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SCHISTOSOMA MATTHEEI VEGLIA & LE ROUX, 1929, EGG OUTPUT FROM CATTLE IN A HIGHLY ENDEMIC AREA IN THE EASTERN TRANSVAAL

R. J. PITCHFORD and P. S. VISSER, Bilharzia Field Research Unit, S.A. Medical Research Council, Nelspruit 1200

ABSTRACT

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The results of 6-month estimations of *S. mattheei* faecal egg counts on 513 cattle in a highly endemic area of the eastern Transvaal over a 2-year period are given. After an initial high egg output of short duration the egg counts stabilized at a low level. The frequency of high egg counts in young cattle which died naturally was more than twice that of all other cattle, suggesting that *S. mattheei* egg counts in highly endemic areas is debatable, and it is suggested that egg counts in man might follow a similar pattern.

INTRODUCTION

Schistosoma mattheei is a common parasite with a very wide definitive host range and geographic distribution in Africa south of the Sahara (Pitchford, 1977). Although its prevalence in domestic stock and game is often high (Lawrence & Condy, 1970; Pitchford, Visser, Pienaar & Young, 1973, 1974), the infection is apparently not of very great economic significance (Lawrence & Condy, 1970), nor is it a cause of mortality and severe pathology amongst stock under epidemic conditions (Le Roux, 1929); Lawrence & Condy, 1970, Strydom, 1963; Reinecke, 1970; Van Wyk, Bartsch, Van Rensburg, Heitmann & Goosen, 1974).

In experimentally infected cattle the numbers of parasites initially declined slowly, but the declension became most rapid between 18 and 40 weeks after infection and then diminished slowly up to 110 weeks (Lawrence, 1977). Egg output, on the other hand, declined rapidly after an initial peak which occurred 3 months after exposure, and then remained at a low level (McCully & Kruger, 1969; Lawrence, 1973).

Three out of 4 cattle subjected to reinfection after the initial egg counts had fallen showed no increase in egg output; the 4th animal showed a significant increase in egg output for one week only before output dropped to the original low level. Worm counts on 2 reinfected animals showed no reduction in expected and actual parasite numbers after the second exposure (Lawrence, 1973). The present investigation reports on the egg output from cattle living in a highly endemic area of the eastern Transvaal and subjected to natural exposure over a 2-year period.

MATERIALS AND METHOD

Faecal *S. mattheei* egg counts were done at 6-month intervals on 513 randomly selected cattle, grazing an area between 25°08′S and 25°17′S and between 31°07′E and the western border of the Kruger National Park. The area has a summer rainfall of about 600 mm per annum, is intersected by several small streams and rivers which form pools during the dry winter. No other water is available. Grazing is poor in sandy parkland. The transmission of *S. mattheei* from snails occurs throughout the year and reaches a peak during summer from about September to March. The area is highly endemic for *S. mattheei* and *Schistosoma haematobium* in cattle and man, respectively, with prevalence generally over 80%. *Schistosoma mansoni* in man has a patchy distribution with low prevalence.

Cattle are numerous, undernourished and of poor quality. They are penned at night in kraals scattered throughout the area and allowed free range during the day.

The 513 animals were recorded by name, age and owner. Faecal samples were collected during June and December 1979, June 1980 and January and June 1981, either *ex rectum* or immediately after dropping, and before the animals were released from the kraals in the early morning.

As a result of deaths, slaughtering, sales or movement out of the area, the number of animals decreased to 305 in June 1981, when the investigation was stopped.

Faecal samples were formalinized, mass measured, processed and the eggs stained and counted by a method already described (Pitchford *et al.*, 1973). Animals were grouped by age at the commencement of the investigation in June 1979 and the results are based on the number of observations in each group at each subsequent collection. The ages of the animals were obtained from the owners and, as birth records were not kept, inaccuracies probably increased with age.

RESULTS

The egg output (expressed as eggs per gram of faeces) for each age group is recorded in Table 1. High counts (set arbitrarily at 76 epg or more) were found only in June and December 1979 and in June 1980, i.e. during the first year. Egg output decreased rapidly with time and age of the animals and no animal was found with high counts on more than 2 consecutive occasions. One old beast remained consistently negative.

