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STUDIES ON THE DYNAMICS OF STRONGYLOIDES EGG RELEASE UNDER STUD CONDITIONS*)

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Abstract. The eggs of *Strongyloides westeri* were found in the faeces of the foals from the 16th day of their life, with a peak in their numbers between the 30th and 40th day of life. Egg release ceased in all foals irrespective of their date of birth in the months July-August. Parallel examinations of the mares were negative. Recommendations for the control of strongyloidosis in foals are given.

Strongyloides westeri infections represent a problem in foal rearing in some countries (Enigk 1972); a part of newborn foals died under the pattern of lung-syndrome caused by *Strongyloides westeri* infection. For this reason we have conducted a study on the dynamics of the release of eggs of *Strongyloides* in mares and foals under stud conditions.

MATERIALS AND METHODS

In a period of 13 months, from January to February of the following year, 20 warm-blooded mares and their foals were examined coprologically under stud conditions. Foaling time lasted from January 9th to April 8th. The horses were kept in bright, spacious stalls on deep litter; in the vegetation period, nearby pastures served as a run. Faeces samples were taken continuously from the selected animals at intervals of two weeks, from some foals every second day. Quantitative examinations were carried out according to the modified McMaster method (Wetzel 1951) within 24 hours after the specimen collection. Simultaneously, faecal samples were examined for the presence of larvae according to the emigration method. Furthermore, over the whole period of the studies, the climatic values of the environment were recorded (values in the open: temperature, precipitation and relative humidity of the air; values in the stable: temperature in the passages, temperature in the stalls one metre above groundlevel, temperature of the mats, and relative humidity of the air).

RESULTS

The first *Strongyloides* eggs were found in the faeces of the newborn foals on the 16th day of life. On an average, with a two-weeks rhythm of examination, the first eggs of this species were found after 24 days (Fig. 1). The egg release curves of all foals were characterized by an extreme increase in the period from the 30th to the 40th day of life with a subsequent sudden decrease in egg release. The greatest number of eggs per gram of faces — 21.000 eggs — was found in a foal born in April. The expulsion of eggs ceased in all foals, independent of the date of birth, in July/August. Within the period of the study, no eggs of *Strongyloides* could be found in the faeces of the mares even when using

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very efficient methods*). Bedside *Strongyloides* eggs we found *Parascaris* eggs, beginning at the 130. day after birth and strongylid eggs starting day 110 (Fig. 1). After the release of *Strongyloides* eggs had ceased in July/August, the first strongylid eggs were found in the faeces of the foals with an expulsion peak in October. At that time, the age of the foals was between 110 and 181 days. In the study period, all mares released strongylid eggs with varying intensity. For three mares, a low-degree of rate of release of *Parascaris*, which lasted only a few weeks, was found in the spring.

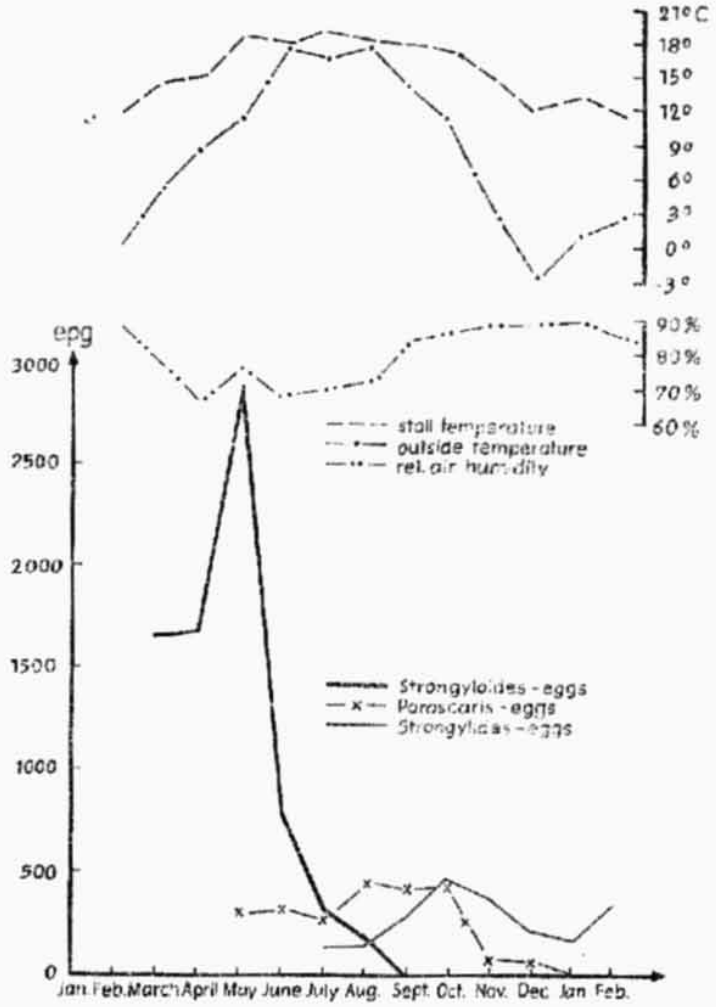

Fig. 1. Nematode egg-counts in foals (monthly).

