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Dedicated to my parents, family and the one concerned.

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ABSTRACT

A survey consisting of fecal examination and questionnaire on management was carried out on swamp buffalo smallholdings in Melaka and Negeri Sembilan. Calves aged 18 months and below were included. It was found that there was high prevalence of Haemonchus (60.4%), coccidia (58.3%) and followed by paramphistomes (31.3%), Trichostrongylus (23.0%) and Strongyloides (22.9%). Cooperia (8.7%), Oesophagastomum (2.9%) and Toxocara (2.1%) were found to a lesser extent.

The management systems practised by the smallholders were similar with poor nutrition, poor housing, drainage and infrequent drenching. Even though the management of the smallholder buffalo calves is poor, the animals appear to have few gastrointestinal parasitic problems.

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1.0 INTRODUCTION

The domestic buffalo (Bubalus bubalis) of Malaysia can be classified into two groups (a) swamp buffalo, which was commonly used as draught animal but now mainly kept for meat and as an asset, and (b) river buffalo (Murrah) which was introduced into this country from India as a dairy animal.

The 1982 Livestock Census reported that the total number of buffaloes in Malaysia is 179,636 with 176,995 heads being swamp buffaloes. These animals are concentrated in a few rice producing states namely Kedah, Trengganu, Kelantan, Pahang and Melaka. However the population of buffaloes is declining rapidly since the early sixties. Mahendranathan (1973) reported that the number of buffaloes was 283,922 in 1964 with 206,306 left in 1972. Mechanization and reluctance of younger generation to rear buffalo are probably the main reasons for the decline in buffalo population. This is further worsened with decreasing grazing areas, health practices and indiscriminate breeding which reduces the reproductive ability of the animal.

Parasitic problems in swamp buffalo rank among the most important.Cockrill (1974) stated that Toxocara spp, Strongyloides spp and coccidiosis have been found to be common worldwide among buffalo calves kept under unsanitary conditions.

There has been no previous survey regarding parasitism in swamp buffalo calves in Malaysia, apart from isolated clinical case reports. The present study was conducted to determine the parasitic status of smallholder swamp buffalo calves in Melaka and Negeri Sembilan. It is hope that this study will help reveal the

problems and constraints faced by the farmer and help to identify the 'parasitic areas' and improve animal production.

2.0 LITERATURE REVIEW

Most research efforts on large ruminants has been directed towards the control of diseases in cattle. This may be due to the less important role of the buffalo in the western animal industry. However the buffalo, to some extent benefitted from the research as they share many common parasites with cattle. An outbreak of coccidiosis in N'Dama cattle in Ibadan, Nigeria showed that Emeria zuerni was the most prevalent species (40.9%) followed by Emeria bovis (25.8%). During the outbreak 12 adult cattle over 10 years of age and 10 young ones aged between 12 and 24 months were infected. The affected animals were emaciated, dehydrated, and had tachycardia and dry coat (Obasaju et al., 1981).

Fecal examination of buffalo calves at Hissar, India by Bhatnagar, Ruppah and Srivastava in 1980 showed that 27.5% of calves below 6 months of age were infected with Neoascaris (Toxocara) vitulorum, of which calves 16 - 30 days old and 1 - 3 and 3 - 6 months age groups revealed 41.9%, 34.2% and 3.6% infection respectively. Buffaloes from 6 months to 10 years did not show N. vitulorum infection.

At the veterinary clinic of Haryana Agricultural University, where 320 buffaloes calves were brought for treatment, 192 (60%) were found positive for Ascaris infection and 80 (25%) were positive for mixed infection of coccidia and Ascaris. The incidence was found to be higher in young calves aged 1 to 6 months (Satija et al., 1973).

A survey of farm management and fecal examination from calves up tc one year of smallholder Murrah buffalo farms was conducted in Selangor and Perak (Chandrawathani, 1984). It was found that there was high prevalence of coccidia, strongyles and Strongyloides with Toxocara and Trichuris to a lesser extent. Larval culture of the strongyle eggs indicate Haemonchus and Cooperia as the most common species especially in calves kept under unhygienic conditions.

A pathogenic trichostrongylid of the buffalo and cattle is Paracooperia nodulosa, which forms multiple nodules in the intestines, diarrhoea, anaemia, emaciation and sometimes death (Mohan, 1968). An eight months old buffalo calf reported to have the above symptoms was found infected with P. nodulosa on necropsy (Sheikh Omar et al., 1985). This parasite can pose a serious health problem in buffaloes.

From 45 buffaloes slaughtered at Kuala Lumpur abattoir 9 species of amphistomes were indentified of which Fischoederius elongatus was the most common (Lee, 1967).

