

THE UNIVERSITY OF MANITOBA

SOME ASPECTS OF THE ECOLOGY OF THE COYOTE  
(CANIS LATRANS SAY) IN SOUTHWESTERN MANITOBA

by

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## ABSTRACT

The feeding patterns of coyotes (Canis latrans) in southwestern Manitoba were determined by the analysis of 478 food samples. Lagomorphs and rodents were the main food sources. Wild ungulates, probably mostly as carrion, formed a large part of the winter diet. Domestic cattle were frequently eaten but most was believed to be carrion. Insects and vegetation were important foods from mid to late summer. Birds formed a small part of the diet. The male to female ratio was not significantly different from the expected 50:50. Average litter size was 5.73 in agricultural areas. A low percentage (approximately 10%) of short yearling females and about 75% of adult females (1½ years and older) produced litters in 1971 and 1972. Two possible causes of the low representation in the short yearling age class were discussed. Filaroides osleri infected 55.2% of the lungs examined while none of the intestines examined were infected by Echinococcus spp.

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## TABLE OF CONTENTS

	Page
LIST OF TABLES .....	ix
LIST OF FIGURES .....	xii
INTRODUCTION .....	1
LITERATURE REVIEW .....	4
MATERIALS AND METHODS .....	14
STUDY AREA .....	14
METHODS .....	21
Frequencies of food items .....	22
Scat Analysis .....	23
Stomach Analysis .....	26
Population Analysis .....	28
Small Mammal Sampling Plots .....	29
Parasite Analysis .....	30
RESULTS .....	36
GENERAL FOOD HABITS .....	36
SEASONAL, ANNUAL AND GEOGRAPHICAL VARIATION OF MAJOR FOOD GROUPS .....	36
SPECIFIC FOOD HABITS .....	41
Vegetation .....	41
<u>Grass and Sedge</u> .....	41
<u>Berries</u> .....	54
<u>Other Vegetation</u> .....	55

	Page
<u>Dung and Masticated Vegetation</u> .....	55
Invertebrata .....	56
Amphibia and Reptilia .....	57
Aves .....	57
Mammalia .....	60
<u>Soricidae</u> .....	60
<u>Lagomorpha</u> .....	60
<u>Sciuridae</u> .....	65
<u>Geomyidae</u> .....	66
<u>Heteromyidae</u> .....	67
<u>Cricetidae</u> .....	67
<u>Zapodidae</u> .....	75
<u>Erethizontidae</u> .....	75
<u>Canidae</u> .....	77
<u>Mustelidae</u> .....	77
<u>Artiodactyla</u> (wild) .....	77
<u>Domestic animals and debris</u> .....	78
POPULATION ANALYSIS .....	82
Sex Ratio .....	87
Reproductive Performance .....	88
PARASITES .....	89

## Page

DISCUSSION .....	90
GENERAL FOOD HABITS .....	90
SEASONAL, ANNUAL AND GEOGRAPHICAL VARIATION OF MAJOR FOOD GROUPS .....	91
SPECIFIC FOOD HABITS .....	92
Vegetation .....	92
<u>Grass and Sedge</u> .....	92
<u>Berries</u> .....	92
<u>Dung and Masticated Vegetation</u> .....	92
Invertebrata .....	93
Amphibia and Reptilia .....	94
Aves .....	95
Mammalia .....	96
<u>Soricidae</u> .....	96
<u>Lagomorpha</u> .....	96
<u>Sciuridae</u> .....	100
<u>Geomyidae</u> .....	100
<u>Heteromyidae</u> .....	103
<u>Cricetidae</u> .....	103
<u>Zapodidae</u> .....	111
<u>Erethizontidae</u> .....	112
<u>Canidae</u> .....	112
<u>Mustelidae</u> .....	113

	Page
<u>Artiodactyla</u> (wild) .....	113
<u>Domestic animals and debris</u> .....	117
FOOD CONSUMPTION .....	123
POPULATION ANALYSIS .....	130
Sex Ratio .....	130
Reproductive Performance .....	131
Life Table Analysis .....	132
Robson and Chapman Survival Rate .....	143
PARASITES .....	146
FACTORS AFFECTING POPULATION SIZE .....	146
CONCLUSIONS .....	148
LITERATURE CITED .....	152
APPENDIX .....	157

