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Michael W. Dryden

A. B. Broce

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Abstract

In June 1991, an investigation was conducted of a severe flea infestation in 23 Holstein dairy calves in South Central Kansas. Inspection of the dairy revealed massive numbers of fleas on calves and in the barn where they were housed. Analysis of blood samples from 10 calves revealed that nine of them had mild to severe anemia. A management program was initiated consisting of treatments of calves and premises with insecticide and insect growth regulator and removal of straw bedding from the barn. Inspection of the dairy 9 wk after this complete control program was initiated revealed that fleas were not evident on calves or on the premises.; Dairy Day, 1991, Kansas State University, Manhattan, KS, 1991;

Keywords

Diary Day, 1991; Kansas Agricultural Experiment Station contribution; no. 92-175-S; Report of progress (Kansas Agricultural Experiment Station); 640; Dairy; Calves; Fleas; Methoprene; Anemia

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SEVERE FLEA INFESTATION IN DAIRY CALVES

M. W. Dryden¹ and A. B. Broce²

Summary

In June 1991, an investigation was conducted of a severe flea infestation in 23 Holstein dairy calves in South Central Kansas. Inspection of the dairy revealed massive numbers of fleas on calves and in the barn where they were housed. Analysis of blood samples from 10 calves revealed that nine of them had mild to severe anemia. A management program was initiated consisting of treatments of calves and premises with insecticide and insect growth regulator and removal of straw bedding from the barn. Inspection of the dairy 9 wk after this complete control program was initiated revealed that fleas were not evident on calves or on the premises.

(Key Words: Dairy, Calves, Fleas, Methoprene, Anemia.)

Introduction

In early June, a report was received of a flea infestation in Holstein calves at a Grade A dairy in South Central Kansas; flea problems had existed on this farm for the past 5 yr. The flea infestation had become severe during the past yr, with owners attributing the deaths of three calves to fleas. Several pesticides had been used both on the calves and in the premises in attempts to control the problem. The list included malathion, diazinon, chlorpyrifos, pyrethrins, and permethrin.

Upon inspection of the dairy, massive numbers of fleas were found infesting a large barn used to house the young bottle calves. At the time of initial inspection, 23 calves, ages 1 to 3

months, were housed in a 40' × 60' (12.2 × 18.3 m) barn. Calves were maintained on 8 to 12" (20 to 30.5 cm) of wheat straw bedding, in individual calf pens until approximately 2 months of age. Calves were then moved to larger group pens in the same barn, holding three to six calves.

Fleas could be observed in all calf pens. Those pens that had been unoccupied for several days had the highest flea numbers. Large numbers of fleas also could be seen in walkways between pens and in doorways of the barn. Fleas also were found on the ground and in weeds on all sides of the barn and on a driveway 50' (15 m) from the barn.

Procedures

Examination of calves revealed fleas on all 23 of them. Although fleas were found over the entire body of the calves, they were most numerous in the inguinal region, head, back of neck, and withers. Several of the younger calves appeared weak and emaciated and had pale mucus membranes. Older calves housed in a different barn and cows did not have any evidence of flea infestation. Further inspection of the farm revealed approximately 30 stray cats and one mixed breed dog. Cats that we were able to inspect and the dog all had moderate to heavy flea infestations. Fleas were combed from two cats and the dog and placed in 70% alcohol for identification.

Ten calves (five bulls and five heifers), 29 to 35 days of age, were selected for further examination. An initial data base included determination of CBC, serum iron, and total iron binding capacity. Several fleas were removed from each calf, using a fine toothed flea comb, and placed

¹Department of Laboratory Medicine.

²Department of Entomology.

into 70% alcohol for identification. Live fleas also were placed into a glass jar to allow for egg production, in order to assess reproductive capability of fleas feeding on calves.

Total flea population assessments were attempted on two of the calves. Calves were placed on a white sheet and sprayed thoroughly with an alcohol-based pyrethrin flea spray. Calves were then combed and brushed for 30 to 40 minutes to remove as many fleas as possible.

A couple of methods were used to assess flea populations in the environment. A small amount of bedding material was removed from several pens. This material was taken to the laboratory and sifted through a 12-mesh screen, in an attempt to recover flea larvae. The owners had been using three lighted flea traps with sticky boards (Happy Jack Flea Trap; Happy Jack) in walkways between pens to help reduce flea populations in areas where they had to work. Although these traps only collected fleas from a small area of the barn, we decided that continued use of the traps would give us an indication of the flea population levels over time. All trap sticky bottoms were collected weekly or every other week.

