

Histoplasmin Sensitivity Among Cattle*

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SINCE Ruhe and Cazier¹ have recently reviewed the occurrence of histoplasmosis in animals, no attempt will be made to review the literature. The disease has been reported in rats, mice, dogs, ferrets, and possibly a horse. The importance of these casual observations of infected animals in the epidemiological picture is difficult to evaluate because of the lack of a sufficient size sample of animals or of adequate diagnostic technic.

There have been, however, several serious attempts to find an animal reservoir of this disease. Emmons and his group^{2, 3} have concentrated on attempts to isolate the organism from the tissues of wild or domestic animals. They reported the isolation of the organism from one house mouse (out of almost 1,000 studied), from 16 rats (*Rattus norvegicus*) (an average of 2.8 per cent), but negative results from numerous other animals such as woodchucks, rabbits, various species of mice, etc.

Our studies have been concentrated in the main on another approach to the problem, namely, the distribution of skin sensitivity to histoplasmin, an extract of the fungus *Histoplasma capsulatum*. The present paper reports studies in histoplasmin sensitivity among cattle and a comparison of this sensitivity among

cattle and children in the same county in Kansas. We were first led to study cattle by the chance finding that of 13 head living on the farm of one of our suspected human histoplasmosis cases, two reacted to histoplasmin. Large scale studies were then done, at first with the active coöperation of Dr. Philip Cazier of the Bureau of Animal Industry, Department of Agriculture, whose assistance is gratefully acknowledged.

The tests were performed in most cases at the same time as tuberculin tests. No cross-reactions with tuberculin were found. One-tenth ml. of histoplasmin was injected intracutaneously in the caudal fold. Tests were read at 72 hours. A positive reaction was evidenced by an edematous swelling at the site of inoculation which was easily palpated and usually clearly visible.

The histoplasmin (Lots H-15 and H-40) was furnished by Dr. Arden Howell, Public Health Service. For the early tests, the same lot of histoplasmin (H-15), which had been extensively employed in tests on human beings, was used. The dilution of antigen to be used in cattle was arrived at empirically on the first farm tested. A dilution of 1 to 100 was first used and no reactions were noted in the 13 cows tested. When the herd was retested with a dilution of 1 to 10, 2 cows showed strong reactions, while none of the others showed any reaction. Lot H-15 was accordingly employed in a

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dilution of 1 to 10 in tests on 589 head of cattle in eastern Kansas. Because of a shortage of Lot H-15, it was necessary to employ Lot H-40 for the remainder of the study. Since H-40 was known to be slightly weaker than H-15, it was employed in a dilution of 1 to 5. Twelve hundred and eighty-five cattle throughout the state, including all those tested in Shawnee County, received this test dose.

A total of 1,874 cattle were tested in Kansas. Approximately 22 per cent of these were beef cattle and 78 per cent were dairy cattle. In the eastern third of the state 1,319 head were tested with 4.2 per cent showing positive reactions, in the central third, 136 were tested with 1.5 per cent positive, and in the western third, 419 were tested without finding

a single positive. Study of these results indicates that histoplasmin sensitivity in cattle falls off as one moves westward in Kansas. A similar falling off in histoplasmin sensitivity in human beings in Kansas was shown earlier by Bunnell and Furcolow.⁴

A more detailed analysis of the comparison of histoplasmin sensitivity among human beings and cattle was attempted in Shawnee County, Kansas, a county in the eastern third of the state in which the state capital, Topeka, is located. Over 1,100 children had been tested in Topeka and their rate of reaction to histoplasmin was known.⁴ For comparison with the cattle, only records of those children less than 13 years of age were used.