LIST OF TABLES

		Page
Table 1.	Comparison of the importance of major food groups from eight other studies .....	5
Table 2.	Comparison of the importance of some mammalian food items from eight other studies .....	7
Table 3.	Sample size of scat collections from the Spruce Woods and Harcus for the spring and summer of 1971 and 1972 .....	25
Table 4.	Percent frequency of occurrence and percent frequency of occurrence as a major item (MI) of specific food items found in 372 scats (spring and summer) and 106 stomachs (winter) collected from May, 1971 to February, 1973 .....	42
Table 5.	Percent frequency of occurrence of specific food items found in 372 scats collected during springs and summers, 1971 and 1972 in the Spruce Woods and Harcus areas .....	44
Table 6.	Percent frequency of occurrence as a major item (MI) of specific food items found in 372 scats collected during springs and summers, 1971 and 1972 in the Spruce Woods and Harcus areas .....	47
Table 7.	Percent frequency of occurrence and percent frequency of occurrence as a major item (M.I.) of specific food items found in 106 stomachs collected during the winters 1971-1972 and 1972-1973 in southwestern Manitoba .....	50

Table 8a.	Number and distribution of small mammals trapped in Harcus on each sampling plot in 1971 and 1972 .....	61
Table 8b.	Number and distribution of small mammals trapped in Spruce Woods on each sampling plot in 1971 and 1972 .....	62
Table 9.	Age structure of the coyote sample collected in agricultural areas in 1971-72 and 1972-73 and both years combined .....	83
Table 10.	Age structure of the male and female segments of the coyote samples collected in agricultural areas in 1971-72 and 1972-73 .....	84
Table 11.	Age structure of the coyote sample collected in the Duck Mountains area in 1972-73 .....	85
Table 12.	The age structure of the coyote sample collected in agricultural areas compared to 3 other studies .....	86
Table 13.	Percent frequency of occurrence as a major item of <u>Ondatra zibethicus</u> per month in relation to monthly precipitation in 1971 and 1972 in the Harcus area.	109
Table 14.	Weights and numbers of some foods consumed by coyotes per square kilometer per month.	126
Table 15.	Time specific life table based on age structure of coyote sample from agricultural areas .....	134
Table 16.	Mortality and survival rates calculated on the basis of the shrinkage between each age class in 1971 and the same year class one year later, assuming that population size is constant .....	138

Table 17.	Mortality and survival rates calculated on the basis of the shrinkage between the age classes in 1971 and same year class one year later, assuming the population has declined by 30% .....	139
Table 18.	Time specific life table showing number of new born coyotes calculated from number of productive females in the sample .....	142
Table 19.	Calculated Robson and Chapman expected values for age classes $\frac{1}{2}$ to $5\frac{1}{2}$ .....	145

## LIST OF FIGURES

	Page
Fig. 1. Map of Manitoba showing the locations of the two spring and summer study areas.....	15
Fig. 2. Map of Manitoba showing the number of coyote carcasses collected at each location during the winter of 1971-72.....	16
Fig. 3. Map of Manitoba showing the number of coyote carcasses collected at each location during the winter of 1972-73.....	17
Fig. 4. Percent frequency of occurrence and percent frequency of occurrence (M.I.) of the four major food groups based on all food samples collected from May, 1971 to February, 1973.....	31
Fig. 5. Comparison of percent frequency of occurrence and percent frequency of occurrence (M.I.) of the four major food groups in 1971-72 and 1972-73.....	32
Fig. 6. Seasonal and annual comparison of the percent frequency of occurrence (ALL) and percent frequency of occurrence (M.I.) of the four major food groups.....	33
Fig. 7. Comparison of the percent frequency of occurrence and percent frequency of occurrence (M.I.) of the four major food groups in the two study areas during the spring.....	34
Fig. 8. Comparison of the percent frequency of occurrence and percent frequency of occurrence (M.I.) of the four major food groups in the two study areas during the summer...	35
Fig. 9. Consumption of two types of vegetation during the spring and summer of 1971 and 1972 in the two study areas on a monthly basis.....	53

Fig. 10.	Consumption of three food sources during the spring and summer of 1971 and 1972 in the two study areas on a monthly basis.....	58
Fig. 11.	Relationship between the density of snowshoe hare and its contribution to the coyote's diet.....	64
Fig. 12.	Relationship between the density of <u>Microtus pennsylvanicus</u> and its contribution to the coyote's diet in the Marcus area.....	69
Fig. 13.	Relationship between the density of <u>Microtus ochrogaster</u> and its contribution to the coyote's diet in the Spruce Woods.....	71
Fig. 14.	Relationship between the density of <u>Microtus pennsylvanicus</u> and its contribution to the coyote's diet in the Spruce Woods.....	72
Fig. 15.	Relationship between the density of <u>Peromyscus maniculatus</u> and its contribution to the coyote's diet in the Spruce Woods.....	76
Fig. 16.	Consumption of some mammals during the spring and summer of 1971 and 1972 in the two study areas on a monthly basis.....	79
Fig. 17.	Consumption of <u>Microtus</u> spp. during the spring and summer of 1971 and 1972 in the two study areas on a monthly basis.....	98
Fig. 18.	Survivorship and mortality curves plotted from the calculated age specific mortality and survival rates.....	135

