Prevalence of stomach nematodes (Habronema spp, Draschia megastoma and Trichostrongylus axei) in horses examined post mortem in Normandy.

C. COLLOBERT-LAUGIER, C. LAMIDEY, N. BRISSEAU, C. MOUSSU and N. HAMET

SUMMARY

Quantitative fecal and post-mortem examinations of 410 horses, aged 2 months to 23 years, originating from Normandy (France), were performed from March 1993 to April 1997 to evaluate the prevalence and intensity of stomach nematodes in these animals.

Draschia megastoma was encountered in only one horse at necropsy. 8.5% of the horses examined were infected by Habronema spp and the infection rate was higher from March to October with a peak in September. Older horses appeared to be more frequently infected but this difference was not significant. The overall prevalence of Trichostrongylus axei was 12.4% and showed annual variations: it was higher in 1993 (24.6%) and lower in 1995 (4.0%).

The horses were significantly more infected from May to August (17.4%) compared to the rest of the year. The infection rate increased regularly from 2 months to 10 years of age but this was not significant.

KEY-WORDS: Habronema spp - Draschia megastoma - Trichostrongylus axei - prevalence - Normandy - horses.

RÉSUMÉ

Prévalence d’infestation par les nématodes gastriques (Habronema spp, Draschia megastoma et Trichostrongylus axei) chez 410 chevaux normands examinés à l’autopsie. By C. COLLOBERT-LAUGIER, C. LAMIDEY, N. BRISSEAU, C. MOUSSU et N. HAMET.

Des coproscopies quantitatives et des examens nécropsiques ont été réalisés sur 410 chevaux normands, âgés de 2 mois à 23 ans, de Mars 1993 à Avril 1997 afin d’estimer la prévalence et la sévérité de l’infestation par des nématodes gastriques.

Draschia megastoma a été identifié à l’autopsie chez un seul animal 8.5% des chevaux examinés étaient infestés par Habronema spp et le taux d’infestation était plus élevé de Mars à Octobre avec un pic en Septembre. Les chevaux âgés semblaient plus souvent atteints mais cette différence n’était pas significative. La prévalence de Trichostrongylus axei était de 12.4% et a montré des variations annuelles : elle était plus élevée en 1993 (24.6%) et faible en 1995 (4.0%). Les chevaux étaient plus fréquemment infestés de Mai à Août (17.4%) que durant le reste de l’année. La fréquence d’infestation augmentait régulièrement entre 2 mois et 10 ans d’âge mais pas de façon significative au seuil de 5%.


Four species of nematodes are found in the stomach of equids: Habronema muscae, Habronema majus, Draschia megastoma and Trichostrongylus axei.

Habronema spp and Draschia megastoma belong to the nematode superfamily Spiruroidea and are morphologically similar. The life-cycles of these spirurid nematodes are integrated with that of their intermediate hosts, Musca domestica and Stomoxys calcitrans. The spirurid larvae of these nematodes (L1) escape from thin-shelled, embryonated eggs during transit through the intestinal tract of infected horses. They are ingested by maggots and the parasites and the flies develop synchronously thereafter.

The life cycle is completed two weeks later when the adult flies emerge from the pupa and at about the same time, the nematode larvae reach the infective third stage and migrate anteriorly to the proboscis. Infection occurs when the infective flies feed around or on the mouth of an equid and the spirurid larvae are released onto the skin and may be swallowed. Whole infective flies may also be ingested. The prepupal period for Draschia megastoma and Habronema spp is about two months. The fourth-stage larvae and the adults localize in the glandular region of the stomach. Draschia megastoma is the most pathogenic of the 3 spirurid species and may cause submucosal eosinophilic granulomas near the margo plicatus which coalesce and later develop into large fibrous masses [2, 4].

The main effect of Habronema spp is to stimulate the secretion of large amounts of thick and tenacious mucus on the glandular part of the stomach close to the margo plicatus with adult worms embedded in the mucus [4, 8].
Trichostrongylus axei belongs to the nematode superfamily Trichostrongyloidea. This nematode is common in ruminants as well as in equids. The preparasitic life-cycle of this parasite closely resembles that of the strongyles. Infective larvae are ingested by horses while grazing; they develop into adults in the lumen of the mucosal crypts or deeply in the mucosa of the stomach. The prepatent period is about three weeks.

Light infections with Trichostrongylus axei do not seem to be very pathogenic in horses [8]. Heavy infections lead to an hyperplastic reaction of the glandular tissue with formation of circumscribed raised plaques, mainly in the fundus, and production of an abundant mucus thinner than that produced by Habronema spp infection [4, 8].

