1981

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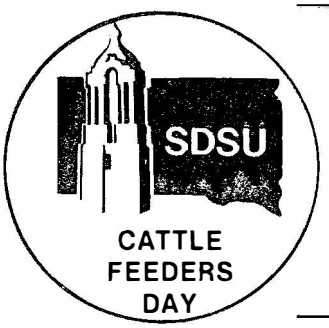

SCABIES RESEARCH WITH INJECTABLE IVERMECTIN

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Department of Animal Science Report
CATTLE 81-10

Introduction

Scabies is a parasitic skin disease caused by tiny mites resulting in skin irritation. These mites are spread from animal to animal by direct contact. The mites puncture the skin and feed on the body fluids released from the wounds. These fluids ooze from wounds and dry to form scabs. Hence the name "scabies." This disease costs the cattle industry millions of dollars each year.

Cattle with scabies lick, rub and scratch themselves to relieve the intense itching. They often lose weight and are more susceptible to complications such as pneumonia. As the number of mites increase, the animal's hair falls out or is rubbed off and lesions spread. If not treated, large areas of the body may be covered with thick, rough crusts.

Scabies is a year-round problem. However, in warm weather skin lesions may disappear because mites are less active. This improvement is only temporary; and, as environmental temperature gets colder, the mites become active and lesions return.

Under normal conditions, mites will survive for a maximum of 3 days off the host animal. It is possible for mites to spread from fences or trucks that have been in contact with infected animals. However, the greatest possibility of spread is directly animal to animal.

Current Methods of Treatment and Control

Treatment is best accomplished by complete immersion of infected animals in an approved pesticide. Two dippings 12 to 14 days apart are required for treating infected cattle.

Pesticides approved by the USDA for scabies control are toxaphene, prolate and Co-Ral. Lime sulfur solution is also on the approved list but is seldom used because the dipping solution must be heated to be effective.

The South Dakota Livestock Sanitary Board has approved toxaphene as the official pesticide used in the control program within South Dakota.

Nonquarantined cattle may move interstate with only one dip. The organophosphate compounds (prolate and Co-Ral) have not proven as effective as toxaphene on a single treatment basis.

Recent EPA regulations have caused concern over the future use of toxaphene, and it is problematic how much longer it will be available.

Experimental Use of Ivermectin

Merck, Sharp and Dohme Inc. has been researching an entirely new concept in parasite control. A new antiparasitic agent called "Ivermectin" has shown high efficacy against a wide spectrum of parasites in several species of animals.

Ivermectin is produced by the fermentation of Streplomyces avermitilis. It is actually an antibiotic with no antibacterial activity but is effective against certain internal and external parasites by both oral and injectable routes of administration.

A research trial was developed at SDSU to evaluate the effectiveness of Ivermectin in the treatment of cattle scabies. The study was conducted cooperatively by the SDSU Animal Disease Research and Diagnostic Laboratory, the Department of Animal Science and the South Dakota Livestock Sanitary Board (SDLSB) in conjunction with Merck, Sharp and Dohme.

Twenty scabies-infected calves with substantial skin lesions were obtained in close coordination with the SDLSB. The calves were transported to the Southeast South Dakota Experiment Farm under quarantine in March, 1980. The cattle consisted of 14 steers and 6 heifers averaging about 500 pounds.

At the start of the trial, each calf was individually ear tagged and weighed. An initial skin scraping was taken to verify the presence of mites and establish a positive diagnosis of Psoroptic scabies. The calves were then randomly allotted to six pens with one heifer randomly assigned to each pen. The pens were double fenced to prevent contact between adjacent lots. The cattle in three of the pens were subcutaneously injected on day 1 with 200 micrograms per kilogram body weight (1 ml./cwt.) of MK-933, the experimental Ivermectin compound, while the animals in the other three pens served as untreated controls.

Subsequently, eight skin scrapings were collected from each calf at weekly intervals to determine the presence or absence of the scabies mites. A calf profile chart was made for each calf to show the sites of lesions on the body and where each scraping was made. The skin scrapings were examined microscopically at the SDSU Veterinary Diagnostic Laboratory using the maceration-flotation technique.

Daily feed consumption and weekly body weight records were obtained during the 8-week trial. The ration consisted of 4 lb. cracked corn and 1 lb. of a 38% commercial protein supplement per head daily plus a full feed of corn silage. The Ivermectin-treated cattle were always handled through the work facilities first for weighing and skin scrapings to avoid possible reinfection from the untreated controls. The chute was cleaned and sprayed with toxaphene after the cattle were worked each week. Care was taken to insure that these cattle remained isolated from other livestock.

The results of the skin scrapings are shown in table 1. All animals tested positive for mites on the initial scraping. At the second scraping on day 8, only three of the treated animals were diagnosed positive. On subsequent scrapings, no mites were found on any of the Ivermectin-treated cattle. Itching and skin irritation decreased and by day 28 of the trial hair and skin on the treated animals appeared normal.

Table 1. Results of Skin Scrapings Taken From Control and Ivermectin-Treated Calves

Animal no.	Skin scraping date								
	3/31	4/7	4/14	4/21	4/28	5/5	5/12	5/19	5/26
				Control Calves					
1	+	+							
2	+	+			+				+
3	+	+							
4	+	+							
5	+								
6	+	+	+	+	+	+		+	+
7	+	+							
8	+	+	+						
9	+	+					+	+	+
10	+	+	+						
				Treated Calves					
11	+								
12	+								
13	+	+							
14	+								
15	+	+							
16	+								
17	+								
18	+								
19	+	+							
20	+								

+ indicates presence of mites. No sign depicts absence of detectable mites in scrapings.

In contrast to the treated calves, some of the control animals continued to be positive for mites throughout the entire 8-week trial. In April, environmental temperature reached the 90's for several days. Since mite activity is reduced by warm temperatures, the absence of any detectable mites on some control animals after the third or fourth week may have been due to the unseasonably warm weather during April. Even though live mites were not found on some controls mid-way through the trial, skin condition and hair coat did not substantially improve, with the skin remaining leathery and thickened. Body weight gain and feed consumption of the treated and control calves were not notably different.

Data from this trial were forwarded to Merck, Sharp and Dohme for inclusion in their submission to FDA concerning clearance of Ivermectin for scabies control.

After termination of the 8-week trial, the control animals were injected with Ivermectin at the same dosage (200 mcg./kg.) as the previously treated animals. Following this treatment, control animals responded in the same manner as the previously treated cattle, and within a month their skin was nearly normal in appearance.

At the request of the SDLSB, animals were retained after the initial 8-week study to evaluate the long-term effectiveness of the drug. The cattle were combined into one large pen and kept on feed through the summer and fall to determine if all of the scabies mites were actually killed by the Ivermectin or if cold weather would reactivate any dormant mites that may have survived.

Cattle were examined by the State Veterinarian and SDSU Veterinary Diagnostic Laboratory personnel on December 16 to evaluate the final health status. All cattle were determined to be free of any clinical signs of scabies. Thus, it appears that Ivermectin is effective in the treatment and control of cattle scabies.