UNIVERSITI PUTRA MALAYSIA

GASTROINTESTINAL PARASITISM IN MURRAH BUFFALO CALVES AND ITS RELATION TO MANAGEMENT OF SMALLHOLDINGS IN SELANGOR AND PERAK

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1984/85

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A project report submitted in partial fulfilment of the requirement for the degree of Doctor of Veterinary Medicine (D.V.M.) in the Faculty of Veterinary Medicine and Animal Science, Universiti Pertanian Malaysia.

January, 1985

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ACKNOWLEDGEMENT

First and foremost, the author wishes to extend her deepest appreciation and heartfelt thanks to supervisors of the project, namely Dr. Rehana bte. Abdullah Sani and Dr. Bashir Ahmad bin Fateh Mohamed for their advice, encouragement, guidance and assistance that led to the completion of the study. The author is also greatly indebted to Dr. Mohd. Nawi Abdul Rahman and Dr. Mak for their advice and guidance in the statistical analysis of the project's data.

The author also wishes to express her sincere thanks to the Dean, Faculty of Veterinary Medicine and Animal Science (FKVSP) and to Dr, Rahman, the Director of the Veterinary Research Institute (V.R.I.) at Ipoh for granting the required permission to use the facilities and vehicles available.

The author's survey in Perak would not have been possible without the aid of Dr. Pallanisamy (Herd Health, V.R.I.), Mr. John (Vet. Asst., Sg. Siput) and En. Zawawi (Vet. Asst., Tapah), for their introductions to the smallholders in these areas.

Special thanks are also extended to Mr, C.C. Lee and the Parasitology laboratory staff at U.P.M. and Mr, Christopher Rajamanickam and the Parasitology laboratory staff at V.R.I. for their invaluable help and advice in laboratory analysis. Thanks also to all who had in one way or another contributed to the successful completion of this study.

Finally, the author would like to thank Mrs, L.K. Chu for her help and the excellent typing of this project paper.

ABSTRACT

A survey consisting of fecal examination and questionaire on farm management was carried out on 7 smallholder Murrah buffalo farms in Perak and 6 farms in Selangor. Only calves of up to one year were included. It was found that there was high prevalence of coccidia, strongyles and Strongyloides in the farms. Toxocara and Trichuris were found to a lesser extent. Most of these infections were characterised by high egg or oocyst counts which may indicate heavy parasite burden. Some of the calves were clinically affected with signs of diarrhoea, anorexia, emaciation, anemia and dehydration.

Larval culture of the strongyle eggs indicate Haemonchus and Cooperia as the most common species. These parasites are commonly found in calves kept under unhygienic conditions. Management factors such as overcrowding and poor manure disposal were found to affect the egg count significantly. Drainage of the pens had no significant effect on the egg count but had an effect on the oocyst count. Concrete and trampled floor types had a lower helminth infection rate, as compared to grass bedding floors. Coccidiosis was found to be highest in trampled soil floor pens.

Other factors such as unorganised drenching, infrequent cleaning, poor nutrition and the tropical climate predisposes animals to parasitic infections readily. Despite these problems, buffalo dairying is still a profitable and encouraging venture.

parasitism is due to helminths. It was found that one ox died per farm per annum due to parasitism, thus bringing the national loss due to death by parasitism to $232,000 per annum. From the same study, it was found that there are 10 trematode species, 3 cestode species, 24 nematode species and 9 protozoan species in the digestive tract of Malaysian bovines. Helminthiasis of the digestive tract formed about 90.5% of all the parasitic diseases treated annually.

Toxocara species, Strongyloides species and coccidiosis have been found to be common among buffalo calves kept under unsanitary conditions. Adult animals are prone to snail-borne trematode parasites due to their habit of wallowing (Cockrill, 1974).

The present study was conducted to determine the parasitic status of smallholder buffalo calves with respect to management. It is hoped that this study will reveal some of the problems and constraints faced by the farmers which indirectly leads to economic loss.

2.0 LITERATURE REVIEW

Most research effort has been directed towards the control of diseases and parasitism in cattle. Therefore the buffaloes too have to some extent benefited as they share many common parasites with cattle. Fecal examination of calves by Pavlasek and Prokopic (1977) in Czechoslovakia, between the ages of 0.5 to 6 months kept in large calf houses revealed the presence of 8 coccidia species such as Eimeria bovis, E. zuernii and others. Five helminth species such as Strongyloides papillosus, Oesophagostomum radiatum, Trichocephalus ovis, Cooperia species and Ascaris suum. Calves may carry coccidia oocyst and helminth eggs on their feet during transportation to the calf house. Calves

1.0 INTRODUCTION

The buffalo or carabaos (kerbau), though often neglected is potentially one of man's most important domestic animals. Buffaloes were first domesticated some 4,500 years ago in the Indus Valley of the Indian subcontinent (Ranjhan, 1983). They are now found in about 40 countries around theworld. The present world population is approximately 150 million, three-quarters of which are in the rice growing areas of Asia. In Malaysia and other South-East Asian countries almost all buffaloes are kept on small farms, with only a few being raised on government and university farms for research and development purposes.

Buffaloes are of two types, namely, the river (Murrah) buffalo which is a dairy breed, and the swamp (Sawah) buffalo which is used for draught purposes. The 1982 Livestock Census reported that the total number of buffaloes in Malaysia is 179,636 of which only 2,641 heads are of the Murrah breed. In 1981, the Murrah buffalo population was 3,290 heads indicating a drop of 19.7% within a year. Inadequate feeding, health practices, inefficient milk marketing systems, lack of trained personnel for the development of both intensive and extensive systems of management and indiscriminate breeding are some of the factors contributing to the decline of the buffalo population.

Buffaloes are used as triple purpose animals; for meat, milk and draught. Thus in order to increase the productivity of these animals management and herd health should be improved. Malaysia being a tropical country favours the survival of parasites throughout the year. Parasitic diseases ranks among the most important cause for loss in production in buffaloes. Fadzil (1977) estimated that 73% of bovines treated for

parasitism is due to helminths. It was found that one ox died per farm per annum due to parasitism, thus bringing the national loss due to death by parasitism to $232,000 per annum. From the same study, it was found that there are 10 trematode species, 3 cestode species, 24 nematode species and 9 protozoan species in the digestive tract of Malaysian bovines. Helminthiasis of the digestive tract formed about 90.5% of all the parasitic diseases treated annually.

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b f already

infected with several species of coccidia and helminths. These workers also found that the number of parasite species and prevalence of infection increased with age.

Yearling dairy cattle were found to have strongyle parasitism with an incidence of 94% in Maine. This study conducted by Randall & Gibbs (1977) showed that the most commonly encountered genera were Ostertagia (85%) and Cooperia (81%). The incidence and degree of parasitism appeared to be related to environmental conditions.

In newly established, large intensive herds of cattle, helminth infection was present in calves in the first month of life, with increasing frequency up to five months and then with diminishing frequency (Kotria et al., 1978).

Nematode larvae has been found in the milk of nursing dams and may be an important source of infection in suckling animals, especially when nematodes show somatic migration or prenatal infection takes place. The nematodes incriminated are S. papillosus and T. vitulorum (Chauhan, Agrawal & Ahluwalia, 1974).

It was found that calves became infected with T. vitulorum when allowed to suckle dams with T. vitulorum larvae in the milk. It was thus concluded that the routes of infection with T. vitulorum is via the colostrum and prenatally, the dam effectively serving as a reservoir host for the parasite. (Mia et al., 1975).

Toxocara vitulorum infection becomes patent by the 19th to 21st day and by day 30, Haemonchus spp. and other trichostrongylid infections becomes evident. (Fernando et al., 1980). Clinical signs of heavy infections are diarrhoea and emaciation associated with butyric odour of breath. Due to the transmammary route of infection

there is no satisfactory chemotherapeutic approach to the control of T. vitulorum, however calves reared under all systems of production should be treated at three and six weeks after birth. In the long term control should be directed at reducing the level of environmental contamination with eggs of T. vitulorum by eliminating the worms before they commence to lay eggs (Copeman, 1982). Contaminated facilities may be disinfected as eggs are destroyed by exposure to direct sunlight for 1.5 hours, boiling water or immersion in 3% lysol for 0.25 hours (Chauhan, 1978).

Out of 230 buffalo calves brought for treatment, 60% were found to be positive for ascaris infection and 25% were positive for mixed infection of coccidia and Toxocara. The incidence was found to be high in winter and young calves between the ages of one to six months. "Vermex" was found to be effective at one gram (6 ml. per 4.5kg body weight). In calves with toxaemia, supportive treatment namely i/v administration of 5% dextrose, coramine and hot soapy water as an enema played a greater role in curing the animal (Satija et al., 1973).

Strongyloides papillosus infection is also acquired via the colostrum or from contaminated environment whereby larvae penetrates the skin. The high susceptibility of the preparasitic stages to dessication limits infection by the cutaneous route to wet periods, or situations where calves are confined to damp, unsanitary yards or stalls. Resistance to S. papillosus develops by 5 months of age. Serious infections may be avoided by keeping calves under dry, sanitary conditions or in the field with their dams under extensive grazing management. Strongyloides larvae in calf pens will be killed by dessication and exposure to sunlight and within 3 hours after washing pens with 5% formalin or 3% orthochlophenol (Copeman, 1982).

Other gastrointestinal parasites such as Haemonchus placei and Cooperia spp. produce most of the nematode eggs found in the feces of young cattle over 4 months of age. The most pathogenic species are H. placie, Mecistocirrus digitatus and Bunostomum phlebotomum. Haemonchus has a short prepatent period and a large egg laying capacity and is thus the most important pathogen. Mixed infections with a number of species occur with additive effects. Signs of chronic emaciation and death is seen in 6.5% of the weaned calves grazing on pasture. Calves were most susceptible to the effects of parasitism for the first 5 to 8 months after exposure to significant levels of infection. They then became immune and fecal egg counts and worm numbers dropped to low levels (Copeman, 1982).

Coccidiosis is found mostly in 3 to 6 months old calves (37,000 to 421,500 opg) with signs of weight loss and blood tinged diarrhoea. High counts of oocysts are seen in new born calves kept with adults for several weeks. This creates unsanitary conditions in paddocks with sandy floors resulting in a heavy buildup of oocysts. These conditions also favour the accumulation of ascarid eggs and strongyloid larvae which affect calves more seriously (Copeman, 1982).

Thus, it is of utmost importance that parasitism should be controlled through interruption of the epidemiological pattern by the use of anthelmintic treatment of the animals or by pasture management (Bliss, Jones & Conder, 1982).

3.0 MATERIALS AND METHODS

A study was made on 13 smallholdings with Murrah buffaloes. These comprise of two groups, that is seven farms in Perak and six farms in Selangor. The farms in Selangor are based around U.P.M.

that is in Sg. Besi, Serdang Lama, Kajang and Semenyih. In Perak, the smallholders were participants of the Milk Collecting Scheme at Sg. Siput, Tapah and Bidor. All the farms surveyed were chosen on the basis of easy access. Data collected include interviews for questionaires and fecal collection.

