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Pathological Pulmonary Lesions in Cows in Mosul Province in 2013

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Abstract
This piece of research characterizes the lesions observed during collecting specimens of lungs of cows from butchers. Grossly, lesions varied from pulmonary paleness to congestion and necrosis. These gross lesions confirmed the histopathological lesions that represented by variant stages of pneumonia; acute, serous, serofibrinous, hemorrhagic, fibrinonecrotic and cases of chronic bronchopneumonia. This study suggests paying attention to preliminary cases of pneumonia as how fast would be deteriorating into advanced stages that affect both dairy products and human consumption.
Keywords: pneumonia, cows, lungs

1. Introduction

It is important here to notify that this study is important to report cases of lung lesions in cows from the pathological point of view. Therefore, many appreciated and abundant resources in Iraq and world could not be mentioned as they are numerous and explore the item from the microbiological point of view or others.

Lungs represent important and sensitive organs in all species and here in cows this item supplements this significance as they have a major role in dairy production as well as their meat consumption by human.

It has been investigated that treatment of clinically affected feedlot cattle may be insufficient to stop significant production losses that attributed to respiratory tract diseases (Wittum et al., 1996).

Simultaneously, (Dee Griffin, 1997) describes the respiratory disease to be the most expensive disease of beef cattle. The author discusses the impact of respiratory disease, evaluation of therapeutic treatment, and lung lesions in beef cattle at Slaughter studies on the economic impact of bovine respiratory disease (BRD).

Pneumonia is the inflammation of .lungs characterized by congestion and consolidation of lungs. The pathological lesions of the lungs are produced in a similar way regardless of the type of etiological agent and include various stages like congestion, red hepatization, grey hepatization then resolution.

Stage of congestion includes hyperemia and pulmonary oedema. The capillaries are swollen with blood and alveoli are filled with watery serous exudate.

Stage of red hepatization is characterized by consolidation of lungs due to accumulation of blood in blood vessels and capillaries (hyperemia and congestion). The consolidated lungs are solid similar to liver tissue and therefore it termed red hepatization. Such lung sinks in water. Alveoli are filled with serous or serofibrinous exudate giving firmness to lungs. In inflammatory condition, the neutrophils, macrophages, lymphocytes along with erythrocytes infiltrate the affected area of lungs.

In the stage of grey hepatization, Lungs remain solid but due to removal of erythrocytes, it becomes grey or less red in color. Firmness of lung remains the same.

Recovery starts in the form of absorption of fluid and cellular debris is removed by phagocytic cells. The causative organism is counteracted or disintegrated from the lungs via body immunity. After that, lung parenchyma becomes normal and starts functioning (Stage of resolution). If the causative agent is more lethal, it may cause death of animal due to respiratory failure or may cause long-lasting lesions like formation of scar.

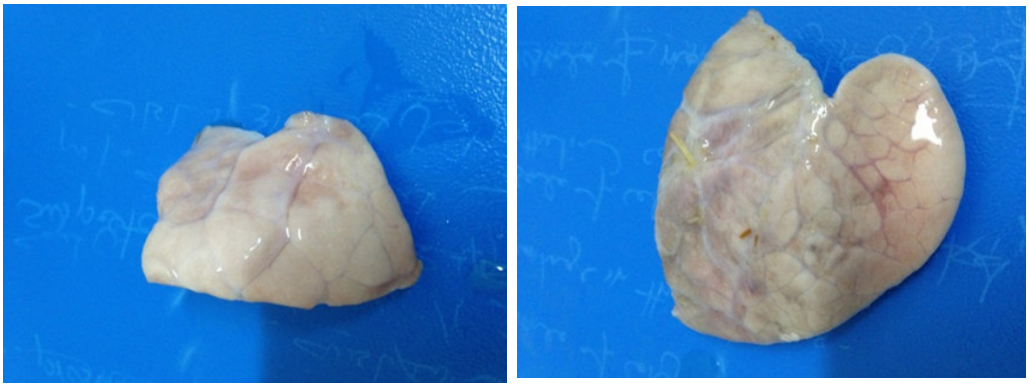
There are various types of pneumonia caused by bacteria, virus, fungi, parasites, allergens, chemicals (Chauhan, 2010).

