# CRITICAL DISEASES DIAGNOSED IN SMALL RUMINANTS IN PERAK, MALAYSIA – THE ROLE OF MANAGEMENT IN DISEASE OUTBREAKS IN THE HOT TROPICS

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**ABSTRACT.** The small ruminant industry in Malaysia is plagued by several significant problems related to health and management. Due to the hot, wet tropical climate, parasitic, bacterial and viral diseases are rampant and conveniently spread and enhanced by poor management. The Veterinary Research Institute has initiated a working group to identify and control critical diseases in small ruminants as an educational cum advisory programme for farmers on the lower economic rung so that productivity and profits may be heightened. Farms are attended to base on the complaint of high mortality and morbidity, whereby a complete and holistic approach to disease control is taken. All the farms sampled were in the vicinity of the laboratory that is within 150 km radius. Samples collected were faeces, blood (serum and whole blood) and nasal swabs as well as water and feed samples. A questionnaire on the management practices as well as history of the farm was recorded. Tests on all samples were conducted according to routine procedures. Results from this study on 7 farms involving 175 goats and sheep revealed that the common parasitic diseases encountered are helminthiasis, coccidiosis and blood protozoans. More than 80% of the animals showed strongyle and coccidial infections. The prominent bacterial infections are Caseous Lymphadenitis (34.3%), Brucellosis (*Brucella melitensis),* Leptospirosis (1.7%), Melliodosis and QFever whereas the viral diseases are Caprine Arthiritis Encephalitis (1.1%) and Blue Tongue (15.4%). Early detection for these diseases is critical so that production losses can be minimised. Poor nutrition and hygiene is a contributing factor for the high incidence of disease in small ruminants. Farmer awareness on latest farming methods and services provided also contributes to general wellbeing of animals. One of the outcomes of this programme is to create awareness and getting farmers to be independent and confident in problem solving with regards to management and disease in their herds.

## INTRODUCTION

The small ruminant industry in Malaysia is fast growing with a total population of about half million heads of sheep and goats. The Agriculture sector, in an attempt to achieve food safety in the new millennium, has embarked on several programmes to increase productivity. In the Veterinary Research Institute, a high impact project to provide fast, efficient service to ailing small ruminant farms has been established. The service includes detailed investigation into the health status of the animals as well as advice on management issues such as nutrition, housing, breeding and sanitation is done within a turnaround time of ten days. This gives the farmer a quick guide to tackle issues of high morbidity and mortality quickly thereby saving animals and improving productivity. In 2011, a total of 7 farms were surveyed by a team of personnel; blood faecal and nasal swabs were collected for analysis and a questionnaire regarding management was carried out. Results were quickly transmitted to the farmer and field personnel so that remedial action could be taken. The information obtained regarding diseases gives an insight to controlling diseases as well as current knowledge on various facets of sheep health and welfare (Perry *et al*., 2001). They can be of value to scientists and professionals working in the discipline and who need to be informed about developments in the small ruminant industry to formulate control strategies for diseases

## MATERIAL & METHOD

Small ruminant farms which experienced high mortality and morbidity rates were brought to the attention of the Veterinary Research Institute (VRI). The information is obtained by field para veterinary personnel and transmitted to VRI. A team comprising veterinarians and researchers as well as field animal care staff were dispatched for a full epidemiological investigation. Samples such as faeces, nasal swabs and blood (serum and whole blood in EDTA) were collected from 25 animals in each farm. Water, concentrate feed, grass samples were collected for analysis. The general hygiene and husbandry practices were noted. Results were compiled and duly informed to the farmer for further corrective action. A total of 175 specimens (swab, whole blood and serum), 174 faecal samples, 7 water and soil samples, 6 concentrate feed samples and 10 grass samples were collected from 7 farms. The whole investigation was conducted in detail to the satisfaction of the farmer. Furthermore, in all cases the problems of disease was identified and corrective action taken as soon as possible. Faecal samples were analysed for parasite eggs (Mcmaster method). Blood smears were analysed for blood parasites, while whole blood was subjected to Packed cell Volume for anemia estimation. Serology was conducted for several disease such as Melioidosis, leptospirosis and Brucellosis. As for virology, diagnosis involved test for Blue Tounge, Caprine Arthritis Encephalitis

(CAE) and viral isolation. Meanwhile for Bacteriology samples from nasal swab, soil and water was collected for bacterial isolation including Mycoplasma species. Water, serum from blood, concentrate feed and grass samples send to Biochemistry section for water quality analysis, Clinical Biochemistry testing, aflatoxin detection and proximate analysis respectively. Serum samples also sent to Immunoassay for Caseous Lymphadenitis (CLA) detection using Enzyme Link Immunosorbent Assay (ELISA) technique.