The questionaires covered most aspects of the farm management, herd establishment and population, calf housing, feeding practices and herd health. However, as no proper records were maintained by the smallholders, the data collected was almost entirely based on what the farmers recalled. A survey of the buffalo farm in Puchong was also done for comparison as it is an extensive type of farm.

Fecal samples were collected to assess the nature of parasitic infestation in the animals. About 5 to 20 gm of feces were collected per recta from each animal. Samples were collected from as many calves as possible below one year old, and brought to the lab within 2 to 3 hours for the following techniques to be performed:

(a) Simple Floation technique using sodium nitrate for qualitative assessment of thefecal sample for helminth eggs and coccidia oocysts.

(b) McMaster's Technique using sodium nitrate for quantitative assessment of the fecal sample for the number of helminth eggs and coccidia oocysts,

(c) Sedimentation technique to detect fluke eggs such as Fasciola spp. and paramphistomes.

(d) Fecal culture for infective larvae in cases where the fecal sample had a high strongyle egg count.

The above techniques were performed within 1 to 3 days of fecal collection. The animals were then classified according to age groups

and egg and oocyst counts. There were four major age groups; that is 0 to 3 months, >3 to 6 months, >6 to 9 months and >9 to 12 months. Animals with no eggs in the fecal samples were assumed to be uninfected. Egg counts of up to 200 epg were taken to denote a low egg count, >200 to 400 epg as medium count and >400 epg as high count. Similarly, animals with no oocysts were classified as uninfected, those with up to 500 opg as having a low count, >500 to 5000 opg as a medium count and >5000 opg as high count.

4.0 RESULTS

4.1 Management

The management of the farm was assessed based on several aspects of farm and herd establishment, herd population, buildings and facilities available for the calves, calf nutrition and herd health. These information was obtained by interviewing the farmer as well as personal observations (Appendix Table 15).

4.1.1 Farm and herd establishment

The smallholders in Selangor and Perak were predominantly Sikh (69%) and Pakistani (31%) due to the long family involvement in dairy buffalo farming. Most of the animals kept were inherited from the family herd and built up gradually by purchasing others. Out of the thirteen farms surveyed, 11 farms (84%) were established for 20 to 30 years or so whereas the other 2(16%) have been established for less than 13 years. None of the farmers have attended any formal training in animal husbandry.

The labour force were either family plus hired labour (23%) or family labour alone (77%). About 69% of the farmers live adjacent to the cow pens while 31% lived about half to one km away from their farms.

4.1.2 Herd population

Thirty eight percent of the farms had a total population of 60 to 80 head of buffalo, 31% with 40 to 50 heads and another 31% with 20 to 30 heads. Apart from the Murrah buffaloes, most farmers (69%) keep other animals such as dairy cattle (LID), goats andpoultry.

4.1.3 Calf housing

Of the 13 farms surveyed, 11 farms (84%) had calf pens. The other two farms (16%) without calf pens were in Perak whereby calves are allowed to roam freely with the adults in an enclosure. A shed is provided where adults and calves alike can take shelter on rainy days. Sixty two percent of the farms with calf pens had 2 separate pens, one for the older calves (more than 3 mo.) and one for the younger calves (less than 3 mo,). The two pens are separated by a low wooden wall by a long feed trough used for grass or concentrate.

The floor type varies with the 2 states. In Perak only soil (29%) and wooden (71%) floors are found. In Selangor, concrete flooring is found in 67% of the farms whereas 33% had floors of trampled soil and dry grass bedding. The roof was made of zinc in 9 out of 13 farms, The other calf pens had attap roofs. It was found that of the 11 farms with calf pens, 10 were overcrowded with less than 20 sq. ft. per calf, The recommended area per calf of 20 sq.ft. or more was found in only one farm in Selangor. The building was poorly constructed in 54% of the total farms, with discarded wooden boards and rusty zinc. Twenty three percent of the farms had well constructed sheds, using strong material and good planning. The rest, (71%) were considered fair (Appendix Table 3).

4.1.4 Calf Nutrition

Calves below 6 months are confined to the pens and allowed out to

their dams at milking time for milk let down. The farmers milk or 3 quarters only and leave the rest for the calf. Weaning is inconsistent as calves are allowed to suckle till the dam is dried off. Grass is provided to all age groups, with 85% of the farms practising cut and carry system as well as grazing for the older calves. In Perak, 3 farms grow improved pasture (guinea grass) fertilised by manure from the herd. The plots ranged from a quarter to one acre. Home made concentrate (e.g. sesame seed cake with molasses) mixed with water is used by 69% of all farms. Water is obtained from a nearby stream, pond, well or piped water.

.1.5 Herd heatlh

None of the farmers keep records of their farm management or production. Thus they are unable to produce reliable evidence of deworming programmes, identification, age, mortality rate etc. Hygiene and sanitation depends on several factors such as manure disposal, drainage status of the pens, use of disinfectants etc. Manure disposal is good in 62% of all the farms, whereby manure is removed from the pen and heaped up far away from thepen or used as fertiliser in the pasture plots. This reduces oocysts and egg contamination ofthe pens. The rest of the farms have poor manure disposal where the manure is thrown just outside the pen, trampled by animals and workers causing contamination of eggs and oocysts to the surrounding area.

The drainage status is classified as good, fair or poor. A well drained pen is found in only 3 of the 13 farms (23%) which is indicated by a dry pen area due to the sloping floors which does not allow water to stagnate. In poorly drained pens, (46%) the area is messy and wet with manure and water tagnating in puddles thus providing a good environment for eggs and oocysts survive; while the rest (31%) had fair drainage. Cleaning is done

once or twice a day depending on the condition of the pen. In most cases, the dung is removed and no disinfectants or water is used to wash the concrete floor.

Irregular deworming is practised in all farms in Selangor and Perak. Anthelmintics are given to calves only when there is a problem of diarrhoea, inappetance or depression. The anthelmintics are bought from the pharmacy or supplied by the government veterinarian. The common ones used are Nilverm, Nilzan, Piperazine and Zanil.

4.2 Gastro intestinal parasites

In Selangor six farms were surveyed; fecal examination revealed that all the farms had coccidia and Strongyloides. Strongyle eggs were found in 4 farms (67%), Toxocara in 3 farms (50%) and Trichuris in 2 farms (33%). A total of 81 calves were examined, showing that 88% of the animals were infected with coccidia, followed by 67% infected with Strongyloides, 40% infected with Strongyles, 11% infected with Toxocara and 5% infected with Trichuris (Appendix Table 1).

In Perak, 7 farms were surveyed; fecal examination showed that all the farms were having coccidiosis and Strongyles. Strongyloides was found in 4 farms (57%), Toxocara was found in 2 farms (29%) and Trichuris in 1 farm (14%). A total of 44 calves were examined, showing that 98% were infected with coccidia, 46% infected with Strongyles, 43% with Strongyloides, 5% with Toxocara and 2% infected with Trichuris (Appendix Table 2, Fig. 1 and Fig. 2).

4.2.1 Prevalence of Strongyle ova in calves of various age groups

In Selangor, the calves in the 6 to 9 month age group were found to have the highest infection rate for Strongyles (68%) followed by 40% infection rate in the 3 to 6 month old calves, 33% infection in the 9 to 12 month old calves and 15% infection rate in the 0 to 3 month old

age group. Analysis of variance (ANOVA) test revealed a significant effect of age of calves on egg counts. (P less than 0.1), showing that younger animals between 0 to 3 months old and older animals between 6 to 12 months have a higher rate of uninfected animals. In Perak, the highest infection rate was seen in the 9 to 12 month old group (67%). The lowest infection rate was seen in the 3 to 6 month old calves (30%). ANOVA test revealed a significant effect of age groups on egg count ($P<0.1$). Least significant difference at 1% level ($LSD_{0.1}$) indicates a significant difference between the age groups. (Appendix Table 5a & b).

4.2.2 Prevalence of Strongyloides ova in calves of various age groups

It was found that farms in Selangor had a 100% infection rate in calves between 9 to 12 months old, while 50% of the calves in the 0 to 3 months age group were infected. The 3 to 6 month and 6 to 9 month old calves showed infection rates of 74% and 71% respectively. ANOVA test revealed a significant effect of age group on egg count ($P<0.01$). LSD at 0.01 level indicates a significant difference between the 9 to 12 month old calves and the rest of the age groups.

In Perak, the highest infection rate of 100% was seen in calves between 0 to 3 months old and the lowest (30%) seen in the 3 to 6 months old calves. ANOVA test does not reveal a significant effect of the age of calves on egg count but $LSD_{0.1}$ indicates a significant difference between the age groups. (Appendix Table 6a & b).

4.2.3 Prevalence of Coccidia oocysts in calves of various age groups

Coccidiosis was found to be prevalent in all the farms in both states. In Selangor the infection rate was 90% or more in all the age groups except the 6 to 9 month old calves (79%). ANOVA test does not reveal a significant effect of age group on oocyst count but $LSD_{0.05}$ indicates a significant difference between the age groups.

In Perak, the infection rate was 100% in all age groups except the 6 to 9 month old calves (95%), ANOVA test does not reveal a significant effect of the age group on oocyst count. (Appendix Table 7a & b).

4.2.4 Prevalence of Toxocara vitulorum ova in calves of various age groups

Ascariasis was found mainly in the younger calves in both states, In Selangor, 20% of the 0 to 3 month old calves were infected and 13% of the 3 to 6 month old calves were infected. The other age groups had uninfected calves. ANOVA test between the 2 age groups indicated a significant difference at $p<0.1$.

In Perak, 50% of the 0 to 3 month old calves were infected but 5% of the 6 to 9 months old calves were infected, The rest of the age groups were not infected. The infected animals had up to 200 epg (low) and consist of only 2 animals from 2 farms thus no ANOVA test was done. (Appendix Table 8a & b).

4.3 Effect of overcrowding on egg and oocyst counts in Selangor farms

Of the 6 farms in Selangor only one farm can be considered as not overcrowded (>20 sq.ft.). Coccidiosis was found in 88% of the calves housed in overcrowded pens and in 100% of the calves in uncrowded pens. The ANOVA test revealed no significant effect of floor space on oocyst count. Helminthiasis was found in 88% of the calves in crowded pens and in 60% of the calves in uncrowded pen. The ANOVA test revealed a significant effect of floor space on nematode egg count ($p<0.1$) (Appendix Table 9).

4.4 Effect of housing on egg and oocyst counts in Perak farms

Out of the seven farms surveyed in Perak, 2 practised extensive type of management and 5 had pens for the calves but with less than

20 sq. ft. per calf. One hundred percent of the calves under extensive system were infected with coccidiosis compared to 97% of the calves in pens. The ANOVA test revealed no significant effect of type of systems on oocyst count.

