Studies on Bunostomum trigoncephalum,

The Hookworm of Sheep

A Thesis submitted in partial fulfilment of the requirements for the Degree of Master of Veterinary Science at Massey University.

J.M. GRAHAM, 1969

ABSTRACT

This thesis records a series of experimental observations on Bunostomum trigonocephalum. The studies were made under the following broad headings:

a) pre-parasitic development

b) comparison of routes of infection and studies of the mechanism of infection including exsheathment of the infective larvae

c) the pathogenesis and pathogenicity of the parasite for the sheep host.

The morphology and development of the first, second and third larval stages was examined. The moult of the first to the second stage was observed and the first stage cuticle appeared to disintegrate rather than be cast as an intact sheath. This moult occurred after about 5 days incubation at 27°C. Little larval growth occurred after the first moult and the second moult followed comparatively quickly. 80% of the larvae were in the infective stage after 7 days incubation.

Survival of infective larvae was compared at temperatures of 0°C, 10°C, 20°C, 27°C and 37°C. Larvae survived longest at 10°C.

Infective larvae were administered to sheep intravenously, subcutaneously, intraruminally, orally and percutaneously. The largest infections were established after percutaneous administration.

Infective larvae applied to the skin of sheep exsheathed rapidly and penetrated the keratinised layers of the skin. They were also found to exsheath on and penetrate into the skin of calves, guinea pigs and rabbits. There was evidence that larvae migrated to the lungs in the guinea pigs and patent infections were established in some calves.

During exsheathment the anterior portion of the sheath appeared to disintegrate allowing the larvae to emerge. This is unlike the processes which have been described in other strongylate nematodes.

A variable proportion of the infective larvae were found to exsheath "spontaneously" in faecal cultures.

Attempts were made to find what stimulates the infective larvae to exsheath. The results were inconclusive. The highest rate of exsheathment was obtained by exposing larvae to buffer of pH 2. The addition of CO_2 enhanced the exsheathment rate but only at pH 2. Even so, the results were variable and difficult to reconcile with conditions on the skin surface.

After infection of sheep the prepatent period was found to range from 54 to 60 days. The 24 hour egg-output per female worm was estimated in 5 infected sheep and was found to range from 2579 to 10480 eggs. Most of the Bunostomum were found in the intestine between 5 and 35 feet posterior to the gastric pylorus. Numbers of Bunostomum in excess of 2-300 caused a significant and progressive decline in haemoglobin, packed cell volume and total serum protein levels over observation periods of up to 16 weeks after infection. The serum protein decline was primarily due to a fall in albumin concentration. The animals so affected also showed evidence of anorexia, retarded growth rate and loss of weight. Diarrhoea occurred sporadically.

Acknowledgements

I would like to thank my Supervisor, Dr. W.A.G. Charleston, for the stimulation, guidance and sincere contructive criticism that he has given me during this study. I am also especially indebted to the help and encouragement of Miss Kerry McRae for assisting me with many of the experiments in this thesis.

I would also like to thank Miss Anne Woodward for the careful and thorough manner in which she typed both the original draft and final script. The assistance of Mrs. Fitch and Mrs. Montgomery of Tasman Vaccine Laboratory's Library and the staff of the Massey University Library in locating many references is much appreciated.

Thanks are due to Mr. A. Finn and Miss S. Jackson who were responsible for the management of the experimental animals and to Mr. R. Dwight and Mr. D. Liardet for their advice on the statistical calculations and photography respectively.

I would like to express my gratitude to the Directors of Tasman Vaccine Laboratory, especially Mr. Fitch for granting me the opportunity and financial assistance to undertake this work.

Finally my sincere thanks to my wife Jennifer for her support and encouragement throughout the whole course of this study.

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