From Table 2 it is apparent that 25 (12%) out of 208 cattle up to 3 years old and 33 (11%) out of 305 older cattle died naturally. However, high counts in cattle up to 3 years old occurred more than twice as frequently in those that died naturally (18%) than in those slaughtered, sold, or leaving the district (6%) or in those that remained for the full 2-year period (8%). High counts in cattle over 3 years old were infrequent.

DISCUSSION

The short duration of high counts followed by consistently low egg output confirms the experimental findings of Lawrence (1973; 1977). High counts were found almost exclusively in young animals up to 3 years old and were often preceded by low counts. The value of *S. mattheei* egg counts on an epg basis as a means of determining comparative worm loads is obviously suspect under the present natural highly endemic conditions and varying degrees of reinfection, because reinfections, although developing to maturity, rarely increase the egg output (Lawrence, 1973).

The mass of faeces excreted per day by adult cattle over 4 years old is about 5–6 times that of unweaned animals. A high egg output based on epg in calves may therefore indicate a similar worm load in older animals with a low epg count. There are, however, too many other variables, such as season, state of grazing, available water, etc. to draw any comparisons between the daily egg output of adult and young animals. In addition, all available data regarding daily faecal output of cattle have been based on highly nourished and well-conditioned animals.

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TABLE 1 Egg output of cattle at various times in eggs per gram (epg) of faeces

Age of animals (years) at commencement	Number of cattle examined																								
	June 1979					December 1979					June 1980					January 1981					June 1981				
	No.	Neg.	epg			No.	Neg.	epg			No.	Neg.	epg			No.	Neg.	epg			No.	Neg.	epg		
			1–25	26–75	76–1 200			1–25	26–75	76–1 200			1–25	26–75	76–1 200			1–25	26–75	76–1 200			1–25	26–75	76–1 200
1	70	6	31	19	14	63	1	14	13	35	55	4	38	9	4	54	1	43	10	0	48	3	44	1	0
2	69	2	39	19	9	65	0	49	15	1	53	0	50	1	2	49	1	42	6	0	39	8	30	1	0
3	69	2	51	12	4	62	0	55	7	0	50	2	46	2	0	40	0	36	4	0	35	6	29	0	0
4	72	6	50	14	2	66	1	56	9	0	61	1	56	4	0	53	2	51	0	0	49	8	39	2	0
5	71	6	57	7	1	67	5	57	4	1	57	4	50	3	0	51	0	50	1	0	47	5	42	0	0
6	76	14	54	8	0	61	2	58	0	1	56	11	44	1	0	51	1	49	1	0	48	5	43	0	0
7	86	15	64	7	0	76	5	70	1	0	58	11	47	0	0	46	2	43	1	0	39	8	31	0	0

TABLE 2 Egg output of various categories of cattle

Cattle				Frequency distribution of faecal egg counts								
Age group	Category	Number	%	Number of observations	epg: 0 Number	%	01–25 Number	%	26–75 Number	%	76–1 200 Number	%
1–3 years	Slaughtered, left, sold	57	27	153	9	6	107	70	27	17	10	6
	Died naturally	25	12	55	2	4	33	60	10	18	10	18
	Remainder	126	60	613	24	4	457	74	83	13	49	8
Total		208		821	35	4	597	73	120	14	69	8
4–7 years	Slaughtered, left, sold	90	29	219	28	13	178	81	13	6	0	0
	Died naturally	33	11	70	8	11	55	78	7	10	0	0
	Remainder	182	59	901	76	8	779	86	41	4	5	0,5
Total		305		1 190	112	10	1 012	85	61	5	5	0,4

The frequent occurrence of high egg counts in young animals was seldom preceded by negative counts and did not occur on more than 2 consecutive occasions in any animal. This suggests that such counts resulted from massive infections before sufficient immunity had built up from preceding light infections or were the result of numerous light infections occurring in a relatively short time. The infrequency of high counts in older animals is explained by the short duration of high counts in reinfected animals (Lawrence, 1977). It is assumed therefor that egg output decreases with increasing worm load until such time as the adult worms begin to decline in numbers, i.e. 18–40 weeks (Lawrence, 1977).

These findings raise the question of the value of schistosome egg counts in man where prevalence and egg output are purported to decrease with age. Patterns of human egg counts in very young age groups, however, have never been followed through to possible stability, at whatever level, in later life.

The increased frequency of high egg counts in young cattle that died naturally suggest that *S. mattheei* may indeed cause death, apart from epidemic conditions, but only after the initial acute infection has subsided.

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