In calves kept under the extensive system, 44% had helminthiasis compared to 77% calves infected with nematodes when kept in crowded pens. The ANOVA test revealed a significant effect of type of system on nematode egg count ($p<0.1$). (Appendix Table 10).

4.5 Effect of farm's floor type on egg and oocyst count

In Selangor, 87% of the calves kept on concrete floor were infected with coccidiosis while 93% of calves kept on grass bedding floor and 100% of the calves kept on trampled soil floors had coccidiosis. The ANOVA test revealed no significant effect of floor type on oocyst count but $LSD_{0.01}$ revealed a significant difference between concrete and other floor types. Helminthiasis was found in 83% of the calves on concrete floor and 100% of the calves on grass flooring but only 60% of the calves on trampled soil floor. The ANOVA test revealed a significant effect of floor type on nematode egg count ($p<0,01$) and $LSD_{0.01}$ revealed a significant difference between concrete and soil floors.

In Perak, coccidiosis was found in 97% of the calves on wood floor and 100% of the calves on soil floors. The ANOVA test revealed no significant effect of floor type on oocyst count. Helminthiasis was found in 77% of the calves on wood floor and 44% of the calves on soil floor. The ANOVA test revealed a significant effect of floor type on nematode egg count ($p<0.1$) (Appendix Table 11a & b).

4.6 Effect of farm's drainage on egg and oocyst count

In Selangor, the rate of infection of coccidiosis in a well drained, fairly drained and poorly drained farm are 85%, 86% and 96% respectively. The ANOVA test revealed no significant effect of drainage system on oocyst count but $LSD_{0.01}$ showed a significant difference between a well drained farm and fairly or poorly drained farm.

The rate of infection of helminthiasis in a well drained, fairly drained and poorly drained farm is 94%, 68% and 96% respectively. The ANOVA test revealed no significant effect of drainage system on nematode egg count.

In Perak, coccidiosis was found in 100% of the calves kept under good and poor drainage systems. Helminthiasis was found in 75% of the calves kept in poorly drained farms compared to 71% and 62% in well drained and fairly drained farms. The ANOVA test revealed no significant effect of drainage system on nematode egg count and oocyst count. (Appendix Table 12 a & b).

4.7 Effect of method of manure disposal on egg and oocyst count

In Selangor, coccidiosis was found in 86% of the animals which were kept in farms with a good manure disposal system as compared to 96% in farms with poor manure disposal system. The ANOVA test revealed no significant effect of method of manure disposal on oocyst count but $LSD_{0.01}$ showed a significant difference between a good method and poor method of manure disposal. Helminthiasis was found in 80% and 96% of the calves in farms with good and poor manure disposal methods respectively. The ANOVA test revealed a significant effect of method of manure disposal on nematode egg count ($p<0.1$).

In Perak, farms with good manure disposal showed 96% infection rate for coccidiosis and 70% infection rate for helminthiasis. Farms

with poor manure disposal showed that 100% of the calves had coccidiosis and 71% of the calves had helminthiasis. The ANOVA test revealed a significant effect of method of manure disposal on oocyst count (p 0.05) but no significant effect on nematode egg count. (Appendix Table 13 a & b).

4.8 Fecal Culture

Fecal culture was done from samples of all the 13 farms separately. It was found that the Strongyles were mainly of the genus Haemonchus and Cooperia. Fecal samples with the highest Strongyle egg count was used and calves of all ages were considered (Appendix Table 14).

5.0 DISCUSSION

In general, all the smallholder dairy buffalo farms had a high prevalence rate of coccidiosis. More than 50% of the calves had oocyst counts of between 500 to 5000 opg (medium count). Clinical signs of diarrhoea and debility were seen in calves with very high oocyst counts in the range of 10,000 opg and above. The general trend of coccidiosis among the various age groups indicates an overall high infection rate of 80% and above in calves between 0 to 6 months of age. This could be due to the heavy infective dose that the calves are exposed to as a result of poor drainage, floor type that retains oocysts, poor manure disposal, overcrowding as well as other factors. However the 6 to 9 month old calves experienced a lower infection rate as their immunity builds up but relapse again to show high counts after 9 months of age. The mortalities are seen in the younger calves. The older calves with high oocyst counts seem better able to tolerate the infection. Since infection of coccidia is via the oral route, prevention of contamination of food, water and pasture is an important method of controlling the infection. An examination of several cattle in Ibadan, Nigeria, suffering

from diarrhoea showed that the most prevalent species causing coccidiosis is E. zuerni (40.9%) followed by E. bovis (25.8%). The animals became dehydrated, unthrifty and finally died. Fecal oocyst counts ranged 300 to 7850/g, while strongyle egg count ranged from 0 to 500/g feces. The animals recovered after treatment with phthalysufathiazole at 1g/7kg body weight for 3 days (Obassaju et al., 1981).

Strongyloides papillosus infection was found in all the farms in Selangor but only in half the farms in Perak. This helminth is commonly found in young calves as a result of infection through the milk of the dam as well as the oral route (Chauhan et al., 1974).

In Selangor, only 20% of the 0 to 3 month old calves were infected with Toxocara, half of which had high egg count (more than 400/epg). In Perak, only 2 animals had Toxocara eggs, both with a low count of 200 epg. Soulsby (1965) reported that the infection could be acquired prenatally or early post natal period, within 24 hours of birth. The sojourn of the worms in the gut does not extend beyond 3 months. Treatment of ascariasis with piperazine compounds has reduced mortality and morbidity thereby reducing the environmental contamination. Treatment is recommended at 15 to 31 days of age when mature worm burdens are at their peak. Piperazine which is efficient against immature worms can be used on even younger animals as eggs are found in the feces of buffalo calves as young as 7 days old. Nilverm given orally at 20 mg/kg body weight in a 2% solution or subcutaneously at 15 mg/kg in a 15% aqueous solution was highly effective and well tolerated (Shiknov, 1971). Bhatnagar (1980) reported that fecal examinations of buffalo calves less than 6 months old showed 28% harboured T. vitulorum. Calves less than 15 days old and between 6 months and 10 years old were not infected.

The commonly found infective larvae (L_3) were Haemonchus spp. and Cooperia spp. These are nematode parasites of the abomasum and small intestine respectively. Animals show signs of anorexia and diarrhoea due to villous atrophy which results in impairment of absorption. Haemonchosis may become a big problem in the farm if control measures are not taken as the parasite has a high biotic potential and fecal egg counts are typically many times higher than in most other species (5,000 to 20,000epg). The development of eggs on pasture to infective stage is extremely rapid under suitable conditions (30^{o}C and adequate moisture). The sudden occurrence of acute clinical disease and death in a previously healthy herd typically occurs after a significant period of heavy rainfall.

Randall and Gibbs (1981) reported that clinical parasitism causes a reduction in feed intake and nutrient digestibility resulting in depressed weight gain. Sub-clinical infection which is seen with low levels of parasitism could result in appreciable losses in young animals. Adrichem (1977) reported that gastrointestinal nematode infection of young cattle can have a relatively long term deleterious effect on growth performance and milk production at the first lactation.

The floor space is important in determining the amount of eggs or oocysts that will be available to a susceptible calf. There is a significantly higher rate of animals with helminthiasis in a crowded pen although coccidiosis was seen in equally high numbers in a crowded as well as not crowded pen. For the floor type, trampled soil had a significantly lower infection rate of helminthiasis as compared to wood, concrete and grass, in increasing order of infection. Coccidiosis was found to be prevalent on all floor types with the lowest infection in concrete floor pens. Drainage ofthe pens did not

indicate any difference in prevalence of helminthiasis although coccidiosis was found to be considerably lower in a well-drained pen. Manure disposal was important in determining the amount of contamination as there is a significant increase in prevalence of helminthiasis in farms with poor manure disposal system. Coccidiosis too was found to be higher in these farms.

It is obvious that weaning calves by grouping them by themselves especially in wet, crowded unsanitary conditions provide favourable circumstances for the rapid buildup of parasites in the pen. Infection rates will be moderated in calves grazed with adults or fed forage cut (grass) from areas where adults graze. As a result they will suffer less but take a longer time to become immune, compared to weaned animals grazing together. Under most management systems calves are exposed to high levels of infection after weaning when they rely on grazing for sustenance. Also a lower nutritional status after weaning makes weaned calves more susceptible to the clinical effects of parasitism. Thus the value of providing feed supplement to the weaned calves to promote growth and reduce the effects ofnematode parasitism is very important (Copeman, 1982).

Thus, as a whole there are several reasons which could contribute to the endemic parasite problem in small holder dairy farms, Malaysia, with its hot, wet climate is favourable for many species of parasites. The poor nutritional status of many calves predispose them to clinical infections of parasitism. In many farms cut grass of poor quality is supplied to the calves apart from home mixed concentrate for the older calves and dam's milk (residual milk after milking) for the younger calves of less than 3 months. Some farms had improved pasture fertilised with manure from the herd which in turn can contaminate the pasture

with parasite eggs from the feces. Overcrowding found in many calf pens together with poor sanitation, disposal of dung around the pen and infrequent cleaning causes a massive buildup of eggs and oocysts which infect susceptible calves leading to a serious parasite problem. Poor drainage of farms around low lying areas may have wet, muddy ground providing good microenvironment for parasites. The drenching practised by all the farmers is irregular and unorganised and done only when there is evidence of a parasite problem.. It is not carried out at regular intervals to check the parasitic problem thus causing an endemic situation (Appendix Table 14, Fig. 3a,b,c, Fig. 4 and Fig. 5).

6.0 CONCLUSION

The survey done revealed the common parasites found in the Murrah buffalo calves, namely; Eimeria, Strongyloides, Strongyles, Toxocara and Trichuris, in order of importance.

Several factors contribute to the endemic parasitic problem in the farms. Management factors such as poor nutrition, poor housing, drinage, sanitation and hygiene overgrazed grazing ground as well as the unorganised drenching practised all contribute to the buildup of infections in the calves. Communal grazing grounds by the roadside or riverside help to further transfer parasitic infections from infected animals to uninfected animals. Above all, our tropical climate encourages and supports the continuity of the parasitic problem.

It is thus recommended that infected animals should be regularly drenched to control their parasitic burden. Infected pastures should not be grazed by drenched animals as they may get reinfected. The poor housing conditions should be improved and more attention should be paid to the calf nutrition, hygiene and sanitation in the farm.

There is an urgent need for effective extension service and aids by government institutions and private sectors, in terms of finance and animal husbandry training to farmers, if smallholder dairy farming and calf management is to be improved.