## INTRODUCTION

The coyote has been a controversial creature since the first white pioneers settled within its range. Ranchers, farmers, sportsmen, trappers, wildlife managers, environmentalists, and government officials, all have an interest in the fate of the coyote. Some groups favour extermination and others are for total protection, but neither is possible and the most reasonable approach is sensible management so that conflicts are minimized.

The coyote is strictly a North American mammal. Its range is restricted to this continent including parts of Central America south to Costa Rica. Originally an animal of the plains, the coyote, in recent years, has penetrated the forested areas in the western North American mountain ranges and the boreal forests of Canada and Alaska. The eastern extension of its range in Canada began in the early 1900s when it first appeared near Windsor, Ontario. By 1952 they were reported in Quebec and by 1958 the first one was shot in New Brunswick. Most of the eastern United States have become occupied by the coyote since about 1930.

Coyotes are known to occupy numerous habitat types including dense forest, prairie, farmland and desert. They thrive in "edge" type habitat. In Manitoba, undulating semi-wooded terrain such as the Assiniboine River valley

and the sandhill topography seem to have a special attraction to them.

The coyote is a predator and most studies dealing with its trophic position have shown that it feeds mostly on small naturally occurring mammals. The coyote's diet is as diverse as the habitat types in which it is found. Depending on the situation, the coyote might be predominantly a rodent, carrion, poultry, sheep, wild ungulate, or insect feeder, but usually its diet consists of a variety of components which change season to season and year to year depending on what is available.

Unlike the gray wolf (Canis lupus), the coyote has been extending its range and although not assuming the vacated niche of the wolf it has at least physically replaced the wolf in many areas. Its range expansion can be attributed in large part to the clearing of once totally forested areas along the margins of the coyotes previous range.

Before 1965, little consideration was given to the management of predators in Manitoba and most effort was expended in controlling them. Since 1965 predators have become recognized for their esthetic, sport, fur and ecological value in the province and this attitude has led to the discontinuation of the ineffective bounty system, the banning of hunting from snowmobiles, and the restriction of

aerial hunting. The coyote is classified as a predator at present and is therefore unprotected in all seasons.

In Manitoba the low status of the coyote as a "predator" without legal protection has resulted in a lack of effort to collect data on coyote biology. No information on the coyote's feeding habits in agricultural Manitoba, effect on the rural economy and game populations, size of home range and population levels, population dynamics, pathology and potentials for consumptive and non-consumptive use have been collected. To provide some data on the biology of the coyote I undertook this study with the following objectives: 1) to determine the food habits of the coyote in some areas in southwestern Manitoba and to find what proportion of the diet consists of wild non-game and non-fur species, game and fur species and domestic species; 2) to determine the population structure of the coyote; 3) to collect information on the reproductive performance of the coyote; 4) to determine the percentage of the coyote population infected with Echinococcus spp. and Filaroides osleri.

## LITERATURE REVIEW

The coyote's feeding habits have been well documented for the western, southern and central United States and as far east as Missouri and Michigan. Table 1 shows the contribution which each of the food groups made to the coyote's diet in each geographical area studied. Table 2 shows the relative importance of each mammalian food to the coyote's diet in each area. Small wild mammals constituted the bulk of the coyote's diet (Table 2).

The coyote's diet has been found to vary seasonally, annually and geographically by Murie (1940), Sperry (1941), Murie (1945), Ferrel et al. (1953), Fichter et al. (1955), Tiemeier (1955), Korschgen (1957), Ozoga (1963), Knowlton (1964), Ozoga and Harger (1966), Gier (1968), Hawthorne (1972) and Mathwig (1972). Some papers presented evidence that the seasonal and annual variations in diet were due to changes in the abundance and availability of prey species (Murie 1940, Tiemeier 1955, Fichter et al. 1955, Korschgen 1957, Knowlton 1964 and Gier 1968). This emphasizes that the coyote is an opportunist, making increasingly more abundant and more easily obtainable foods a more important part of its diet. Fichter et al. (1955) indicated that abundance was not the only criterion which governed how important a food was to the coyote and that predilection also played a role.

