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RESEARCH COMMUNICATION

THE USE OF DOMESTIC CHICKENS AS LABORATORY HOSTS OF THE LARVAE OF THE BONT TICK, *AMBLYOMMA HEBRAEUM*

A. D. HOLLEY and T. N. PETNEY[1], Tick Research Unit, Rhodes University, Grahamstown 6140

ABSTRACT

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A comparison of attachment, engorgement and moulting success of *Amblyomma hebraeum* larvae fed on domestic chickens and Himalayan giant white rabbits indicates that chickens are better hosts than the rabbits. Moreover the time needed for detachment of all engorged larvae is significantly less for chickens than for the rabbits. No evidence of induced immunity was found in chickens on re-infestation with larvae of *A. hebraeum*.

INTRODUCTION

Theiler (1959, 1962) has indicated the importance of ground-feeding birds as hosts for the immature stages of ticks belonging to the genus *Amblyomma* in Africa. Although few accurate, quantitative data are available on the importance of various avian host species for this genus, Horak & Williams (1986) have shown that the helmeted guinea fowl *(Numida meleagris)* is an important host in South Africa for the larvae of both *Amblyomma hebraeum* and *Amblyomma marmoreum*. This is of some significance as *A. hebraeum* is the major vector of heartwater *(Cowdria ruminantium)* in South Africa, while *A. marmoreum* is also capable of transmitting this disease (Oberem & Bezuidenhout, 1987).

In view of the importance of ground-feeding birds as hosts for the immature stages of these ticks the use of domesticated birds as possible laboratory hosts is of considerable interest. In this communication we discuss the use of domestic chickens as laboratory hosts of the larvae of *A. hebraeum*.

MATERIALS AND METHODS

Attachment of A. hebraeum *larvae to rabbits and chickens*

A. hebraeum larvae were obtained from the South African Bureau of Standards, East London. These larvae were the pooled progeny of 3 females and were 2 months old when used. Approximately 1 000 larvae were placed on the heads of each of 8, 6-week old chickens and the ears of 4 Himalayan giant rabbits. Neither group had previously been exposed to tick infestation. Grooming was inhibited by loosely tying the legs of the chickens together without completely inhibiting movement and by placing a wooden Elizabethan collar around the necks of the rabbits. The chickens and the rabbits were individually housed in wire-mesh cages suspended above trays containing water approximately 10 mm deep.

The larvae were allowed to attach, engorge and detach. Detached engorged larvae were collected daily from the trays below each host, counted into groups of 10 and mass-measured, then kept in cotton wool-stoppered glass vials at 29 °C and 80 % relative humidity. Moulting success was determined.

Reinfestation of chickens with A. hebraeum *larvae*

Larvae from the same source and of the same age as those in the previous experiment were used. Four of the chickens which had previously been exposed to infestation with approximately 1 000 larvae were used as an experimental group. Three chickens of the same age, with no previous exposure to ticks, were used as a control group. Each chicken from both groups was infested with 150 *A. hebraeum* larvae.

The number of larvae detaching after engorgement and the number successfully moulting to nymphae were determined.

RESULTS

More larvae attached to chickens than to rabbits and a greater total number of ticks from the chickens moulted successfully (Table 1).

The percentage of larvae which moulted successfully did not differ significantly for the 2 hosts.

Larvae engorged significantly more quickly on chickens than on rabbits and the period over which peak detachment occurred was shorter (Table 2).

The mean mass per larva of 100 engorged larvae from both hosts was the same (chickens 2,40 mg ± 0,34; rabbits 2,42 mg ± 0,43).

No significant differences occurred in the numbers of ticks engorging or moulting between chickens which had previously been infested and those which had not (Table 3).

TABLE 1 The engorgement and moulting success of *Amblyomma hebraeum* larvae fed on domestic chickens and Hymalayan giant rabbits. t values and their significance are given for interspecies comparisons. Percentage data were arcsine transformed before analysis

	Host		t value
	Chickens (n = 8)	Rabbits (n = 4)	(Probability)
Mean number (± SE) engorging/host	480,6 (34,0)	243,0 (16,7)	6,26 (P = 0,001)
Mean number moulting/host	347,1 (23,2)	193,3 (16,5)	5,39 (P = 0,001)
Mean percentage moulted/host	58,63 (1,45)	63,07 (1,32)	1,87 (ns)

[1] Reprint requests should be directed to Dr T. N. Petney

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TABLE 2 A comparison of the mean number of engorged larvae of *Amblyomma hebraeum* detaching daily from domestic chickens and from Himalayan giant rabbits

Day after infestation	Mean number of engorged larvae detaching (± SE)			
	Chickens (n = 8)		Rabbits (n = 4)	
3	0		0	
4	5,8	(6,9)	0	
5	197,1	(16,0)	11,3	(3,2)
6	226,0	(21,8)	62,5	(11,1)
7	42,9	(5,3)	72,3	(7,9)
8	8,3	(1,5)	64,8	(6,0)
9	0		21,5	(3,3)
10	0		10,8	(3,0)
11	0		0	

TABLE 3 A comparison of the engorgement and moulting success of *Amblyomma hebraeum* larvae fed on naive and previously infested domestic chickens. t tests are used to compare groups with an arcsine transformation being used on percentage data

	Previously infested chickens (n = 4)	Naive chickens (n = 3)	t value (probability)
Mean number (± SE) engorging/host.....	24,3 (9,4)	27,0 (4,1)	0,1 (ns)
Mean number (± SE) moulting/host.....	17,5 (7,5)	20,0 (2,6)	0,1 (ns)
Mean percentage (± SE) moulted/host.....	11,7 (5,0)	13,4 (1,8)	0,1 (ns)

The time from attachment to detachment is shorter on chickens than on rabbits, thus decreasing the handling time of the host and the number of days over which detached larvae must be collected.

As in the case of rabbits (Norval, 1978), chickens show no immune response to reinfestation with the larvae of *A. hebraeum*, even after a high initial infestation. Continued use of the same hosts is thus possible.

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