## MATERIALS AND METHODS

The McMaster technique was done for all faecal samples to estimate the number of helminth eggs in faeces. The result will indicate the worm burden of the animal (Christopher R. *et al.*, 1992). Stained thin blood film was done to detect the presence of protozoa in blood such as trypanosome, theileria and piroplasmosis, while packed cell volume (PCV) technique was used to determine the extent of anemia (MAFF, 1978). The PCV also indicates the level of the donor's hydration can be determined.

The samples such as nasal swabs, soil and water were taken for bacterial isolation and identification. For bacterial isolation, 2 types of media were used which were 5% ox blood agar-base and McConkey agar. The bacteria that have been isolated were then identified using biochemical tests and gram staining (P. J. Quinn *et al.*).

Serum samples were sent to serology unit to detect diseases such as Melioidosis, Brucellosis and Leptospirosis. For Melioidosis and Brucellosis, Complement Fixation Test (CFT) was used to identify the disease. This method is based on the reaction between antigen and antibody with the presence of complement. Antibodies are present in the infected specimen (sera) and antigen was introduced to initiate the reaction (Manual of Diagnostic test and Vaccines for Terrestrial Animals, 2004). Leptospirosis Microscopic Agglutination Test (LMAT) technique was done for detection of Leptospirosis. This technique is considered the gold standard for detection of *Leptospira* sp. (ref).

The serum samples are also tested for Caseous Lymphadenitis (CLA) and q-fever disease. Enzyme Linked Immunosorbent Assay (ELISA) was used for detection of these diseases. This Technique is also based on the reaction between antigen and antibody but without the presence of complement and instead enzyme is used as an indicator for reaction between the antigen and the antibody (Manual Q-Fever Antibody Test Kit) (Ramlan *et al.*, 2010).

Other specific viral diseases such as Caprine arthritis Encephalitis and Blutongue were tested using Agar Gel Immunodiffusion (AGID) technique (Manual of Diagnostic test and Vaccines for Terrestrial Animals, 2004). The result of this technique is obtained by observing a white line produced on the agar between the antigens well and the sera well which indicates the existence of precipitate between antigen and antibody present in the sera. As for negative result, we cannot

observe white line precipitate. Viral isolation is also done using cell line instead of a host body and the cytopathogenic effect was observed.

Samples such as grass and concentrate for feeding the ruminants were also tested. Proximate analysis such as crude protein, crude fiber, crude fat, total ass, moisture, calcium and phosphorus were done to evaluate the quality of the nutrition fed to their animals (Methods of Test for Animal Feeds and Feedstuffs, 1971). The pH level of the drinking water for the ruminants in each farm was also tested. The pH level of the water is based on WHO standard for animal drinking water. All serum samples were also sent for clinical biochemistry tests.

Table 1 shows the general information about the 7 farms visited during this programme. This programme focuses more on complaints made by the farmers regarding the herd health of the small ruminants.

## RESULT AND DISCUSSION

5 out of the 7 small ruminant farms that we have visited are feeding formulated feed to the animals, while the other 2 are providing only grasses in the form of cut-and-carry or free grazing in areas around the farm. All of them are practicing the semi-intensive farming. From the feed proximate analysis, the highest crude protein found in the feed was 15.23% from the sample of the third

**Table 1:** Information of the farms visited

| Farm | District | System | Goat | Sheep | Breed | Type Of Feed | Grazing/ Cut & Carry |
|---|---|---|---|---|---|---|---|
| SMR 1 | Selama | Semi-intensive | 71 | 0 | Boer | Grass/Oil Palm Leaves | Grazing |
| SMR 2 | Kuala Kangsar | Semi-intensive | 200 | 0 | Cross Boer/ Jamnapari/ Saanen | Grass, Leaves, Agriculture Waste | Grazing/ Cut And Carry |
| SMR 3 | Kinta | Semi-intensive | 700 | 0 | Cross Breed | Grass, Mixed Leaves, Concentrate | Grazing |
| SMR 4 | Kinta | Semi-intensive | 50 | 0 | Katjang | Grass, Concentrate | Grazing |
| SMR 5 | Selama | Intensive | 465 | 0 | Boer | Grass (Napier) | Cut And Carry |
| SMR 6 | Kinta | Semi-intensive | 20 | 16 | Boer/Long Tail | Grass | Grazing/ Cut And Carry |
| SMR 7 | Manjung | Semi-intensive | 10 | 70 | Long Tail/Cross Boer/Jamnapari | Grass/Oil Palm Leaves | Grazing |

