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PATHOLOGY OF PNEUMONIC PASTEURELLOSIS IN GOATS IN KELANTAN AT DRY AND WET SEASONS

Veterinary Medicine

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ABSTRACT

Gross and histophatological changes in cases of caprine pneumonia due to natural infection with Pasteurella multocida and Mannheimia haemolytica has been described after sampling collection at 7 districts in kelantan from November 2015 to August 2016. The gross pulmonary lesions diagnosed were almost the same in both seasons, it includes: pulmonary congestion, emphysema, atelectasis, oedema, white material thread like membraneous coveringof partial or complete lung lobes and abscess formation. A distinct gross and microscopical lesions frequently diagnosed in dry season more than in wet season which comprises of fibrinous pneumonia at a rates of (32%) and (20%) respectively. The most common inflammatory pulmonary lesions had occurred in the wet season are described histologicaly as interstitial pneumonia (27.5%), bronchopneumonia (27.5%), necrotizing pneumonia (10.0%), verminous pneumonia (5.0%), and suppurative bronchopneumonia (5.0%). Percentages of affections at the dry season comprises bronchopneumonia (28.6%), interstitial pneumonia (17.1%), suppurative bronchopneumonia (17.1%), fibrinous pneumonia (5.7%), fibrinous bronchopneumonia (5.7%) and pleuropneumonia (5.7%). It has been concluded that pneumonic pasteurellosis as a disease due to P.multocida and M.haemolytica has become a significant issue in respiratory infection of goats, in both sexes at all ages and in several breeds, specifically, in dry season in Kelantan, with high morbidity of pulmonary (inflammatory and non-inflammatory) lesions.

KEYWORDS

Gross, histophatological changes, Goats, Season

INTRODUCTION

In many parts around the world, goats have a major role for providing a livelihood to many people (Elsheikh & Hassan, 2012). Small ruminants are high value assets for the majority of Southeast Asian nations, as they provide meat and milk. However, they are prone to respiratory diseases such as pneumonia through infection of the upper and lower respiratory tract. Usually, the causes of these infections are bacterial, viral or fungal. There are also other factors, including environmental pollution from toxic heavy metals in the atmosphere, as well as mechanical induction of respiratory distress, which can lead to these abnormal conditions. Factors such as climate, physiological conditions, inappropriate housing, transportation, and etiological factors play a significant role in the incidence of respiratory diseases (Kumar et al., 2014). Respiratory diseases known to have a very significant economic cost by way of lost productivity and in the socio-economic development of poor farmers. Furthermore, respiratory diseases also result in high rates of mortality and morbidity. (Abera & Sisay, 2014). Abrupt climate changes boost Goat's susceptibility to pneumonias (Abdullah et al., 2015). Any change in environmental conditions could thus affect such agents, either positively or negatively, and therefore influence livestock health (Forman et al., 2008). Seasonal influence is observed with more of the pneumonia cases being recorded in the main rainy season than in the dry season (Emikpe et al., 2013).

MATERIALS AND METHODS

In this research, carcases of goat with suspected pneumonia have been collected to do gross and histopathological examination of lung affection. It was from farms and postmortam cases at wet and dry seasons in Kelantan.

Study area

The study was conducted in Kelantan state in the northeast of Peninsular Malaysia during the period from Nov. 2015 until Aug. 2016. Kelantan state is located 453 km from Kuala Lumpur, the capital of Malaysia. The state is geographically positioned at 6.1254° N latitude and 102.2381° E longitude. It has been divided into ten districts. The wet season in this state is from November, to January when the Northeast Monsoon blows. On the other hand, the dry season comprises of, April, May, June, July and August (Department Meteorology Malaysia).

Animals and specimens

A total of 50 lungs in the wet season and 50 in the dry season were collected and used in this investigation. All the specimens collected in this research were mainly from three sources: 1. Samples of pneumonic lung were taken from goats slaughtered in Kota Bharu town in Kelantan state. 2. Specimens that were presented at post mortem in the Faculty of Veterinary Medicine, Universiti Malaysia Kelantan. 3. From goats that died in some farms in the districts of Kelantan. The whole lung specimens were immediately collected aseptically after slaughter. Specimens were transferred to the histopathology laboratory at the Department of paraclinical in the faculty of vetrainary medicine,Kota Bharu (FPV). The specimens were placed into a medical plastic box within the ice-pack container and tightly closed. Routine processing for the histopathological examination was carried out directly when the specimens were brought to the lab, in order to study and describe the gross morphology changes.