Review of diseases in Indonesia affecting draught power in domestic animal shows that gastrointestinal nematodiosis in buffaloes and cattle is caused mainly by Haemonchus contortus and Trichostrongylus spp. The parasites are widely spread in Indonesia. Most surveys indicate that 60% to 90% of both young and adult small ruminants harbour H. contortus, with the percentage being much lower in large ruminants. Coccidiosis and paramphistomes was also known to occur (Sutijono Partoutomo et al., 1985).

Calves that suckle dams harbouring Toxocara vitulorum were found to be infected with T. vitulorum (Mia et al., 1975). It was

also shown that T. vitulorum larvae was in the milk, thus confirming that the route of infections were via the colostrum and prenatally, with the dam effectively serving as an intermediate host for the parasite.

3.0 MATERIALS AND METHODS

A survey was made on 19 smallholdings with swamp buffaloes in the state of Melaka and Negeri Sembilan. The smallholders chosen for this study were based on easy access to the farms and obtained with reference from each district veterinary office. The number of buffaloes owned by a smallholder ranged from 2 to 24 animals with calves numbered from 1 to 10.

Data collected included interviews for questionnaires and fecal samples of buffalo calves. The questionnaires covered mostly herd establishment and population, calf housing, feeding practices and herd health. Since the smallholder kept no proper records, almost all data collected were based on what the owner recalled.

Fecal samples were collected from calves aged 18 months and below. About 5 to 30 grams of sample were taken per recta or newly defecated feces and these were collected into tightly capped plastic vials stored in a cool polystyrene box. Although the calves appeared tame, difficulties were encountered in restraining the animals.

In the laboratory the samples were transferred into the refrigerator (4 ^{o}C). The feces were analysed for parasitic infestation within 1 to 3 days of collection and the techniques performed were:

(a) Modified McMaster's Technique using saturated sodium chloride for quantitative and qualitative accessment of helminth eggs and coccidia oocysts.

(b) Sedimentation Technique to detect fluke eggs such as Fasciola spp. and paramphistome.

(c) Fecal culture to obtain infective larvae (L_3) in samples having strongyle eggs.

Animals with no egg in the fecal samples were considered uninfected. Egg counts of $\leq$ 200 e.p.g. were taken to be low, egg count of $>$ 200 to 400 e.p.g. as medium and $>$ 400 e.p.g. as high. Similarly animals with no oocysts were classified as free from coccidiosis, those with $\leq$ 500 o.p.g. as low oocysts count, $>$ 500 to 5000 as medium oocysts count and >5000 as having a high oocysts count.

4.0 RESULTS

4.1 Farm and herd establishment

All smallholders surveyed in this study were Malays and 42% started out by buying buffaloes from their own villagers, 32% inherited the animals and 26% by the Pedua system. In this system a buffalo cow is kept by another person and he or she will obtain ownership of the calf borne by the animal. Out of the 19 owners interviewed 9 owners (47%) have been involved in buffalo rearing for less than 10 years, 4 owners (21%) from 10 to 19 years and 6 owners (32%) for more than 20 years. All the smallholders have never attended any kind of formal animal husbandry training.

About 18 farms (95%) started with 1 to 3 animals and only 1 farm (5%) started with 20 animals through inheritence. Most of the smallholders expanded their herd by breeding and buying from

fellow villagers. At the time of the survey 15 owners (55.6%) had 1 to 5 animals with 1 to 3 calves. Eight owners (29.6%) had 6 to 10 heads of buffaloes with number of calf ranging from 1 to 5 animals and 3 owners (11.1%) had 11 to 15 animals with 4 to 5 calves. There was only 1 owner (3.7%) keeping more than 16 animals (24) with 10 calves (Table 1).

All the smallholders kept poultry around the farm with 4 farms (21%) having bulls kept for fattening and 2 farms (11%) having goats.

4.2 Management

All the farms were run by their owners with the help of their family. The type of rearing system practised by the smallholders is semi-intensive where the animals are allowed to roam free or tied in the field in the day and kept in confinement at night.

Of the 19 farms surveyed, 18 farms (95%) were located in padi field areas and 1 farm (5%) at the sea shore where it is sandy. Off the farms, 95% have poorly drained confinement pens, with some pens even having mud puddles for the buffaloes to wallow. Only 1 farm (5%) had a naturally good drainage due to its sandy soil. Eighteen farms (95%) do not practise manure disposal and 1 farm remove the feces daily by simply pushing it to the back of the shed.

Only 1 farm (5%) kept the buffaloes under an attap roof shed at night, the other 18 farms (95%) kept their animals in open-air areas fenced in with wood or bamboo.

All the farms allow the calves to suckle their dam until the latter is in advanced pregnancy or until the next calving.

The buffaloes grazed in uncultivated padi fields and road sides. Five farms (26%) also allowed their animals to graze under

rubber and oil palm estates. Some smallholders supplemented their animals with cut grass but this was not consistent. The type of roughage commonly available to the buffaloes are Paspalum conjugatum (Buffalo grass), Imperata cylindrica (lalang), padi straws and native herbage.