Management recommendations included removal of existing straw bedding and treatment of the premise with a chlorpyrifos-methoprene formulation (Siphrotol plus II house treatment; Vet-Kem). The barn should be left empty for 3 wk and retreated before allowing new calves into the facility. All calves should be treated once weekly with a pyrethrin-methoprene flea spray (Ovitrol Plus; Vet-Kem), until fleas were no longer evident. Stray cats should be live-trapped and removed from the dairy. The dog also should be treated with the pyrethrin-methoprene spray twice weekly.

Although the owners agreed to initiate the control program, they said that cleaning of the barn could not be attempted for 3 to 4 wk, because of impending wheat harvest.

Results

Analysis of blood samples taken from each of 10 calves selected for further study revealed that nine of these calves had some blood parameter associated with anemia; the data indicated that the

anemia was severe in some of the animals (Figures 1 to 4). Fleas collected were identified as *Ctenocephalides felis felis*, the cat flea. Total flea recovery attempts resulted in 2,808 (1,564 females & 1,244 males) and 5,317 (3,884 females & 1,433 males) fleas from calves number 1 and 10, respectively.

Fleas removed from calves laid 126 eggs in the jar. Eggs were placed in flea rearing media in a rearing jar and maintained at 29°C (84°F) and 80 to 85% relative humidity for 4 wk. Forty-seven adult fleas emerged. Approximately 1 lb (450 g) of straw bedding was sifted, resulting in the collection of 405 flea larvae.

Fleas collected in the lighted flea traps were individually counted where possible. Some of the trap bottoms had collected extremely high numbers of fleas. Therefore, fleas on those trap bottoms were estimated by counting fleas in subsamples. It was estimated that a total of over 92,000 fleas were collected in the three traps (Table 1).

Between wk 1 and 4, all cats were removed from the farm and calves were treated weekly. During wk 4 the barn was cleared of all bedding and the floors were treated. Inspection of the calves 6 wk after the initial visit (2 wk since barn was treated) revealed the presence of only one flea on one calf. The flea traps had caught only 17 fleas in the previous 24 hours, compared to over 3,000 per day during the initial visit. A final inspection, during wk 13 (9 wk after treatment of barn) revealed no fleas in the barn or on the new calves placed in it.

Shortly after studies had been initiated at this dairy, we received a report about a second dairy with a similar flea problem; this second dairy was located within 5 miles of the first dairy. About 80 calves were housed in two barns, also using wheat straw for bedding. Ten randomly selected calves were inspected and all were found to be infested with cat fleas. Of interest was that there were only two cats at this facility. A control program similar to that used at the first farm was recommended and initiated.

Discussion

Ctenocephalides felis, the cat flea, occurs worldwide, parasitizing many species of wild and

domestic animals, including dogs, cats, ferrets, raccoons, opossums, bear, chickens, cattle, sheep, and goats. In the U.S., it is the most common flea infesting dogs and cats. It is the most common ectoparasite of domestic pets, responsible for production and transmission of several diseases of animals, including flea allergy dermatitis, anemia, Murine Typhus, and *Dipylidium caninum*, a dog and cat tapeworm. American pet owners spend several hundred million dollars annually in attempts to control this parasite.

The cat flea, and others in the same genus, commonly infest livestock in the Middle East, India, and Africa,. These flea infestations are often severe, with both anemia and death in calves and lambs commonly reported. In these reports, little information is given concerning numbers of fleas on calves or in the environment, other than that the animals were massively infested.

Documented cases of flea infestations in livestock in the U.S. have been rare. Two cases were reported from Georgia in 1982 and Ohio in 1990 of dairy calves suffering from severe anemia because of heavy infestation with *C. felis*. Other similar cases also have been reported recently from Texas and California.

Cat fleas have a high reproductive potential, producing an average of 25 to 30 eggs per day when feeding on cats. This high reproductive rate can lead to massive infestations, if environmental conditions are optimal for larval survival. Under conditions of 25 to 29°C (approximately 77 to 84°F) and 75 to 85% relative humidity, greater than 50% of the eggs laid can develop into

adult fleas in 3 to 4 wk. These conditions are often found when calves are raised on straw bedding. The bedding becomes soaked with urine and feces, resulting in a compost. Flea larvae migrate up or down in the straw until they locate the optimal thermal and humidity zone. As was cited previously, massive infestations have been reported frequently outside the U.S. under such conditions. But, even though many dairy calves are raised on straw bedding in the U.S. and many of these farms have flea-infested cats, flea infestations had not been commonly reported. The apparent recent increase in reports of fleas infesting dairy cattle in the U.S. and our experiences with the massive outbreaks in South Central Kansas are of considerable interest.