2. Results

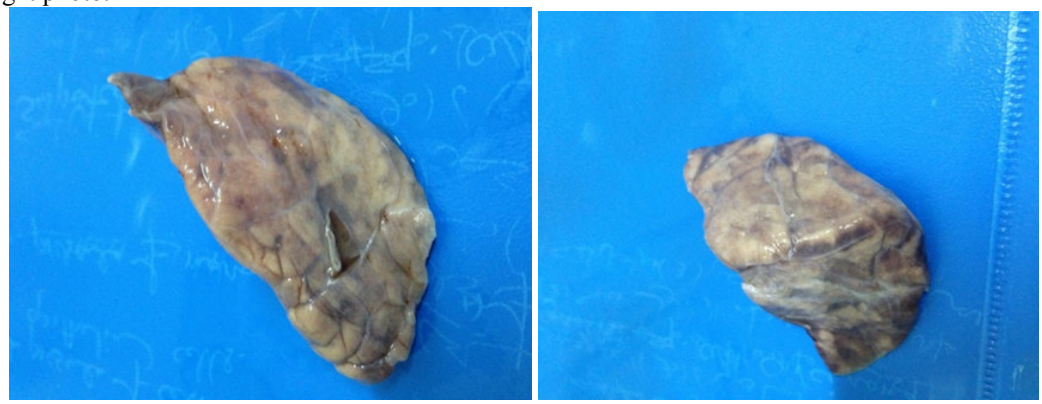
From collecting lungs randomly, samples show graduating patterns of pneumonia (acute serous to hemorrhagic pneumonia, serofibrinous to necrotic pneumonia).

Gross lesions:

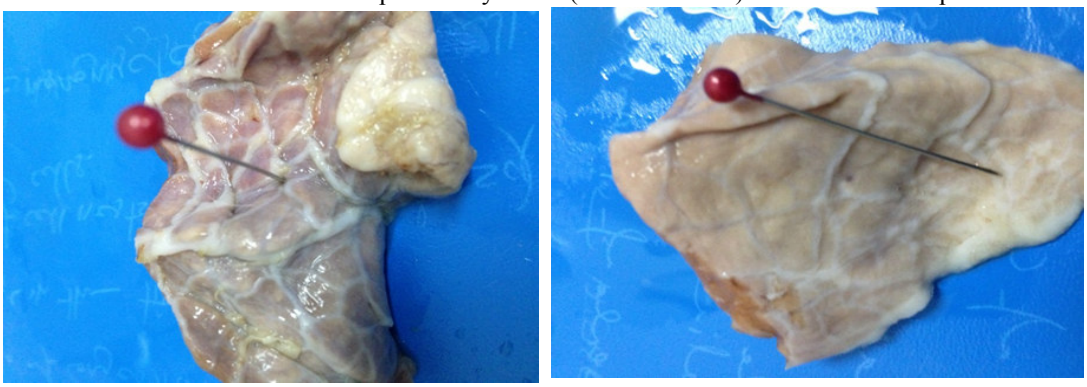
The following gross photos represent the randomly collected pulmonary specimens from cows before conducting the routine histopathological procedures:



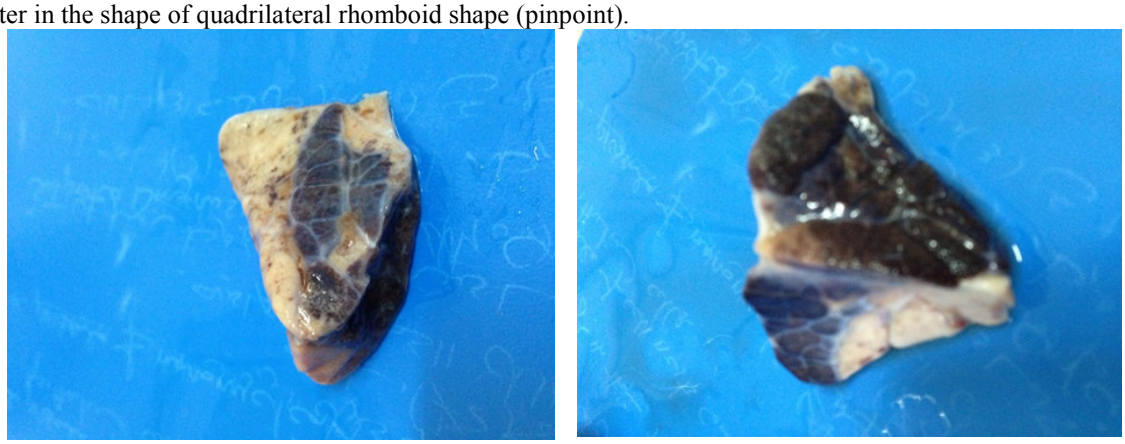
Photos of cow lung represent the obvious paleness of its color with thickness in the interstitial tissue especially in the right photo.



Photos show necrosis of the pulmonary tissue (brown in color) with thickness of pleura.

