosoma actinioides
7 - Lipoptena depressa
8 - Dermacentor albipictus

Figure 3. Distribution of Parasites of Mule Deer in South Dakota

man (1945). Boddicker and Hugghins (1969) reported *S. cervi* from pronghorn antelope of South Dakota.

Two mule deer from the Slim Buttes were infected with *Ostertagia bisonis,* a species originally described by Chapin (1925) from American bison, *Bison bison.* Becklund and Walker (1967) redescribed the species using, in part, specimens from the above mule deer and other specimens collected by the authors from pronghorns and bison in South Dakota. *Ostertagia ostertagi* was found in one mule deer from the Slim Buttes. This species has been reported from a variety of domestic and wild ruminants, including pronghorn antelope in South Dakota (Boddicker and Hugghins, 1969). *Ostertagia odocoilei* was found in the abomasum of two white-tailed deer from the Newton Hills. This species has been reported only in white-tailed deer from Pennsylvania (Dikmans, 1931), Louisiana (Dikmans, 1933), New York (Dikmans, 1934), and Florida (Dinaberg, 1939). This report extends its known distribution to the north-central United States.

Arthropods

Eleven white-tailed deer and two mule deer were examined for ectoparasites. Of the four white-tailed deer examined from the Black Hills, all were heavily infested with a biting louse, *Trichol-ipeurus parallelus,* which occurred on the scrotal hair and posterior abdominal region. A closely related species, *T. lipeuroides,* has been reported from white-tailed deer in Minnesota by Erickson, *et al.,* (1961) and from mule deer in Wyoming by Honess and Winter (1956).

Lipoptena depressa, a louse fly, was found on a white-tailed deer from Lawrence County and a mule deer from Harding County. Both infestations were light and apparently of little consequence to the hosts. Bequaert (1942) reported this species infesting elk from Custer State Park, Hermosa, South Dakota. He also recorded it on white-tailed deer from the Black Hills (Bequaert 1952-1956).

Retropharyngeal pouches of three white-tailed deer from Lawrence County harbored immature stages of deer nose bots, which have been tentatively identified as *Cephenemyia phobifera* and *C. jellisoni.* Positive identifications are based on adults which were not available. Erickson *et al.* (1961) reported 21.8% of white-tailed deer examined from Minnesota carried *C. phobifera.* Bennett (1962) has described the biology of this parasite and discussed its effect on its host.

Ticks found on a mule deer from the Slim Buttes were identified as *Dermacentor albipictus.* This species has been associated with winter mortality in moose by Cowan (1951) and has been commonly reported from large herbivores.

Bacteria

Several large cysts were observed on the greater omentum of a white-tailed deer from Brule County and on the right common carotid artery of another from Codington County. *Corynebacterium pyogenes* was determined to be the causative agent. Though both deer appeared to be in good health, neither weighed as much as deer of comparable age taken from the same areas. This bacterium has been commonly reported in domestic livestock.

DISCUSSION

Helminths infested 15.5% of the white-tailed deer and 47.0% of the mule deer examined. Since infestations in both species were light and since the more harmful helminths occurred in relatively few animals, it appeared that helminths were not important contributing factors to mortality of deer in South Dakota. However, it should be noted that most animals examined were taken during the fall hunting seasons and that helminth and arthropod parasite incidences could be expected to fluctuate through the different seasons. Deer below six months of age were not examined.

Arthropod parasites were found on 36.7% of 11 white-tailed deer skins and on both of the mule deer skins examined. Little could be concluded on the basis of these small samples. Tick-caused mortality as reported for moose by Cowan (1951) has not been reported for mule deer in South Dakota and the authors found no evidence of it during the course of this study.

See Figures 4 and 5 for detailed information on incidence of each species of parasite. Incidence of helminths was much lighter than anticipated for the white-tailed deer. However, except for the absence of the giant liver fluke, *Fascioloides magna,* which occurred in 26.6% of Minnesota deer, the South Dakota infestation rates for white-tailed deer were comparable to those reported by Erickson *et al.* (1961).

Deer from the Black Hills were most consistently parasitized and were consistently of lighter weight and of poorer general condition than deer from the other areas studied. However, a causative relationship between parasites and deer condition could not be shown on the basis of our work.

Figure 4. Parasites of 86 White-tailed Deer from South Dakota

NEMATODA	Organ Infected	No. Examined	No. Infected	% Infected	Highest No. Specimens
Setaria cervi	mesenteries	84	1	1.2	2
Dictyocalus viviparous	lungs	74	2	2.7	3
Haemonchus contortus	abomasum	84	1	1.2	21
Ostertagia odocoilei	abomasum	84	2	2.7	24
Ostertagia sp.	abomasum	84	1	1.2	1
CESTODA					
Moniezia benedeni & sp.	small intestine	80	2	2.6	2
Taenia hydatigena (cysticerci)	mesenteries	84	5	6.0	1
Thysanosoma actiniodes	small intestine	80	1	1.3	1
INSECTA					
Tricholipeurus parallelus	hair and skin	11	4	36.7	500+
Lipoptena depressa	hair and skin	11	1	9.9	1
Cephenemyia phobifera	retropharyngeal pouches	9	3	33.3	17
C. jellisoni	retropharyngeal pouches	9	2	22.2	10

Figure 5. Parasites of 31 Mule Deer from South Dakota

NEMATODA	Organ Infected	No. Examined	No. Infected	% Infected	Highest No. Specimens
Haemonchus contortus	abomasum	30	4	13.3	8
Ostertagia bisonis	abomasum	30	2	6.7	15
Ostertagia ostertagi	abomasum	30	1	3.3	5
CESTODA					
Moniezia benedeni	small intestine	30	3	10.0	8
Taenia hydatigena (cysticerci)	mesenteries	30	4	13.3	2
Thysanosoma actinioides	small intestine	30	5	16.7	6
ARTHROPODA					
Dermacentor albipictus	skin	2	1	50.0	9
Lipoptena depressa	skin	2	1	50.0	12

SUMMARY

Helminth and arthropod parasites recovered from 17.4% of 86 white-tailed deer examined were as follows: *Dictyocaulus viviparous, Haemonchus contortus, Setaria cervi, Ostertagia odocoilei, Ostertagi* sp., *Moniezia benedeni, Moniezia* sp., *Thysanosoma actinioides, Taenia hydatigena* (cysticerci), *Cephenemyia phobifera, C. jellisoni, Tricholipeurus parallelus,* and *Lipoptena depressa.* Two white-tailed deer had cysts caused by a bacterium, *Corynebacterium pyogenes.* Helminth and arthropod parasites infesting 48.4% of 31 mule deer were as follows: *Haemonchus contortus, Ostertagia bisonis, O. ostertagi, Moniezia benedeni, Thysanosoma actinioides, Taenia hydatigena* (cysticerci), *Dermacentor albipictus,* and *Lipoptena depressa.* Infestations were light, and harmful effects on the hosts were not evident.

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