Gross examination of caprine pneumonic lung

The examination was done directly after collection the lung specimens, in order to avoid any postmortem changes. The specimens of the lungs, which were diagnosed for gross changes was belong to the goats of different ages, species, and for both sexes. The lungs were examined for color changes, consistency, adhesion, hemorrhages, emphysema, congestion, and pulmonary edema or if there are any other changes. The type of gross lesions which has been identified found in each season was studied and compared for both seasons. Investigation of gross changes was done in cases of caprine pneumonic lung. Identifying the types of pneumonia for each specimen, was also included respectively.Gross examination procedure to each specimen in the laboratory, was performed under powerful lighting. Right and left part in each specimen, including lobes (cranial, middle, accessory and caudal) that examined carefully. Typical color for a healthy goat lung is a pale pink, and that color was the reference and comparison with other discolorations, that occur in diseased lung. The lung consistency was checked. An ideal lung is soft and pasty or in the other word (spongy). On the other hand, unhealthy lung specimens are thicker. Observing the consistency was included all the lobes of each specimen. Check-up has been done for the Adhesion, Hemorrhages, Emphysema, congestion, pulmonary edema and if there are any other changes or lesions.

Histopathological examination of caprine pneumonic lung

Histopathology examinations were aimed to identify and study the types of pneumonia that occur in cases of caprine pneumonic lung, at wet and dry seasons. Preparation of each lung specimen for histopathological examination has been done directly, after gross examination. Sampling of tissues has been done for each lung specimen collected. Tissues were excised from different lobes that shows lesions and infection. Immediately, after taking the tissue samples, preservation was done for each tissue sample by inserting it in a medical sterile specimen container with 10% neutral buffered formalin. Following the standard method in the laboratory, processing of tissues, in order to determine the histopathologic changes and pathological lesions in cases of caprine pneumonic lung, was done by: routinely trimming in cassette, fixing, embedded in wax blocks sectioned at 4-5µm, slide preparation and stained with routine Hematoxylin & Eosin (H&E).

Results and Discussion

Types of gross morphology changes of specimens collected and diagnosed during wet and dry seson

Results showed a difference between the goats pneumonic cases collected at wet and dry season were fibrinous pneumonic lesion. It has been observed in cases of dry season more than in cases at the wet season in a rate of (32.0%), and (20.0%) respectively. The other pulmonary gross morphological lesions diagnosed are similar in both seasons. Which include the following: pulmonary edema, congestion, hepatization, emphysema, atelectasis, abscess and pulmonary consolidation.

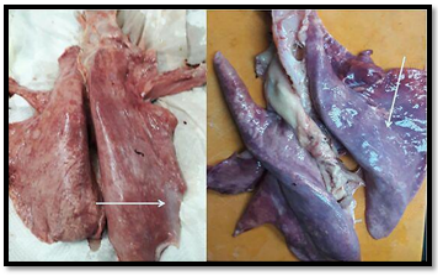

Figure 1: Goats lung specimens in the wet season. There are layers of fibrin (arrow) covering the surface of the lung (dorsal or caudal lobe) of right and left lungs diagnosed as (Pulmonary Fibrinous pleuritis).

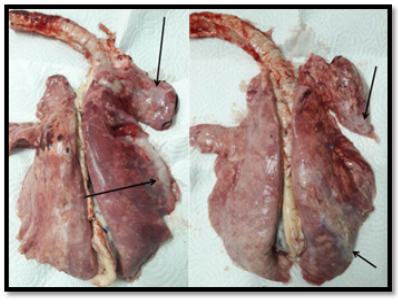

Figure 2 : A cross section of goat lung specimens in the dry season. There are spots of fibrin was spreading on the surface of the lung (dorsal lobe) of right and left lung. This lesion was diagnosed as (Pulmonary Fibrinous pleuritis). It was most significant lesion and change in cases of caprine pneumonic lung at dry season.

Outcomes of histopathological changes for the cases of caprine pneumonic lung.

histopathological examination were to identify the grossly changes and types of pneumonia in infected goats as well as to obtain further details on the changes in the alveoli wall, bronchiolar mucosa, necrosis, epithelial cells, vascular changes, endothelia, congestion of pulmonary vessels and capillaries, exudative changes, inflammatory fluid and cells such as neutrophils, macrophages and lymphocytes. Bronchial associated lymphoid tissue, cellular changes, which will give more information on the pulmonary lesions. The results of histopathological diagnosis and seasonal prevalence of pneumonia in goats at a wet and dry season in Kelantan were analyzed statistically using descriptive statistics in SPSS version 22, involving frequency and percentage of pulmonary lesions. As well, to non-inflammatory pulmonary.