**Table 2:** Types of concentrated feed in 7 goat farms

| No. | Types of concentrated feed | Ash | Calcium | Crude Fat | Phosphorus | Moisture | Crude Protein | Crude Fiber |
|---|---|---|---|---|---|---|---|---|
| SMR 1 | Pellet | 6.67 | 1.53 | 3.49 | 0.55 | 10.73 | 13.7 | Not done |
| SMR 2 | Mix feed | 4.56 | 0.61 | 3.56 | 0.74 | 10.22 | 12.53 | 21.14 |
| SMR3 | Pellet | 9.3 | 2.3 | 5.27 | 0.7 | 7.01 | 15.23 | 12.72 |
| | Mix feed | 7.39 | 1.28 | 5.77 | 0.69 | 6.85 | 12.04 | 11.11 |
| SMR 4 | Pellet | 12.51 | 0.47 | 0.62 | 0.02 | 9.64 | 8.31 | 36.16 |
| SMR 5 | none | | | | | | | |
| SMR 6 | none | | | | | | | |
| SMR 7 | Pellet | 8.78 | 2.10 | 5.37 | 0.66 | 11.42 | 13.54 | 22.10 |

Not done = machine damage none = no sample tested

**Table 3:** Type of Pasture and fodder from 7 farms

| farm | Type of pasture and fodder | Ash | Calcium | Crude Fat | Phosphorus | Moisture | Crude Protein | Crude Fiber |
|---|---|---|---|---|---|---|---|---|
| SMR 1 | Common guinea | 8.4 | 0.16 | 1.33 | 0.22 | 90.93 | 5.49 | Not done |
| SMR 2 | grass | 0.52 | 1.32 | 1.88 | 0.46 | 70.24 | 12.95 | 22.44 |
| SMR 3 | *Ceiba pentandra* (cotton tree leaves) | 4.33 | 1.13 | 3.35 | 0.04 | 71.37 | 9.93 | 29.58 |
| SMR 4 | grass | 11.61 | 0.65 | 3.12 | 0.02 | 81.32 | 14.03 | 11.4 |
| SMR 5 | mixed grass | 4.36 | 0 | 2.92 | 0.02 | 64.94 | 8.5 | 8.07 |
| | Fresh grass | 10.33 | 1.28 | 3.28 | 0.05 | 60.03 | 5.03 | 3.62 |
| SMR 6 | creepers | 6.85 | 1.6 | 3.3 | 0.25 | 75.97 | 20.8 | 25.38 |
| | *Cleome gynandra* (Shona cabbage) | | 3 | 3.2 | 0.5 | 87.48 | 23.98 | 20.27 |
| | Napier grass | 7.75 | 0.75 | 3.1 | 0.17 | 84.87 | 11.2 | 35.32 |
| | *Foeniculum vulgare* (Israel grass) | 11.03 | 2.43 | 3.21 | 0.22 | 84.83 | 11.2 | 21.86 |
| SMR 7 | Palm oil leaves | 9.70 | 0.98 | 4.28 | 0.78 | 60.19 | 13.88 | 38.62 |
| | weeds | 3.39 | 1.98 | 22.05 | 0.20 | 68.28 | 6.53 | 31.52 |
| | *Chromolaena odorata* (Christmas Bush) | 2.55 | 2.00 | 3.95 | 0.15 | 79.93 | 15.07 | 15.03 |

Not done = machine damage

farmer (SMR3). Based on the SIRIM requirement for goats, the minimal protein requirement for goats is 17%, crude fibre 12-15%, minimal moisture 12%, total ash maximum 7%, crude fat 4.5-6%, calcium 1%. Phosphorus 0.7%, we can conclude that the crude protein from the six samples taken, are below than the recommended requirement. Meanwhile, for the total ash and moisture requirement, both fulfill the nutrient requirement according to SIRIM. 12.55% of average crude protein from the six concentrated samples is lower than the minimal requirement for goats which is 17%. From the table above, it is shown that all the farmers obtain concentrated feed source which contain low crude protein. Meanwhile, the majority of the other proximate analysis tests are above the suggested value except for the pellet samples taken from SMR 4 farmer which contains low phosphorus, calcium and crude fat. Provision of feed to the small ruminant in the form of concentrates is encouraged in order to supply protein source which is deficient in pasture and fodder but if the feed concentrate value itself is lower than value needed for the meat growth so the cost of investment is less efficient and as a result it may cause a profit loss to the farmer.

