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DISEASE AND MORTALITY SURVEILLANCE OF SHEEP IMPORTED FROM AUSTRALIA

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SUMMARY: One hundred and thirty four sheep of which 73 were Commercial Merino Border Leicester Cross ewes and 61 were Polled Dorset and Suffolk rams, were monitored from the time of their arrival from Australia until 3 years later.

During the first year, a total of 292 cases of clinical disease were observed with 90.8% occurring during the first six months of arrival. The most common diseases (of 292 cases) were keratoconjunctivitis (43.8%) and respiratory infections (28.8%). Other conditions included myiasis (7.5%), lameness (4.5%), contagious ecthyma (3.8%), anorexia and weakness (3.8%), diarrhoea (2.7%) and blue tongue (2.7%). By the end of the first year, 84 of the 134 sheep (62.7%) had died, 57 of the deaths (42.5%) occurred during the first six months. Clinical signs were not observed prior to death in 57 of the sheep. A total of 116 pathological conditions were recorded in the 84 dead sheep.

The most common post mortem findings were pneumonia (31% of sheep), haemonchosis (28.6%), acute starvation (15.5%), bluetongue (9.5%), septicaemia (9.5%) and emaciation (8.3%).

At the beginning of the second and third year there were 50 and 35 sheep left, respectively. Clinical disease was observed in 30 (60%) and 13 (31.7%) sheep in the second and third years, respectively. Similar clinical diseases were observed during these two years. These included myiasis (13/33 animals), respiratory infections (5/33), mastitis (4/33), enlarged scrotum (5/33) and musculoskeletal conditions (6/33). Mortality during the second and third year occurred in 15 sheep (50%) and 4 sheep (11.4%), respectively. The main post mortem finding was pneumonia (3/19 sheep), whilst in many cases (13/19 sheep) no diagnosis was made. These results indicated that importing sheep from a temperate climatic zone into Malaysia required proper planning and provision of basic living requirements. Improved nutrition, housing and a good herd health programme played major roles in early detection and treatment of diseases.

Keywords: disease surveillance, mortality, imported sheep

INTRODUCTION

Malaysia has taken a number of steps in her goal to develop its sheep industry. These are the selection and breeding of local animals which are then crossbred to temperate breeds and the importation of productive temperate or 'tailor-made' breeds deemed adaptable to the Malaysian environment (Babjee, 1988). The development of the sheep industry will significantly increase mutton production, whilst providing options for an income generating activity. The integration of sheep with plantation crops will maximise the use of agricultural land and help minimise the use of herbicides.

Large scale importation of sheep by Malaysia started in October 1987, with sheep coming from Australia and recently, also from Thailand. The first few years after their arrival in Malaysia will be the 'risk' period, because of the time taken for adjustment and adaptation of these animals to the new environment and management as well as to diseases or conditions that are enzootic in Malaysia.

This paper describes a study of the clinical problems and mortality experienced by a group of newly imported Australian sheep.

MATERIALS AND METHODS

One hundred and thirty four sheep newly arrived from Australia were donated by the Department of Veterinary Services at the end of October 1988 to Universiti Pertanian Malaysia (UPM). These sheep were about one year old, and consisted of 73 Commercial Merino Border Leicester Cross ewes and 61 Polled Dorset or Suffolk rams.

During the first three months at UPM, the sheep were grazed during the day in *Setaria* paddocks and housed overnight in group pens. During the second three months, the sheep were housed entirely under shade in separate ewe and ram group pens. Each pen consisted of a 16 x 5 m^2 concrete floor with a 3.7 m high pitched asbestos roof and plastic mesh sides (Davis and Rajion, 1990). Slatted wooden platform, 100 mm high, provided some lying space for about half the sheep. Cut grass and concentrate were provided in feed troughs. During the sixth month, 26 each of the heaviest rams and ewes were transferred to single pens in a specially designed shed. The shed had a wooden slatted floor 1.6 m above a concrete floor. The walls were of timber slats and the roof was pitched asbestos. The remaining 26 sheep stayed in the group pens on concrete flooring. Grass was fed *ad libitum* after feeding a ration of broken corn: fishmeal (6:1). Ten grams/day/sheep Vifosmin 2 (Pfizer Ltd., Sandwich, England) provided the mineral and vitamin requirement. Water was provided *ad libitum*.