The raised plaques may enlarge from half a centimetre to several centimetres and later become eroded in the center; the lesions evolve from an initial whitish color to later appear as reddish ulcers surrounded by hypertrophied gastric mucosa [4, 8].

Several publications on the prevalence and intensity of stomach worms in equids are available in the United States, Australia and Morocco but specific data on these parasites are not available in France.

The main objective of the present investigation was to evaluate infection rates and numbers of stomach worms present in horses in Normandy at necropsy.

Material and methods

410 horses originating from Normandy and older than 2 months were examined post-mortem for stomach nematodes from March 1993 to April 1997. These horses were submitted for routine necropsy which was usually performed within 24 hours after death. The breed, sex, age and date of death of each horse were recorded (Table 1). The average age of the horses was about six years with a range of 2 months to 23 years. The stomach of each horse was ligatured on the two extremities (cardia and pylorus) and isolated. It was opened with scissors along the great curvature. The gastric content was examined grossly for the presence of Draschia megastoma or Habronema spp and then discarded.

The mucosa was inspected grossly for lesions produced by Draschia megastoma (fibrous nodules) and Trichostrongylus axei (circumscribed raised plaques of hyperplastic glandular tissue with or without central erosion) and for the presence of thick and abundant mucus on the glandular part.

A) PROCEDURE FOR SPIRURID LARVAE AND ADULT AND LARVAL FORMS OF TRICHOSTRONGYLUS AXEI

The glandular mucosa was separated from the musculature with a lancet and cut into small pieces of about 4 cm². These samples were digested for 16 to 24 hours at 37°C in a solution of 1 % pepsine and 1.5 % HCl in proportion of 50 g of tissue per 100 ml of solution.

The total volume of digest was then placed in a Baermann apparatus equipped with a 63 µm sieve and the recovery of the spirurid larvae and both adult and larvae forms of Trichostrongylus axei was carried out by the BAERMANN technique. The sieve was inspected macroscopically. Then,
modified MAC MASTER technique [18]. A larval culture was made by incubation at 23°C for 13 days from all the positive fecal samples. The third-stage larvae were recovered by a BAERMANN technique and the T. axei larvae were identified according their morphological criteria [5, 21].

Results

51 of the 410 horses examined post-mortem (12.4 %) were infected by T. axei. 35 of the positive horses were detected by coproscopy; adult worms or larvae were recovered from the stomach of the others. For all the infected horses, the parasitic burden was low; the number of eggs, adult worms or larva recovered respectively ranged from 7 to 100 (38.9±21.5), 5 to 10 (7.5±2.9) and 4 to 30 (10.5±7.9). The adult worms and larvae of T. axei were found mainly in the gastric mucus (11 cases versus 4 positive determinations from the gastric mucosa). The frequency of infection according to breed, sex, age and month is presented in Table 1. A higher infection rate was observed from May to August (17.4 %). Significant annual variations in the prevalence were detected; the horses were more often infected in 1993 (24.6 %) than in 1995 (4.0 %).

The infection rate increased from 2 months to 10 years of age from 5.5 % to 17.4 % and then decreased to 14.0 % in older horses but these differences were not significant. There was no obvious difference in the prevalence between sexes and breeds. Mucosal lesions were occasionally observed in horses infected by T. axei (7.8 %) as thickening and crinkled aspect of the glandular mucosa (Figure 1) and presence of an abundant mucus adherent to the stomach wall (Figure 2).

Only one horse was infected by Draschia spp (0.2 %); one larva was recovered from the gastric mucosa and no associated lesion was detected.

The total prevalence of Habronema spp. was 8.5 % (35 of the 410 horses). For 34 horses, only larval stages were identified, from the gastric mucus (nb=33) and from the mucosa (nb=1). 3 adult worms were recovered from one horse in the gastric mucus and were identified as Habronema muscae. The worm burden was low for all the infected horses (ranging from 2 to 30 larvae with a mean 7.8±5.4).

There were no significant variations in the prevalence according to breed, sex, age and month (Table I). The frequency of infection increased regularly with age from 4.1 % for the younger horses (2 to 12 months old) to 13.0 % for those older than 10 years. The prevalence was significantly higher from March to October (10.4 %), reaching a peak of 13.2 % in September, compared to the rest of the year (3.5 %).

Only 3 horses (0.7 %) were infected by both T. axei and Habronema spp.