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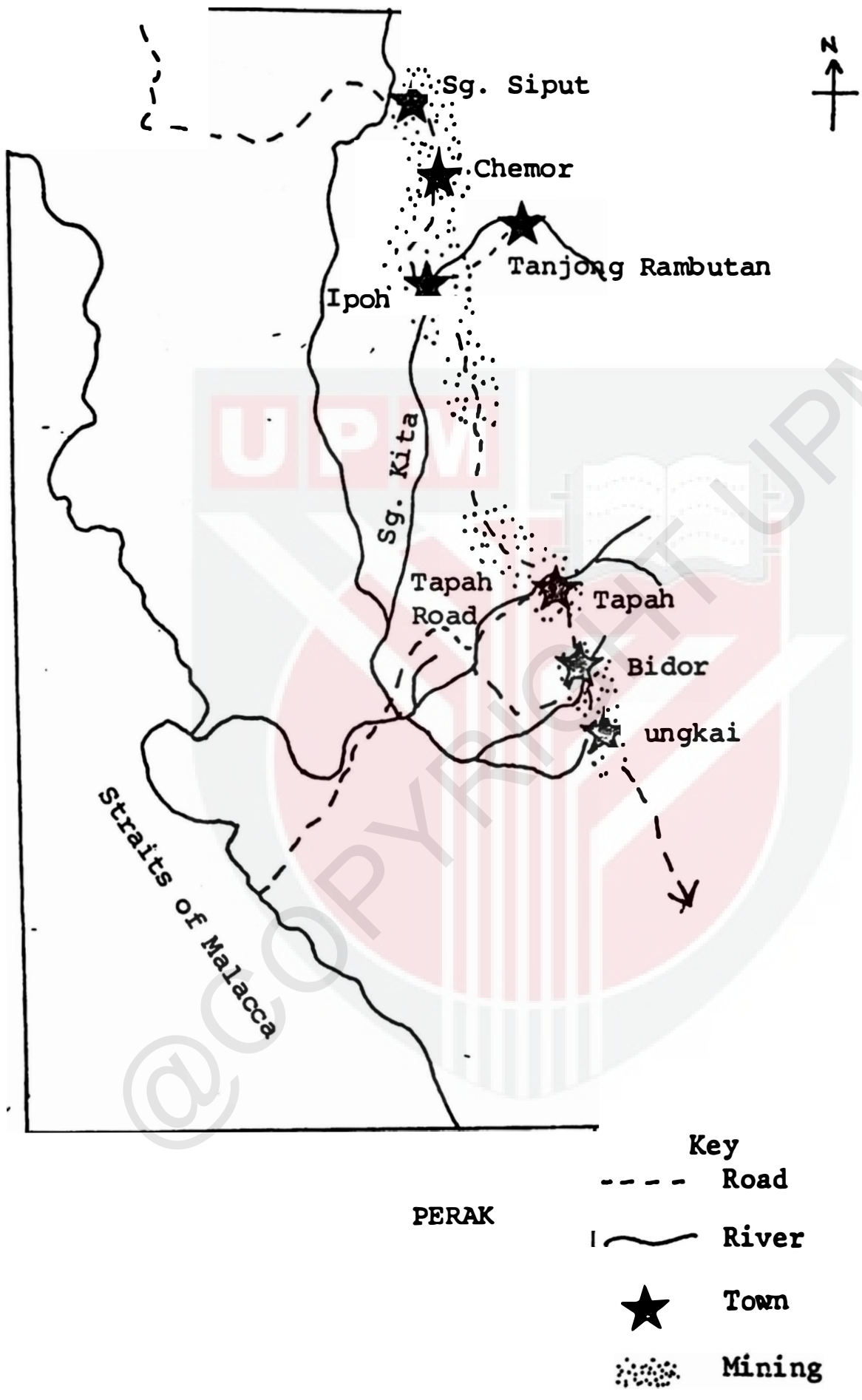
APPENDIX A

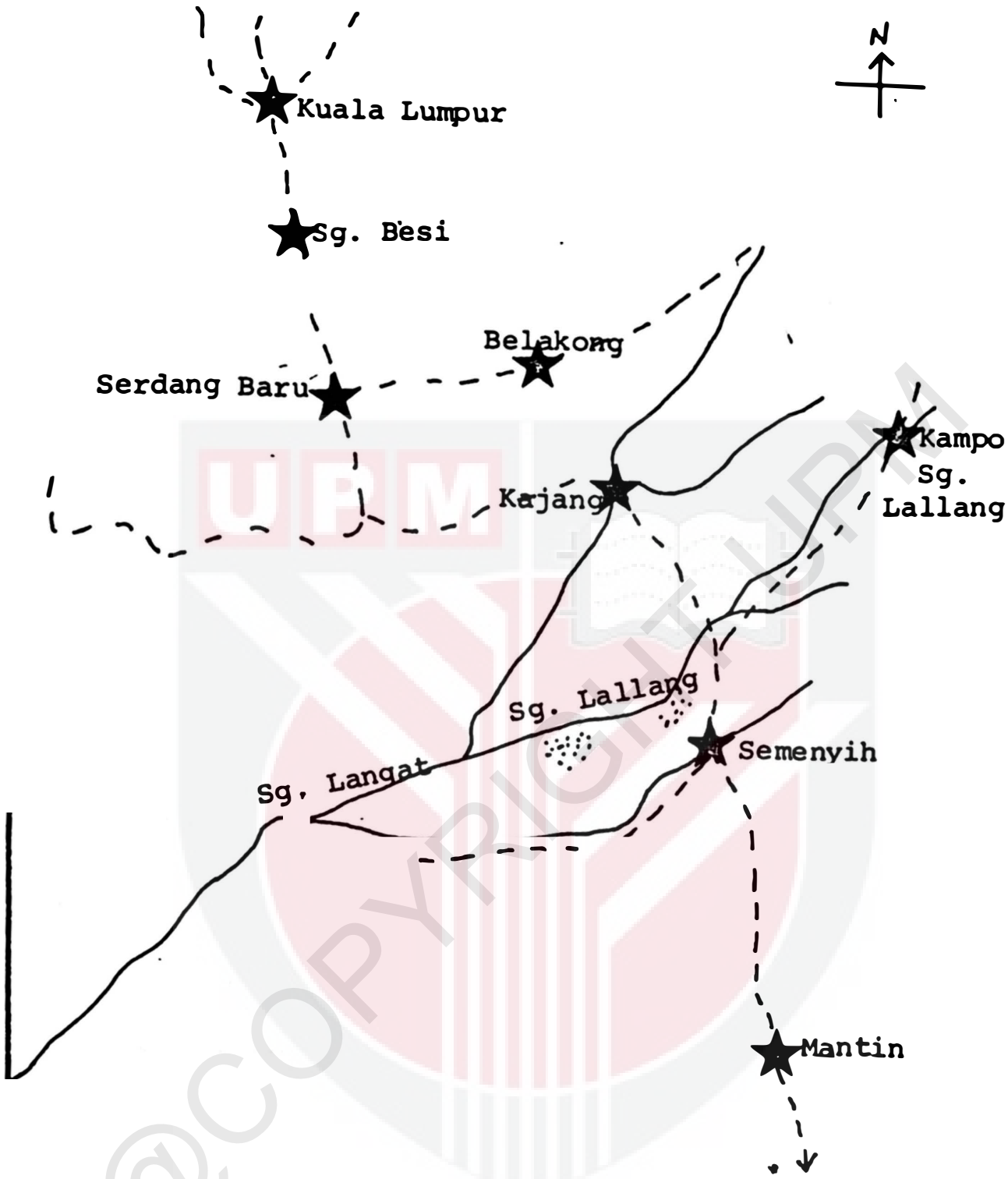
List of farmers and their addresses

1.	Niranjan Singh	Batu 10½, Jalan Balakong, Serdang, Selangor.
2.	Magar Singh	Bangi (UKM), Selangor
3.	Harnik Singh	Bangi, Selangor
4.	Ranjit Singh	Sg. Lallang, Selangor
5.	Razîah Begum Amirullah	28 mile, Sg. Lallang (Jalan Kacau), Selangor.
6.	Puan Jamilah	Sg. Lallang, Semenyih, Selangor.
7.	Puchong Buffalo Farm	Puchong (UPM), Selangor.
8.	Bachan Singh	34136, Kg. Che Zainal, Chemor, Perak.
9.	Jelidin Ibrahim	592, Simpang Jalong, Sg. Siput, Perak
10.	Chandu Din	Kanthan Baru, Perak.
11.	Kartar Singh	SS 16, Bidor, Perak.
12.	Pajan Singh	4th mile Tapah Road, Perak.
13.	Chanan Singh	Sungkai Estate, Sungkai, Perak.
14.	Manjit Singh	SS 9 Sikh Settlement, Bidor, Perak.

APPENDIX B1 Map of Location and Distribution of Farms



APPENDIX B2 Map of Location and Distribution of Farms.



SELANGOR

APPENDIX C

Table 1 Presence of GIT parasites in smallholder buffalo calves. (S'gor)

Parasites	farms affected		animals affected	
	No.	%	No.	%
Coccidia	6	100	71	87.7
Strongyle	4	66.7	32	39.5
Strongyloides	6	100	54	66.7
Toxocara	3	50	9	11.1
Trichuris	2	33.3	4	4.9

Table 2. Presence of GIT parasites in smallholder buffalo calves. (Perak)

Parasites	farms affected		animals affected	
	no.	%	no.	%
Coccidia	7	100	43	97.7
Strongyle	7	100	20	45.5
Strongyloides	4	57.1	19	43.2
Toxocara	2	28.6	2	4.5
Trichuris	1	14.3	1	2.3

Table 3. Summary on Calf Management in S'gor and Perak

Item	No. of farms (S'gor)	%	No. of farms (Perak)	%
Calf pen				
Present	6	100	5	71.4
No. of pens				
1	1	16.7	2	28.6
2	5	83.3	3	42.9
Floor type				
Concrete	4	66.7		
Grass	1	16.67		
Soil	1	16.67	2	28.6
Wood			5	71.4
Area/calf				
20 sq. ft	5	83.3	5	71.4
	1	16.7	2	28.6
Roof				
Attap	2	33.5		
Zinc	4	66.7	5	71.4
Manure disposal				
Good	4	66.67	4	57.1
Poor	2	33.33	3	42.9
Drainage				
Good	2	33.3	1	14.3
Fair	2	33.3	2	28.6
Poor	2	33.3	4	57.1
Deworming				
Irregular	6	100	7	100

Sample population	S'gor	Perak
Total farms	6	7
Total calves	81	44

Table 4. Table of fecal samples taken and age group classification

FARM (Selangor)	TOTAL NO. OF CALVES IN FARM	SAMPLES TAKEN	0-3m	>3-6m	>6-9m	>9-12m
Farm 1.	35	17	6	11		
Farm 2.	40	14	6	8		
Farm 3.	30	20	5	8	6	1
Farm 4.	23	14		2	11	1
Farm 5.	20	11			11	
Farm 6.	8	5	3	1		1
Total	156	81(52%)	20	30	28	3
Farm 7.	Puchong					
(Perak)						
Farm 8.	20	6		6		
Farm 9.	7	3		3		
Farm 10.	12	4		4		
Farm 11.	15	9	1		7	1
Farm 12.	14	7			7	
Farm 13.	10	8	1		5	2
Farm 14.	7	7		7		
Total	85	44 (52%)	2	20	19	3

Table 5a. Prevalence of Strongyle ova in calves of various age groups (Selangor)

	epg age(m)	Uninf. f	%	Low (200) f	%	Med. (>200-400) f	%	High (>400) f	%	% inf.
A	0-3	17	85	0	0	1	5	2	10	15
B	>3-6	18	60	1	3.3	6	20	5	16.7	40
C	>6-9	9	32	8	28.6	9	32.2	2	7.2	68
D	>9-12	2	67	0	0	1	33	0	0	33

NB. 1. ANOVA Test revealed a significant effect of age of calves on egg counts. (P less than 0.1).