Anthelmintics were administered soon after arrival at UPM and thereafter monthly for 10 months, then annually for the next two years using Ivermectin (Ivomec: MSD-AgVet Harlem Netherlands) at 1 ml/50 kg BW subcutaneously and occasionally oxfenbendazole (Systamex: Wellcome Ltd., London, UK) at 1 ml/50 kg orally. A coccidiostat, Sulphaquinoxaline-ethylprimidine-Vitamine K (Hi-Cocci 2+K: Hi-Lab. Corp. (M) Sdn. Bhd., Kuala Lumpur, Malaysia), given at a dose rate of 8 ml/10 kg BW for three days was administered only once, soon after arrival. *Pasteurella haemolytica* vaccine (an oil adjuvant vaccine produced by the Veterinary Research Institute, Malaysia) at 5 ml/animal intramuscularly was administered soon after arrival. *Clostridium* polyvalent vaccine (Heptavac-P: Hoechst Animal Health Division, Milton Keynes, UK) was administered annually.

The whole flock was given long acting oxytetracycline (Terramycin LA, Pfizer Ltd. Sandwich England) at a dose rate of 20 mg/kg BW for treatment or prophylaxis on at least five occasions - for pneumonia (first and sixth month), septicaemia (second and twelfth month) and keratoconjunctivitis (third month). On each occasion an animal received two doses, one day apart. However, when the signs persisted, a third or fourth dose, one day apart were administered. Chloramphenicol eye ointment (Enclor: PharmMalaysia Sdn. Bhd., Malaysia) was also applied topically to eyes with keratoconjunctivitis at least once daily. Haematinics were also administered to the flock, some time during the fifth month. At other times, animals were treated individually. Other procedures included deticking, dehorning, shearing and collection of blood for haematology and faeces for parasitological examination.

All the sheep had their hooves trimmed and dipped in copper sulphate and their wool dipped in Asuntol' (Bayer: Leverkusen, Germany) during the ninth month.

RESULTS

This study reports the result of monitoring 134 imported Australian sheep from their arrival at the end of October 1988 until the end of December 1991.

Year 1

The monthly frequency of illness is presented in Figure 1. It was high during the first six months. The causes are summarised in Table 1. A total of 292 clinical cases on 210 occasions were observed, with 265 cases (90.8%) occurring during the first six months. Keratoconjunctivitis (43.8%) and respiratory infections (28.8%) were the most common diseases recorded. The other conditions were myiasis (7.5%), lameness (4.5%), contagious ecthyma (3.8%), non-specific anorexia and weakness (3.8%), diarrhoea (2.7%) and bluetongue (2.7%). Lameness was due mainly to foot rot and diarrhoea to endoparasitism.

Bacterial examination of conjunctival swabs from animals with keratoconjunctivitis revealed many organisms, amongst which were *Moraxella* spp., *Neisseria* spp. and *Mycoplasma* spp. Microbiological examination of random samples of nasal swabs from the sheep with respiratory infections revealed an isolate of an Infectious bovine rhinotracheitis-like virus and several species of bacteria, all of which were commensals. No *Pasteurella* spp. were isolated.

Faecal examination showed the presence of strongyles (0-11400 epg), strongyloides (0-3000 epg) and monieza (0-5000 epg) eggs and coccidia oocysts (0-9000 epg). The contamination rate of strongyles was high until four months after the sheep were transferred to the slatted, raised floor shed. Strongyloides were present, but at low levels between the fifth and ninth month. Coccidia was present initially but disappeared soon after the sheep were stall-fed. Monieza was identified only at the beginning of sampling. The strongyles identified after faecal cultures were *Haemonchus* spp. and *Trichostrongylus* spp.