Fourteen farms (74%) supplemented their animals with common salt (NaCl), 1 farm (5%) gave copra cake plus salt and 1 farm (5%) supplemented with salt and molasses once a week.

The buffaloes were allowed to drink water ad lib from ponds, river and streams. Only 1 farm (5%) provided water during night confinement.

Identification of animals was only by recognition by the owner and only 1 farm (5%) practised ear notching to identify his animals.

4.3 Health

From the survey it was found that every cow calved at every calving season at the rate of 2 calves per 3 years. Since no proper record were kept, only 1 dystocia case was recalled. For the other calvings little supervision were given to the dams. Six farms (32%) apply wood ash to the naval of newly born calves and only 1 farm (5%) used potassium permanganate ($KMnO_4$).

The history of the farms from what the owners can recall revealed that the buffaloes face very few disease problems. Out of 19 farms only 1 farm (5%) had abortion problems (3 cases). From the entire survey there were also only 3 reports of emphemeral fever, 1 dystocia, 1 bloat, 1 suspected haemorrhagic septicaemia, 1 maggot wound and 3 emaciation cases (1 adult and 2 calves).

Vaccination was carried out on 8 farms (42%) with Haemorrhagic septicaemia vaccine and 2 farms (10%) were given both Haemorrhagic septicaemia and foot and mouth disease (FMD) vaccine.

Only 4 farms (21%) dewormed their calves with 'Nilzan' bolus, 'Nemicide' or 'Systemax'. One farm (5%) dewormed the calf when signs of anorexia, emaciation and ruffled hair coat were manifested. Three farms (16%) used traditional potions such as "akar ali" and 'angsana' leaves.

4.4 Gastrointestinal parasites

From the 19 farms surveyed, 16 farms (84%) were infected with strongyles and of the 48 calves sampled 29 calves (60.4%) were infected (Table 2). This is followed by coccidiosis in 14 farms (73.7%) and 28 calves (58.3%). Paramphistomes, Strongyloides and Toxocara vitulorum occurred to a lesser extent.

Out of the 60.4% calves infected with strongyles, 27.1% had low egg counts, 12.5% medium and 20.8% high egg counts (Table 3a). There appears to be no pattern in the distribution of infection levels in the infected calves. Animals infected with Strongyloides (22.9%) shows that most infected calves (16.7%) have high levels of egg counts ($>$ 400 e.p.g.). Statistical analyses indicate a significant correlation ($P < 0.01$) between Strongyloides egg count and calf age. The one calf which was positive for Toxocara vitulorum had a low egg count ($\leqslant$ 200 e.p.g.).

The prevalence of coccidia in calves shows a descending pattern, from non infected calves (41.7%), low ocysts count (20.9%) medium ocysts count (27.1%) and high ocysts count with only 10.4% (Table 3b).

Fecal culture of 21 calves having strongyle eggs revealed that all had Haemonchus, 8 calves (38.1%) had Trichostrongylus, 3 calves (14.3%) had Cooperia and 1 calf (4.8%) infected with Oesophagastomum (Table 4 a).

From the 21 calves, 12 (57.1%) had solely Haemonchus infection (Table 4b). Six calves (28.6%) had dual strongyle infection, namely 5 calves infected with Haemonchus + Trichostrongylus and 1 calf with Haemonchus + Oesophagastomum. Only 3 calves (14.3%) were infected with 3 strongyle species namely Haemonchus + Trichostrongylus + Cooperia.

With the aid of a histogram, the gastrointestinal parasites of swamp buffalo calves in Melaka and Negeri Sembilan can be divided into 3 groups. Firstly the 'high prevalence' parasites, Haemonchus (60.4%) and coccidia (58.3%). This is followed by the 'medium prevalence' paramphistomes (31.3%), Trichostrongylus (23.0%) and Strongyloides (22.9%). The third group 'low prevalence' consist of Cooperia which only infected 8.68% of the calves, Oesophagastomum 2.9% and Toxocara vitulorum 2.1%.

Table 1: Population of buffaloes owned by 27 smallholders

Group	No. of owners		Total no. of animals	No. of calves					
		%		1	2	3	4	5	5
A	15	55.6	1 - 5	8	3	4			
B	8	29.6	6 - 10	1	2	1	3	1	
C	3	11.1	11 - 15				2	1	
D	1	3.7	16						1*

* 10 calves

Table 2: Prevalence of gastrointestinal parasites in 48 calves on 19 farms

Parasites	Farms affected		Animals affected	
	No.		No.	
Strongyles	16	84.2	29	60.4
Coccidia	14	73.7	28	58.4
Paramphistome	10	52.6	15	31.3
Strongyloides	8	42.1	11	22.9
Toxocara	1		1	2.1

