



UNIVERSITI PUTRA MALAYSIA

**GASTROINTESTINAL PARASITISM IN KEDAH-KELANTAN CALVES-
INCIDENCE, EFFECT ON GROWTH AND COST- BENEFIT OF
ANTHELMINTICS**

CHANDRAWATHANI PANCHADCHARAM

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GASTROINTESTINAL PARASITISM IN KEDAH-KELANTAN CALVES
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by

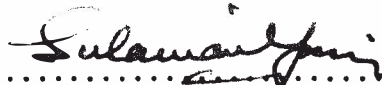
Chandrawathani Panchadcharam
D.V.M (U.P.M.)

A thesis submitted in partial fulfilment
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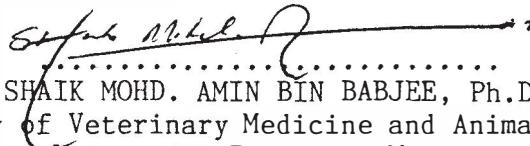
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.....
SULAIMAN HAJI MOHD. YASSIN, Ph.D.
Professor/Dean of Graduate School
Universiti Pertanian Malaysia
(Chairman Board of Examiners)



.....
D.E. JACOBS, Ph.D.
Reader in Veterinary Parasitology
The Royal Veterinary Parasitology
College Field Station
England
(External Examiner)



.....
SHAIK MOHD. AMIN BIN BABJEE, Ph.D.
Faculty of Veterinary Medicine and Animal Science
Universiti Pertanian Malaysia
(Internal Examiner)




.....
REHANA ABDULLAH SANI, Ph.D.
Faculty of Veterinary Medicine and Animal Science
Universiti Pertanian Malaysia
(Supervisor/Internal Examiner)



This thesis was submitted to the Senate of Universiti
Pertanian Malaysia and was accepted as partial fulfilment of
the requirements for the degree of Master of Science.

Date: 21 JUL 1988


.....
SULAIMAN M. YASSIN, Ph. D.
Professor/
Dean of Graduate School

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An abstract of the thesis presented to the Senate of Universiti Pertanian Malaysia as partial fulfilment of the requirements for the degree of Master of Science.

GASTROINTESTINAL PARASITISM IN KEDAH-KELANTAN CALVES -
INCIDENCE, EFFECT ON GROWTH AND COST-BENEFIT
OF ANTHELMINTICS.

by

Chandrawathani Panchadcharam

April, 1988

Supervisor : Dr. Rehana Abdullah Sani

Faculty : Veterinary Medicine and Animal Science.

A study of the incidence and effects of gastrointestinal tract parasitism on growth rates and two blood parameters of Kedah-Kelantan was carried out in the Beef Unit, Universiti Pertanian Malaysia. The cost effectiveness of two anthelmintics, oxfendazole and ivermectin was also assessed.

A total of 75 newborn Kedah-Kelantan calves were allocated equally into three groups. All the calves grazed with their dams till one year of age, under an improved extensive rotational pasture management. Oxfendazole and ivermectin was administered regularly at the recommended dose rates to the first and second groups respectively. The third group of calves remained as untreated controls. All calves were given an oral coccidiostat. At regular intervals, the calves were



weighed and faecal samples were collected for qualitative and quantitative assessment of helminths and coccidia. Blood samples were also taken for packed cell volume, plasma protein and gastrin measurements.

Three species of coccidia, namely Eimeria bovis (more than 80 percent of the calves) , E. zuernii (more than 60 percent of the calves) and E. ellipsoidalis (less than 10 percent of the calves) were identified in the three groups of calves especially during the first six months despite of regular coccidiostat therapy. Other parasites such as Toxocara vitulorum (found only in 8 percent of the control calves) and Strongyloides papillosus (more than 80 percent of all calves) were found during the first two and three months respectively. Tapeworm (Moniezia) was present in 44 percent of the ivermectin treated and control groups, and in 24 percent of the oxfendazole treated group. The only strongyle recovered from faecal culture was Haemonchus placei found in 92 percent of the control calves from three months of age onwards.

In control calves, the packed cell volume values ranged from 31.0 to 40.2 percent and plasma protein values ranged from 4.7 to 6.3 g % thus falling into the normal range of values for bovines aged up to one year. Both these parameters showed a poor correlation with faecal egg counts except in a few individual cases. Serum gastrin values were found to be relatively low even in the control calves indicating that the



worm burden was low despite showing substantially high faecal strongyle egg counts.