Blood samples taken from 10% of the sheep population on three occasions, that is, the fourth (13 sheep), fifth (9 sheep) and seventh (12 sheep) month indicated that 55-69% of these animals were anaemic (normochromic, normocytic) and hypoproteinaemic. Leukopaenia was also common during the fourth and fifth month, 53.8% of sampled

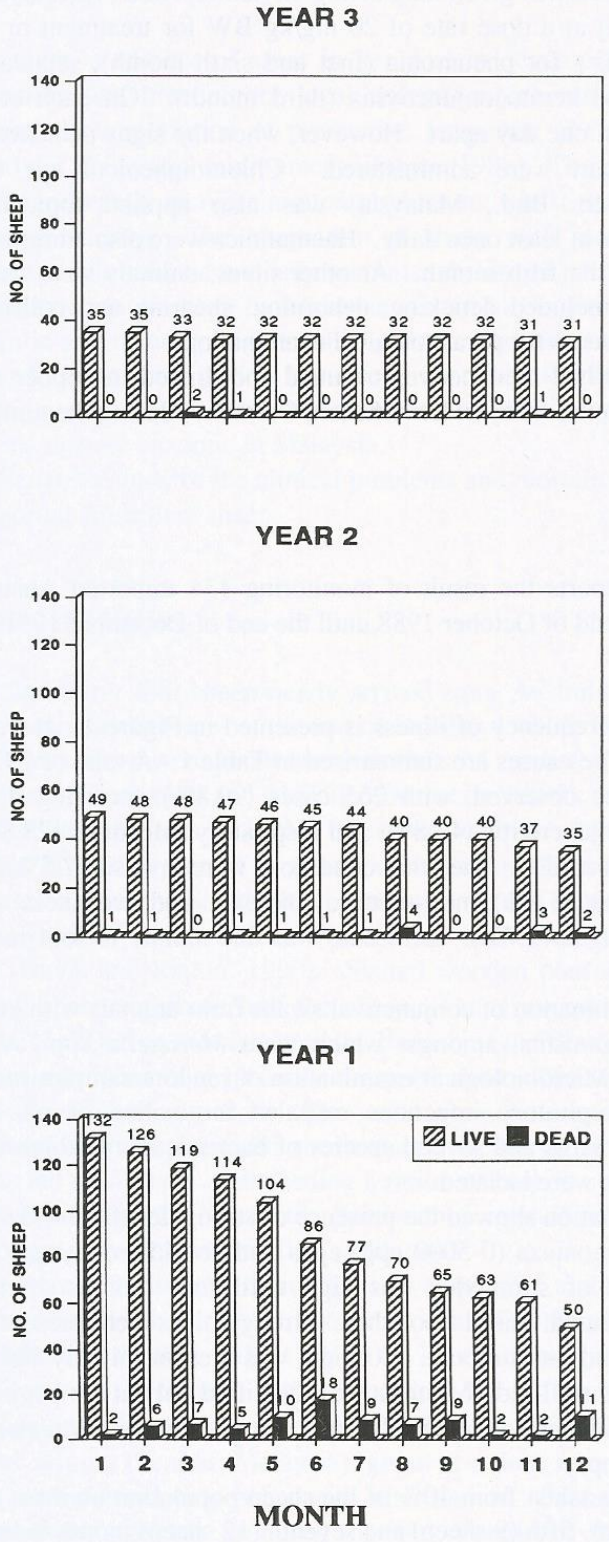

Figure 1. Pattern of live and dead imported Australian sheep in Universiti Pertanian Malaysia over a three-year period

animals being affected but by the seventh month, leukocytosis (neutrophilia, lymphocytosis) were present in all animals sampled. The other blood parameters were within the normal range.

