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SURVEY OF COLORADO'S WILD RUMINANTS FOR SEROLOGIC TITERS TO BRUCELLOSIS AND LEPTOSPIROSIS[1]

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Abstract: A 10-year survey for serologic titers to brucellosis and leptospirosis in mule deer (*Odocoileus hemionus*), elk (*Cervus canadensis*), and antelope (*Antilocapra americana*) in Colorado is summarized. Over 10,000 blood samples were tested against *Brucella abortus* and 4,747 samples were tested against *Leptospira pomona*. A total of 1,761 blood samples were tested against *L. canicola, L. grippotyphosa, L. hardjo, L. icterohemorrhagiae*. All results were considered negative.

INTRODUCTION

Brucellosis[1,2] and leptospirosis[2] are two diseases which may be transmitted between free-ranging wildlife and domestic livestock when they share common range or pasture lands. When outbreaks of these diseases occur in livestock, the wildlife in the area often are implicated as the source of the problem (Hibler, Pers. Comm.).

Since 1967, the Colorado Division of Wildlife has been working closely with the State-Federal Cooperative Brucellosis Laboratory in Denver, Colorado to develop and implement a comprehensive method to test large numbers of wild ruminants (*Odocoileus hemionus, Cervus canadensis,* and *Antilocapra americana*) for evidence of exposure to brucellosis and leptospirosis.

METHODS AND MATERIALS

Collection of large numbers of blood samples from big game populations is very difficult. Obtaining samples from animals being trapped and transplanted is easy, but the numbers of these animals are relatively small and they come from a limited area. These animals are tested as a matter of routine, but the practice is not satisfactory for a comprehensive survey.

Attempts to collect body fluids from hunter-harvested animals brought through hunter check stations have been unsatisfactory because the condition of the samples generally was not suitable for reliable testing.

One way to obtain satisfactory blood samples from large segments of a big game population is to have hunters collect blood after making a kill. To implement this, the Colorado Division of Wildlife distributed blood tubes to hunters as they entered the field prior to the opening of the game season in 1969. These hunters were requested to leave the blood tubes at check stations. This procedure was moderately successful, but again, the areas being surveyed were limited.

As game management methods have become more intensified, the Division of Wildlife has issued special permits for hunters in specified areas. This control makes it possible to have the name and address of each hunter, so a procedure was developed for preparing and mailing a blood sample kit to the hunter prior to the start of the hunting season.

[1] A contribution of Colorado Federal Aid in Wildlife Restoration Project W-38-R.

The kits sent hunters consisted of an ethylene glycol-treated polypropylene 10 ml tube with rubber stopper, a small plastic bag, a pre-addressed box to hold the sample, and a letter to explain the purpose of the survey program and directions for taking the blood and returning the box with the blood tube.

Another useful aspect of this system is that each kit can be pre-coded with the area where the hunter will be hunting, so that this information can be recorded as the sample reaches the laboratory.

To make a more comprehensive survey of each species, a rotating system of sampling only one species in any given year is employed. Thus, each species—deer, elk, or antelope — is surveyed every third year.

RESULTS AND DISCUSSION

The antigen used for the rapid screening agglutination test for brucellosis was prepared from *Brucella abortus* strain 1119-3. The antigen used for the leptospirosis test was *Leptospira pomona* (formalin killed), unless otherwise indicated.

The hunter response to the sampling method for brucellosis and leptospirosis surveys is summarized in Table 1. The number of kits returned with blood is excellent when the per cent return is correlated with hunter success.

The results of serologic testing for brucellosis and leptospirosis are presented in Table 2. All results, including the 1/50 titer for brucellosis and 1/40 titer for leptospirosis, are considered negative.

The discrepancy between blood samples received and those tested for either brucellosis or leptospirosis is due to the condition of the samples when received at the laboratory; this is a highly variable factor from year to year, depending on weather conditions and the time from animal kill to receipt at the laboratory. Generally, however, approximately one-third of all samples received are very good to excellent in quality, while approximately one-fourth are haemolyzed and unusable.

TABLE 1. Hunter response to requests for samples of blood, 1968-1976.

Year	Species	No. of kits mailed	Blood samples returned		Kits returned empty		Total returned	
			Number	%	Number	%	Number	%
1968	Antelope	3,019	1,463	48.5	252	8.3	1,715	56.8
1969	— — — —		NO MAIL SURVEY		— —		— —	
1970	Elk	9,390	2,338	23.5	2,021	20.4	4,359	43.9
1971	Antelope	4,590	2,721	59.3	763	16.6	3,484	75.9
1972	Deer	2,500	774	30.9	201	8.0	975	39.9
1973	Elk	7,502	1,231	16.4	—	—	—	—
	Deer	804	153	18.2	—	—	—	—
	Antelope	630	273	43.3	—	—	—	—
1974	Antelope	3,995	2,044	51.0	214	5.4	2,258	56.5
1975	Deer	7,501	1,301	17.3	592	7.9	1,893	25.2
1976	Elk	13,385	2,086	15.6	— No Request for Empties			—
Totals		53,892	14,384	26.69	4,043	9.98	18,427	34.2

TABLE 2. Results of serologic testing of blood samples returned by hunters for brucellosis-leptospirosis diagnosis, 1967-1976.

Species	Year	Brucellosis			Leptospirosis[1]		
		Negative	1/25	1/50	Negative	1/10	1/40
Deer	1967	17	0	0	17	0	0
	1967	107	0	0	0	0	0
	1970	128	0	0	110	0	0
	1971	774	0	0	53	3	1
	1973	116	0	0	115	1	0
	1975	508	0	0	508[2]	0	0
Totals		1,650	0	0	803	4	1
Elk	1967	28	0	0	28	0	0
	1967	42	0	0	0	0	0
	1968	125	0	0	125	0	0
	1970	2,338	5	1	1,087	4	0
	1973	693	5	0	692	6	0
	1976	607	0	0	607[2]	0	0
Totals		3,833	10	1	2,539	10	0
Antelope	1967	126	0	0	0	0	0
	1967	264	0	0	0	0	0
	1969	1,463	0	0	229	51	2
	1971	2,486	0	0	263	8	0
	1973	272	0	0	267	4	0
	1974	660	0	1	646[2]	12[3]	3[4]
Totals		5,271	0	1	1,405	75	5
GRAND TOTALS		10,754	10	2	4,747	89	6

[1] Antigen unless otherwise specified was *Leptospira pomona*.

[2] Antigen *Leptospira canicola, grippotyphosa, hardjo, pomona,* and *icterohemorrhagiae* (formalin killed).

[3] Six *L. icterohemorrhagiae,* 5 *hardjo,* 1 *pomona.*

[4] Two *L. hardjo,* 1 *pomona.*

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