The ivermectin and oxfendazole treated group of calves showed higher average daily gain values (0.28 and 0.25 kg/day respectively) as compared to untreated calves (0.16 kg/day) from eight months to 12 months of age resulting in measurable economic gain. This indicates that subclinical infection, as encountered in this study, does inhibit growth rates and cause losses to cattle production.



Abstrak tesis yang dikemukakan kepada Senat Universiti Pertanian Malaysia bagi memenuhi sebahagian daripada syarat-syarat ijazah Sarjana Sains.

INFEKSI PARASIT GASTROINTESTIN PADA ANAK LEMBU KEDAH-KELANTAN -
INSIDENS, KESAN KEATAS KADAR TUMBESARAN DAN NILAI
KEBERKESANAN ANTHELMINTIK.

oleh

Chandrawathani Panchadcharam
April, 1988

Penyelia : Dr. Rehana Abdullah Sani.

Fakulti : Kedokteran Veterinar dan Sains Peternakan.

Suatu kajian mengenai insidens dan kesan parasit gastrousus keatas kadar pertumbuhan dan dua parameter darah lembu Kedah-Kelantan telah dijalankan di Unit Pedaging, Universiti Pertanian Malaysia. Nilai keberkesanan dua anthelmintik iaitu oksfendazol dan ivermektin juga dinilai.

Sejumlah 75 ekor anak lembu Kedah-Kelantan yang baru lahir dibahagi sama rata kepada tiga kumpulan. Semua anak lembu meragut pastura yang bermutu bersama ibu mereka di bawah pengurusan pastura ekstensif bergilir. Oksfendazol diberi kepada kumpulan pertama dan ivermektin diberi kepada kumpulan kedua secara teratur dan menurut dos yang dicadangkan. Kumpulan ketiga anak lembu dibiarkan sebagai kumpulan kawalan tanpa rawatan. Semua anak lembu diberi koksidiostat secara oral.



Pada jangkamasa yang tertentu dan secara teratur, anak-anak lembu ditimbang dan sampel tinja diambil untuk menganalisa secara kualitatif dan kuantitatif mengenai cacing helmin dan jenis koksidia. Sampel darah juga diambil untuk menganalisa nilai isipadu sel padat, protein plasma dan gastrin.

Tiga spesies koksidia iaitu Eimeria bovis (yang terdapat pada lebih daripada 80 peratus anak lembu), E. zuernii (lebih daripada 60 peratus anak lembu) dan E. ellipsoidalis (kurang daripada 10 peratus anak lembu) di kenalpasti pada tiga kumpulan anak lembu terutama sekali pada umur 6 bulan pertama walaupun koksidostat diberi secara teratur. Terdapat parasit lain seperti Toxocara vitulorum (8 peratus anak lembu dalam kumpulan kawalan sahaja) dan Strongyloides papillosus (lebih daripada 80 peratus anak lembu), iaini masing-masing didapati pada umur dua dan tiga bulan pertama. Cacing pita (Moniezia) didapati dalam 44 peratus daripada anak lembu dalam kumpulan yang dirawat dengan ivermektin dan kumpulan kawalan, dan 24 peratus dalam kumpulan yang dirawat dengan oksfendazol. Larva strongil yang diperolehi daripada kultura tinja ialah hanya Haemonchus placei, yang mana didapati dalam 92 peratus daripada kumpulan kawalan, pada umur tiga bulan keatas.

Pada kumpulan kawalan, nilai isipadu sel padat (daripada 31.0 hingga 40.2 peratus) dan nilai protein plasma (4.7 hingga 6.3 g %) terdapat dalam julat biasa untuk bovin yang berumur satu tahun. Kedua-dua parameter ini tidak menunjukkan korelasi yang baik dengan kiraan telur tinja kecuali dalam beberapa kes

individu sahaja. Nilai gastrin serum didapati rendah dalam anak lembu kawalan; ini menunjukkan beban cacing yang rendah walaupun kiraan telur strongil dalam tinja adalah tinggi.

Kumpulan anak-anak lembu yang dirawat dengan ivermektin dan oksfendazol menunjukkan nilai kadar pertumbuhan yang tinggi (masing-masing 0.28 dan 0.25 kg/hari) jika dibandingkan dengan anak lembu dalam kumpulan kawalan (0.16 kg/hari) daripada umur lapan hingga 12 bulan dan berkesudahan dengan keuntungan daripada segi ekonomi. Ini menunjukkan bahawa infeksi subklinikal seperti yang didapati dalam kajian tersebut menghalang kadar pertumbuhan dan menyebabkan kerugian dalam produksi lembu.

