

## SCABIES CONTROL IN FREE-RANGING ELK

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### Objectives

The objective of this study using free-ranging elk and a related study using captive elk was to test the efficacy and safety of a new parasiticide, ivermectin, for the control of psoroptic scabies in elk. Scabies is a disease caused by mites of the genus *Psoroptes* which pierce the epidermis of the host and feed on lymph. Infected areas become heavily encrusted with exudate, and scabs and hair are eventually shed (Tarry, 1974). Scabies results in hair, fluid, and heat loss; ear canal occlusion; secondary infections; decreased weight gain; and mortality in domestic and wild animals (Tarry 1974, Colwell and Dunlap 1975, Lange et al. 1980, Fisher and Wright 1981).

Scabies (*Psoroptes cervinus*) has long been known to occur in elk (*Cervus elaphus*) of the Jackson Hole herd (Murie, 1951; Honess, 1982). Severe infestation is most common in mature bulls and it is a major cause of winter mortality in this sex and age class (Smith 1985).

Effective treatment of scabies in wild animals has not been practical. Conventional techniques used on domestic animals involve dipping in antiparasitic chemicals. A relatively new parasiticide, ivermectin (22, 23 dihydroavermectin B1), has shown promise for treating domestic and wild animals (Egerton, et al., 1980). Ivermectin is a broad spectrum antiparasitic agent which acts upon nematodes and arthropods and has a wide range between therapeutic and toxic dose in most animals (Campbell and Benz, 1984).

Successful completion of this project will likely demonstrate a technique to save the lives of scabies infested bull elk; more importantly, it may demonstrate a method for controlling scabies in elk.

### Methods

Studies to test the efficacy of ivermectin to control psoroptic scabies in elk were initiated on 13 January 1986 with a toxicity trial and a study using captive bull elk conducted at the Wyoming Game and Fish Department's Sybille Wildlife Research Unit. The study to test ivermectin on free-ranging elk began in February 1986 (Muschenheim and Thorne, 1986).

For capture, immobilizing drugs were administered remotely using a projectile rifle and 4 ml projectile syringes. Nineteen bull elk were immobilized during February and March 1986 and 1987 on the National Elk Refuge using 2.5 mg carfentanil citrate and 15 mg xylazine hydrochloride; naloxone hydrochloride or naltrexone hydrochloride were administered as antidote. Antibiotics were given to all animals. Skin scrapings, ear swabs, feces, and blood were taken from all animals at the time of capture and treatment. Drawings and photographs were made to record areas with lesions and physical appearance. Prior to release each animal was fitted with a radio transmitter collar.

All animals were assigned to either treatment or control groups by a systematic method. Elk assigned to treatment groups were given 70 mg of ivermectin (Ivomec, Merck and Co. Inc., Rahway, NJ 07065) by subcutaneous injection in the scapular region. Animals in the control group were given subcutaneous injections of propylene glycol in a volume equivalent to the ivermectin received by treatment group.

Skin scrapings were taken from the peripheral region of the most encrusted lesions on each individual. Mineral oil was applied to each location and, using a fresh scalpel blade, a scraping approximately 1.5 by 1.5 cm was taken until blood showed. Skin scraping samples were then stored in plastic bags. Hair over areas to be scraped was clipped to approximately 1 cm for some samples to decrease debris and increase ease of locating mites. Ear swabs were taken with cotton tipped swabs from both ears of all individuals. All mite samples were refrigerated until examined. Skin scrapings and ear swabs were examined under a dissecting microscope (10 X) for the presence of psoroptic mites.

Mite samples were sent to Dr. Lloyd Knutson (U.S. Department of Agriculture, Agricultural Research Service, Biosystematics and Beneficial Insects Institute, R. 1, Bldg. 003, BARC-West, Beltsville, MD 20705) and to Mr. Fred Wright (U.S. Department of Agriculture, Agricultural Research Service, U.S. Livestock Insects Laboratory, P.O. Box 232, Kerrville, TX 78029-0232) for positive specific identification based on morphology.