Results of pneumonic types diagnosed during a wet season

Different types of pneumonia were observed in the histopathology examination of caprine pneumonic, lung tissues at the wet season in Kelantan state. Microscopic examination of all the slides of tissues have been diagnosed that there are inflammatory pulmonary and non-inflammatory pulmonary lesions occurring in goats in Kelantan state (Table 1) and (Table 2).

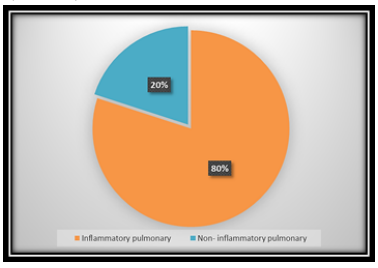

Figure 3: The frequency (%) and different between the incidents of inflammatory pulmonary lesions and non- inflammatory pulmonary in goats at wet season in Kelantan state. 40 cases 80%, were inflammatory pulmonary. While, 10 cases 20% were non-inflammatory pulmonary.

Table 1: Seasonal occurrence of various types of pneumonia in goats, and diagnostic histopathology of all specimens at wet season in Kelantan state.

Wet season			
No	**Types of pneumonia**	**No, lungs Affected**	**Percentage**
1.	Interstitial pneumonia	11	(27.5%)
2.	Bronchopneumonia	11	(27.5%)
3.	Necrotizing pneumonia	4	(10.0%)
4.	Suppurative bronchopneumonia	2	(5.0%)
5.	Proliferative pneumonia	2	(5.0%)
6.	Verminous pneumonia	2	(5.0%)
7.	Acute pneumonia	2	(5.0%)
8.	Pleuropneumonia	1	(2.5%)
9.	Exudative pneumonia	1	(2.5%)
10.	Suppurative pneumonia	1	(2.5%)
11.	Lymphocytic pneumonia	1	(2.5%)
12.	Sub-acute hyper pneumonia	1	(2.5%)
13.	Lymphocytic interstitial pneumonia	1	(2.5%)
Total		**40**	**100%**

Table 2: Seasonal occurrence of Non- inflammatory pulmonary cases diagnosed in goats at wet season

Wet season			
No	**Non- inflammatory pulmonary**	**No, lungs Affected**	**Percentage**
1.	Pulmonary haemorrhage	5	(50.0%)
2.	pulmonary congestion	2	(20.0%)
3.	pulmonary edema	1	(10.0%)
4.	pulmonary atelectasis	1	(10.0%)
5.	pulmonary emphysema	1	(10.0%)
Total		10	(100.0%)

Results of pneumonic types diagnosed during a dry season

Various types of pneumonia have been diagnosed during the dry season in cases of caprine pneumonic lung. Furthermore, non-inflammatory pulmonary were also detected in this season.

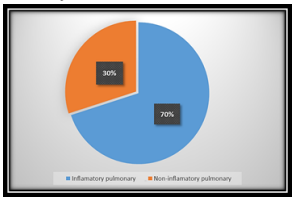

Figure 4: Shown the frequency (%) and different incidents between the inflammatory pulmonary lesions and non- inflammatory pulmonary in goats at dry season in Kelantan state. 35 cases 70%, were inflammatory pulmonary. While, 15 cases 23% were non-inflammatory pulmonary.

Table 3. Occurrence of various types of pneumonia in goats, diagnostic histopathology of all specimens at dry season in Kelantan state.