Table 1: Comparison of the importance of major food groups from eight other studies.

	Mammal	Bird	Invertebrate	Vegetation	Reptile
Western United States <sup>1</sup> stomachs (percent volume)	93	3	1	2	0
California <sup>2</sup> stomachs (percent volume)	85	4.6	2.6	4.0	0
Nebraska <sup>3</sup> stomachs (percent frequency)	89.3	42.8	9.2	3.6	1.1
(percent volume)	78.0	17.7	0.9	1.6	0.1
Nebraska scats (percent frequency)	95.1	33.5	26.0	16.0	0
Missouri <sup>4</sup> stomachs (percent volume)	84.6	11.8	0.8	2.0	0
Michigan <sup>5</sup> scats (percent frequency)	89.5	21.5	46.1	82.6	10.9
(percent volume)	62.7	3.0	4.2	29.5	0.4
Texas <sup>6</sup> stomachs (percent volume)	53.7	7.9	12.2	18.8	0
Texas scats (percent frequency MI)	73.9	2.2	12.0	9.2	0

cont'd

Table 1: continued

	Mammal	Bird	Invertebrate	Vegetation	Reptile
New Mexico <sup>7</sup> stomachs (percent volume)	86.3	6.7	1.0	4.9	2.7
Ohio <sup>8</sup> stomachs (percent volume)	95.1	4.2	trace	0.3	0
Manitoba <sup>9</sup> stomachs and scats (percent frequency)	96.0	11.5	21.1	49.8	0.8
(percent frequency MI)	84.2	2.1	5.9	6.8	0

<sup>1</sup>Sperry (1941)

<sup>2</sup>Ferrel et al. (1953)

<sup>3</sup>Fichter et al. (1955)

<sup>4</sup>Korschgen (1957)

<sup>5</sup>Ozoga (1963)

<sup>6</sup>Knowlton (1964)

<sup>7</sup>Rogers (1965)

<sup>8</sup>Mathwig (1972)

<sup>9</sup>This study

Table 2: Comparison of the importance of some mammalian food items from eight other studies.

	Lagomorpha	Rodentia	Odocoileus spp.	Ungulates (Domestic)	Carrion
Western United States <sup>1</sup> stomachs (percent volume)	33.25	17.52	3.58	13.59	25.17
California <sup>2</sup> stomachs (percent volume)	13.2	33.2	17.0	19.4	10.2
Nebraska <sup>3</sup> stomachs (percent volume)	54.0	10.2	0.1	12.5	1.2
Missouri <sup>4</sup> stomachs (percent volume)	53.7	11.3	1.6	8.9	5.8
Michigan <sup>5</sup> scats (percent volume)	16.15	23.73	20.52	1.86	0
Texas <sup>6</sup> stomachs (percent volume)	8.1	26.2	4.9	8.9	0
New Mexico <sup>7</sup> stomachs (percent volume)	49.0	24.8	0	6.7	0
Ohio <sup>8</sup> stomachs (percent volume)	70.6	10.5	0	14.0	0
Manitoba <sup>9</sup> stomachs and scats (percent frequency MI)	40.4	19.1	19.4	18.3	0

Table 2: continued

<sup>1</sup>Sperry (1941)

<sup>2</sup>Ferrel et al. (1953)

<sup>3</sup>Fichter et al. (1955)

<sup>4</sup>Korschgen (1957)

<sup>5</sup>Ozoga (1963)

<sup>6</sup>Knowlton (1964)

<sup>7</sup>Rogers (1965)

<sup>8</sup>Mathwig (1972)

<sup>9</sup>This study

O. J. Murie (1935) designated 70.29% of the items the coyote consumed as economically beneficial, 18.22% as neutral and 11.49% as destructive. Sperry (1941) designated 80% of the coyote's diet as economically beneficial or neutral and 20% as destructive. Murie (op. cit.) and Sperry (op. cit.) made this designation while according to Errington (1946) and Fichter et al. (1955) compensatory factors can mean that the predator may have no effect on prey population levels. There is some evidence in the literature to indicate that coyotes can have an appreciable effect on some wild animal population levels. A. Murie (1940) tried to relate coyote feeding patterns to prey population levels and concluded that the coyote had a negligible effect on the elk (Cervus canadensis) herd in Yellowstone since most of the animals consumed were carrion or weakened individuals. Ozoga (1963) and Ozoga and Harger (1966) had similar findings but noted that deer (Odocoileus virginianus) fawns contributed about 20% to the spring diet and that the coyotes could have killed a large proportion of this. Ozoga (op. cit.) suspected that if coyotes did influence the deer herd it was through predation on fawns. Horn (1941) found that the coyote measurably regulated deer numbers through predation on fawns. Knowlton (1964) found that although fawns were heavily preyed on by coyotes in the

Welder Wildlife Refuge there was no effect on the deer herd. Horn (op. cit.) found, however, that the coyote did not control rodent and rabbit populations. Recently, Wagner (1972) reported that coyote predation on black-tailed jack rabbits (Lepus californicus) was a major source of hare mortality hastening, if not primarily causing, the hare decline from 1963 to 1967 and allowing the increase in hare by its relaxation from 1968 to 1970 in Utah.

