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ECTOPARASITES OF SHARP-TAILED GROUSE, *Pediocetes phasianellus*

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Abstract: Seven species of ectoparasites were recovered during a survey of sharp-tailed grouse, *Pediocetes phasianellus*, including the ticks, *Haemaphysalis chordeilis* and *H. leporispalustris;* the lice, *Goniodes nebraskensis, Lagopoecus gibsoni* and *Amyrsidea* sp.; the hippoboscid fly, *Ornithomyia anchineuria;* and the mite, *Ornithonyssus sylviarum*. Seasonal changes in populations of ticks and lice were found but not for populations of the hippoboscids or mites. All stages of *H. chordeilis* were found on sharp-tailed grouse only. Larvae and nymphs of *H. leporispalustris* were found on sharp-tailed grouse and song birds. Larvae, nymphs and adults of *H. leporispalustris* were recovered from a snowshoe hare. Small mammals from the study area did not harbour any species of ticks.

INTRODUCTION

The paucity of information on parasites of sharp-tailed grouse, *Pediocetes phasianellus,* is unusual considering its importance as a game bird. The most extensive survey on the parasites of sharp-tailed grouse was done by Boddicker[3] in South Dakota but only a species list and location of parasites on the host were discussed. Other work includes reports of parasitism of sharp-tailed grouse[7] and the prevalence of ticks on sharp-tailed grouse.[1,4]

This study was undertaken to determine the ectoparasites of sharp-tailed grouse, seasonal changes in numbers of ectoparasites and evaluation of the effects of parasitism.

MATERIALS AND METHODS

The study was conducted in a portion of the Mantagao Wildlife Management Area near Hodgson, Manitoba (51°15′00″ N; 98°00′00″ W), in the Interlake Region, 140 km north of Winnipeg.

Two hundred and thirty-five sharp-tailed grouse were collected by shooting during 1974, 1975 and 1976. Sharp-tailed grouse collected from 1 April to 1 November (1974-76) were: April, 10 males, 2 females; May, 24 males, 4 females; June, 22 males, 3 females; July, 4 males, 4 females, 16 juveniles; August, 2 males, 4 females, 30 juveniles; September, 8 males, 6 females, 28 juveniles; October, 8 males, 7 females, 36 juveniles. Seventeen birds were collected during the winter (10 males, 7 females). An additional 35 birds were live-trapped using rocket and cannon nets and 12 were collected using brood traps. All birds collected by shooting were placed for 1 h in a clear plastic bag containing a cotton swab soaked in chloroform and then thoroughly examined for ectoparasites still attached. All ectoparasites were removed from the plastic bag, identified when possible, counted and fixed in 80% ethanol. Live-trapped sharp-tailed grouse were examined for ectoparasites but only attached ticks could be accurately assessed.

To determine the population dynamics of *Haemaphysalis chordeilis* and *H. leporispalustris* in 1975, song birds and small mammals were studied in a 5 ha area composed of grassland, pasture and mixed forest. This area was utilized by three broods of sharp-tailed grouse in

1974 and again in 1975 by three broods consisting of 25 sharp-tailed grouse. Mist netting was done during the early morning and evening from May to September. Birds collected were examined for ticks, then banded and released. Collections of small mammals were done on a 3 ha area of long grass intermixed with a few low shrubs. Mammals were collected in Sherman live traps set in units of four. A total of 400 trap-nights were involved from May to the end of August. Snares were set for snowshoe hares.

All ectoparasites were cleared and mounted according to established methods.[6] Since differentiation between larval *H. chordeilis* and *H. leporispalustris* was time consuming the scanning electron microscope was used to facilitate identification. Specimens were removed from ethanol, air dried and then placed in rows on an aluminum stub coated with a layer of adhesive. These specimens were not coated with gold or aluminum but were viewed directly in a Cambridge Stereoscan microscope at an accelerating voltage of 2-5 KV. Up to 200 *H. chordeilis* could be evaluated per hour. In addition, ticks could be removed from stubs without damage and then processed for light microscopy.

Throughout this text the term abundance of a parasite (population size) is calculated as the product of prevalence (percentage of host infested) and intensity (mean number/infected host). Dominance is the abundance of a parasite expressed as a percentage of the total abundance of all parasites.

RESULTS

Statistical analyses of parasite intensity values revealed no significant difference ($p < 0.05$) between male and female birds and between years, consequently data was combined for years and sexes. This was understandable given the range of parasites encountered between individual birds (Table 1).

