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INVESTIGATION OF HIGH FATALITY AMONG LAMBS IN SHEEP FARMS IN PEKAN, PAHANG, MALAYSIA

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SUMMARY. This study was conducted to investigate the high mortality of young lambs in two sheep farms in Pekan, Pahang over a period of 3 years. Samples from postmortem of 1,451 lambs below one year of age by a farm veterinarian were submitted for laboratory diagnosis at the Bacteriology Section of the Regional Veterinary Diagnostic Laboratory in Kuantan. *Escherichia coli* is the most commonly recorded bacteria with 161 lambs diagnosed in 2013. In 2014 and 2015, there was a decrease in occurrence of *E. coli* related deaths, with 120 and 75 lambs respectively. A total of 25% of the cases showed *Escherichia coli* positive by culture on blood agar and MacConkey agar, and confirmed by biochemical tests. A total of 21% of the cases were positive for *Staphylococcus* sp, 3% and 6% for *Streptococcus* sp and *Klebsiella pneumoniae*, respectively. Other bacteria were isolated in 45% of the cases. It was further noted that a total of 285 lambs between the ages of one to four months of age followed by 58 lambs (20%) less than one month old had *E.coli* isolation. It is

also noteworthy that there were 10 lambs with *E.coli* infection in one to fourteen day-old lambs during the 3-year period from January 2013 to December 2015. This information was collated as a result of routine diagnosis of field cases submitted and with the intention of highlighting the common pathogens causing high mortality in local small ruminant farms so that preventive action may be taken for future farming ventures. *E. coli* infections or Colibacillosis is an important finding and indicator of poor management including poor nutrition, hygiene and environmental contamination which can reduce animal immunity and render it susceptible to other infections.

Keywords: colibacillosis, *Escherichia coli*, young lambs

INTRODUCTION

Death of neonates and young small ruminants is a serious problem which contributes to economic losses to the country and reduces productivity and profit for farmers. The death of young small

ruminants can be either due to microbial or non-microbial origins. In most cases, there are multiple symptoms involving the gastrointestinal and respiratory systems. Animals become weak, showing diarrhoea, coughing and lameness; which are seen as some of the common symptoms. According to the New Agriculture Policy, ruminant farming is encouraged nationwide to achieve self-sufficiency level. Large scale commercial farms are facilitated with sufficient information and technical knowledge such that they are viable and are able to successfully generate a sustainable farming system.

Malaysia, having a hot, wet tropical climate has the perfect environment for bacterial spread in poor husbandry or hygiene. One of the common pitfalls of large commercial small ruminant establishments is the development of colibacillosis, an infection which is caused by *E. coli*, a bacteria which can cause devastating effects in young animals. Colibacillosis plays a significant role in microbial death in small ruminants (Saraswat Sahoo *et al.*, 2015). Colibacillosis is common disease of neonatal calves and lambs. In sheep and goat, *E. coli* causes diarrhoea and mortality in kids and lambs (Raji, 2014) and also can cause a serious health risk. Colibacillosis is a very important neonatal disease and most commonly occurs in lambs at few weeks of age (Panda *et al.*, 1965; N. Hassan *et al.*, 2014). According to Sojka *et al.* (1971) and Hassan *et al.* (2014), lambs at ages 2 to 6 weeks are easily infected with

colisepticemia which is characterized by severe illness and rapid death.

Karimi *et al.* (2011), revealed that colibacillosis is one of the principal causes of morbidity and mortality in poultry industries by its association with various disease conditions either as a primary pathogen or as a secondary pathogen. Therefore, the risk of infection will increase with increasing infection pressure in the environment.

According to Raji *et al.* (2014), the samples that can be helpful in *Escherichia coli* isolation are heart blood, spleen, liver, gall bladder, faeces, yolk sac and pericardium of the infected birds. Lambs manifest enteric signs and some animals may become chronic. Most of the animals will show septicaemic or peracute symptoms. Lambs 1-2 days and 3-8 weeks old commonly suffer from disease. Acute cases collapse without showing any symptoms but a few animals show signs of acute meningitis by stiff gait and tetanic convulsions. In chronic cases, the signs of arthritis are manifested. The significant lesions may be absent, but in those which have died of colisepticaemia, there may be subserous and submucosal petechial haemorrhage and enteritis. In cases of pneumonia, the lungs may show areas of congestion and necrosis. The spleen and lymph nodes of mesentery are sometimes enlarged and congested, and joint infections develop as synovitis. According to Hassan *et al.* (2014), newborn farm animals are highly vulnerable to infections and diseases as they possess

negligible concentrations of circulating immunoglobulins. Colibacillosis is one of the important neonatal diseases occurring during the first few days to few weeks of life. It is caused by pathogenic serotypes of *E. coli* and associated with two forms of enteric and septicaemic infections. The enteric form is more commonly observed in 2 to 8-day-old lambs, characterized by varying degrees of diarrhoea, dehydration and death in a few days if untreated. The septicaemic form is seen in lambs at 2 to 6 weeks of age and characterized by severe illness and rapid death. The suckle reflex in lambs is weak or absent, making the effects more severe as they are unable to obtain proper nourishment through milk. However, there are no diagnostic clinical signs that can differentiate the disease but clinical findings such as these can pave the way to start an effective diagnostic and therapeutic strategy.