Dry season			
No	Types of pneumonia	No, lungs Affected	Percentage
1.	Bronchopneumonia	10	(28.6%)
2.	Interstitial pneumonia	6	(17.1%)
3.	Suppurative bronchopneumonia	6	(17.1%)
4.	Pleuropneumonia	2	(5.7%)
5.	Fibrinous pneumonia	2	(5.7%)
6.	Fibrinous bronchopneumonia	2	(5.7%)
7.	Fibrinous and Suppurative pneumonia	2	(5.7%)
8.	Verminous pneumonia	1	(2.9%)
9.	Lymphocytic pneumonia	1	(2.9%)
10.	Hematogenous pneumonia	1	(2.9%)
11.	Granulomatous pneumonia	1	(2.9%)
12.	Chronic fibrinous pneumonia	1	(2.9%)
Total		35	100%

Table 4: Seasonal occurrence of various types of Non-inflammatory pulmonary cases diagnosed in goats at dry season

Dry season			
No	Non- inflammatory pulmonary	No, lungs Affected	Percentage
1.	Pulmonary haemorrhage	8	(53.3%),
2.	Pulmonary congestion	5	(33.3%)
3.	Lymphoid hyperplasia	1	(6.7%)
4.	Bronchiolar hyperplasia	1	(6.7%)
Total		15	(100.0%)

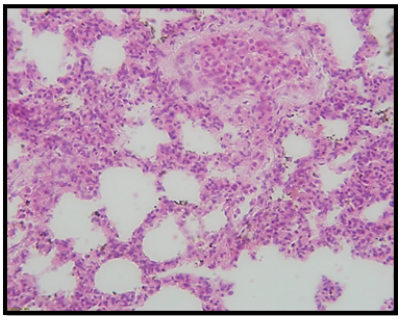

Figure 5: Photomicrograph of pulmonary inflammatory diagnosed as interstitial pneumonia in the lung specimen of goat at the wet season. with area of alveolar emphysema. The alveolar septa are infiltrated with mononuclear cells ×400, (H & E) stain.

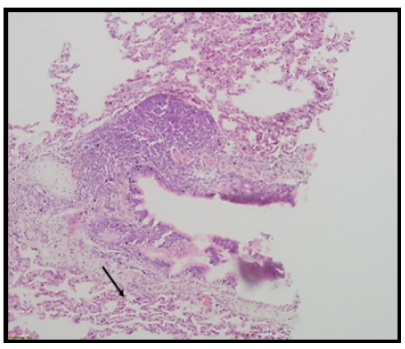

Figure 5: Photomicrograph of bronchopneumonia at the wet season. Alveolar spaces and lumen of the bronchi are filled with inflammatory exudates mostly neutrophiles, debris, and fibrin were observed in these areas arrow ×100, (H & E) stain.

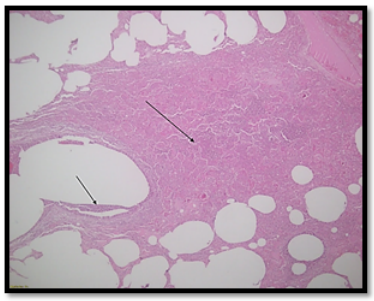

Figure 6: Photomicrograph of suppurative bronchopneumonia occurred in goats at the wet season. There was endothelial damage, More extensive and necrotic changes with neutrophilic infiltration of the alveoli. Severe desquamation of the bronchial and bronchial epithelium ×40, (H & E) stain.

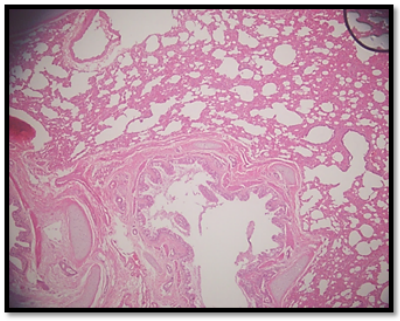

Figure 7: Photomicrograph shown type of pulmonary inflammatory diagnosed as interstitial pneumonia at the dry season. In alveolar, highly thickening with a lot of cell infiltration, mostly are monocyte, lymphocyte and macrophage. Increased reticular cell between the alveolar tissue spaces) ×100, (H & E) stain.

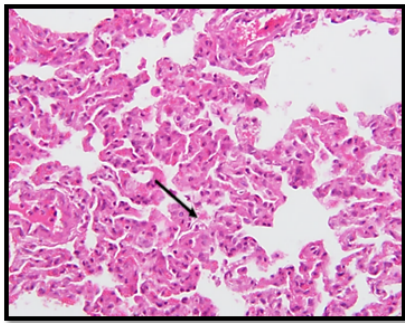

Figure 8: Photomicrograph showing type of inflammatory pulmonary diagnosed as bronchopneumonia at the dry season. Necrotizing bronchial, a lot of inflammatory cells, infiltrated around the muscle ×400, (H & E) stain.