Many studies have shown that wild ungulates constitute a large part of the coyote's diet but a large proportion of this was considered to be carrion. Dearborne (1932) found that deer was most heavily utilized during the hunting season. Sperry (1941) also found this and a similar peak in consumption associated with winter kill. Murie (1940) found that elk was seldom eaten by coyotes in the spring, summer and fall but was an important food source during the winter but usually as carrion or weakened individuals.

It has been demonstrated that losses of domestic animals to coyote predation are often increased by man's activities. Often dead farm animals are discarded where they encourage the coyote to venture nearer domestic stock (Sperry 1941, Teimeier 1955 and Korschgen 1957). Also attempts by novices to trap coyotes to reduce numbers have been shown to result in maimed animals which tend to rely more heavily on domestic

stock thus increasing depredation rather than reducing it (Sperry 1939, 1941).

Numerous papers have been published on the parasites harboured by the coyote. They include studies by Chandler (1944), Erickson (1944) in Minnesota, Eads (1948) in Texas, Butler and Grundman (1954) in Utah, Gier and Ameel (1959) in Kansas, Brunetti (1959) in California, Freeman et al. (1961) in Ontario, Holmes and Podesta (1968) in Alberta, and others. Many parasites which infect coyotes are mainly of academic interest although they can supply some information concerning food habits if the life cycle of the parasite is known. Echinococcus sp., however, is of special interest to man since humans can be infected by this parasite as an intermediate host. Unlike wolves, a low percentage of coyotes have been found to be infected. Erickson (op. cit.) found that out of 61 coyotes none were infected by Echinococcus sp. in Minnesota. Butler and Grundman (op. cit.) found that in Utah out of 75 coyotes, none were infected. Gier and Ameel (op. cit.) found that in Kansas, out of 1850 coyotes, none were infected. In Ontario, Freeman et al. (1961) found that 1% of 339 coyotes were infected. At Lac la Biche, Alberta, Holmes and Podesta (1968) found that out of 29 coyotes, none were infected, but at Banff, Alberta 17% of 23 coyotes were infected. This high occurrence of

E. granulosus at Banff was attributed to abnormal conditions. The infected lungs of elk shot during a herd reduction program were discarded and scavenging coyotes were thus infected.

Most previous studies (Rogers 1965, Gier 1968 and Mathwig 1972) except one (Knowlton 1972) dealing with the analysis of coyote populations were done in association with food habits studies. Rogers (op. cit.), Gier (op. cit.) and Mathwig (op. cit.) collected their data in areas where there was either intense hunting pressure or control. Knowlton's (op. cit.) coyote population was relatively unexploited. In all studies however the rate of turnover was high and over 80% of the populations was less than 3 years old.

The human factor affects the dynamics of a coyote population. Where coyotes were intensively controlled and numbers were kept low litter size was 6.9 whereas in areas with no control litter size averaged only 4.3. Also, the percentage of ovulating females and those with implantation sites was significantly higher in controlled areas (Knowlton 1972).

The long-term density of the coyote appears to be partly a function of the size of the food base. Clark (1972) showed that the size of the jack-rabbit (Lepus californicus) population influenced the size of the coyote population.

Little research has been done in Manitoba since the publication by Criddle et al. (1923) with the exception of testing the effectiveness of various control methods and predator repellants. Criddle et al. (op. cit.) made observations on the natural history and distribution of the coyote in Manitoba. They noted that at that time the coyote was extending its range into the northern forests of Manitoba because forested areas were being cleared. Most of their observations centred around the Treesbank area which they considered to be particularly well suited as coyote habitat. They collected information on pairing, selection of den sites, whelping time, size of the litter, care of young and some general observations on food habits. They noted that the coyote was primarily a rabbit feeder, but when rabbits were not plentiful alternate food sources such as gophers and mice were utilized. They found that with the arrival of settlers in Manitoba the coyote began to utilize domestic stock especially in years when natural food sources were scarce.