

## *Dictyocaulus arnfieldi* (Cobbold, 1884): comparative analysis of the occurrence in horses, mules and donkeys

### *Dictyocaulus arnfieldi* (Cobbold, 1884): análise comparativa da ocorrência em eqüinos, muares e asininos

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## SUMMARY

To study *Dictyocaulus arnfieldi* occurrence, the authors analysed the lungs of 20 donkeys, 22 mules and 44 horses from the following Brazilian States: Maranhão, Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Bahia, Minas Gerais and Goiás. The prevalence of the infection was 65% in donkeys, 22.72% in mules and 4.54% in horses, with the mean intensity of 34.3 worms in the donkeys, 36.5 in the mules and 2.0 in the horses. The authors reported the *D. arnfieldi* Male/Female ratios which are: 1: 1.82 in donkeys and 1: 4.41 in mules.

UNITERMS: *Dictyocaulus arnfieldi*; Protostrongylidae; Lungworms; Donkeys; Mules; Horses.

## INTRODUCTION

*Dictyocaulus arnfieldi* has a worldwide distribution (Round<sup>15</sup>, 1976) and the donkeys is its natural host (Round<sup>14</sup>, 1972), although this parasite can be found in horses, mules, zebras and tapirs as well.

In British Islands Pankhurst<sup>12</sup> (1963) verified that 27% of donkeys analysed faecal samples presented *D. arnfieldi* larvae, whereas only 0.05% in horse samples were positive. A patent infection of 72.97% was reported by Round<sup>14</sup> (1972), in donkeys that were examined. Losson; Lekeux<sup>8</sup> (1980) postulate that donkeys once infected, the infection persists during all lifetime.

Clayton<sup>2</sup> (1979) reported a prevalence above 70% in donkeys from Glasgow. In Denmark, Andersen; Fogh<sup>1</sup> (1981) found the parasite in 87.5% of the donkeys and in 10.4% of the horses that had been raised together.

Gothe; Heil<sup>7</sup> (1984) reported the presence of *D. arnfieldi* in 45.3% of donkeys in Germany. Lyons *et al.*<sup>10</sup> (1985) reported the presence of the parasite in 2% of horses, in 68% of donkeys and in 22% of mules, whereas no parasites were found in ponies. The same authors (Lyons *et al.*<sup>11</sup>, 1985) found the parasite in 11% from 488 lungs of Thoroughbred horses and in 50% of four donkeys. Lyons *et al.*<sup>9</sup> (1986) reported the presence of *D. arnfieldi* larvae in 93% of the donkeys and in 50% of the Thoroughbred horses. The parasite was not found in two ponies.

The findings of this parasite in Brazilian horses were reported from the States of Mato Grosso, Minas Gerais, São Paulo, Pernambuco, Rio Grande do Sul and Rio de Janeiro

(Costa *et al.*<sup>3</sup>, 1986). Referring to donkeys there are the reports of Silva<sup>16</sup> (1961) in Bahia and Gonçalves<sup>6</sup> (1961) in Rio Grande do Sul; and to mules, Freitas<sup>5</sup> (1957) in Minas Gerais and Fernandes<sup>4</sup> (1965) in Paraná. Studies about prevalence and worm burden were not carried out by those authors, but Ribeiro *et al.*<sup>13</sup> (1979) found this parasite in 9.09% of 55 necropsies made in Pantaneira horses from Poconé, Mato Grosso.

The purpose of this research was to study the occurrence of this parasite in donkeys, mules and horses from some Brazilian States.

## MATERIAL AND METHOD

To evaluate the occurrence and the parasitic amount in natural infections by *D. arnfieldi*, tracheas and lungs of horses, donkeys and mules from the States of Maranhão, Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Bahia, Minas Gerais and Goiás were examined. On the whole, 20 donkeys, 22 mules and 44 horses were studied. The materials from horses and mules from the States of Minas Gerais and Goiás were collected at slaughterhouses; the other animals were specially purchased for this study. They were grown-up animals.

In the necropsy, tracheas and lungs were removed from the carcass and after a macroscopic analysis of the appearance, they were opened and visible worms collected in saline solution (0.8%). Opened tracheas and lungs were washed with saline and the sediment was examined in order to detect the parasites.

The worms were collected and settled in hot formaline

**Table 1**

*D. arnfieldi*: occurrence by States of origin. 1987-1988.

Origin of the animals	Hosts					
	Donkeys		Mules		Horses	
	Exa	Pos	Exa	Pos	Exa	Pos
Maranhão	1	1	3	0	3	0
Piauí	4	3	2	1	4	0
Ceará	3	2	3	1	3	0
Rio G. do Norte	3	2	1	0	4	0
Paraíba	2	0	2	1	4	2
Pernambuco	3	3	4	2	2	0
Bahia	1	0	0	-	0	-
Minas Gerais	3	2	4	0	19	0
Goiás	0	-	3	0	5	0
Total	20	13	22	5	44	2

Exa = Examined; Pos = Positive

solution (10%). Then they were transferred to special recipients with AFA (distilled water = 240 ml, formaline = 36 ml, acetic acid = 6 ml and alcohol 95° = 120 ml) and duly identified. For the microscopic examination, worms were diaphanised by using Aman's lactophenol.