Prevalence, intensity and seasonal distribution. Results are summarized in Table 1. Prevalences of ectoparasites were high on sharp-tailed grouse with four species having prevalence values greater than 50%. Intensity values for *H. chordeilis, H. leporispalustris* and *Goniodes*

TABLE 1. Ectoparasites of sharp-tailed grouse[1,2]

Species	Prevalence	Intensity	Range	Abundance
Haemaphysalis chordeilis (Packard)	95	18.83±23.41	4-180	17.41
Haemaphysalis leporispalustris (Packard)	96	18.67±27.14	9-225	17.92
Goniodes nebraskensis (Carriiker)	94	17.67±16.72	1-135	16.61
Lagopoecus gibsoni (Hopkins)	56	1.67± 1.53	1-22	0.94
Amyrsidea sp.	21	4.39± 4.97	1-8	0.92
Ornithomyia anchineuria (Speiser)	16	1.50± 1.66	1-2	0.24
Ornithonyssus sylviarum (Canestrini and Fanzago)	7	1.30± 1.91	1-3	0.09

[1]Values calculated from birds collected between April 1 and November 1. Seventeen birds collected during the winter (November-March) had no ticks, mites or louse flies; 3 birds had lice; 2 had *G. nebraskensis*, 1 had *L. gibsoni*.
[2]Specimens deposited in the Canadian National Collection, Ottawa.

nebraskensis were 18.83, 18.67 and 17.67, respectively, versus intensities of less than five for the other ectoparasites. Three species, *H. chordeilis*, *H. leporispalustris* and *G. nebraskensis* dominated the parasite fauna as indicated by their combined dominance values of 95.95%.

Seasonal changes in parasite numbers were evident (Figs. 1 & 2) but differences between sexes were not statistically different ($p < 0.05$) nor were differences between juveniles and adults. The lack of statistical significance between numbers of ectoparasites on adult and juvenile sharp-tailed grouse may be due to the small sample of adult birds for July and August and the wide range in numbers of ectoparasites recovered from both adult and juvenile birds.

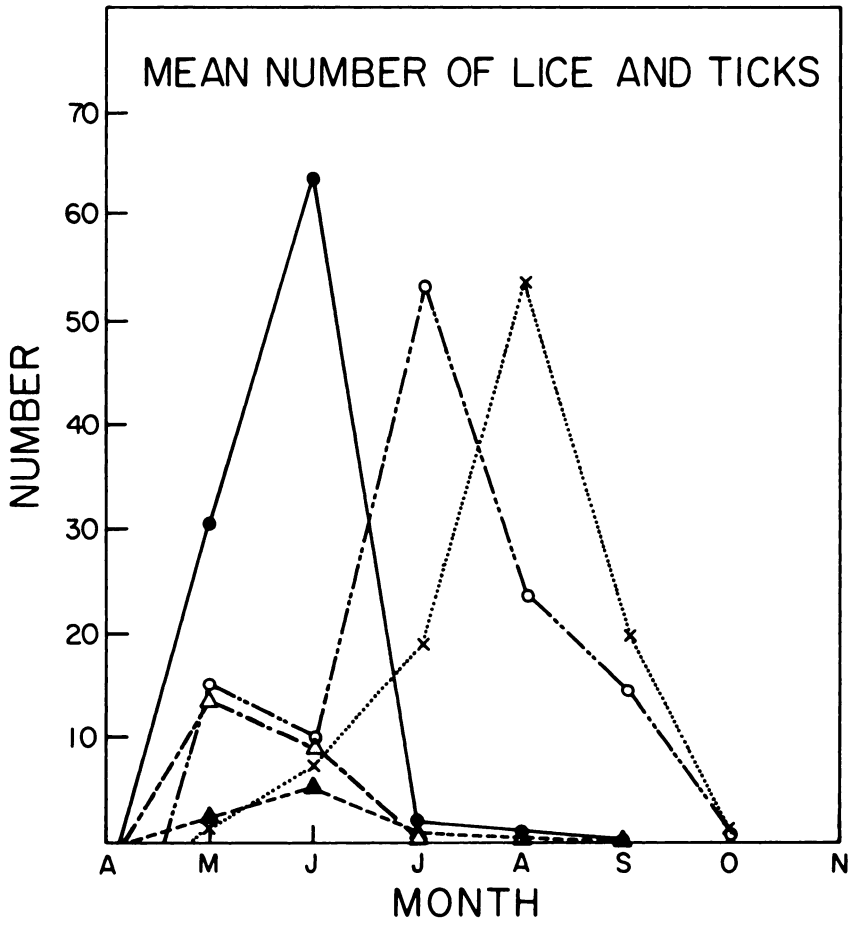

FIGURE 1. Seasonal distribution of lice and ticks on sharp-tailed grouse. Lice: *G. nebraskensis* •——•, *L. gibsoni* ▲- - - -▲, *Amyrsidea* sp. Δ— · —Δ. Ticks: *H. chordeilis* ○ — · · — ○, *H. leporispalustris* x.....x.