Treatment of this flea infestation necessitated the use of both insecticides to kill adult fleas and an insect growth regulator (methoprene) to inhibit egg hatch and larval development. Insect growth regulators are synthetic insect hormones that inhibit flea eggs from hatching and prevent flea larvae from forming pupa. With such large numbers of fleas on the calves, massive numbers of eggs were being deposited into the straw bedding. Without elimination of developing eggs and larvae, it is doubtful that control could have been achieved using just insecticides.

This is the first documented report of fleas infesting dairy calves in the midwest. This is also the first report in which flea infestation levels were documented. We estimated that the fleas infesting calf #10 were consuming 10.5 to 14% of that calf's blood weekly.

Table 1. Flea Collections from Three Lighted Flea Traps in Flea-infested Calf Barn

Trapping period	Fleas collected in lighted traps	
	No. days in trapping period	Average No. of fleas/day
previsit	10	3,353
wk 0 - 1	7	1,691
wk 1 - 2	7	2,616
wk 2 - 4*	14	1,839
wk 4 - 6	13	194
wk 6 - 7	7	17
wk 13	14	0

*Insecticide treatment of premise initiated Wk 4.

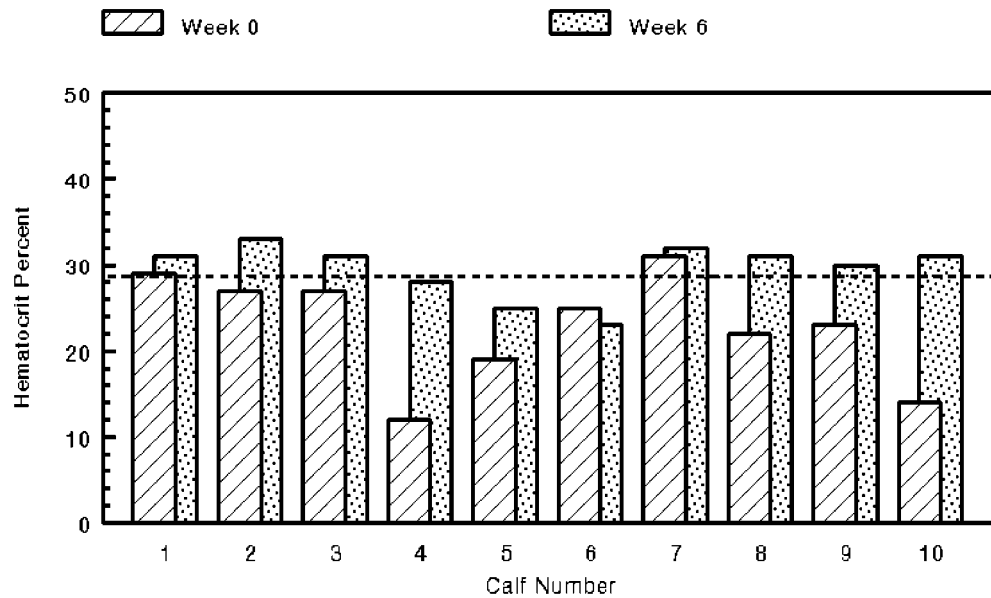


Figure 1. Hematocrit of Dairy Calves Infested with Cat Fleas. Dotted Horizontal Line Indicates Low Normal Values for Calves.

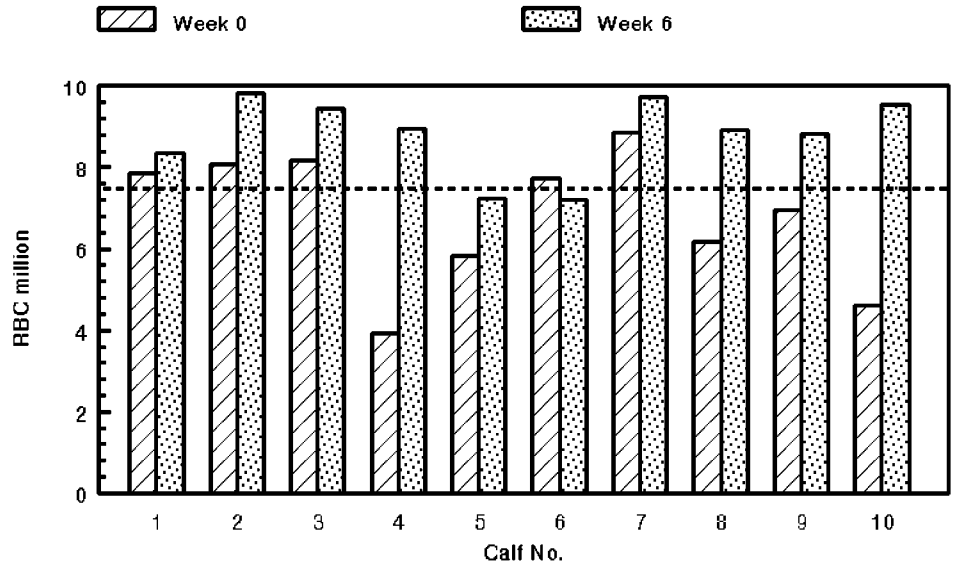


Figure 2. Red Blood Cell Counts in Dairy Calves Infested with Cat Fleas. Dotted Horizontal Line Indicates Low Normal Values for Calves.