CHAPTER 1

INTRODUCTION

There are 400,000 heads of native Kedah-Kelantan (KK) cattle in the country; most of which are in the hands of the smallholders. The KK was traditionally a draft animal but now it is estimated to provide about 60 percent of the domestic beef supply. It is reputed to be a hardy breed, adapted to low quality feeds and forages as well as to our tropical climate. However the current beef production can satisfy only about 50 percent of the national beef requirement and with the increasing demand for beef, there is an urgent need to step up production and cut down losses in the livestock industry (Samuel, 1986). In the quest for self sufficiency in beef, one of the areas to concentrate our efforts is in the improvement of health and management aspects of animal production such as control of diseases, the economical use of drugs and efficient management of pasture and feed.

Investigations in the Australian tropics by Copeman (1982) showed that calves were most susceptible to the effects of gastrointestinal nematode parasites for the first five to eight months after being exposed to significant levels of infection. It was estimated that 6.5 percent of the entire herd grazing improved pasture in wet coastal areas would die or become



chronically emaciated from haemonchosis four to six months after weaning. In addition to mortality, the mean loss of weight in calves attributed to nematode parasitism varied from 18 kg to 59 kg. Thus, the effective use of anthelmintics as a weapon to control nematode parasites is expected to yield a return on investment of at least 500 percent, based on the observed permanent weight gain advantage of 12 kg to 22 kg in calves in North Queensland.

However, there is limited information available locally on the effects of gastrointestinal parasites such as coccidia and strongyles, on the growth rate of KK calves. Dahlan (1983) conducted a study on the effect of gastrointestinal parasites on the growth rate of local KK calves as well as KK crossbreds and found that gastrointestinal parasites are an important cause for low cattle production in this country. The study revealed that calves with a higher strongyle egg count (300-500 egg) had clinical signs of soft faeces, rough hair coat and dry skin as well as a reduction in ADG as much as 127.6 gm per day, seen in the Brahman-KK crosses.

In order to formulate control measures for calves against gastrointestinal tract parasites, the significance of the prevalent coccidia and strongyles has to be ascertained. In view of this, studies using various anthelmintics against the various parasites as well as the cost effectiveness of the various control regimes should be encouraged.

The scanty data available on the importance of gastrointestinal parasitism from tropical areas and the doubtful validity of interpreting or extrapolating results and information from temperate regions to the tropical setting has limited the widespread use of control measures. Few of the principles of control used in temperate areas can be applied without modification in this country. Thus, for control measures to have any chance of widespread acceptance in this country, they must be inexpensive and able to be implemented with minimum change to the present method of land usage, environment and social convention.

This study was carried out with the following objectives:

1. To study the incidence of gastrointestinal tract helminths in calves from birth to one year of age and its effects on their growth rate under an extensive management system.
2. To study the effect of anthelmintic treatment namely oxfendazole and ivermectin, on the growth rate of calves.
3. To evaluate the cost effectiveness of the drugs used.
4. To correlate parasitic profile with specific blood parameters such as packed cell volume and plasma proteins.
5. To evaluate the preliminary use of a new diagnostic technique, that is the gastrin test, for abomasal parasite infections such as haemonchosis.

CHAPTER 2

LITERATURE REVIEW

THE KEDAH-KELANTAN CATTLE

The indigenous Kedah-Kelantan cattle is a major source of domestic beef production in this country at present although it was originally used as a draught animal. It is widely distributed in the country and is kept by smallholders in a subsistence environment. Although production parameters are low in these animals, experimental data has shown that with improved management and nutrition, liveweight gain could be significantly increased (Cameons, 1981). Cameons (1981) has shown the mean body weight of a female and male calf at 12 months of age to be 63.5 kg (sd=8.2) and 102 kg (sd=20) respectively. Mean birth weights are 12.2 and 12.7 kg in females and males respectively. Mature weights do not exceed 182 kg in the female and 273 kg in the male at four years. Thus, in order to increase beef cattle productivity to commensurate with increasing demands for beef, it is important to employ better methods of management.

THE ECONOMIC IMPORTANCE OF PARASITISM IN MALAYSIA

The only source of information on the economic importance of parasitism in Malaysia is derived from a report by Fadzil (1977). The data was collected from abattoirs and farms from



six states over a period of five years, that is from 1971 to 1975. There are at least 156 species of nematodes, trematodes, cestodes and protozoa recorded among food animals in this country. The author suspects these parasites to cause considerable loss in terms of reduced weight gains, lowered milk production and indirect cause of death. Parasitism is mainly a chronic disease and losses due to it are not as striking as sudden deaths caused by bacterial or viral diseases. This explains the poor reporting and recording of parasitic cases and little is known of the extent to which helminth parasites adversely affects productivity of cattle in the tropics. The collection of this information should be given research priority as it will give economic perspective to recommendations on control as well as to refine control measures.