Table 3a: Prevalence of parasites in calves

Parasites	Uninfected		Infected (egg per gram)					
			Low (≤200)		Med. (>200-400)		High (>400)	
	F	%	F	%	F	%	F	%
Strongyles	19	39.6	13	27.1	6	12.5	10	20.8
Strongyloides	37	77.1	3				8	16.7
Toxocara	47	97.9	1	2.1				

Table 3b: Prevalence of coccidia in calves

Parasites	Uninfected		Infected (oocysts per gram)					
			Low (≤500)		Med. (>500-5000)		High (>5000	
	F	%	F	%	F	%	F	%
Coccidia	20	41.7	10	20.8	13	27.1	5	10

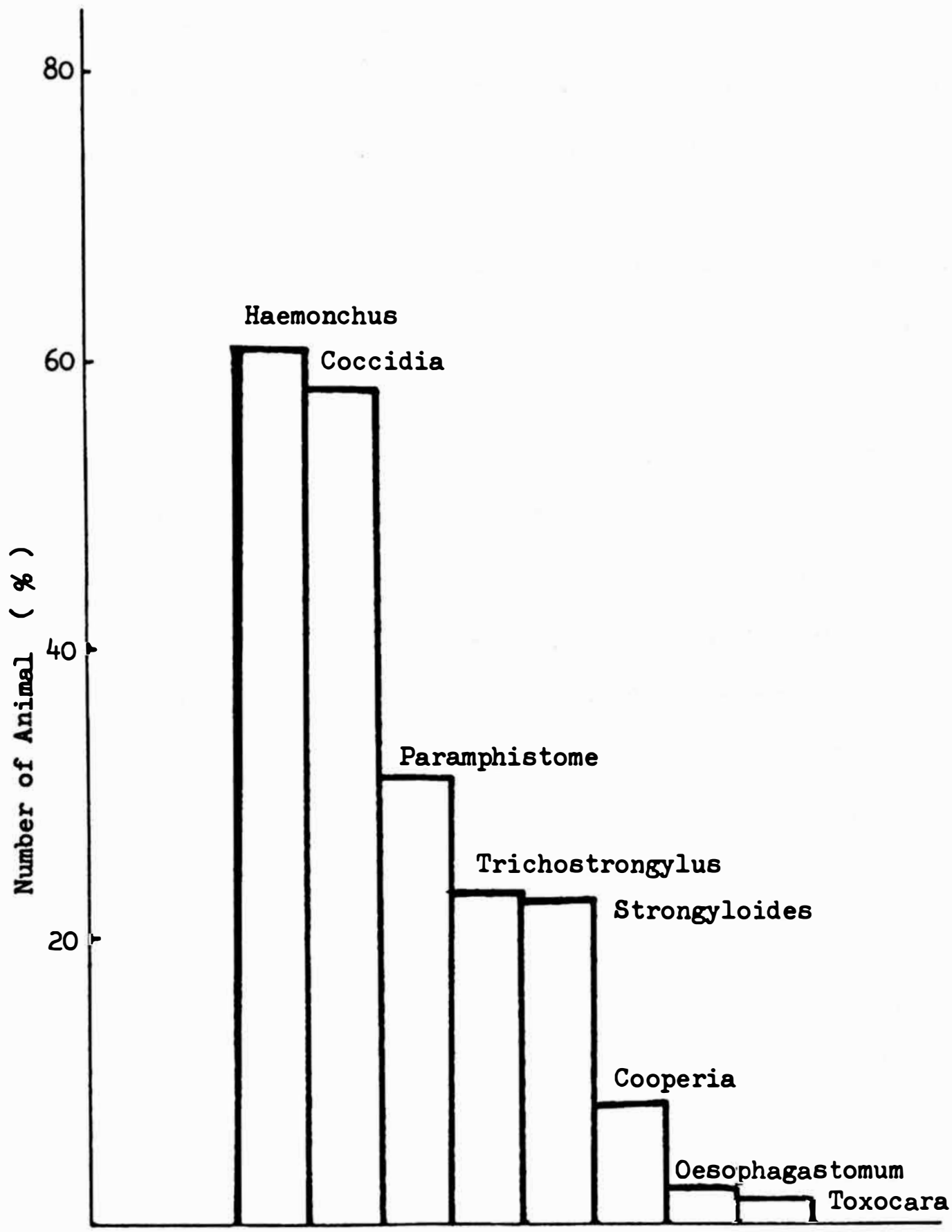
Table 4a: Prevalence of infective larvae (L_3) obtained from fecal cultures of 21 calves

Strongyles			
Haemonchus	Trichostrongylus	Cooperia	Oesophagastomum
21 (100%)	8 (38.1%)	3 (14.3%)	1 (4.8%)

Table 4b: Prevalence and ratio of single, dual and triple strongyle infections

		Strongyles	Prevalence	Ratio
Infection	Single	Haemonchus	12	
	Dual	Haemonchus+Tricho.	5	8:1-4:5
		Haemonchus+Oesop.	1	5:2
	Triple	Haemonchus+Tricho.+Cooperia	3	5:3:1-5:2:7

Histogram of species of gastrointestinal parasites in swamp buffalo calves



5.0 DISCUSSION

From the survey it was interesting to note the 'Pedua' system. In this system famers who are interested in buffaloes but cannot afford to buy can own animals by looking after other villagers' buffaloes. This will encourage poorer farmer to rear their own buffaloes and build up their assets. With increase in number of owners, will directly increase the population of animals.