Temperature values (mean values of the month) in the open varied between - 2.6 and +18 °C, those inside the stable — stall temperature at a height of one metre — between +12.5 and +20.5 °C, and mat temperature between 12.5 and 22 °C.

DISCUSSION

By means of coprological examinations, the release of *Strongyloides* eggs in foals, with negative findings in the mares, could be found as early as in the first month of life on the sixteenth day. Geer et al. (1974) demonstrated a prepatent period of *Strongyloides*

*) Combined sedimentation and flotation technique with natrium silicate solution and centrifugation.

westeri, after experimental infection in pony foals of 6—10 days and in pony yearlings of 11—13 days. It seems, that the mode and intensity of infection is not without influence on the prepatent period. The pronounced peak-like increase in the release of eggs at the age of 30 to 40 days in this mode of animal keeping indicates, on the one hand, the prevalence of favourable infection conditions in the stable with repeated re- and superinfections, but, on the other hand, the prevalence of environmental conditions in the stalls promoting the development of the larvae. Although in the stalls the faeces are removed every day and the mats in the stable are repeatedly loosened, faeces accumulate in the litter. Examination of various mat samples showed that most of the *Strongyloides* larvae were located in the area of the greatest accumulation of faeces. It could be repeatedly observed that the foals preferred to rest at sites with the greatest accumulation of faeces in the litter probably due to the fact that the floor was warmer there because of increased chemical decomposition processes. This situation, promoted by the foals' particular way of resting, creates favourable conditions for the percutaneous penetration of the larvae into the host organism.

April and May should be considered to be the months of the highest accumulation of larvae. The varying intensity of egg release from animals kept under similar conditions can be ascribed to differences in the constitution of the foals, if we considered the dynamics of egg expulsion. The course and rhythm of egg release throughout the year is certainly influenced also by environmental factors, especially climatic values, in dependence on the individual mode of animal keeping. Most eggs were expelled in April/May. At this time the animals were kept mainly in stables under conditions of an appreciably high temperature and low air humidity. The following decrease in the number of eggs in the faeces of animals kept under similar conditions was evidently due to the fact that the organism developed a resistance to infection with advanced age. Egg expulsion ceased towards the end of July and the beginning of August in all foals whether born in January or toward the end of the foaling period. At this time the animals were kept mainly outdoors on pastures and large runs (paddocks). The increased freedom of movement reduced considerably the possibility of infection and since a decrease in the number of eggs released with the faeces had started already at an earlier period in view of a developing resistance of the organism, a complete cessation of egg release might be expected.

On the basis of our results we suggest control measures against the incidence of strongyloidosis in foal which have proved to be effective:

1. From the 15th day of their life, the foals should be examined coprologically. In case of positive findings, they should be treated with an highly effective anthelmintic (e.g. Thiabendazole or Morantel tartrate) twice at an interval of a fortnight (Drudge and Lyons 1966, Mackay 1970, Hiepe et al. 1971).

2. Within the same period, the litter should be removed and renewed at least every second day.

3. A further possibility of controlling strongyloidosis under stud conditions which, however, requires a greater amount of organisation of horse rearing, would be a shifting of the foaling period to the months of May/June. This would result in a considerable shortening of the period during which the animals are kept in the stable and thus a reduction in infection possibilities.

From the time we have practised this way of control of *Strongyloides* infection no sucking-foal has died from *Strongyloides westeri* infection and no outbreak has been observed.

ИЗУЧЕНИЕ ДИНАМИКИ ВЫДЕЛЕНИЯ ЯИЦ ВИДА *STRONGYLOIDES WESTERI* В УСЛОВИЯХ КОННОГО ЗАВОДА

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Резюме. В помете жеребят в возрасте с 16-го дня после рождения находили яйца нематоды *Strongyloides westeri*; численность яиц достигала пика в период между 30-м и 40-м днем жизни жеребят. Выделение яиц у всех жеребят прекратилось независимо от возраста в месяцах июль—август. Соответственное обследование кобыл дало отрицательные результаты. В работе приведены рекомендации по борьбе с стронгилоидозом жеребят.

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