

# DURATION AND VIABILITY OF THE LARVAL INSTARS OF *DERMATOBIA HOMINIS* (DIPTERA: CUTEREBRIDAE) IN BOVINES.

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**SUMMARY:** Duration and viability of the three larval instars of *Dermatobia hominis* were studied using bovines at the Universidade Federal Rural do Rio de Janeiro. A first group of ten bovines were infested, individually, with 25 newly hatched larvae of *D. hominis*. One larva from each bovine was removed after 1, 2, 3, 4, 16, 17, 18 and 19 days post-infestation. Based on length and shape of cephalopharyngeal skeletons, spines distribution and number of respiratory slits in the posterior spiracles was concluded that there were three larval instars. The first instar larvae molted at 1-2 days and second instar larvae molted at 17-19 days post-infestation. The larval period of *D. hominis* on bovines ranged from 40 to 43 days. To study the viability of the three larval instars a second group of four bovines were infested, individually, with 50 newly hatched larvae. The percentages of viability of the first, second and third larval instars were 38.5, 77.9 and 93.3, respectively.

**KEY WORD:** *Dermatobia hominis*, larval instar, bovines.

## INTRODUCTION

The larvae of *Dermatobia hominis* (Linnaeus Jr., 1781)(Diptera: Cuterebridae), commonly known as "berne" in Brazil, develop in the subcutaneous tissue of cattle and several domestic and wild animals of tropical and sub tropical regions of Latin America. Larvae of *D. hominis* cause great economic loss to cattle producers and to the livestock industry by reducing meat and milk production and partial or complete damage to the hide. The wounds produced by the larvae can be associated by secondary infections causing severe pain to the animals (CREIGHTON & NEEL, 1952; GUIMARÃES & PAPAVERO, 1966; MAIA & GUIMARÃES, 1985).

In 1911, MORALES was the first entomologist to observe that *D. hominis* eggs are transported by vectors mosquitoes (NEIVA & GOMES, 1917). To date, other insects in seven families of diptera (Culicidae, Fanniidae, Anthomyiidae, Simuliidae, Muscidae, Calliphoridae and Tabanidae) have been reported as vectors of *Dermatobia* eggs (NEEL *et alli*, 1955; ARTIGAS & SERRA, 1965; GUIMARÃES *et alli*, 1983). Eggs remain attached to vectors and first instar larvae emerge when

the vector comes in contact with the host. The larvae move actively on the skin and after few minutes they penetrate completely under the healthy skin and disappear in the subcutaneous tissue. After few days post-infestation small nodules could be seen on the animal and a breathing hole located in the upper part of the nodule is maintained by the larvae throughout its development. In dogs, the first instar larvae molt at 3-8 days and the second instar larvae molt at 16 days (NEIVA & GOMES, 1917). In guinea pigs, the first instar larvae molt at 6-8 days while the second instar larvae at 16-22 days. The average periods of the first, second and third instar larvae were 3, 12 and 32 days, respectively. The principal characters used to determine the change of instars were the length of mouth hooks, cephalopharyngeal skeletons, number of respiratory slits in the posterior spiracles and the distribution of the spines in the abdominal segments (MOYA BORJA, 1966). The larval period in bovines ranged from 35 to 42 days (KOONE & BANEGAS, 1959).

The objective of this study was to determine the duration and the viability of each larval instar of the *D. hominis* in bovines.

## MATERIALS AND METHODS

Before initiating the experiments a small laboratory colony was established collecting manually mature *D. hominis* larvae from bovine's skin abated at the slaughterhouses of Rio de Janeiro. Soon after collection the larvae were placed on humid sawdust in cylindrical glass containers for pupation. The pupae were maintained in an incubator at 27 °C of temperature and 85% of relative humidity until the adults emergency. After the emergency, the flies were transferred to 30x30x30 cm cages. The bottom and back of each cage were made of plywood, the top and two sides were covered with a fine-mesh white nylon fabric and the front was covered with a glass. Oviposition of *D. hominis* was induced placing in the same cage adults of *Musca domestica*. Vectors with eggs of *Dermatobia* were captured, placed in test tubes and maintained at 27°C and 85% RU. The eggs were stimulated to hatch placing them in the palm of the hand and blowing our breath on eggs, then picked up the emerging larvae with a fine brush and transferred to the animals.