2. $LSD_{0,1}$ indicated significant difference between B versus D and C versus D.

Table 5b. Perak

	egp age(m)	Uninf. f	%	Low (200) f	%	Med. (>200-400) f	%	High (>400) f	%	% inf.
A	0-3	1	50	1	50	0	0	0	0	50
B	>3-6	14	70	2	10	3	15	1	5	30
C	>6-9	8	42	3	16	3	16	5	26	57
D	>9-12	1	33.3	0	0	1	33.3	1	33.3	66.6

NB. 1. ANOVA Test revealed a significant effect of age of calves on egg counts. (P less than 0.1)

2. $LSD_{0,1}$ indicates significant difference between B vs A.D. and C vs A.D.

Table 6a. Prevalence of Strongyloides ova in calves of various age groups (Selangor)

	epg age(m)	Uninf. f	%	Low(200) f	%	Med(>200-400) f	%	High(>400) f	%	% inf.
A	0-3	10	50	1	5	2	10	7	35	50
B	>3-6	8	26	6	20	5	17	11	37	74
C	>6-9	8	29	4	14	6	21	10	36	71
D	>9-12	0	0	0	0	2	66.7	1	33.3	100

N.B. 1. ANOVA test reveals a significant effect of age of calves on egg count (P less than 0.01).

2. $LSD_{0.01}$ indicates that there is a significant difference between D vs A.B.C.

Table 6b Perak

	epg age(m)	Uninf. f	%	Low(200) f	%	Med(>200-400) f	%	High(>400) f	%	% inf.
A	0-3	0	0	1	50	0	0	1	50	100
B	>3-6	14	70	3	15	0	0	3	15	30
	>6-9	9	47	1	5	2	11	7	37	53
D	>9-12	2	67	0	0	0	0	1	33	33

N.B. 1. ANOVA Test does not reveal a significant effect of the age of calves on egg count

2. $LSD_{0.1}$ indicates a significant difference between B vs A.D. and C vs A.D.

Table 7a. Prevalence of Coccidia oocysts in calves of various age groups (Selangor)

	opg age(m)	Uninf. f	%	Low(500) f	%	Med(>500-5000) f	%	High(>5000) f	%	% inf.
A	0-3	2	10	0	0	7	35	11	55	90
B	>3-6	1	3	2	7	18	60	9	30	97
C	>6-9	6	21	4	14	11	40	7	25	79
D	>9-12	0	0	1	33.3	1	33.3	1	33.3	100

NB. 1. ANOVA test does not reveal a significant effect of the age of calves on oocyst count

2. $LSD_{0.05}$ indicates a significant difference between D vs B.C.

Table 7b Perak

	opg age(m)	Uninf. f	%	Low(500) f	%	Med(>500-5000) f	%	High(>5000) f	%	% inf.
A	0-3	0	0	0	0	2	100	0	0	100
B	>3-6	0	0	0	0	15	75	5	25	100
C	>6-9	1	5.3	0	0	0	0	18	94.7	94.7
D	>9-12	0	0	1	33	2	67	0	0	100

NB. 1. ANOVA test does not reveal a significant effect of the age of calves on oocyst count.

2. LSD does not indicate a significant difference between A,B,C,D.

Table 8a. Prevalence of Toxocara vitulorum ova in calves of various age groups (Selangor)

	epg age(m)	Unif f	Unif %	Low(200) f	Low(200) %	Med(>200-400) f	Med(>200-400) %	High(>400) f	High(>400) %	% inf
A	0-3	16	80	1	5	1	5	2	10	20
B	>3-6	26	87	1	3	1	3	2	7	13
C	>6-9	28	100	0	0	0	0	0	0	0
D	>9-12	3	100	0	0	0	0	0	0	0

Table 8b. Perak

	epg age(m)	Unif f	Unif %	Low(200) f	Low(200) %	Med(>200-400) f	Med(>200-400) %	High(>400) f	High(>400) %	% inf
A	0-3	1	50	1	50	0	0	0	0	50
B	>3-6	20	100	0	0	0	0	0	0	0
C	>6-9	18	95	1	5	0	0	0	0	5
D	>9-12	3	100	0	0	0	0	0	0	0

Table 9. Relationship between oocyst count and nematode egg counts in calves with floor space.

Selangor

	opg(epg) space/calf	0 f	200-400 f	>400-800 f	>800 f	Total	% inf
A	<20sq.ft	9(10)	7(23)	3(9)	57(34)	76	88(88)
	>20sq.ft	0(2)	0(3)	1(0)	4(0)	5	100(60)
	Total	9(12)	7(26)	4(9)	61(34)	81	

NB. 1. ANOVA test revealed no significant effect of floor space on oocyst count

2. LSD revealed no significant difference between A vs B

(1) ANOVA test revealed a significant effect of floor space on nematode egg count. (P less than 0.1)

(2) $LSD_{0.1}$ revealed a significant difference between A vs B

Table 10. Relationship between oocyst and nematode egg counts in calves with type of housing

	opg(epg) system	0	200-400	>400-800	>800	Total	% inf
A	Ext.	0(5)	0(3)	2(1)	7(0)	9	100(44)
B	Pen	1(8)	1(10)	1(10)	32(7)	35	97(77)
	Total	1(13)	1(13)	3(11)	39(7)	44	

N.B. 1. ANOVA test revealed no significant effect of type of system on oocyst count.

2. LSD revealed no significant difference between A vs B

(1) ANOVA test revealed a significant effect of type of system on nematode egg count. (p less than 0.1)

(2) $LSD_{0.1}$ revealed a significant difference between A vs

Table 11a. Relationship between oocyst and nematode egg count in calves with various floor types

Selangor

	opg(epg) floor	0	200-400	>400-800	>800	Total	% inf
A.	concrete	8(10)	3(17)	1(9)	50(26)	62	87(83)
B.	grass	1(0)	4(5)	3(1)	6(8)	14	93(100)
C.	soil	0(2)	0(3)	1(0)	4(0)	5	100(60)
	Total	9(12)	7(25)	5(10)	60(34)	81	

N.B. 1. ANOVA test revealed no significant effect of floor type on oocyst count.

2. $LSD_{0.01}$ revealed a significant difference between A vs B,C. and B vs C.

(1) ANOVA test revealed significant effect of floor type on nematode egg count. (P less than 0.01)

(2) $LSD_{0.01}$ revealed a significant difference between A vs C

Table 11b. Perak

	opg(epg) floor	0	200-400	>400-800	>800	Total	% inf
A.	Wood	1(8)	1(10)	1(10)	32(7)	35	97(77)
B.	Soil	0(5)	0(3)	2(1)	7(0)	9	100(44)
	Total	1(13)	1(13)	1(13)	39(7)	44	

N.B. 1. ANOVA test revealed no significant effect of floor type on oocyst count.

2. LSD revealed no significant difference between A vs B

(1) ANOVA test revealed a significant effect of floor type on nematode egg count (P less than 0.1).

(2) $LSD_{0.1}$ revealed a significant difference between A vs B

Table 12a Relationship between oocyst and nematode egg count in calves with the various drainage system

Selangor

	opg(epg) drainage	0	200-400	>400-800	>800	Total	% inf.
A.	Good	5(4)	1(9)	1(5)	27(16)	34	85(94)
B.	Fair	3(7)	2(4)	1(3)	16(8)	22	86(68)
C.	Poor	1(1)	4(12)	3(2)	17(10)	25	96(96)
	Total	9(12)	7(25)	5(10)	60(34)	81	

N.B. 1. ANOVA test revealed no significant effect of drainage system on oocyst count

2. $LSD_{0.01}$ revealed a significant difference between A vs B.C.

(1) ANOVA test revealed no significant effect of drainage system on nematode egg count.

(2) LSD revealed no significant difference between the three drainage types.

Table 12b. Perak

	opg(epg) drainage	0	200-400	>400-800	>800	Total	% inf.
A.	Good	0(2)	0(1)	0(3)	7(1)	7	100(71)
B.	Fair	1(5)	1(6)	0(2)	11(0)	13	92(62)
C.	Poor	0(6)	0(6)	3(6)	21(6)	24	100(75)
	Total	1(13)	1(13)	3(11)	39(7)	44	

N.B. 1. ANOVA test revealed no significant effect of drainage system on nematode egg count and oocyst count.

2. LSD revealed no significant difference between the three drainage types.

Table 13a. Relationship between oocyst and nematode egg count in calves with method of manure disposal

Selangor

opg(epg) disposal	0	200-400	>400-800	>800	Total	% inf.
Good	8(11)	3(13)	2(8)	43(24)	56	86(80)
Poor	1(1)	4(12)	3(2)	17(10)	25	96(96)
Total	9(12)	7(25)	5(10)	60(34)	81	

N.B. 1. ANOVA test revealed no significant effect of method of manure disposal on occyst count.

2. $LSD_{0.01}$ revealed a significant difference between A vs B.

(1) ANOVA test revealed a significant effect method of manure disposal on nematode egg count (P less than 0.1)

(2) $LSD_{0.05}$ revealed a significant difference between A vs B.

Table 13b.

Perak

opg(epg) disposal	0	200-400	>400-800	>800	Total	% inf,
Good	1(8)	1(9)	0(8)	25(2)	27	96(70)
Poor	0(5)	0(4)	3(3)	14(5)	17	100(71)
Total	1(13)	1(13)	3(11)	39(7)	44	

N.B. 1. ANOVA test revealed significant effect of method of manure disposal on oocyst count (P less than 0.05)

2. $LSD_{0.05}$ revealed a significant difference between A vs B.

(1) ANOVA test revealed no significant effect of method of manure disposal on nematode egg count.