Thus, this analysis was carried out from an accumulation of cases submitted to the Regional Veterinary Diagnostic Laboratory over a three-year period to elucidate the common bacterial pathogens isolated so as to get a clearer understanding of the infections present at the farm level. This information is vital in planning control and eradication measures so as to minimize further losses due to death by bacterial infection. This will in turn improve productivity and profits for the farmer and the country overall.

MATERIALS AND METHOD

A total of 3,447 individual cases of Dorper sheep of varying ages and sexes originating from two farms at Pekan, Pahang were sent for laboratory diagnosis as specimens (vital organs) to Kuantan Regional Veterinary Laboratory over a period of 3 years from January 2013 to December 2015.

The Dorper sheep necropsied were categorized according to age in months from the farm information received. The five vital organs (heart, lung, spleen, liver and kidney) were sent to the Bacteriology Section for isolation and identification of bacteria. Streaking was done on blood agar and MacConkey agar and incubated at 37 °C for 24 h. Gram staining was performed to reveal either gram-positive or negative organisms, followed by oxidase test. Further identification of bacteria isolated was confirmed either by Biomerieux API 20E or API 20NE test.

RESULTS

Out of a total of 3,447 cases recorded, 1,451 of the cases were from young lambs which were between of one to twelve months of age. A total of 25% of the 1,451 cases are *Escherichia coli* positive by culture on blood and MacConkey agar and biochemical tests for confirmation. A total of 21% of the cases showed *Staphylococcus* sp. Whereas 3% and 6% are *Streptococcus* sp and *Klebsiella pneumonia*, respectively while the other 45% showed other bacteria isolated. The occurrence of *Escherichia*

YEAR	NO. OF CASES (animals)	NO. OF CASES (animals) (1-12 MONTHS OLD)
2013	1,061	593
2014	1,548	525
2015	838	333
JUMLAH	3,447	1,451

Table 1. The number of cases (animals) received at Bacteriology Section, Kuantan Regional Veterinary Laboratory from January 2013 to December 2015.

BACTERIA \ YEAR	2013	2014	2015	TOTAL	PERCENTAGE %
<i>Escherichia coli</i>	161	120	75	356	25
<i>Staphylococcus</i> sp	136	75	90	301	21
<i>Streptococcus</i> sp	32	12	6	50	3
<i>Klebsiella pneumoniae</i>	58	20	15	93	6
Other bacteria	206	296	147	649	45
TOTAL	593	525	333	1,451	100

Table 2. The number of bacteria isolations at Bacteriology Section, Kuantan Regional Veterinary Laboratory from January 2013 to December 2015 in 1 to 12-month-old lambs.

coli in lambs ages 1 to 4 months was high, with 285 cases compared to 5 to 8-month-old and 9 to 12-month-old, with 58 and 13 cases respectively. The findings also revealed the occurrence of *Escherichia coli* infection in very young lambs between the ages of 1 to 14 days in 10 cases throughout the 3 years (2013-2015). Table 1 indicates the number of cases received for laboratory diagnosis from 2013 to 2015. It is seen that 2014 had the most number of cases that is 1,548 whereas 2013 had the most number of young animals less than 12 months of age sent in for diagnosis that is 593 cases.

Table 2 shows the various bacterial species isolated from 2013 to 2015. During the three years, *Escherichia coli* and *Staphylococcus* sp were commonly

identified. However, other bacteria constituting various species as well as insignificant bacteria made up 45% of the total isolations. This indicates the necessity for further diagnostic investigation to be conducted to identify the presence of any pathogenic bacteria. The bacteria isolated indicate also the pathogens that commonly cause pneumonia and related symptoms as seen in the young animals.

Table 3 shows that the one to 4-month-old lambs constitute 285 animals of the total postmortem number which is 80% of the samples received, having *E. coli*. This indicates that the high risk groups which are susceptible to infections are the very young animals, and a detailed study needs to be done to elucidate the

AGE/ YEAR	2013	2014	2015	TOTAL
1-4 months old	131	92	62	285
5-8 months old	23	24	11	58
9-12 months old	7	4	2	13
Total	161	120	75	356

Table 3. Occurrence of *Escherichia coli* in lambs within the ages of 1-12 months.