A first group of ten crossbred bovines of approximately 12 to 18 months old, were infested, individually, along the dorsal line with 25 newly hatched larvae of *D. hominis*. Beginning with the day of inoculation one larva from each bovine was removed making small incisions in the skin of the animals after 1, 2, 3, 4, 16, 17, 18 and 19 days post-infestation. These larvae were used to determine the number of instars and the duration of each stadium. One larva was left in each animal until its natural abandon from the host. The extracted larvae were killed and fixed to study the morphological characters. Temporal and permanent slide mounts were made to observe the different anatomic parts of the larvae using the stereoscope and the optical microscope. To separate the larval instar the length and shape of cephalopharyngeal skeletons, spines distribution and number of respiratory slits in the posterior spiracles were observed.

A second group of four bovines were infested, individually, along the dorsal line with 50 newly hatched larvae to study the viability of three larval instars. The number of nodules containing alive larvae was observed daily. To register the number of first instar larvae that penetrate in the skin animals, they were checked 24 hours post-infestation. The other observations were made every two days until 42 days. To register the alive larvae during the different larval instars the nodules on the animals were squeezed gently. This trial ended when the last third instar larva abandoned the host naturally.

This study was carried out at the Estação para Pesquisas Parasitológicas W. O. Neitz, UFRRJ, from April to October 1997.

## RESULTS AND DISCUSSION

The results obtained in this trial indicated that there were three larval instars. The first instar larvae molted at 1-2 days and second instar larvae molted at 17-19 days post-infestation.

The larval period of *D. hominis* on bovines ranged from 40 to 43 days. MOYA BORJA (1966) found that the first instar larvae molt at 6-8 days while the second instar larvae at 16-22 days post-infestation in guinea pigs. In dogs the first instar larvae molt at 3-8 days (NEIVA & GOMES, 1917). The first molt in bovine was shorter than in guinea pigs and dogs. However, the second molt in bovines, guinea pigs and dogs are similar. After 17 and 19 days post-infestation was very common to observe recently molted third instar larvae (pharate larvae) with the exuviae of the second instar larvae (Fig. 1). JOBSEN & MOURIER (1972) described the morphological characteristics of the three larval instars reared on bovines. The average larval period in cattle was 42 days. The average duration of the first, second and third instar larvae were 1, 17 and 24 days, respectively.

The viability of the larval instars of *D. hominis* are showed in Table 1. The data indicated that there is a tendency to increase the larval viability as soon as the larvae molt to the next instar. Of 200 larvae inoculated on the bovines, only 100 larvae penetrate in the skins and formed small nodules; however only 77 (38.5%) molted to second instar after 1 day post-infestation. Of 77 larvae 60 second instar larvae (77.9%) molted to third instar larvae after 20 days post-infestation and 56 full-grown (93.3%) abandoned the hosts naturally. The percentage of larval viability of *D. hominis* was 28.0 because out of 200 first instar larvae seeded on the bovines only 56 third instar larvae reached the maturity (Table 2).