(2) LSD revealed no significant difference between A vs B

Table 14. Fecal culture of samples with high nematode egg count (Selangor & Perak)

Farm	Age of animals (M)	Larval count			Egg count	
		Haem	Coop	S'loides	S'loides	S'le
Farm 1	3-6	0	0	20	4800	400
	3-6	0	0	20	3200	0
	3-6	0	0	20	5600	0
Farm 2	3-6	12	8	0	0	400
	3-6	15	5	0	800	800
Farm 3	3-6	7	13	0	400	1600
	9-12	3	17	0	400	400
Farm 4	6-9	5	0	15	600	400
Farm 5	9-12	2	0	18	400	0
Farm 6	6-9	0	0	20	8400	0
	6-9	0	0	20	2000	400
Farm 7	Puchong					
Farm 8	3-6	5	15	0	0	200
	3-6	8	12	0	0	400
Farm 9	3-6	0	20	0	0	600
Farm 10	3-6	0	20	0	00	400
Farm 11	3-6	0	0	20	200	200
Farm 12	6-9	2	0	18	0	600
	6-9	4	0	16	0	600
Farm 13	3-6	0	0	20	800	1800
	3-6	0	0	20	1600	1400
Farm 14	3-6	0	2	18	200	400

Table 15.

Summary of Survey conducted on Smallholder Buffalo farms

Farm	Total samples	Building (calf pen) floor	area/calf (sq.ft)	roof	constr.	Nutrition grass	conc.	water source	Hygiene Manure disposal	drainage	cleaning (X/day)	Deworming Drug	age of 1st Deworming	Frequency
1.	17		8	attap	poor	I&II	-	Tank	good	fair	1	Nilv/ Nilz	8-12 w	irregular
2.	14		15	zinc	fair	I&II	+	river	good	good	1	Nilv	3 w	irregular
3.	20		10	zinc	good	I&II	+	well	good	good	1	Nilv	2 w	irregular
4.	14		4	attap	poor	I&II	-	pond	poor	poor	1	Zan/ Sulf	3 w	irregular
5.	11		4	zinc	poor	I&II	+	river	poor	poor	1	Nilz	8 w	irregular
6.	5		30	zinc	good	I&II	-	river	good	fair	1/2	Nilv	3 w	irregular
7.	Puchong													
8.	6	-	-	zinc	poor	II	+	well	poor	poor	1/wk	Zan	4 w	irregular
9.	3	-	-	zinc	poor	II	-	pond	poor	poor	1	Eridor	1 w	irregular
10.	4	wood	5	zinc	fair	I&II	+	pond	good	fair	1	Nilv/ Nilz	1 w	irregular
11.	9	wood	5	zinc	fair	I&III	+	river	good	fair	1	Antisan	1 w	irregular
12.	7	wood	8	zinc	good	I&III	+	tank	good	good	1	Nilz	1 w	irregular
3.	8	wood	3	zinc	poor	I&II	+	well	poor	poor	1	H.A.	1 w	irregular
14.	7	wood	4	zinc	poor	I&III	+	well	good	poor	1/2	Antepar	1 w	irregular

Source of grass

= grazing at roadside or riverside, fields, wasteland

II = cut and carry grass from roadside, etc.

III = cut and carry grass from planted plot

Concentrate + = available - = not available

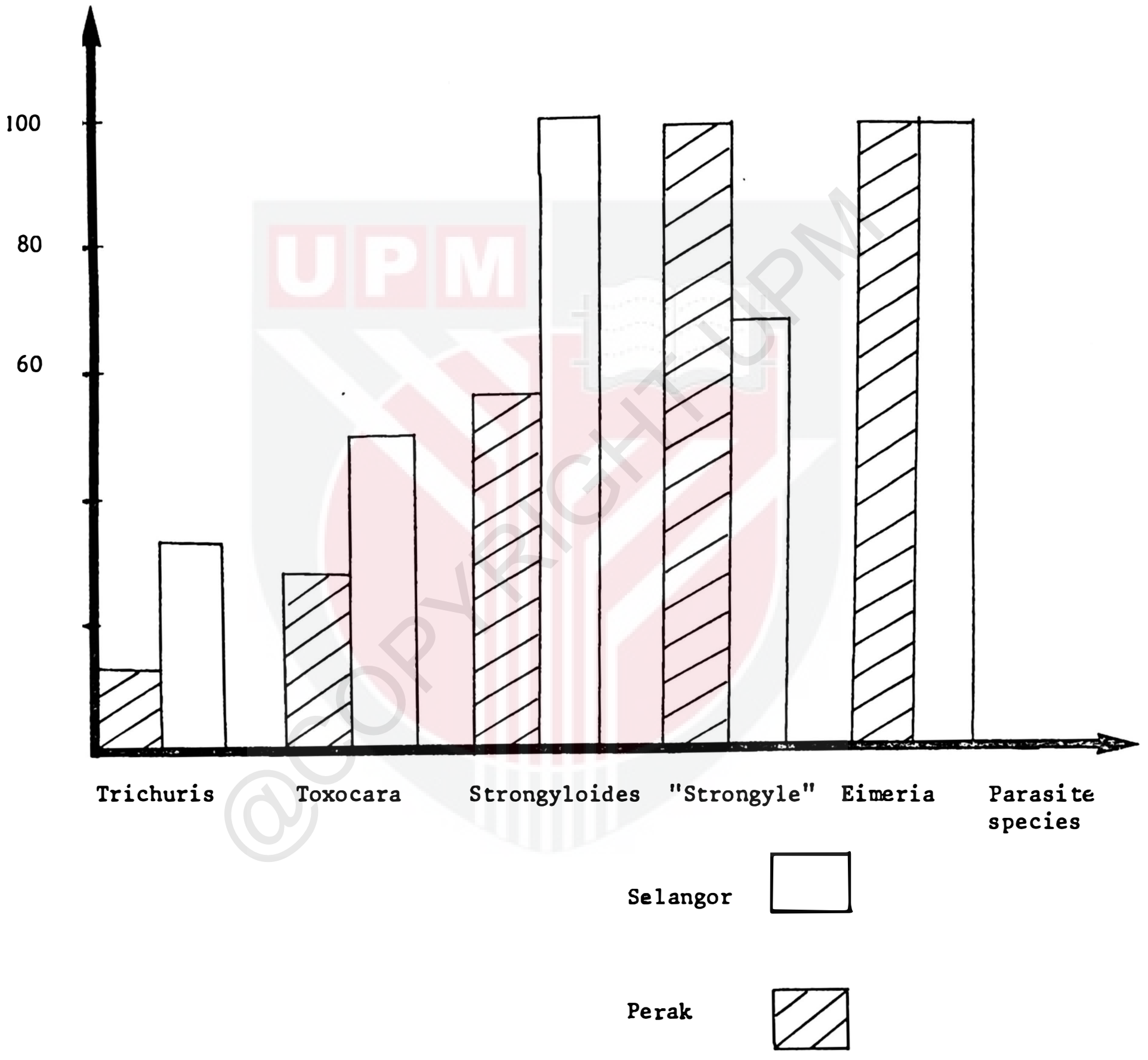


Fig 1: Graph of the Percent Farms Affected Versus The Various Parasite Species

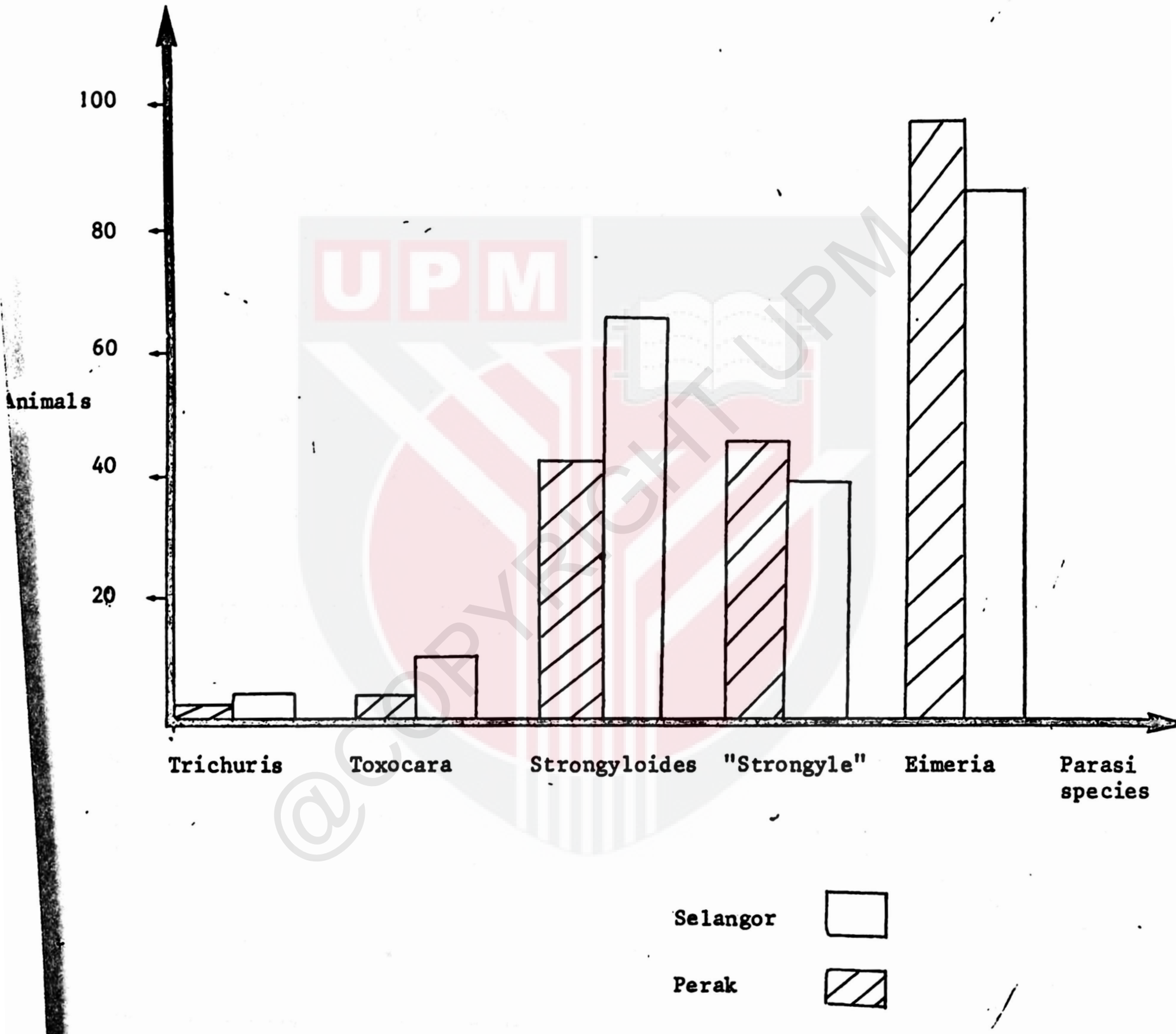


Figure 2: Graph of the Percent Animals Affected Versus The Various Parasite Species