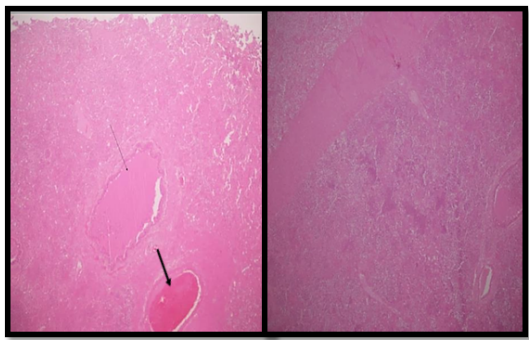

Figure 9: Photomicrographs of suppurative bronchopneumonia, at dry season. Exudates around and in bronchioles, interspersed red blood cells, alveoli and bronchioles filled with variable proportions of neutrophils, macrophages, serofibrinous exudation, degenerated leukocytes and necrotic debris ×100, (H & E) stain.

Discussion

Gross morphology and histopathology diagnosis of different types of

lesions develoed and related to the lower respiratory system, mainly the pulmonary tissue indicate the serious attention that has to be paid to control pneumonic pasteurellosis that can be influenced and potentiated by climatic changes. Determination and evaluation the prevalence, the onset of lung lesions and their impact on growth of animals species was crucial to show that severe lung lesions could lead to greatly decreased growth weight and performance of the animals (Mahdi, 2015). The evidence was clear from the study results, when to answer the important Question weither there are any gross and histopathological changes in the cases of caprine pneumonia diagnosed during the wet season compared with the collected cases during the dry season and how is the classified patterns for pneumonia. The main lesion diagnosed in the specimens collecte in both wet and dry seasons is the frequent and domenant presence of the fibrin. The fibrin was seen either diffuse or clumps and in some specimens it covered most dorsal lobe of the lung with hard consolidation. This image was seen mostly in the dry season at a rate of (32.0% in dry), and (20.0% in wet). This type of lesion was also assigned and in accord with Kumar et al. (2004) and also reported by Al-Sultan et al. (1987).

It has been detected that the inflammatory pulmonary lesions in the wet season are mainly confined to (Interstitial pneumonia and bronchopneumonia) which represents the most frequent pulmonary pathology with a rate of (27.5%) interstitial pneumonia and (27.5%) bronchopneumonia. On the other hand, in the dry season bronchopneumonia (28.6%), interstitial pneumonia (17.1%), and suppurative bronchopneumonia (17.1%) which recognized as the most frequent among the other types.

In general this finding is similar to Dar et al. (2012), Yesuf et al. (2012), Kumar et al. (2004) and Emikpe et al. (2013). The high percentage of suppurative bronchopneumonia is another indication that bacterial pneumonia is the serious and dangerous task and challenge in goats health herd or individual animal that react to environmental and climatic change.

Animal health may be affected by climate change in four ways: heat-related diseases and stress, extreme weather events, adaptation of animal production systems to new environments, and the emergence or re-emergence of infectious diseases, especially vector-borne diseases critically dependent on Environmental and climatic conditions. To face these new menaces, the need for Strong and efficient veterinary services are irrefutable, combined with good Coordination of public health services, as many emerging human diseases are zoonoses (Forman et al., 2008).

Conclusion

Pneumonia is a major condition in all goats presented for post mortem in the department of paraclinical at the section of veterinary pathology in the University Malaysia Kelantan and goats slaughtered in Kelantan market. The results indicate that the inflammatory pulmonary lesions are present at a high frequency, specially bronchopneumonia and interstitial pneumonia in the wet season, while bronchopneumonia, interstitial pneumonia and Suppurative bronchopneumonia at dry season. The seasonal distribution of the different lesions was almost the same in both seasons and also, the non- inflammatory pulmonary affections.

Gross morphology in most cases of caprine pneumonia, described with the presence of abundant deposition of fibrin on the surface of various lung lobes. The most appropriate and scientific analysis is the presence of a microbial agent with a tendency to affect by injury the intimal layer of the blood vessels. The most possible cause is either infection with pasteurella species or mycoplasma that can exert this type of gross lesion.

In the author opinion, this study although shed some light on the most frequent diagnosed and important pulmonary lesions that occurred in the cases of caprine pneumonia. As findings in wet and dry season in Kelantan, needs to expand and improve through studies on the availability of these pathogens in its highest virulent status and the factors that facilitate to cause the disease at the favorable season.

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