All the data is based on dry matter basis. From table 2, we can see that all pasture and fodder contain sufficient crude fiber and ash. All samples are low in phosphorus except *Chromolaena odorata and* only 2 samples are more than 17 % crude protein which is the minimal requirement of crude protein for goats. For analysis of calcium content, only 61% samples met the recommended calcium requirement from Malaysia Standard guideline. Free grazing can affect the meat growth because the energy is used for food searching activity. This condition gets worsen when all the farmers do not practise systematic management of grass and only rely on the natural pasture which has low protein content. From all seven farms, it is found there is no farmer practising systematic grass planting and they do not have particular plan for growing pasture or fodder in the farm. The crude protein value of the grass is very much influenced by the age when the grass is harvested. There is an obvious decrease in crude protein when the age of the plant reached 5 weeks and above (Hj Md Yusoff *et al*., edisi 2). Besides, consistent application of fertilizer also ensures a sufficient crude protein source for the pasture and fodder grown. From the farm visit carried out, it is found that the pasture and fodder resources are totally sourced from the plant growing naturally in the surroundings. Therefore, it is recommended to improve the knowledge on management of pasture and fodder among the farmers in order to improve the resources of pasture and fodder for the livestock and also to ensure the farmers to be able to rear livestock successfully and change from small scale farming to commercial scale farming.

**Table 4:** Result of pH analysis for water samples

| farm | Types of water<br>Acceptable range for pH level | pH<br>6.5 - 8.5 |
|---|---|---|
| SMR 1 | Well water | 5.95 |
| SMR 2 | Tap water | 6.71 |
| SMR 3 | Tap water | 7.45 |
| SMR 4 | Tap water | 5.93 |
| SMR 5 | Tap water | 7.14 |
| SMR 6 | Tap water | 6.85 |
| SMR 7 | Tap water | 8.81 |

Table 4 shows various types of water samples collected from 7 farms visited. All samples were only tested for pH value because of machine damage. Two types of samples were tested: well water and tap water. From the whole sample, samples from well water (SMR 1), tap water (SMR 4 and SMR 7) show pH level which are out of the acceptable range with their respective values 5.95, 5.93 and 8.81. For water sample obtained from SMR 1 this happened probably due to contamination of the water with feces or urine of the goats since the farmer is applying semi-intensive farming and the well has no fence itself or good flow of water. Water samples for SMR4 are obtained from tap water which is more acidic. It maybe due to the presence of more chemical in acidic form such as ferum, chlorine present in the pipe system. For water sample SMR 7, the pH is more alkaline probably because the water was obtained from the tap water. The location of SMR 7 is near to the seaside and the water sources from the seaside are usually more alkaline.

| Type of Test | | No. of Infected | Percentage, % |
|---|---|---|---|
| Brucella Cft | | 0 | 0 |
| Blue Tounge Agid | | 27 | 15.4 |
| Q-Fever | | 7 | 4 |
| Melioidosis | | 0 | 0 |
| Leptospirosis | | 3 | 1.7 |
| Caseous Lymphadenitis (CLA) | | 60 | 34.3 |
| Caprine Arthritis and Encephalitis (CAE) | | 2 | 1.4 |
| Coccidiosis | | 162 | 92.6 |
| Blood Protozoa | | 25 | 14.29 |
| PCV | <19 (Anemia) | 26 | 30.7 |
| | >38 (Dehydration) | 4 | 2.7 |
| Helminthiasis | 0 EPG | 23 | 13.2 |
| | >1000 EPG | 60 | 34.5 |
| Mycoplasma Isolation | | No isolate | |
| Virus Isolation From Nasal Swab | | No isolate | |
| Bacteria Isolation | *Alpha-haemolytic Streptococcus* sp. | 61 | |
| | *Branhamella* sp. | 57 | |
| | *Haemolytic staphylococcus aureus* | 46 | |
| *Acinetobacter* sp. | Water | 2 | |
| | Soil | 4 | |

Some of these diseases are important due to the zoonotic impact. Poor nutrition and hygiene is an important contributing factor for the high incidence of disease

in small ruminants. Improvement of host nutrition can contribute to the improvement of the goat response against worm populations (Hoste *et al*, 2005). Farmer awareness on latest farming methods and services provided also contributes to general wellbeing of animals. One of the outcomes of this programme is to create awareness and getting farmers to be independent and confident in problem solving with regards to management and disease in their herds (Chandrawathani P. *et al* 2009). The questionnaire surveys of 7 farms indicate that 71% gave supplementary feed such as pellets and 85% gave mineral block. It was shown that 57% of the farms had permanent grazing and only 1 farm practised rotational grazing; with 42% grazing in the morning and 57 grazing in the evening. The common symptoms observed by the farmer were sneezing, diarrhea, hair loss, rough hair coat and coughing which led to 57% of farmers giving antibiotics and 67% giving anthelmintics, while only 14% vaccinated against pasteurellosis. A total of 86% of farms experienced death of animals in the last 6 months but 43% did not know the cause of death as 57% did not send carcasses for post-mortem. The faeces in 5 farms were processed or sold for extra income. A total of 43% of farms used piped water for washing and drinking while the rest used pond or river water, with 71% providing water ad lib in the sheds. This information clearly shows the degree of management for each of the farms and generally 5 out of the 7 farms screened can be considered below average in management.

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