Graph of percent nematode infection versus age of calves

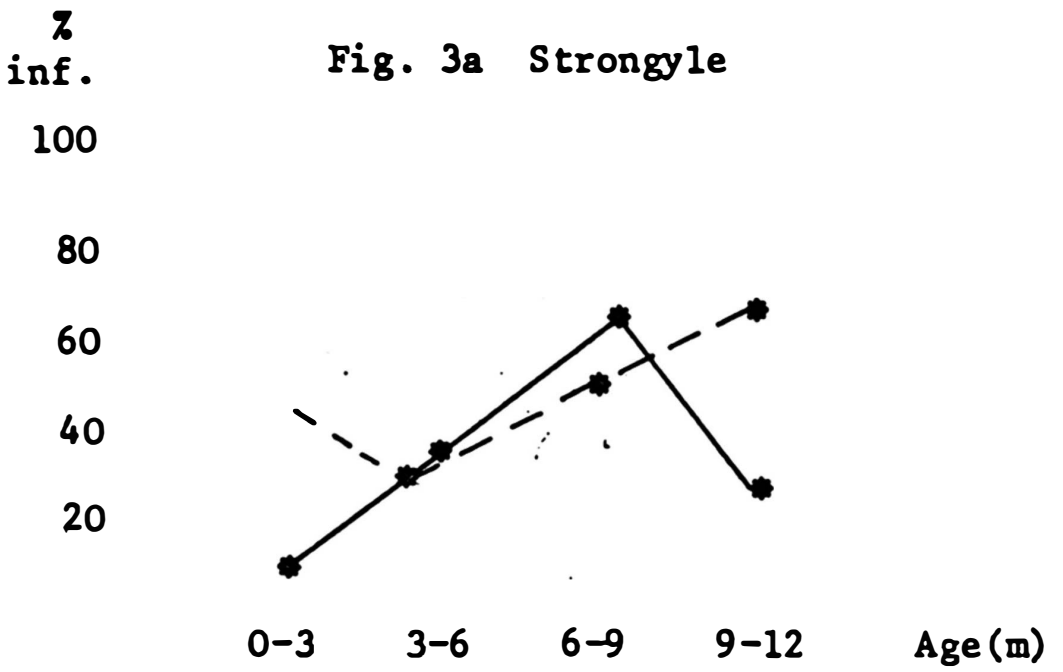


Fig. 3a Strongyle

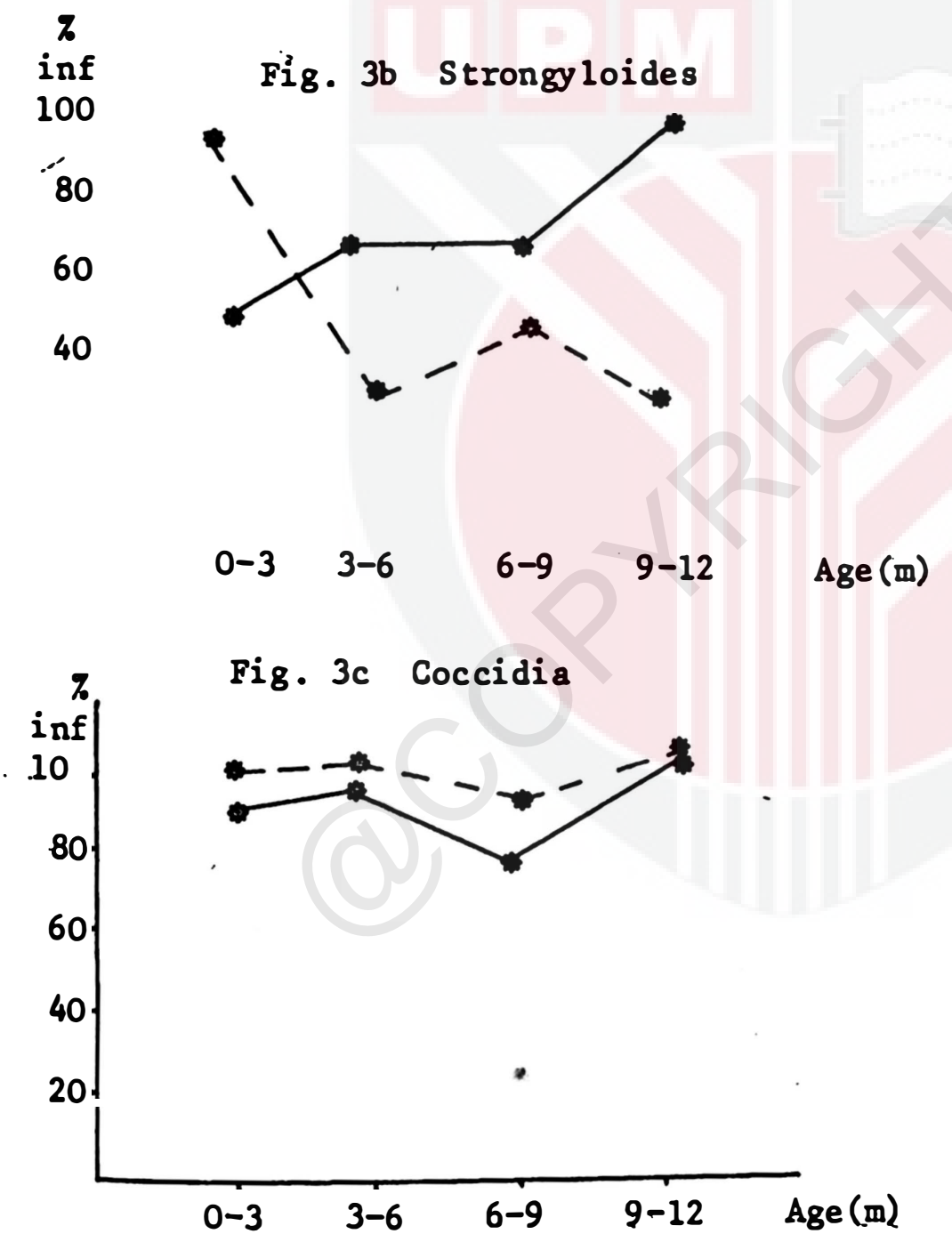


Fig. 3b Strongyloides

Fig. 3c Coccidia

KEY:

- - - - - Perak

——————— Selangor

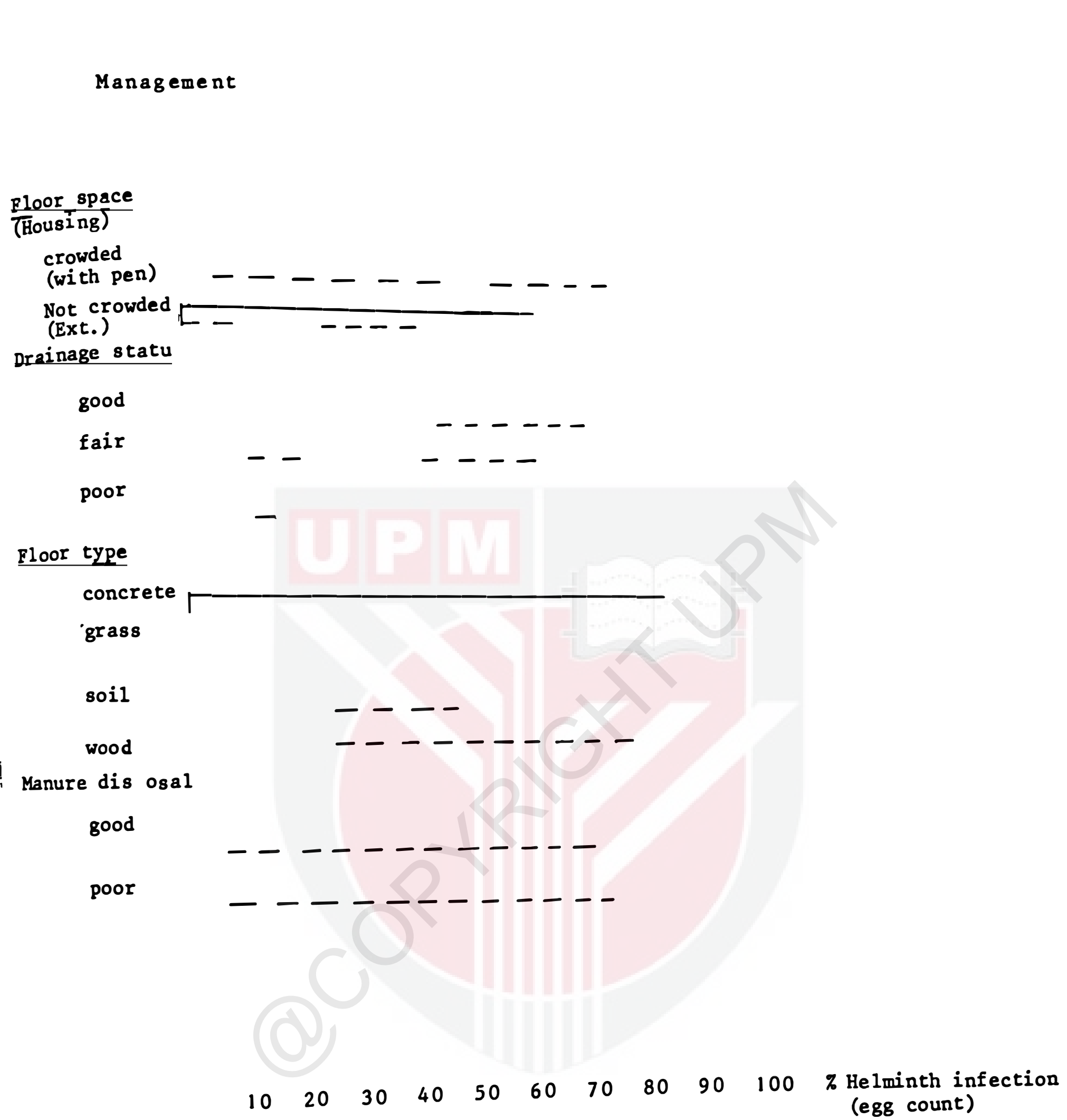


Fig. 4: Relationship between management factors and helminthiasis

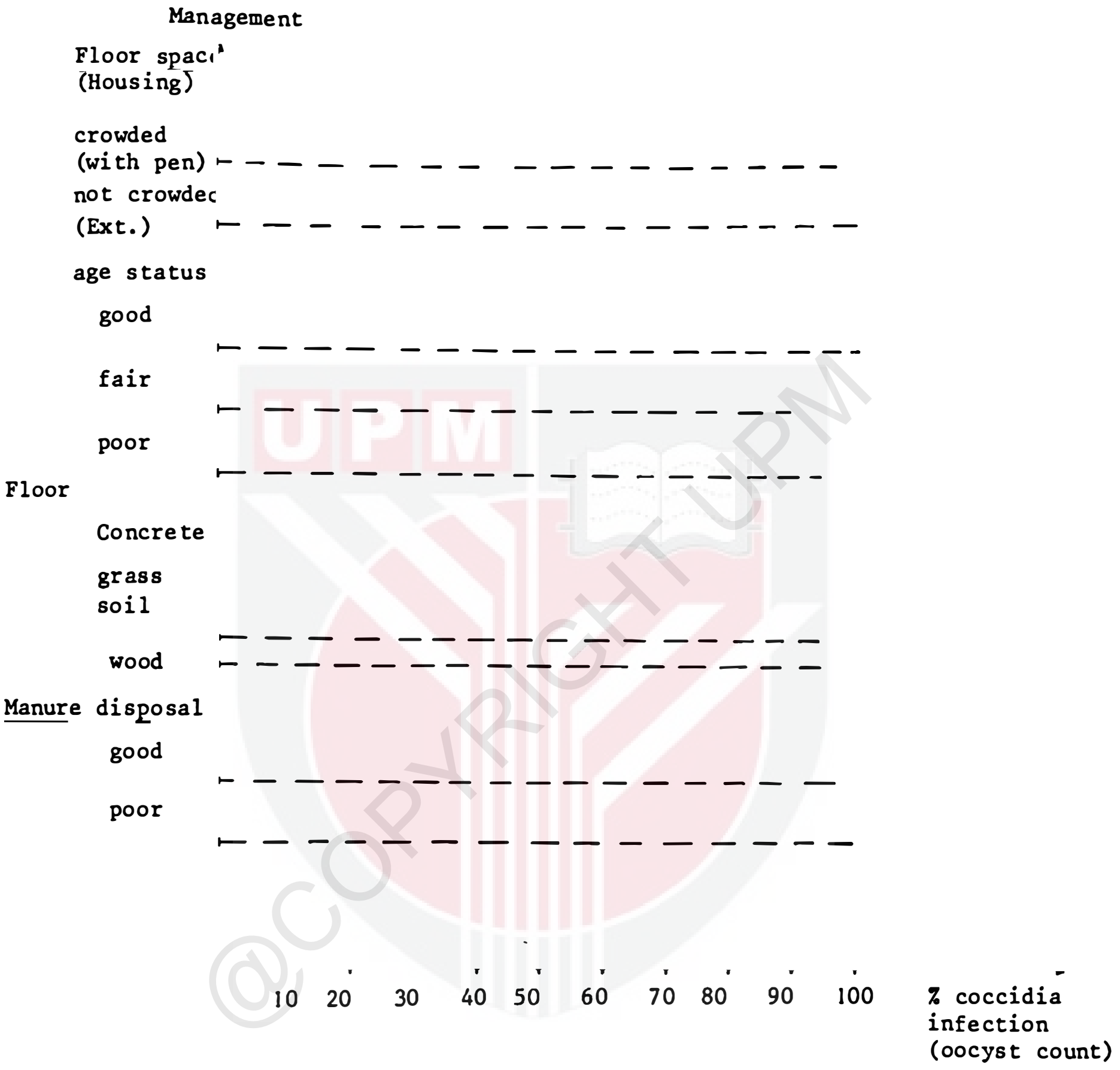


Figure 5: Relationship Between Management Factors and Coccidiosis

SURVEY QUESTIONNAIRE FOR GASTROINTESTINAL PARASITES IN RELATION TO HUSBANDRY, MANAGEMENT & NUTRITION IN SMALLHOLDER FARMS.

(A) INTRODUCTION

i) Name:

ii) Age:

iii) Race:

iv) Address:

v) Main Occupation:

(B) I. FARM AND HERD ESTABLISHMENT

i) When started keeping buffaloes:

ii) How get involved in buffalo rearing:

Father/relatives [

Attended course [

Others

iii) Source of animals: Buy [ ] From

Given by father/relatives [ ]

Others

iv) Type of farm Intensive

Semi intensive

Extensive

II. HERD POPULATION

i) Total no. of buffaloes started with :

ii) Total herd now: Cows

Bulls

Calves: 0-6 mo

6 mo

Total

iii) Total calves produced per year :

iv) Other animals kept: Goat/ Sheep

Cattle

Poultry

(6) BUILDING AND FACILITIES (For observation)

I. GENERAL

i) No. of buildings for animals:

ii) Floor type; Concrete ☐

Trampled soil

Others

iii) Roof type: Attap

Zinc ☐

Scrap metal ☐

Others ☐

iv) Design and Construction:

Good ☐

Fair ☐

Poor ☐

v) Materials used for walls, etc.:

Wood ☐

Bricks

Others ☐

vi) Area Location:

Swampy

Muddy ☐

Low lying (flooding) ☐

Sandy

vii) Does farm have wallowing pond Yes ☐ No ☐

II. CALF HOUSING

i) Calf pens available: Yes ☐ No ☐

ii) If no calf pens, where are calves kept:

iii) No. of pens:

iv) Area per pen:

v) No. of calves per pen:

vi) Total pen area:

vii) Floor space percalf:

viii) How long are calves kept in pens

i) Floor type: Concrete ☐

Trampled s il ☐

Slated (raised floor) ☐

Others ☐

ii) Type of Wall: Open ☐

Wood

Concrete ☐

Others ☐

iii) Type of Roof: Zinc ☐

Attap ☐

Others

iv) Design and Construction of building: Good

Fair ☐

Poor

v) Area location:

Wet/ damp condition ☐

Muddy ☐

Others ☐

(D) CALF FEEDING

I. COLOSTRUM AND MILK

i) Is it given ? Yes ☐ No

ii) When calf starts suckling:

iii) No. of suckles per day:

iv) How long per suckle:

v) Age calf stops suckling:

vi) How is non suckling animal fed:

milk by hand milking ☐

milk replacer ☐

others

i) Is it used: Yes ☐ No

ii) When start using it:

iii) Amount per calf per day:

iv) No. of feedings / day : 1 X

2 X

more than 2 X

v) Method of giving: individually(pail)

common trough ☐

vi) age stop milk replacer: _____

vii) Type of milk replacer used: _____

III. GRASS AND PASTURE

i) Is it used: Yes ☐ No ☐

ii) When start using it:

iii) Amount per calf per day: Ad lib ☐

Body wt. ☐ kg.

iv) No. of feedings per day : 1 X [ ]

2 X ☐

more than 2 X ☐

v) Method of giving:

a) Cut and carry: Individual trough [ ]

common trough

or floor ☐

b) Grazing ☐

c) Both ☐

vi) Type of grass: Native ☐

Improved pasture ☐

Both ☐

vii) Source of gr Planted ☐

Neighbouring areas ☐

roadside ☐

riverside ☐

estate ☐

a) Type :

b) Amount:

c) Frequency:

IV. CONCENTRATE

i) Is it used? Yes ☐ No ☐

ii) Amount/calf/ day: Ad Lib ☐

Body wt. ☐ kg.

iii) No. of feedings per day: 1 X

2 X ☐

more than 2 X

iv) Method of giving: Individual pails ☐

Common troughs ☐

v) Age stop concentrate: start:

V. MINERALS

i) Is it given to calves: Yes ☐ No ☐

ii) Type of minerals: a)

b)

c)

iii) How given: Ad lib (salt lick) ☐

Added in feed ☐

Injected ☐

Others ☐

iv) Amount:

v) When given to calves: daily feed ☐

regularly ____ X /mo./wk./yr. ☐

irregularly ☐

VI. VITAMINS

i) Is it used: Yes ☐ No ☐

ii) Type of vitamins used:

b)

iii) How given: added in feed [

injected I

others

iv) When given to calves: daily feed ☐

regularly ____ X/wk./mo./yr. ☐

irregularly ☐

VII. WATER

i) Amount of water given: ad lib

_____Pails/kg./day ☐

ii) How is it given: Individually I

Common ☐

iii) When is water given: 1 X [

(per day) 2 X ☐

more than 2 X [ ]

iv) Type of Water trough: metal ☐

wood ☐

porcelain ☐

others

v) Source of water : Tank ☐

river ☐

pond [ ]

others ☐

VIII. <u>OTHER SOURCES OF FEED</u>

i) Type of feed:

ii) Amount: _____ kg./day/wk./mo.

(E) GENERAL MANAGEMENT

I. i) Close supervision at calving: No [ ]

Why?

ii) Use of iodine at navel: Yes [ ] No [ ]

II. CASTRATION: Yes [ ] No [ ]

i) Why?

ii) Age: _____ mo./yrs.

iii) Method: Open method [ ]

closed method (Burdizzo)

iv) By whom: UPM [ ]

Pej. Haiwan [ ]

Self [ ]

others [ ]

III) DEHORNING: Yes [ ] No [ ]

i) Why?

ii) Age: mo./yrs.

iii) Method:

iv) By whom: UPM [ ]

Pej. Jabat Haiwan [ ]

Self [ ]

Others [ ]

IV) RECORDS: Yes [ ] No [ ]

i) Types: a)

b)

c)

III) CALF IDENTIFICATION: Yes [ ] No [ ]

i) Method: Tags [ ]

Tatoo

Branding [ ]

Others [ ]

I. HYGENE AND SANITATION

Good [ ]

Fair

Poor

i) Manure disposal:

Pit system ☐

to pasture ☐

roadside ☐

around pen ☐

others ☐

ii) Drainage:

Good ☐

Fair ☐

Poor ☐

iii) Cleaning: Yes ☐ No ☐

Frequency: /day/wk.

1 X ☐

2X ☐

Others X ☐

iv) Method of cleaning:

remove dung only ☐

remove dung & wash ☐

others _____ ☐

v) Use of disinfectants/antiseptics: Yes [ ] No

Type:

II. DISEASE IN FARM

i) Common problems in adults: a)

b)

c)

ii) Common problems in calves: a)

b)

c)

iii) Calf size:

small [ ]

average ☐

large ☐

iv) Calf vigour:

Born dead ☐

weak ☐

v) Mortality in calves highest in:

Prenatal ☐

0–6 mo. ☐

6 mo.–1 yr. ☐

more than 1 yr. ☐

vi) Common cause:

vii) Treatment by: UPM ☐

Pej. Haiwan ☐

self ☐

both ☐

others ☐

PREVENTION & CONTROL

I. DEWORMING

i) Is it practised: Yes ☐ No ☐

ii) Type of anthelminthic used:

iii) Source of drug: ☐

UPM ☐

Pej. Haiwan ☐

Others [ ]

iv) When start deworming: wk./mo./ yrs.

v) Frequency of deworming: 1 X [ ]

2 X [ ] /mo./yr.

3 X [ ]

irregularly by vet [ ]

irregularly by farmer ☐

vi) How does farmer know when to deworm animal:

(Signs of parasitic infection)

II. DETICKING: Yes [ ] No [ ]

i) Drug used:

ii) Frequency: regularly X/mo./yr. [ ]

irregularly [ ]

iii) By whom: UPM [ ]

Pej, Haiwan

self ☐

iv) When deticked: mo./yr.

III. VACCINATION

i) Is it done: Yes [ ] No [ ]

ii) What type: FMD ☐

TB ☐

Brucella ☐

HS ☐

Others ☐

iii) By whom: UPM ☐

Pej. Haiwan ☐

self ☐