

A Consideration on the Relationship between Worm Age and Mortality of *Setaria marshalli* Recovered from the Peritoneal Cavity of Calves Born in Tottori Prefecture, Japan

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ABSTRACT. Eight calves born in November-December of 1992 were necropsied at the ages of 29–230 days in an attempt to estimate the life span of *Setaria marshalli* in Japan. Worm ages were estimated on the base of active season for mosquitoes. Thirty worms estimated 4–9 months old recovered from 4 calves were all alive in the peritoneal cavity. Thirty-five out of 50 worms estimated 7–13 months old were dead with being entrapped by fibrin on the peritoneum. It is speculated that this is a normal fate of this parasite at the end of its life, and therefore, the life span of *S. marshalli* would be approximately one year after prenatal infection. — **KEY WORDS:** calf, life span, *Setaria marshalli*.

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Setaria marshalli is one of the prevalent filarial parasites found in peritoneal cavity of calves in Japan. Several studies concerning *Setaria* have been carried out on morphology [1, 8], taxonomy [7, 9, 10] or epidemiology [3, 6]. However, the life cycle of the genus *Setaria* has not been clearly elucidated although it is previously reported that in summer *S. marshalli* prenatally infects cattle during the middle stage of their fetal life [4]. In the present study, eight calves with high chances to be prenatally infected with *S. marshalli* were necropsied to estimate the life span of this parasite. Eight calves (four Holstein-Friesian, one Japanese-Black, and three Holstein-Friesian × Japanese-Black, both male and female of 29 to 230 days old), which were in the middle stage of their fetal life during the summer of 1992 and born in November or December 1992, were selected from commercial farms in Tottori prefecture. One or two of these animals were killed each month from December 1992 to June 1993. The number of live and dead filarial parasites

in the peritoneal cavity were counted. All filarial parasites were identified as *S. marshalli* by the morphological characteristics of their anterior and posterior parts [1, 2, 7, 9].

The number of *S. marshalli* recovered from the peritoneal cavities of eight calves ranged from 3 to 20 in total (mean 10.0). Out of these worms, live worms ranged from 0 to 13 (mean 2.9) and dead worms ranged from 0 to 18 (mean 4.4) as shown in Table 1. Microfilariae were also observed in blood of the eight calves. Since all the calves were supposed to have been prenatally infected with *S. marshalli* during the previous summer (June-August 1992, which is the active season for mosquitoes), the age of each worm is regarded as the length of the period between the previous summer and the day they were killed. On the basis of this premise, the worm ages of the eight calves are estimated to be 4–13 months, with a low of 4–7 months in calf No. 1 killed in December 1992 and a high of 10–13 months in calf No. 8

Table 1. Estimated worm age and the mortality of *Setaria marshalli* in the peritoneal cavity of calves born in Tottori prefecture, Japan

Calves No. Breed ^{a)}		Birth (1992–1993)	Kill	Age (day)	<i>S. marshalli</i> -adult worms			Estimated age ^{b)} (months)
					Number of worm recovered			
					Live	Dead	Total	
1	HF × JB ♀	Nov. 24	Dec. 23	29	9	0	9	4 – 7
2	HF ♀	Dec. 18	Jan. 23	36	5	0	5	5 – 8
3	HF × JB ♂	Dec. 13	Jan. 23	41	10	0	10	5 – 8
4	HF × JB ♂	Dec. 6	Feb. 20	76	6	0	6	6 – 9
5	HF ♂	Nov. 15	Mar. 20	125	2	18 ^{c)}	20	7 – 10
6	JB ♂	Dec. 11	Apr. 29	139	0	14 ^{c)}	14	8 – 11
7	HF ♀	Nov. 16	May 31	196	0	3 ^{c)}	3	9 – 12
8	HF ♀	Nov. 10	Jun. 28	230	13	0	13	10 – 13
Mean				109.0	2.9	4.4	10.0	

a) HF: Holstein-Friesian, JB: Japanese-Black

b) Period between *S. marshalli* infection (previous summer: June-August) and calves killed.

c) All worms were entrapped in the peritoneal cavity.

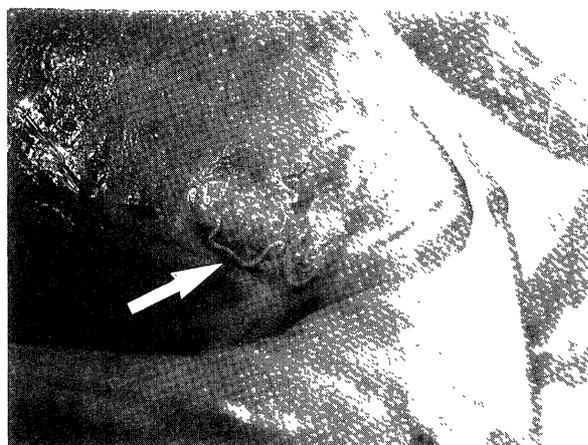


Fig. 1. *Setaria marshalli* (arrow) entrapped by many tags of fibrin on the omentum of a calf.

killed in June 1993. The dead worms found in three animals were entrapped by many tags of fibrin and adhered to the peritoneum (Fig. 1). These lesions were histopathologically found to be a granulomatous response, which is the same as that reported for *S. digitata* in horses [11].

Despite the presence of *S. marshalli*, none of the host animals showed any clinical disorders. Therefore, it is indicative that the parasites made no pathogenical approach to the hosts, and fibrinous entrapping of the worms should be considered as a normal response of the natural host to the parasites after the parasites end their normal life span. The granulomatous response is a process of eliminating the dead parasites as foreign bodies. It is intriguing that microfilariae remain present even in calves without live adult *S. marshalli* in the peritoneal cavity. Therefore, the hypothesis is that these microfilariae may continue to survive another one or two months until the following summer when they may be transmitted by mosquitoes. Generally, the life span of *S. marshalli* is believed to be shorter than 2 years because *S. marshalli* is found only in young calves and not in cattle over 2 years old [5]. Our

present results confirm that worms less than 7 months of age stayed alive (calf No. 1–4) but all worms of more than 10 months had died (calf No. 6 and 7) except for one case of live worms which were 10–13 months in age (calf No. 8). This exceptional calf might have been infected in late summer. Therefore, the worm age in this case would be the lowest figure of the estimated range of months (10 months). So this period would not fully cover the life span. Based on the foregoing results the life span of *S. marshalli* varies between 10 and 13 months. It would be reasonable to conclude that the life span of *S. marshalli* is approximately one year after prenatal infection in cattle. However, it may be possible that the life span has to be adjusted if larger number of animals have been investigated.

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