In Shawnee County 432 cattle were

FIGURE 1

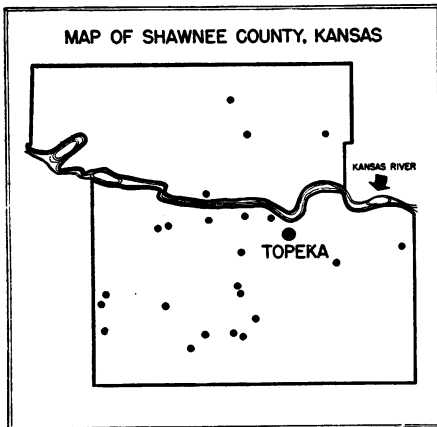


FIGURE 2

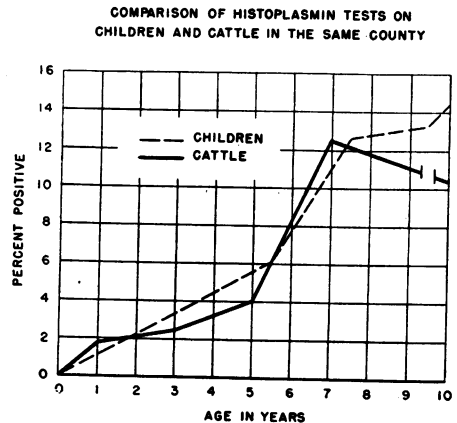


TABLE 1

Comparison of Histoplasmin Tests on Children and Cattle in the Same County

Children (1:1,000 histoplasmin Lot H-15)

	Age				Total
	5-6	7-8	9-10	11-12	
Number Tested	98	103	38	184	423
Number Positive	6	13	5	32	56
Per cent positive	6.1	12.6	13.2	17.4	13.2

Cattle (1:5 histoplasmin Lot H-40)

	Age					Total
	Under 2	2-3	4-5	6-7	8 and Over 8	
Number Tested	54	167	100	72	39	432
Number Positive	1	4	4	9	4	22
Per cent Positive	1.8	2.4	4.0	12.5	10.3	5.1

TABLE 2
Histoplasmin Sensitivity by Age of Cattle in Shawnee County, Kansas

		Age					
		Under 2	2 and 3	4 and 5	6 and 7	8 and Over	Total
<i>Original Tests</i>							
Number Tested		16	109	81	53	23	282
Number Positive		0	4	4	8	4	20
Per cent Positive		0	3.7	4.9	15.1	17.4	7.1
<i>Institutional Herds</i>							
Number Tested		38	58	19	19	16	150
Number Positive		1	0	0	1	0	2
Per cent Positive		2.6	0	0	5.3	0	1.3
<i>Total Cattle Tested</i>							
Number Tested		54	167	100	72	39	432
Number Positive		1	4	4	9	4	22
Per cent Positive		1.8	2.4	4.0	12.5	10.3	5.1

tested. These cattle were distributed among 23 farms as illustrated in Figure 1. They ranged in age from less than 1 year to 16 years. Relatively few cattle over 9 years of age were tested. Table 1 shows the comparison of the histoplasmin skin test results on these 432 cattle compared to 423 children who were 12 years of age or less. In Figure 2 the comparison is shown graphically. From this figure it is evident that there are marked similarities in reaction rates between cattle and children of similar age.

A peculiarity was noted in the cattle testing, the significance of which is not clear. In the original studies, approximately 282 cattle on 21 farms scattered throughout the county were tested. Because of the interesting results obtained, an additional 150 head of cattle were tested from two institutional herds located on the outskirts of Topeka. The results of tests on these two institutional herds are tabulated separately in Table 2 as they are quite different from those obtained with the scattered farm testing, since only 2 of these 150 cattle, or 1.3 per cent, were positive to histoplasmin. Of the scattered 282 cattle tested on 21 premises, 7.1 per cent were positive to histo-

plasmin. The peculiar epidemiological characteristics of the two institutional farms compared with the remainder of the county are under investigation at present. So far no lead has been uncovered to explain the differences in histoplasmin reactors.

In summary, it is evident that histoplasmin reactors occur in cattle and that their geographic distribution in Kansas resembles that of histoplasmin reactors in human beings. Determination of the age-specific rates for cattle and men in a single county in Kansas makes it evident that the rates are quite similar in human beings and cattle of like age. From this it is deduced that both cattle and men are probably infected from the same outside source and that cattle do not constitute an animal reservoir of importance in the spread of the disease to human beings.

REFERENCES

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