Table 1. Clinical problems and frequency in imported Australian sheep

	Number of Sheep										
	Year 1					Year 2			Year 3		
Time	1-6 mths	7-12 mths	Total	% cases	% sick animals	Total	% cases	% sick animals	Total	% cases	% sick animals
Total number of sheep with signs of illness	183	27	210	-	-	27	-	-	13	-	-
%	87.1	12.9	100	-	-	100	-	-	100	-	-
Keratoconjunctivitis	128	0	128	43.8	61.0	0	0	0	0	0	0
Respiratory infections	79	5	84	28.8	40.0	3	10.0	11.1	2	15.4	15.4
Myiasis	15	7	22	7.5	10.5	13	43.3	48.1	0	0	0
Lameness	11	2	13	4.5	6.2	4	13.3	14.8	2	15.4	15.4
Anorexia & weakness	5	6	11	3.8	5.2	3	10.0	11.1	0	0	0
Contagious ecthyma	11	0	11	3.8	5.2	0	0	0	0	0	0
Diarrhoea	8	0	8	2.7	3.8	0	0	0	0	0	0
Bluetongue	6	0	6	2.1	2.9	0	0	0	0	0	0
Recumbency	1	2	3	1.0	1.4	0	0	0	1	7.7	7.7
Fracture	0	2	2	0.7	1.0	0	0	0	1	7.7	7.7
Septicaemia	1	0	1	0.3	0.5	0	0	0	0	0	0
Bloat	0	1	1	0.3	0.5	0	0	0	0	0	0
Haemorrhage	0	1	1	0.3	0.5	0	0	0	1	7.7	7.7
Haemoglobinuria	0	1	1	0.3	0.5	0	0	0	0	0	0
Mastitis	0	0	0	0	0	2	6.7	7.4	2	15.4	15.4
Abortion	0	0	0	0	0	1	3.3	3.7	2	15.4	15.4
Vaginal prolapse	0	0	0	0	0	0	0	0	1	7.7	7.7
Enlarged scrotum	0	0	0	0	0	4	13.3	14.8	1	7.7	7.7
Total cases	265	27	292	100	139.2	30	99.9	111	13	100.1	100.1
% of cases	90.8	9.2	100.1	-	-	100	-	-	100	-	-

The monthly mortality frequency is presented in Figure 2. The mortality rate until the end of 1989 was 62.7% (84/134 sheep), ranging from two to 18 deaths per month, being high during the first six months (57/84 sheep) particularly the fourth to the sixth month, when 44% (37/84 sheep) of deaths occurred. No obvious sign of illness was observed in 67.9% (57/84 sheep) of the sheep that died. Table 2 presents the distribution and frequency of the post mortem findings. A total of 116 cases in 84 animals were recorded, 69% (80/116 cases) of which were identified during the first six months, a greater proportion (56/116) occurring during the fourth to sixth month. Pneumonia (31% of animals), haemonchosis (28.6%), fatty liver (15.5%), bluetongue (9.5%), septicaemia (9.5%) and emaciation (8.3%) were the common findings. The incidences of pneumonia