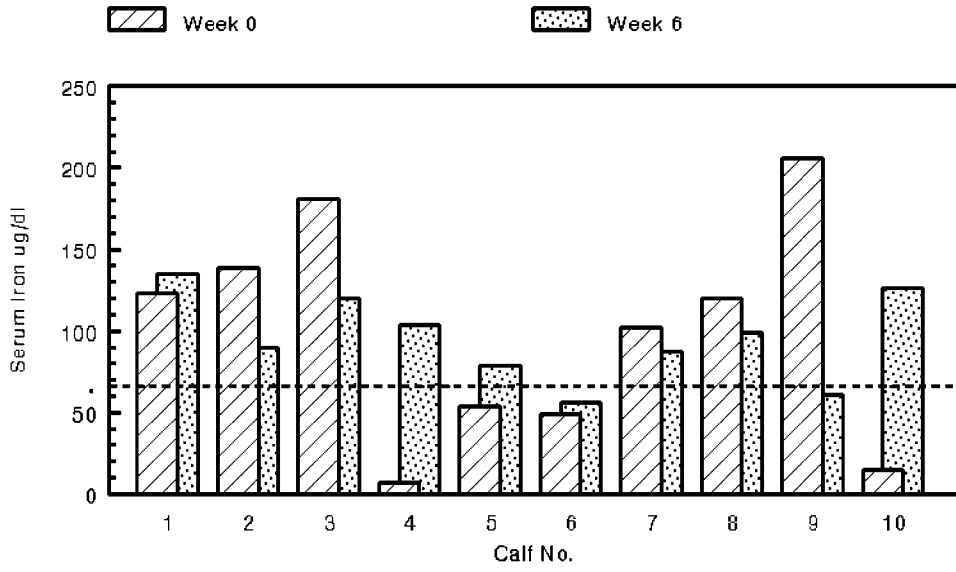


Figure 3. Serum Iron of Dairy Calves Infested with Cat Fleas. Dotted horizontal Line Indicates Low Normal Values for Calves.

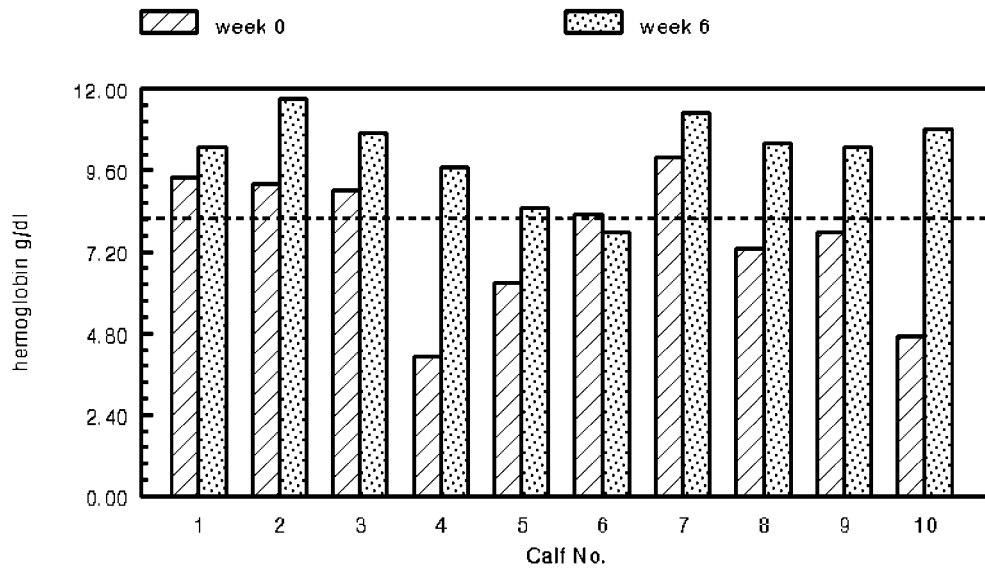


Figure 4. Hemoglobin Concentration of Dairy Calves infested with Cat Fleas. Dotted horizontal Line Indicates Low Normal Values for Calves.