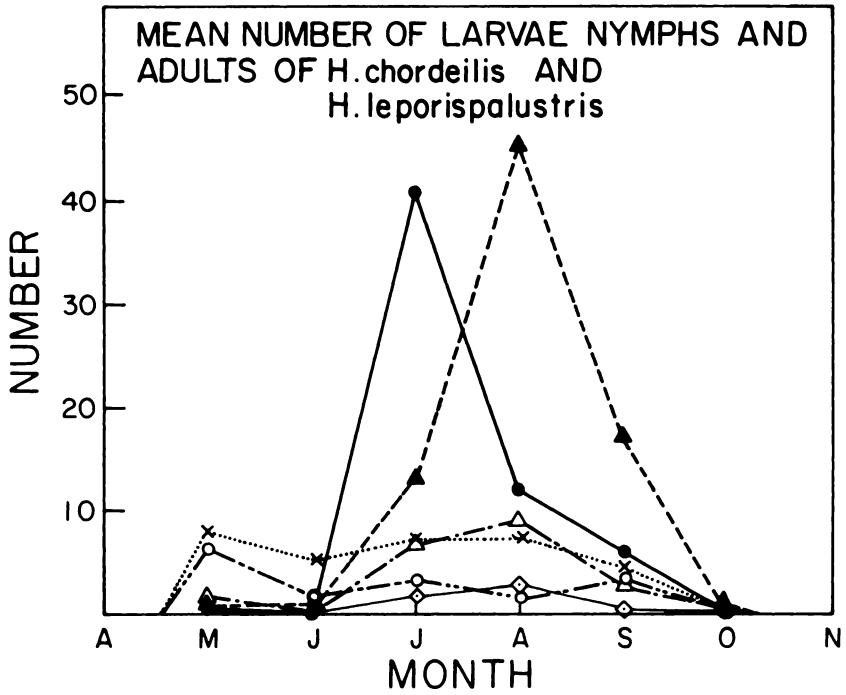

FIGURE 2. Seasonal distribution of larval, nymphs and ticks on sharp-tailed grouse. *H. chordeilis* males x.....x, *H. chordeilis* females ○—·-·—○, *H. chordeilis* larvae •——•, *H. chordeilis* nymphs ◇——◇ , *H. leporispalustris* larvae △ — · — △ , *H. leporispalustris* nymphs ▲ · · · · ▲.

Ectoparasites collected from sharp-tailed grouse clearly showed seasonal changes for *H. chordeilis, H. leporispalustris, G. nebraskensis, Lagopoecus gibsoni* and *Amyrsidea* sp. Prevalence and intensity of the hippoboscid, *Ornithomyia anchineuria* were too low to show seasonal changes (Table 1) even though they appeared in early May and disappeared by October. Similarly, prevalence and intensity of *Ornithonyssus sylviarum* were too low to show seasonal changes (Table 1) but they were present from May to October with individuals frequently associated with *O. anchineuria*. Lice populations peaked in May and June (Fig. 1). The most pronounced increase and decrease in numbers occurred with *G. nebraskensis*. While *G. nebraskensis* and *L. gibsoni* were found on both adult and juvenile birds, *Amyrsidea* sp. was absent from all birds for the remainder of the year, including winter. When all stages of ticks were collectively plotted (Fig. 1) there was a distinct peak for *H. chordeilis* in July and for *H. leporispalustris* in August. Tick numbers declined during the latter part of August and September and disappeared by mid October. Figure 2 outlines seasonal data of larval, nymphal and adult stages of the haemaphysalids. Adult *H. chordeilis* appeared on sharp-tailed grouse in early April with numbers reaching a maximum by early May. While numbers of

males were somewhat higher than females their relative numbers remained more-or-less constant from May to September, after which they declined. Larval *H. chordeilis* peaked in early July and nymphs peaked at much lower numbers in early August. Both larvae and nymphs of *H. leporispalustris* peaked in early August but larval populations were lower than the nymphs (Fig. 2).

Song birds did not harbour *H. leporispalustris* in May and June but larval and nymphal stages were present in July, August and September (Table 2). *Haemaphysalis chordeilis* was not recovered from 2 *Microtus pennsylvanicus*, 3 *Peromyscus maniculatus*, 4 *Zapus*

TABLE 2. *Haemaphysalis leporispalustris* recovered from songbirds 1975.[1]