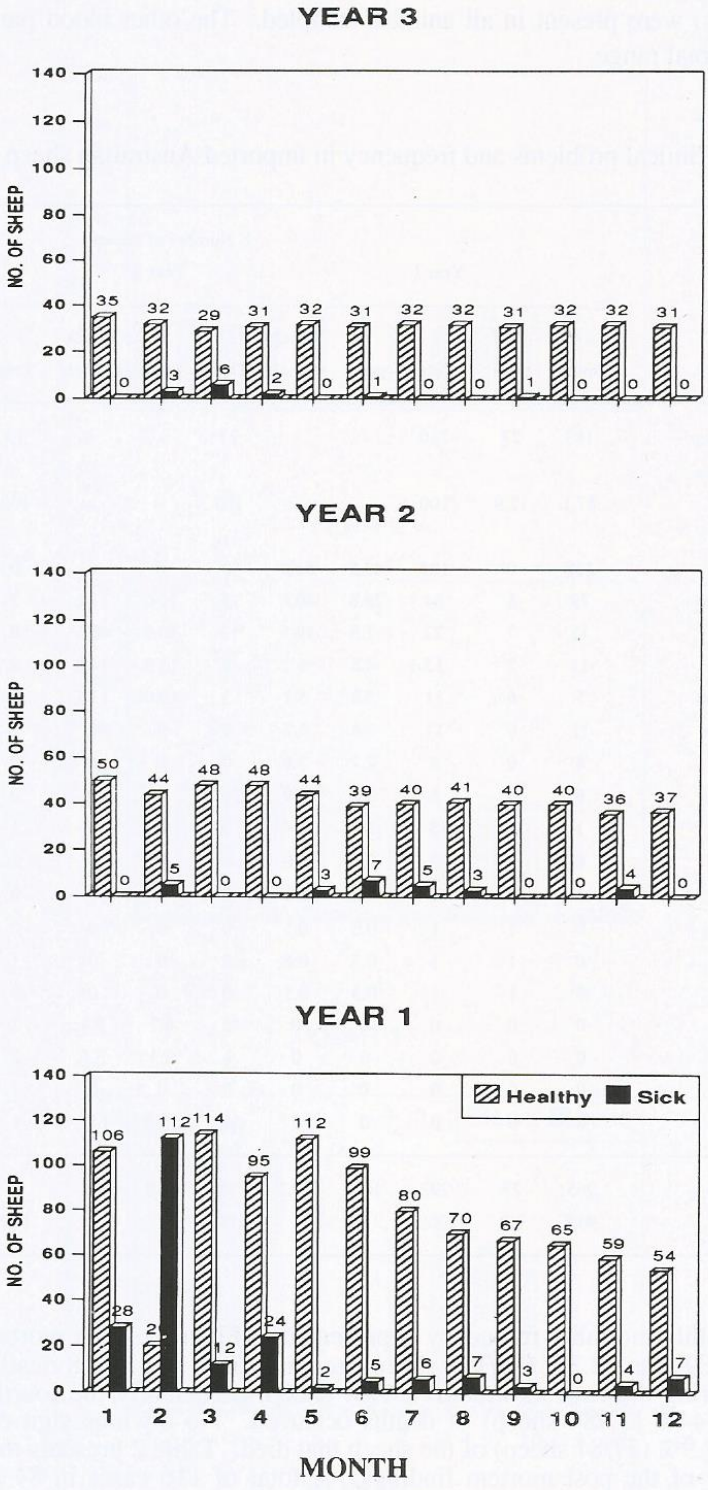

Figure 2. Pattern of healthy and sick imported Australian sheep in Universiti Pertanian Malaysia over a three-year period

and septicaemia were high during the first six months, bluetongue during the first three months, haemonchosis and haemorrhagic enteritis during the fourth to the ninth month, and fatty liver and emaciation during the fourth to the sixth month. Melioidosis (4.8%) appeared after ten months of the sheep coming into Malaysia.

Grossly, lesions of the lungs were consistent with pasteurellosis and *Pasteurella haemolytica* were isolated from many lungs.

Table 2. Post mortem findings and their frequency in imported Australia sheep

	Number of Sheep										
	Year 1					Year 2			Year 3		
Time	1-6 mths	7-12 mths	Total	% cases	% dead animals	Total	% cases	% dead animals	Total	% cases	% dead animals
Total number of deaths	57	27	84	-	-	15	-	-	4	-	-
%	67.9	32.1	99.9	-	-	100	-	-	100	-	-
Pneumonia	21	5	26	22.4	31.0	1	6.7	6.7	0	0	0
Haemonchosis	12	12	24	20.7	28.6	0	0	0	0	0	0
Fatty liver	13	0	13	11.2	15.5	0	0	0	0	0	0
Bluetongue	8	0	8	6.9	9.5	0	0	0	0	0	0
Septicaemia	5	3	8	6.9	9.5	1	6.7	6.7	0	0	0
Emaciation	5	2	7	6.0	8.3	0	0	0	0	0	0
Haemorrhagic enteritis	4	1	5	4.3	6.0	0	0	0	0	0	0
Melioidosis	0	4	4	3.4	4.8	2	13.3	13.3	0	0	0
Suppurative arthritis	2	1	3	2.6	3.6	0	0	0	0	0	0
Footrot	1	1	2	1.7	2.4	0	0	0	0	0	0
Encephalitis	0	1	1	0.9	1.2	0	0	0	0	0	0
Haematoma (neck)	1	0	1	0.9	1.2	0	0	0	0	0	0
Internal haemorrhage	0	0	0	0	0	0	0	0	1	25	25
Cellulitis	0	1	1	0.9	1.2	0	0	0	0	0	0
Rumen acidosis	0	0	0	0	0	1	6.7	6.7	0	0	0
No significant finding	2	1	3	2.6	3.6	6	40	40	3	75	75
Autolysed	6	4	10	8.6	12.0	4	26.7	26.7	0	0	0
Total cases	80	36	116	100	138.4	15	100.1	100.1	4	100	100
% of cases	69.0	31.0	100	-	-	100	-	-	100	-	-
% of dead sheep	95.2	42.9	138.1	-	-	100	-	-	100	-	-