In general, all samllholders had no formal animal husbandry training, despite this most of the buffaloes were healthy and in a fairly good body condition. Even though many years of experience (> 50% for > 10 years) play an important role in their success, it is possible for buffalo production to improve with proper training and upto date knowledge of buffalo nutrition and reproduction systems.

It is also found that more than 50% of smallholders had less than 5 animals. The low number of animals per owner can be due to the limitted time the smallholder had for their animals which is just a sideline occupation. This is shown by more than 37% of the smallholders interviewed were housewives and the others had their wives helping them. Apart from this the limitted areas for grazing can be another reason for low buffalo numbers. The low number of animal per owner can also be attributed to slaugthering of animals during festive times. Owners also complain of the occurance of buffalo theft and difficulties in recognition with too many animals. This sometimes result in dispute over ownerships and discourage smallholder to keep buffaloes.

All smallholders allowed the buffaloes to graze from morning to late evening. Some owners let the animals free and others tie the animals but shift to a different spot daily. This system of grazing

will reduce the chances of animals being infected with infective larvae (L_3) of nematodes. This results in reduced gastrointestinal parasites infection compared to a more intensive type system practised by Murrah buffalo owners (Chandrawathani, 1984). It was also observed that the buffaloes had preferred sites and times for defecation such as in rivers and immediately after release from confinement. This will reduce the contamination level in the confinement area or pens since less animals defecate during confinement.

All swamp buffalo calves suckle and are late weaners. This gives the calves better protection against disease with the maternal antibodies. The immunoglobulins (especially Iga) in milk also makes the calves more resistant to fascioliasis. Hence the abscence of fascioliasis among calves were observed. In comparison Murrah buffalo calves which are given only one quater of the dam's milk, have a higher level of gastrointestinal parasitic infection (Chandrawathani, 1984).

There was no supplement of concentrate of minerals apart from common salt (NaCl) given to the buffaloes but the animals were observed to be in fair body condition. This indicates that the buffalo is a good converter of roughage. In contrast cattle reared in the same area were observed to be in poor body condition with many having prominent ribs and hip bones.

Many smallholders reported that the buffalo calving rate was 2 calves in 3 years. This coincides with observation made by Fadzil (1969) with calving interval of 536 days. Owners also reported that the newborn calves were hardy and few complication faced during parturition. This is thought to be the result of little intervention by man in buffalo breeding with nature totally in control.

Most smallholders have few disease problems and from the 1985 treatment cases by the Melaka veterinary office, 0.26% were

gastrointestinal parasitism. This is low compared to 2.09% cases of gastrointestinal parasitism among cattle. This indicates the high resistance of buffaloes to diseases compared to cattle.

Deworming was performed on 21% only of the farms surveyed. This is bacause most animals show no signs of illness. The owners were also reluctant to spend money for deworming and the difficulties faced when giving medication.

Toxocara vitulorum was reported by workers such as Bhatnagar et al. (1980), Chauhan et al. (1978), Mia et al. (1975) and Chandrawathani (1984) who worked with Murrah buffaloes. In this study on swamp buffalo calves only one calf had positive egg count ($\leqslant$ 200 e.p.g.).

Lee (1967) reported 9 species of paramphistomes from 45 adult buffaloes in Kuala Lumpur abattoir. The incidence is higher in adults compared to calves with 31.3% in this study.

All the strongyle positive calves had Haemonchus spp. which is present in the abomasum of the animal. This nematode feeds on blood of the host by piercing blood vessels in the wall of the abomasum. Sometimes it can cause erosion and ulceration of the mucosal surface. Animals show signs of anaemia, edema and anorexia. This can be a big problem in the farm if control measures are not taken.

In general, there is a 'low' gastrointestinal infection in swamp buffalo calves. However in Murrah buffalo calves it was reported by Chandrawathani (1984) that there was a high parasitic infection. The differences may be due to management of the Murrah buffalo calves which are reared in an intensive system with a bigger herd population and also the calves get less milk from the dams.

The present situation of 'low' gastrointestinal infection in swamp buffalo calves may increase if the present semi-intensive type of management is carried on. It is important to note that the percentage of farms infected is higher than animals infected (Table 2). Therefore there is the possibility that the number of calves infected will increase. This is because the climate in Malaysia is favourable for the survival of the infective larval stage throughout the year. Therefore grazing areas and confinement pens will have a high level of contamination. This is further worsened with the presence of cattle and goats in the area which hosts similar parasites. The possibility of an endemic situation occuring is high if proper steps are not taken to control the gastrointestinal parasites.