To perform the analysis of variance, the logarithm of the numbers of counted parasites plus one (Snedecor; Cochran<sup>17</sup>, 1968) was used.

## RESULTS

The occurrence of *D. arnfieldi* in Brazil, concerning the States of origin, is presented in Table 1. Data about the collected worms from 20 donkeys, 22 mules and 44 horses are presented in Table 2. The analysis of variance revealed that the mean number of worms in donkeys, mules and horses are significantly different ( $P < 0.01$ ).

## DISCUSSION

Donkeys have been found parasitized in almost all States (Table 1), even considering the few number of examined animals. The number of recovered worms is larger in donkeys than in mules and horses even considering the average worms in the slaughtered animals, as shown in Table 2.

*D. arnfieldi* was recovered from 65% of the donkeys. This percentage is smaller than the prevalences reported by: Thomas; Jones<sup>18</sup> (1960) in Tennessee - USA (94.44%); Lyons *et al.*<sup>9</sup> (1986) who found 93% of larvae in faeces and 100% of worms alive in the lungs; and Andersen; Fogh<sup>1</sup> (1981) who reported 87.5% in Denmark. Other data, although superior in quantity, but not much, are the ones of Round<sup>14</sup> (1972) who found 72.97% in England, and the ones of Lyons *et al.*<sup>10</sup> (1985) who reported 68% in USA. Minor prevalences were found by Pankhurst<sup>12</sup> (1963) in the United Kingdom (55%) and by Gothe; Heil<sup>7</sup> (1984) in Germany (45.3%).

The prevalence of *D. arnfieldi* in horses in some countries, as 0.05% in the British Islands (Pankhurst<sup>12</sup>, 1963), 2.0 and 11.0% in the United States (Lyons *et al.*<sup>10,11</sup>, 1985), 10.4% in Denmark (Andersen; Fogh<sup>1</sup>, 1981), 9.09% in Pantaneira horses in Brazil (Ribeiro *et al.*<sup>13</sup>, 1979), and the amount of information collected in this study (4.54%) make clear that *D. arnfieldi* is less common in horses than in donkeys.

Data above mentioned confirm that *D. arnfieldi* is a natural parasite of donkeys.

Considering that mules are hybrid, having their origin as a result of the coupling between donkeys and horses, one must conclude that mules are more susceptible to *D. arnfieldi* than horses are. Our findings concerning the prevalence (22.72%) reinforce such assertion. An approximate prevalence (22%) was reported by Lyons *et al.*<sup>10</sup> (1985) in the United States.

In horses, when the mean intensity is examined, the reported results point out a low average (2.0), lower than the one presented by Ribeiro *et al.*<sup>13</sup> (1979) who found 4.33 and the one by Lyons *et al.*<sup>11</sup> (1985) with 6.0 lungworms per horse. Concerning donkeys and mules, a mean of 34.3 and 36.5 *D. arnfieldi* per animal was found respectively, suggesting that a

**Table 2**

*D. arnfieldi*: data on worms recovered from donkeys, mules and horses. 1987-1988.

Items	Hosts		
	Donkeys	Mules	Horses
Recovered worms	158M 88F	27M 19F	0M 4F
Average worms in the slaughtered animals	22.3	6.63	0.09
Average worms in the infected animals	34.3	36.5	2.0
Infectious amplitude	2 - 139	11 - 98	1 - 3
Occurrence %	65.0	22.72	4.54
Worm Male/Female ratio	1 : 1.82	1 : 4.41	-
Worm Male/Female amplitude	1:0.71 - 1:3.25	1:1.30 - 1:7.91	-

F = female; M = male

correlation between infection intensity and host susceptibility does not occur.

The average of Male/Female ratios in *D. arnfieldi* points out the presence of larger number of females among the hosts.

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## RESUMO

Para estudo da ocorrência da infecção por *Dictyocaulus arnfieldi*, em alguns Estados brasileiros, foram examinados os pulmões de 20 asininos, 22 muare e 44 eqüinos procedentes dos seguintes Estados: Maranhão, Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Bahia, Minas Gerais e Goiás. Foram registradas as ocorrências de 65%, 22,72% e 4,54%, respectivamente, para asininos, muare e eqüinos; as intensidades médias de 34,3, 36,5 e 2,0 vermes para asininos, muare e eqüinos e as relações macho/fêmea de 1: 1,82 e de 1: 1,41 *D. arnfieldi* em asininos e muare.

UNITERMOS: *Dictyocaulus arnfieldi*; Protostrongylidae; Vermes pulmonares; Jumentos; Mulas; Cavalos.

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