AGE/ YEAR	2013	2014	2015	TOTAL	PERCENTAGE %
1 month old	25	18	15	58	20
2 months old	45	21	15	81	29
3 months old	36	35	23	94	33
4 months old	25	18	9	52	18
TOTAL				285	100

Table 4. Occurrence of *Escherichia coli* at ages of 1-4 months.

Age/year	2013	2014	2015	Total
1 - 14 days old	6	3	1	10

Table 5. Occurrence of *Escherichia coli* at ages 1-14 days.

causes for this, which could include poor mothering ability, lack of colostrum or other concurrent disease or management factors. Further to this, Table 4 also indicates about 29-33% the 2 and 3-month-old lambs with high percentage in *E. coli* isolates. Consequently, within the 3 years, *E. coli* was only found in 10 lambs within a fortnight of birth as shown in Table 5. Thus, the early care and management of young lambs is ultimately crucial in determining the survival of lambs and prevention of infection.

DISCUSSION

In the present investigation, *Escherichia coli* was the most prevalent bacteria with a percentage of 25% of all the bacterial isolates. *Escherichia coli* can be considered an important cause of fatality in young sheep flocks. This agrees with the findings of Sharif *et al.* (2005), where the neonatal mortality rate within 4 weeks of age in lambs and kids was 3.2%, and *Escherichia coli* was the most frequent bacteria isolated causing neonatal mortality in lambs and kids, representing 63.4% of all bacterial isolates. According to Ahmed *et al.* (2010), *E. coli* is the most important bacterial pathogen involved in neonatal diarrhoea

or colibacillosis. In the present findings from data analysis, it was observed that 10 cases of *Escherichia coli* in young lambs at the age of 1 to 14 days old were noted. Some studies showed that colisepticemia occurs during the first weeks of life and most commonly between 2 and 5 days of age. Meanwhile chronic disease with localization can occur up to 2 weeks of age (Merck, 1996). According to Ahmed *et al.* (2010), 48.78% of lambs died at ages 0-7 days and 17.07% lambs died at ages 8-14 days, followed by 10.97% at ages 15-21 days and 22-28 days. Mortality among lambs ages 29-35 days was 9.76% and two lambs (2.44%) aged above 35 days died. This indicates young animals are very susceptible to the disease as they have hardly any immunity as newborns.

There are various risk factors that can cause colibacillosis in young lambs which includes physiological conditions of affected animals, primary or secondary infection and farm management practices. Most young small ruminants are highly vulnerable and septicaemic colibacillosis may occur due to insufficient colostrum intake that leads to deficiency of circulating immunoglobins in the body (Hassan *et al.*, 2014). A study by Morris *et al.* (1980), showed that suckling lambs of ewes vaccinated with the K99 antigen were resistant to challenge with K99-positive enteropathogenic *Escherichia coli*. Therefore, the presence of sufficient colostrum in gut lumen soon after birth is very helpful in determining susceptibility to infection and colostrum protective

properties should be increased or enhanced with relevant antigenic determinants on the specific pathogen as prevention to the neonates.

Animals in stressful environmental conditions are easily infected by microbes and can lead to death (Saraswat *et al.*, 2015). In addition, the risk of infection will also increase with increasing infection pressure in the environment. Contaminated drinking water with faecal coliform will affect the performance of the animals and also can cause systemic disease in poultry. Usually water does not provide ideal conditions for pathogenic microorganisms to multiply but they will generally survive long enough to allow waterborne transmission (Karimi *et al.*, 2011). Therefore, treated water supply does not necessarily prevent infection as poor farm management can allow the waterborne transmission through faecal coliform contamination.

The outcome of this report showed that young animals are susceptible to infections and extra care should be taken in managing the risk factors such as overcrowding, poor nutrition, hygiene and concurrent disease management. Good management practices for lambs and periparturient animals will greatly improve the viability of animals thereby reducing mortality. The Department of Veterinary Services is entrusted to give sustainable advised to commercial and smallholder farmers from information garnered from these studies towards improving productivity.

CONCLUSIONS AND RECOMMENDATION

Colibacillosis in young small ruminants are varied according to the severity of disease and the physiological condition of affected animals. This investigation shows that colibacillosis can be one of the first organisms to colonise the gut of small ruminants and reaches to significant level by the 6th hour of birth to few weeks of age, if attention is not fully given. Therefore, small ruminants that are treated immediately after onset of clinical signs will have a better response to the treatment regime. Good management practices by farmers will give a good healthy livestock and also will help the expansion of farming in general.

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