6.0 CONCLUSION

The survey carried out revealed the common parasites found in swamp buffalo calves, namely; Haemonchus, coccidia, paramphistomes, Trichostrongylus, Strongyloides, Cooperia and Oesophagastomum in order of importance. T. vitulorum was found to be uncommon among swamp buffaloes.

It was found that management systems of the smallholders were similar with poor nutrition, poor housing, drainage and infrequent drenching. All the above contribute to the endemic status of the parasitic problems in farms. Communal grazing in uncultivated padi fields and estates further aid in the buildup of infection in the calves. The tropical climate in Malaysia also encourages and supports the continuity of the parasitic problems.

Even though the management of the buffalo calves is poor, smallholders appear to have few gastrointestinal parasitic problems.

This knowledge is important to note because with proper management such as improved nutrition, proper housing, drainage and organised drenching systems the swamp buffalo production can improved. Therefore there should be effective extension services and aids by government institutions and private sectors, in terms of finance and animal husbandry training.

7.0 REFERENCES

Bhatnager, P.K., Ruprah, N.S. and Srivastava, G.S. 1980. Note on the incidence of Neoascaris vitulorum in buffalo calves at Hissar. Indian Journal of Animal Science 50 (12): 1145-1147.

Chandrawathani, P. 1984. Gastrointestinal parasitism in Murrah buffalo calves and its relation to management of smallholdings in Selangor and Perak. Faculty of veterinary medicine and animal science. U.P.M.

Cockril, W.R. 1974. The husbandry and health of the domestic buffalo FAC, U.N.

Fadzil, M. 1969. Birth weight of Malaysian swamp buffalo. Kaj. Vet. Malaysia - Singapore 2 (2): 67-69.

Lee, S.K. 1967. Paramphistomiasis in cattle and buffaloes slaughtered in Kuala Lumpur. Kaj. Vet. 1 (2): 73-76.

Mahendranathan, T. 1973. Buffalo at the crossroads in Malaysia. Malaysian Agri. Journal 49: 48-54.

Mia, S., Dewan, M.L., Uddin, M. and chowdhury, M.U.A. 1975. The route of infection of buffalo calves by Toxocara. Tropical animal health production 7 (3): 153-156.

Mohan, R.N. 1968. Disease and parasites of buffalo, Part III. Veterinary Bulletin 38: 735.

Obasaju, M.F., Obi, T.U., Olufemi, B.E. and Oduye, O.O. 1981. Coccidiosis in N'Dama cattle in Ibadan, Nigeria. Tropical Animal Health and Production 13 (3): 155-159.

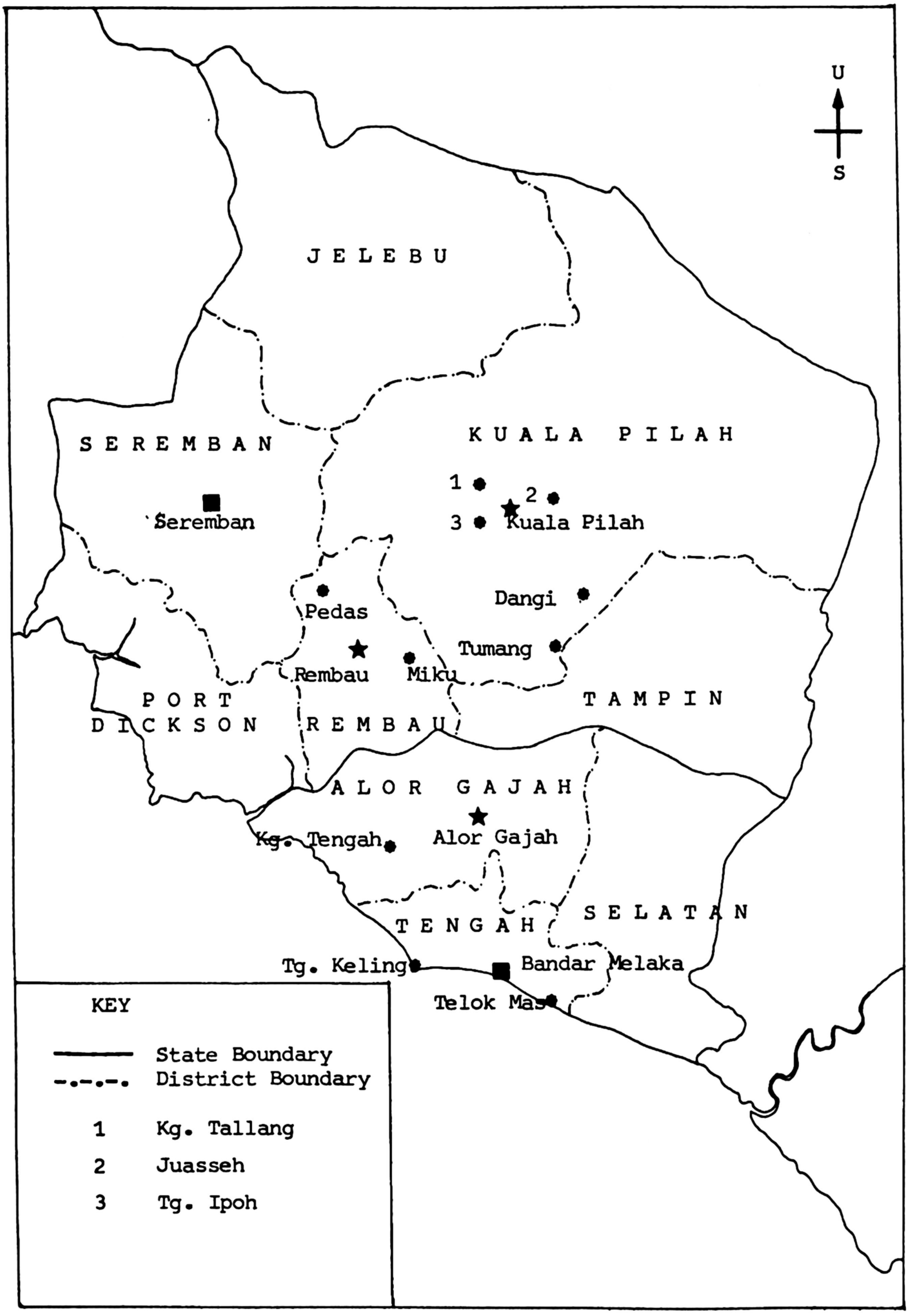
Satija, K.C., Gera, K.C. and Sharma, S.S. 1973. Ascariasis in buffalo calves. Indian Veterinary Journal 50 : 868-871.