Discussion

The prevalence of T. axei in Normandy was high (12.4 %) when compared with the infection rates determined by several investigations in the USA (0 to 4.0 %) [10, 12, 13, 19], in Australia (0.0 %) [14, 22] and in Germany (0.0 to 1.1 %) [1, 3] (Table II). In Great Britain, however, POYNTER [17] obtained a similar value for the overall prevalence (23.9 %) by fecal examinations of 3227 horses. This increased until the age of three years (41.1 %) to fall in the adult group thereafter. A study in Marocco [15] showed that among a population of light horses over 4 years old, the frequency of infection by T. axei was as high as in ruminants (80.9 %) but these horses had received no anthelmintic treatment.

In Normandy, region of intense horse breeding, a relatively high prevalence of T. axei infection in a regularly dewormed population could be explained by the frequent grazing communally with cattle. A higher prevalence was observed from May to August and could be associated with climatic conditions promoting the parasitic cycle at this period of the year.

Indeed, larval development in the environment is governed by the same factors as strongyle larvae and required heat (27 °C) and humidity.

The annual differences observed with a higher prevalence in 1993 and a lower one in 1995 could be related to hygrometry variations : a dry summer was recorded in 1995 [7].

In Normandy, the numbers of T. axei recovered per infected horse were low. In previous investigations, the worm burdens varied considerably from few specimens in Belgium.

FIGURE 1. — The gastric lesions associated with light infections by T. axei are located to the fundus and characterized by small raised plaques of hyperplastic mucosa.

FIGURE 2. — The worms are recovered in the thick gastric mucus excreted in great amounts by the glandular mucosa.
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**Table II.** — Prevalence and intensity of stomach nematodes in horses in different countries.
in the USA [12, 13] and in Germany [1] to heavier infections reaching about 13,000 worms, observed in the USA [10] and in Morocco [15] (Table II).

Only one horse was infected by Draschia megastoma in the present study. Draschia megastoma is considered to be a rare parasite in some countries of central and western Europe [1, 3, 6, 16] and in Morocco [15]. This species has been more frequently identified in the USA where a prevalence of 24% has been reported in the Southwestern, Southern and Central states [20], 62% in Kentucky [10], 47% in Ohio [19] and in Australia where infections rate varied from 39 to 41% [14, 22]. The frequency of the specific gastric lesions induced by this parasite was high in 2 surveys carried out in Kentucky before March 1983 (59 and 63% of the examined horses) [10, 11].

Another investigation carried out from October 1985 to February 1986 [13] showed a marked decrease in the percentage of lesions and infections: D. megastoma specimens were recovered from 3% of the foals and from none of the older horses; D. megastoma lesions were found in the stomach of 5% of the foals and 2% of the older horses. According to Lyons and others [13], the great decline in D. megastoma infections observed between 1985-1986 could be related to the effect of ivermectine which was approved for use in the USA in March 1983.

The overall prevalence of Habronema spp. in Normandy was 8.5%. The prevalences determined by previous studies differed a lot in Europe as well as in the USA (Table II). In Germany, BAUER [1] found infection rates of 48% for H. majus and 28% for H. muscae; ÇIRAK and others [3] observed a prevalence of 88% (7/8 horses) for H. majus. In Belgium, PECHEUR and others [16] identified exclusively H. muscae in 17% of the horses examined and, in Poland [6], H. muscae and H. majus were recovered in small numbers from each infected horse with respective frequencies of 8% and 16%. Our results were similar to those of GAWOR [6] obtained from working horses in Poland.

In the numerous surveys conducted in the United States [13, 19] and in Australia [14, 22], H. muscae was the only species of Habronema spp. identified (Table II).

Seasonal variations of prevalence were observed by MFITILODZE and HUTCHINSON [14] with a higher infection rate in summer (67%) and a lower one in autumn (20%). In Kentucky, seasonal differences were only seen for immature stages of Habronema spp.: the prevalence increased from June to reach a peak in October and then fell [10].

In our study, similar results were found: most of the infected horses (34/35) harboured exclusively larval forms and a higher prevalence was recorded from March to October with a peak in September, at the end of the summer (13%), reflecting the activity of the intermediate hosts.

The stomach nematodes, Habronema spp., Draschia megastoma and Trichostrongylus axei seem to be of little clinical importance in horses in Normandy as very mild gastric lesions were found at necropsy. The anthelmintic programs performed in Normandy (routine treatment every 8 weeks) seem to enable a successful control of these parasites as their prevalence and intensity remained low or moderate.

References