Nematodes form about 52 percent of the total endoparasites in food animals. Almost 62 percent of the endoparasites are in the digestive tract of cattle and buffaloes. Helminthiasis appears to be the most common parasitic condition among food animals in this country. Some of these helminths are pathogenic especially in young animals causing parasitic gastroenteritis. In cattle and buffaloes, helminthiasis makes up 73 percent of the total number treated for parasitism. A government farm record over a period of seven years showed that one out of 26 deaths in cattle was due to parasitism. Of these, protozoan infections constituted 66 percent while helminthiasis caused 34



percent of the deaths in cattle. From here Fadzil (1977) estimated the national loss due to deaths in cattle from parasites to be equivalent to M\$232,800 per annum. In bovines, the estimated cost of treatment was M\$9,300 per annum. Losses due to the reduction in milk yield (M\$2.9 million) and reduction in meat yield (M\$16.9 million) as a result of parasitism was considerable in cattle. Condemnation at abattoirs cost a further M\$741,000 per annum. Thus, the total estimated losses due to parasitism in bovines per annum in Malaysia is M\$21.8 million.

A survey of laboratory records of confirmed cases from 1971 to 1976, from the local Veterinary Diagnostic Laboratories, revealed the most important parasitic condition diagnosed was gastrointestinal helminthiasis, comprising of 125 cases out of 255 total diagnoses (49 percent). These were due to Mecistocirrus digitatus, Haemonchus placei and Bunostomum species. Although field records indicate that the most common treatment carried out is against helminthiasis, worm infestation continues to be prevalent (Anwar, 1977).

PARASITISM IN RELATION TO PRODUCTION

Insidious losses of productivity through reduced feed intake and decreased efficiency of feed utilization are often the largest economic losses (Leng, 1986). It is suggested that the underfed animals or animals without the correct balance of essential nutrients suffer the greatest production losses. It



is obvious that parasites deplete body proteins especially those circulating in the plasma. In addition, anaemia due to blood loss is also evident. These effects of parasitism increase the animal's need for absorbed amino acids and thus increase the requirement for protein relative to energy. This disparity causes loss in appetite. In addition, most parasitic infections impair the efficiency of digestion or absorption of nutrients, thus decreasing the availability of amino acids.

Investigations on the importance of low worm burdens in cattle have supported opposing viewpoints. The potential economic loss due to subclinical parasitism has been determined indirectly by anthelmintic treatment of cattle. Studies in this area are necessary before we can conclude that the benefit derived from anthelmintics is in fact due to removing the helminths harboured.

The effects of gastrointestinal parasites infestation on the performance of young Brahman-KK crosses was studied by Dahlan (1983). The study was initiated with naturally infected calves of day old to eight months of age and revealed that four types of parasites were encountered; namely, Strongyloides papillosus being the most common in young animals between the age of 17 to 75 days, followed by strongyles like Haemonchus, Trichostrongylus, Cooperia and Bunnostomum in calves of about 55 days old and older. Toxocara vitulorum was found in calves of 45 days onwards and coccidia such as Eimeria zuernii and E. bovis was rampant.

It was found that the average daily gain was significantly higher in calves with a lower egg count (epg). Strongyle infection showed clinical signs of rough hair coat, dry skin and soft feces. However, calves with Strongyloides or Toxocara infections did not show clinical signs although there were high egg counts. Coccidiosis showed clinical signs of bloody diarrhoea and dehydration, as well as a lower average daily gain (ADG). The reduction of about 155.4 g per day was noted in affected calves although treatment was given. It was concluded that drug therapy, namely oxfendazole and Sulphur drugs may clear the parasite from the intestinal tract but residual damage left by the parasite may persist for weeks and clinical recovery may be slow. A previous study by Dahlan (1981) on the effects of natural infestations of cattle tick and strongyle worms on the growth of Kedah-Kelantan, Brahman-KK and Hereford-KK weaners showed that there was no significant effect of the anthelmintic and acaricide treatments on the weight gain of KK weaners. The average daily gain (ADG) of KK calves was 0.268 kg/day. The Brahman-KK weaners showed some improvement on weight gain in treated animals (ADG=0.355 kg/day) but was not significant ($p>0.05$) whereas the Hereford-KK weaners showed a significant increase ($p<0.01$) in weight (ADG=0.417 kg/day) in treated animals. The strongyle egg counts were lowest in the control (untreated) KK animals as compared to control Brahman-KK and control Hereford-KK animals. All untreated animals with egg counts did not show any clinical signs indicating that worm burdens were generally at