Sheikh Omar, A.R., Ikeme, M.M. and Fatimah, I. 1985. Paracooperia nodulosa infection in a water buffalo (Bubalus bubalis) calf. Vet. Record 116 : 134.

Sutijono, P., Purnomo, R., Wilson, A.J. and Stevenson, P. 1985. Rewiew of disease in Indonesia affecting draught power in domestic animals. ACIAR Proceedings Series 10 : 170.

Livestock Census., 1982. Department of Veterinary Services, Kuala Lumpur.

APPENDIX 1: Map of Location and Distribution of Farms



APPENDIX 2: General

Smallholder	Total No. of animals	No. of Calves	Age (mo.)	Body Sccre
Abdul Karim	6	2	3	4
			3	5
Idris Mohd. Jauh	24	10	7	5
			14	6
			7	5
			14	6
			14	6
			17	5
			18	6
Rajiah Mohd.	3	2	16	4
Abu Mat	6	4	12	4
			14	4
Normah Abu	3+2	2+1	3	4
(2 owners)			6	4
			6	4
Manap Ismail	11	4	8	4
			5	4
Mahanum Ahmad	5	3	18	4
			4	4
			4	4
Hj. Zainuddin Samsuri		2	12	5
			6	4
Siti Aminah Ahmad	8	4	6	4
			7	4
			8	5
Halus Badul	8	5	4	3
			4	4
Kamariah Hamid	2	2	12	5
Abu Zaharin Othman	6	3	8	6
			18	5
Zakariah Kidam	6	4	6	4
			7	4
Hj. Pilus Ibrahim	6	1	5	4
Hj. Zakaria Basir	2	1	12	4
Awaluddin Ahmad	5+5+5	3+3+3	18	3
(3 owners)			8	3
			6	4
			5	4
Ismail Ali	14+3	5+1	14	5
(2 owners)			3wk.	5
			14	5
Siti Sari	3+4+2+5+2	1+1+1+1+1	5	4
(5 owners)			5	4
			2	3
			5	4
			3	4
Hj. Mahmud Ledar	13	4	5wk.	4
			4	4

APPENDIX 3: Intensity of parasitism in relationship to hygiene

Smallholder	Location	Intensity	Hygiene
Abdul Karim	Melaka Tengah	3	5
Idris Mohd. Jauh	Melaka Tengah	1	7
Rajiah Mohd.	Alor Gajah	1	4
Abu Mat	Alor Gajah	0	4
Normah Abu	Alor Gajah	1	4
Manap Ismail	Rembau	1	4
Mahanum Ahmad	Rembau	4	5
Hj. Zainuddin Samsuri	Rembau	1	5
Siti Aminah Ahmad	Rembau	4	5
Halus Badul	Rembau	10	5
Kamariah Hamid	Rembau	5	5
Abu Zaharin Othman	Kuala Pilah	10	3
Zakaria Kidam	Kuala Pilah	10	3
Hj. Pilus Ibrahim	Kuala Pilah	10	3
Hj. Zakaria Basir	Kuala Pilah	1	3
Awaluddin Ahmad	Kuala Pilah	1	3
Ismail Ali	Kuala Pilah	1	4
Siti Sari	Tampin	10	3
Hj. Mahmud Ledar	Tampin	10	4