Month	Scientific Name	Common Name	No. of Birds	No. Ticks
May	*Spizella passerina* (Bechstein)	Chipping sparrow	1	—
	Spizella pallida (Swainson)	Clay coloured sparrow	2	—
	Empidonax minimus (Baird and Baird)	Least fly catcher	2	—
	Melospiza melodia (Wilson)	Song sparrow	2	—
June	*S. pallida*		3	—
	M. melodia		2	—
	Vermivora peregrina (Wilson)	Tennessee warbler	1	—
	Caprimulgus vociferus (Wilson)	Whip-poor-will	1	—
July	*Passerculus sandwichensis* (Gmelin)	Savannah sparrow	1	3
August	*S. pallida*[2]		4	3
	S. pallida[3]		1	4
	Spinus tristis (Linnaeus)	Goldfinch	1	—
	P. sandwichensis		1	50
	M. melodia[2]		1	7
	M. melodia[3]		5	1, 3, 2
	Melospiza georgiana[2] (Latham)	Swamp sparrow	4	10
	M. georgina[3]		1	12
	Dendroica dominica (Linnaeus)	Yellow-throated warbler	3	—
September	*S. pallida*		1	2
	Ammospiza leconteii (Audubon)	Le Contes sparrow	1	—
	P. sandwichensis		1	9
	M. melodia[3]		1	—
	M. georgiana[3]		1	—
	D. dominica		1	—

[1]no *H. chordeilis* were recovered from these birds
[2]new host records
[3]immatures

hudsonius and 15 *Spermophilus tridecemlineatus*. One *Lepus americanus* had 250 larval and nymphal stages and 45 adults of *H. leporispalustris*. Although *Dermacentor variabilis* was frequently encountered on clothing and during flagging, none were found on the birds and mammals examined.

Pathology. Lesions induced by *H. chordeilis* adults were frequently encountered on sharp-tailed grouse and in some cases the site of tick attachment was recognizable for some time after an engorged tick had dropped off. The area of attachment was always swollen and frequently appeared to be secondarily infected as evidenced by extensive edema and a purulent exudate. Extensive scratching of the neck and head region and the absence of crown and neck feathers indicated that sharp-tailed grouse were constantly trying to remove attached ticks and lice (see below). Lesions were less pronounced with *H. leporispalustris* even though large numbers of nymphs were recovered from sharp-tailed grouse (Fig. 2). The effect of lice was unclear but heavy infestation of *L. gibsoni* with extensive egg laying modified feathers in the malar region such that they protruded whisker-like from the body. Although *O. sylviarum* was not noted to have any detrimental effects on sharp-tailed grouse a dead ruffed grouse collected near the study area had 20,000 *O. sylviarum* as determined by an established method.[6]

DISCUSSION

This is the first study to evaluate prevalence and intensity of ectoparasitism of sharp-tailed grouse and to detail seasonal changes of lice and ticks on this host. As there is little published information on parasites of sharp-tailed grouse it is difficult to make comparisons, however, densities of 37.5 ticks/host recorded in this study can be compared to 96.1 *Ixodes ricinus*/red grouse.[2] Both values are much higher than the 2-5 ticks/host reported by other workers.[3]

Seasonal data clearly showed a preponderance of lice in the spring on adult birds on the dancing grounds and is probably related to the concentration of birds during the copulatory phase of their life cycle.

A decline in numbers of lice on adult sharp-tailed grouse in June and early July coincided with growth of feathers and infestation of young birds. Low numbers of lice through August and September and the occasional louse and/or egg recovered during the winter indicates that lice overwinter in very low numbers.

Ticks had a pronounced seasonal cycle with maximum numbers in July and August for both *H. chordeilis* and *H. leporispalustris*. However, larvae, nymphs and adults of *H. chordeilis* were present on sharp-tailed grouse from April through September indicating continual recruitment of all stages during the summer. A peak in numbers of *H. chordeilis* larvae in late June and early July followed by lower numbers of nymphs in early August indicates that females engorged in May and June dropped off and laid eggs which commenced hatching by late June. The low numbers of *H. chordeilis* nymphs suggests a high mortality of larvae. The availability of sharp-tailed grouse, the only host of *H. chordeilis* in this study, could have a considerable affect on tick numbers as it is known to infest other species of host.[1] Furthermore, the frequent use of dancing grounds and surrounding areas by broods as well as adult males indicates that dancing grounds may be an essential focus for the maintenance of *H. chordeilis* populations.

Haemaphysalis leporispalustris had a much wider range of hosts, including sharp-tailed grouse, song birds and snowshoe hares. Larvae of *H.*

leporispalustris while present on sharp-tailed grouse were not nearly as numerous as nymphs. This is understandable since *H. leporispalustris* has numerous alternate hosts for its larval stages.[1,4] High numbers of engorging *H. leporispalustris* nymphs on sharp-tailed grouse indicate the importance of this bird in the life cycle of the tick and since sharp-tailed grouse tended to frequent areas utilized by snowshoe hares their chances of becoming infested were greater.

The role of ectoparasitism on mortality and population fluctuations on game birds is far from clear. It was apparent in this study that lice and ticks affected sharp-tailed grouse as evidenced by extensive scratching and loss of feathers. Although secondary infections due to tick bites were noted no deaths could be attributed to these infections.

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