From January through March 1987, attempts were made to locate and identify bulls that returned to the National Elk Refuge. Drawings and photographs were made to record lesions and hair loss of all animals that were relocated and identified. Information was collected on study animals that were killed by hunters. Four new animals were added to the study in February, 1987.

During June and August 1987 attempts were made to observe some of the elk for signs of scabies such as hair loss or antler deformities. Drawings were made to record lesions and hair loss of all animals that were observed.

## Results

Mites from the elk were identified by 2 USDA laboratories. R. L. Smiley of the Biosystematics and Beneficial Insects Institute identified the mites as Psoroptes equi. F. Wright of the U.S. Livestock Insects Laboratory identified them to be P. cervinus (Sweetman 1958).

Information was available on 3 elk radio collared during March 1986 that were killed by hunters. All were in the control group. Two were described as having hair loss on the neck and shoulders. The 3rd was said to have no hair loss. Three other bulls (2 treated and 1 control) are known to be dead, but no information is available on these animals.

Four control animals were identified during January through March 1987. Three had hair loss on the shoulders, but in none were the lesions as severe as during the previous year. The 4th had no apparent hair loss. Three treated bulls were identified. Two had no hair loss and the 3rd had some hair loss on the shoulders, but less severe than during the previous year. At least 1 of 2 remaining animals, both treated, was observed to have no hair loss. In the case of these bulls, no signal was ever received from either transmitter, and they were not positively identified. Data collected may be attributed to either animal and may represent both (Table 1).

Animals 4A and 2A were observed near Phelps lake in Grand Teton National Park on 17 and 19 June 1987 and 4A was seen again on 10 August. No signs of scabies were observed on either animal. Number 7 was seen near Signal Mountain on 17 August and had no hair loss but did have deformed antlers. Animal 4B was seen near Moose on the Snake River on 21 August and had no hair loss (Table 2).

## Conclusions

It is apparent from our initial results that ivermectin arrests and in some cases alleviates the clinical manifestations of scabies infestations in mature bull elk over time. However, reinfestation is possible and may be dependent on a number of factors including density and proximity of other infested animals.

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Table 1. Observed condition of radio collared elk captured in March 1986 and observed during January through March 1987.

Animal number	Treatment	Initial samples-March 1986			Hunter kill reports Nov. 1986	Observations	
		Scrapings No. live mites	Fraction positive	Ear swabs No. live mites		Fraction positive	January 1987
2	control	0	0/4	0	0/3	Rough on shoulders, (transmitter not working)	Very rough on shoulders, some hair loss.
3A	control	0	0/4	0	0/3	Hair loss on shoulders, neck and head.	
4	control	many	4/4	0	0/3		Rough in shoulders and neck.
4A	control	many	2/4	0	0/3	No hair loss.	Rough in shoulders. Hair loss on face, neck and shoulders.
6	control	0	0/2	0	0/3	Hair loss on lower neck and shoulders.	
7	control	many	2/4	6	1/3	No hair loss.	
7A	control	many	2/4	0	0/3	Found dead on the north end of NER- no data available.	
10	control	4	2/4	0	0/3		No hair loss.

Table 2. Summer observations of elk previously demonstrated to be infested with psoroptic mites.

<u>Collar No.</u>	<u>Treatment Date</u>	<u>Treatment</u>	<u>Frac. Samples Pos. On Treatment Date</u>	<u>Summer Observation</u>	
				<u>June</u>	<u>August</u>
2A	March 86	140 mg. ivermectin	4/4	no hair loss	no observation
4A	March 86	Control	2/4	no hair loss	no hair loss
4B	March 86	140 mg. ivermectin	5/5	no observation	no hair loss
7	February 87	Control	2/7	no observation	no hair loss, antler deformities

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