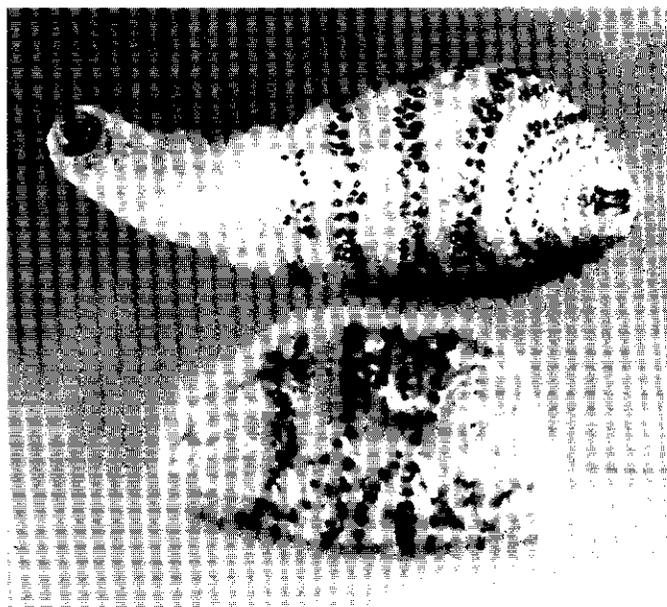


Fig. 1. Recently molted third instar larva (pharate larva) with the exuviae of the second instar larva.

Table 1 - Viability of the three larval instars of *Dermatobia hominis* on artificially infested bovines.

Bovines	Nº of larvae tested <sup>1</sup>	Nodules counts							
		1 day (L <sub>1</sub> ) <sup>2</sup>		2 days (L <sub>2</sub> ) <sup>3</sup>		20 days (L <sub>3</sub> ) <sup>4</sup>		40-42 days <sup>5</sup>	
		Nº	%	Nº	%	Nº	%	Nº	%
I	50	29	58,0	23	46,0	15	65,2	14	93,3
II	50	20	40,0	14	28,0	11	78,6	11	100,0
III	50	16	32,0	13	26,0	12	92,3	11	91,6
IV	50	35	70,0	27	54,0	22	81,5	20	90,9
Total	200	100	50,0	77	38,5	60	77,9	56	93,3

<sup>1</sup> Recently hatched larvae inoculated in bovines.<sup>2</sup> Larvae fixed 1 day post-infestation.<sup>3</sup> Viability of first instar larvae.<sup>4</sup> Viability of second instar larvae.<sup>5</sup> Viability of third instar larvae.Table 2 - Larval viability of *Dermatobia hominis*, on bovines infested artificially.

Bovines	Nº of larvae tested <sup>1</sup>	Nodules counts			
		1 day (L <sub>1</sub> ) <sup>2</sup>		40-42 days <sup>3</sup>	
		Nº	%	Nº	%
I	50	29	58,0	14	48,3
II	50	20	40,0	11	55,0
III	50	16	32,0	11	68,8
IV	50	35	70,0	20	57,1
Total	200	100	50,0	56	56,0

<sup>1</sup> Recently hatched larvae inoculated in bovines.<sup>2</sup> Larvae fixed 1 day post-infestation.<sup>3</sup> Larval viability after fixation.

## SUMÁRIO

O período larval, a duração e a viabilidade dos instares larvais de *Dermatobia hominis* foram estudados na Universidade Federal Rural do Rio de Janeiro, utilizando-se bovinos como hospedeiro natural. Dez bezerros foram infestados, individualmente, ao longo da linha dorsal com 25 larvas recém eclodidas de *D. hominis*. Para coleta das larvas de diferentes idades, foram feitas incisões na pele com auxílio de bisturi nos dias 1, 2, 3, 4, 16, 17, 18 e 19 após as infestações. Os resultados indicaram que há três instares larvais separados por duas mudas. A primeira muda ocorreu 1-2 dias pós- infestação e a segunda ocorreu 17- 19 dias pós- infestação. O estágio larval de *D. hominis* em bovinos durou de 40 a 43 dias. De 200 larvas de primeiro instar de *D.*

*hominis* infestadas em bovinos, apenas 100 fixaram-se. Dois dias pós-infestação 77 larvas mudaram para o segundo instar e após 18 dias 60 larvas mudaram para o terceiro instar. Entretanto, 56 larvas emergiram naturalmente do hospedeiro 42 dias pós-infestação.

PALAVRAS-CHAVE: *Dermatobia hominis*, instar larval, bovino.

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