Year 2

At the beginning of the second year, the flock comprised 50 sheep (31 ewes, 19 rams). The monthly frequency of illness and mortality are presented in Figures 1 and 2. Thirty clinical cases in 27 animals were observed, three quarters of which (23/30 cases) occurred during the first six months. The monthly morbidity rate was 5% (range 0 to 16.7%). Myiasis (43.3%) was the major problem (Table 1). Respiratory infection was

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RINGKASAN

PENGAWASAN PENYAKIT DAN KEMATIAN PADA BEBIRI YANG DIIMPORT DARI AUSTRALIA

Seratus tiga puluh empat ekor bebiri, yang mana 73 ekor bebiri betina baka kacukan Commercial Merino Border Leicester dan 61 ekor bebiri jantan baka Polled Dorset dan Suffolk, diawasi selama tiga tahun dari masa mereka sampai dari Australia. Pada tahun pertama sejumlah 292 kes penyakit dilihat, 90.8% terjadi pada enam bulan pertama. Penyakit paling kerap (daripada 292 kes) adalah keratokonjunktivitis (43.8%) dan jangkitan sistem pernafasan (28.8%). Keadaan lain termasuk miasis (7.5%), ketempangan (4.5%), ektima menular (3.8%), anoreksia dan lemah (3.8%), cirit-birit (2.7%) dan penyakit lidah biru (2.7%). Pada akhir tahun pertama, 84 daripada 134 ekor bebiri (62.7%) telah mati, 57% daripada kematian ini (42.5%) terjadi pada enam bulan pertama. Petanda klinikal tidak terlihat sebelum kematian dalam 57 ekor bebiri tersebut. Terdapat sebanyak 116 keadaan patologi pada 84 ekor bebiri yang mati ini. Keputusan post mortem adalah pneumonia (31% daripada bebiri), hemonkosis (28.6%), hati berlemak (15.5%), lidah biru (9.5%), septisemia (9.5%) dan kurus kering (8.3%).

Pada awal tahun kedua dan ketiga masing-masing, 50 ekor dari 35 ekor bebiri yang tinggal. Penyakit klinikal terdapat dalam 30 ekor (60%) pada tahun kedua dan 13 ekor (31.7%) pada tahun ketiga. Penyakit klinikal yang terdapat hampir sama. Kes-kes ini termasuk miasis (13/33 bebiri) jangkitan sistem pernafasan (5/33) mastitis (4/33), skrotum terbesar (5/33) dan keadaan rangka otot (6/33). Lima belas ekor (50%) mati pada tahun kedua dan 4 ekor (11.4%) pada tahun ketiga. Keputusan post mortem utama adalah pneumonia (3/19 bebiri), sambil dalam banyak kes (13/19 ekor bebiri) tiada diagnosis yang dapat dibuat. Keputusan kajian ini menunjukkan bahawa pengimportan bebiri dari zon iklim sederhana ke Malaysia memerlukan perancangan baaik dan peruntukan kehidupan asas. Pemakanan dan perumahan yang lebih baik dan program kesihatan gerompok yang baik memain peranan yang penting dalam langkah pengesanan awal dan rawatan penyakit.