APPENDIX 4: Infective larvae from fecal culture

Calf No.	Strongyles egg count	% Infective larvae			
		Haemonchus	Tricho.	Cooperia	Oesophagas.
C2	4000	-	-	-	-
C8	100	100	-	-	-
C10	100	100	-	-	-
C15	200	-	-	-	-
C17	600	100	-	-	-
C18	100	71.4	-	-	28.6
C20	1100	-	-	-	-
C22	700	100	-	-	-
C23	400	100	-	-	-
C25	200	100	-	-	-
C26	600	100	-	-	-
C27	300	100	-	-	-
C29	1800	100	-	-	-
C30	200	-	-	-	-
C31	200	-	-	-	-
C32	500	-	-	-	-
C33	500	87.5	12.5	-	-
C35	300	44.4	55.6	-	-
C36	100	88.9	11.1	-	-
C37	300	100	-	-	-
C41	100	100	-	-	-
C42	300	64.3	35.7	-	-
C43	300	52.4	4.8	42.9	-
C44	1000	58.3	33.3	8.3	-
C45	200	75.0	25.0	-	-
C46	200	36.8	15.8	47.4	-
C48	200	100	-	-	-

SURVEY QUESTIONNAIRE FOR PROJECT ON GASTROINTESTINAL PARASITES IN SWAMP BUFFALO CALVES AND THEIR MANAGEMENT IN SMALLHOLDER FARMS

A. INTRODUCTION

i. Name:.....

ii. Address:.....

iii. Main Occupation:.....

B. 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 .....

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 .....
Others .....

c. BUILDING AND FACILITIES (for observation)

GENERAL

i. No. of buildings for animals: .....

ii. Floor type: Concrete .....
Trample 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 ..... Low Lying (flooding) .....
Muudy ..... Sandy .....

vii. Does farm have wallowing pond — Yes .... No .....

viii. Calf pens available: — Yes .... No .....

D. CALF FEEDING

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 stop suckling: .....

vi. How is non suckling animal fed:
Milk by hand milking .....
Milk replacer .....
Others .....

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. Source of grass: Planted .....
Neighbouring areas.....
Roadside .....
Riverside .....
Estate .....
Others .....

CONCENTRATE

i. Is it used — Yes .... No ....

ii. Amount/calf/day: Ad lib .....
Body wt..... Kg. ....

iii. No. of feeding per day: 1X ....
2X ....
More than 2X .....

iv. Method of giving: Individual pails .....
Common troughs .....

v. Age stop concentrate: .....

MINERALS

i. Is it given — 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 .....

WATER

i. Amount of water given: Ad lib ....
.... pails/kg./day

ii. How is it given: Individualy .....
Common .....

iii. When is water given: 1X/day .....
2X/day .....
More than 2X/day .....

iv. Type of water trough: metal .....
wood .....
porcelain .....
others .....

v. Source of water — tank .....
river .....
pond .....
others .....

E. GENERAL MANAGEMENT

i. Close supervision at calving: Yes .... No ....
Why .....

ii. Use of iodine at navel: Yes .... No ....

RECORDS

i. Is it used Yes .... No ....

ii. Type: a.
b.
c.

CALF IDENTIFICATION

i. Is it used Yes .... No ....

ii. Method: Tags ....
Tatoo ....
Branding ....
Others ....

F. HERD HEALTH

HYGIENE AND SANITATION

Good .....
Fair .....
Poor .....

i. Manure disposal : Pit system ....
To pasture ....
Roadside ....
Around pen
Others ....

ii. Drainage: Good ....
Fair ....
Poor ....

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 ....
normal ....

v. Mortality in calves highest in: Prenatal ....
0-6 mo. ....
6mo.-1yr. ....
more than 1 yr.....

vi. Common cause: .....

vii. Treatment by: UPM ....
Pej. Haiwan ....
Self ....
Others ....

G. PREVENTION AND CONTROL

DEWORMING

i. Is it practised: Yes .... No ....

ii. Type of anthelminthic used: .....

iii. Source of drug: Buy ....
UPM ....
Pej. Haiwan ....
Others ....

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

v. Frequency of deworming: 1X ....
2X ....
3X .... /mo./yr.
irregularly by vet....
irregularly by farmer ....

vi. How does farmer know when to deworm animal:
(Signs of parasitic infection)
.....

VACCINATION

i.	Is it done	Yes	No ....
ii.	What type:	FMD	
		TB	
		Brucella	
		HS	
		Others	
iii.	By whom	UPM	
		Pej. Haiwan....	
		Self	
		Others	

General body condition (Score of 1-10) ....
Girth ....
Length ....