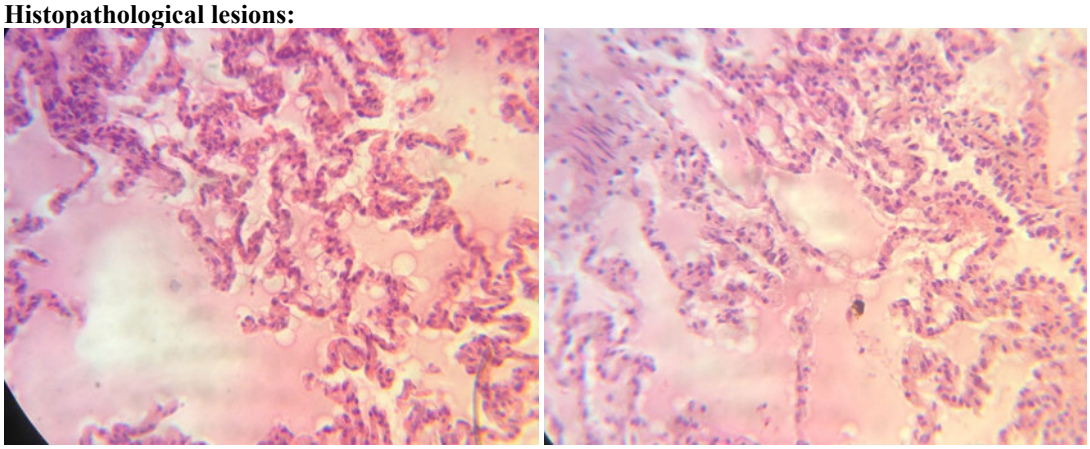


Photos revealed more necrotic tissue with thickness of pleura and fatty tissue surrounding it. In addition, thickness of the interstitial tissue surrounding the pulmonary tissue has been observed. It is represented by white matter in the shape of quadrilateral rhomboid shape (pinpoint).

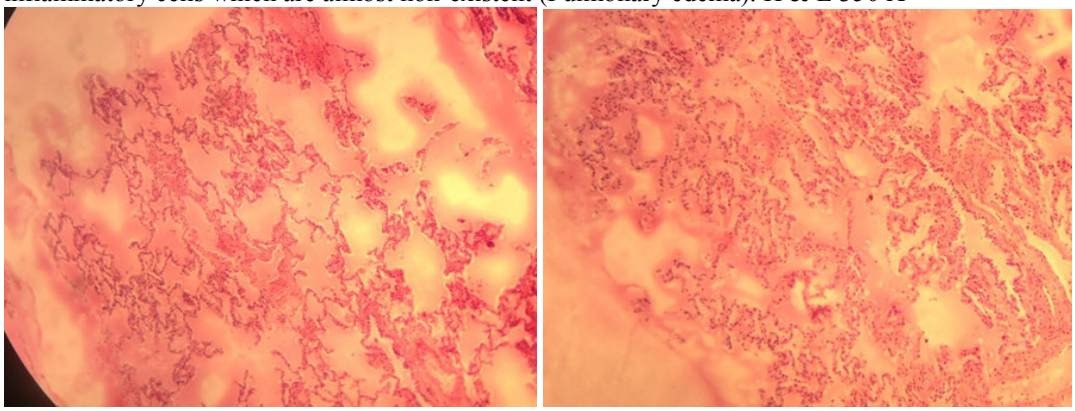


Photos revealed more deterioration of the pulmonary tissue necrosis (dark chocolate in color) with consolidation. In addition, discoloration of the fatty matter surrounding pulmonary tissue (left photo).

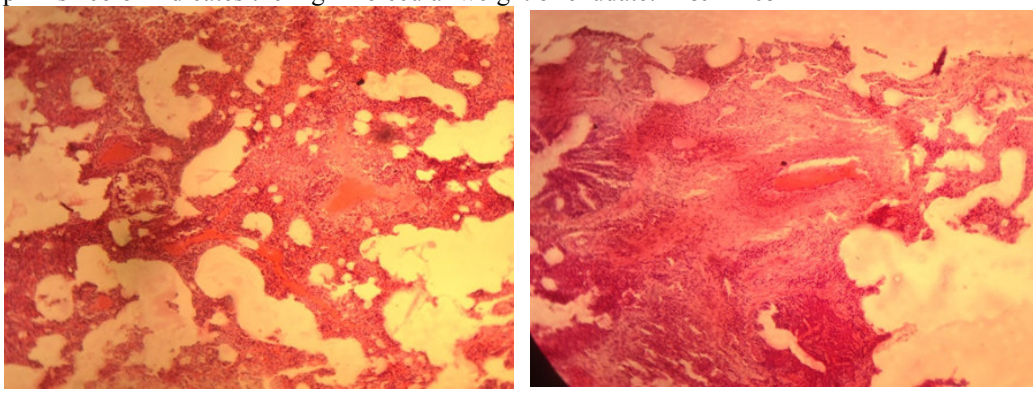
Histopathological lesions:



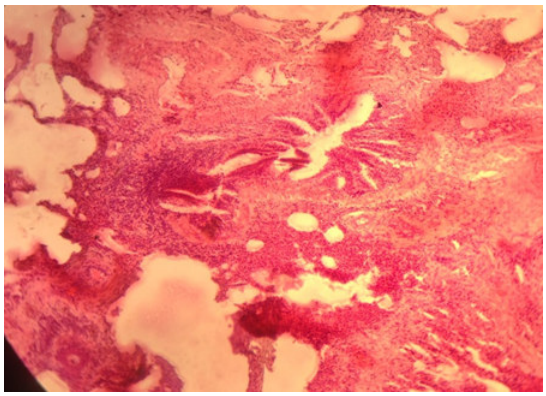
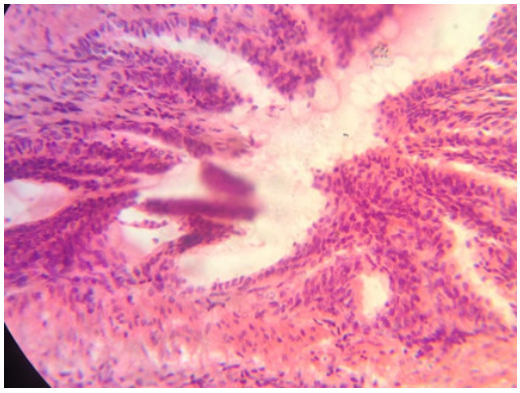
Photos shows infiltration of light pink- colored exudate in spaces of pulmonary alveoli with small numbers of inflammatory cells which are almost non-existent (Pulmonary edema). H & E 350 X



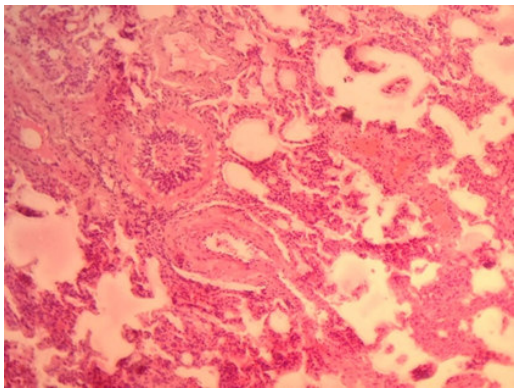
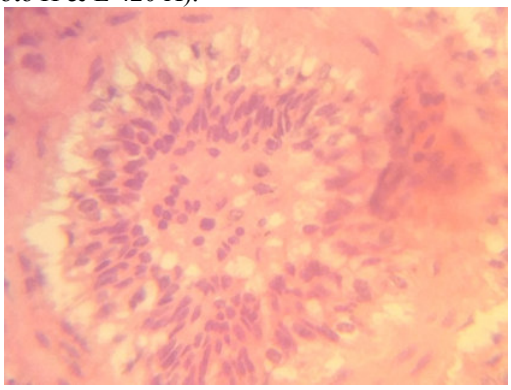
Photos revealed infiltration of exudate (more pinkish in color) covering all over pulmonary alveoli. The more pinkish color indicates the high molecular weight of exudate. H & E 105 X



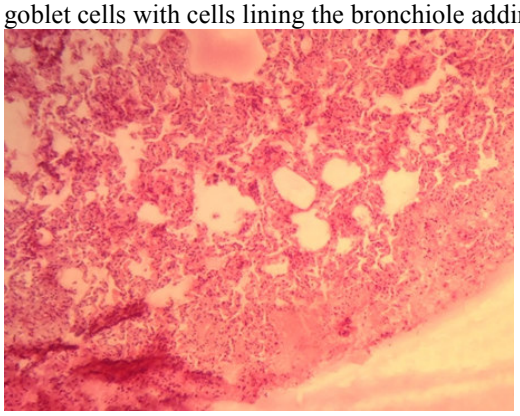
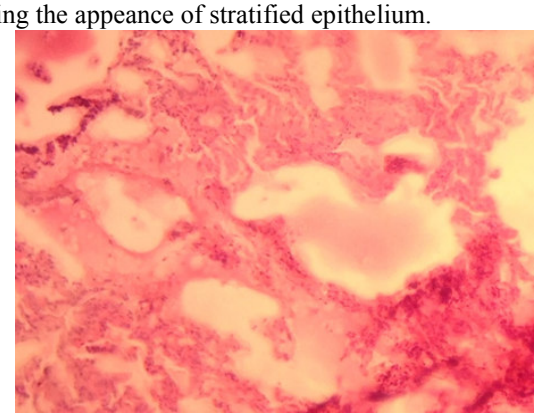
Photos shows more advanced stage of inflammation. (Hemorrhagic inflammation): infiltration of polymorphic inflammatory cells. Hyperemia and congestion of blood capillaries that nourishing pulmonary alveoli and bronchioles. Thus, Thickening of pulmonary interstitial tissue and covering of pulmonary alveolar spaces result in compensatory emphysema in other parts of alveoli. H & E 142 X

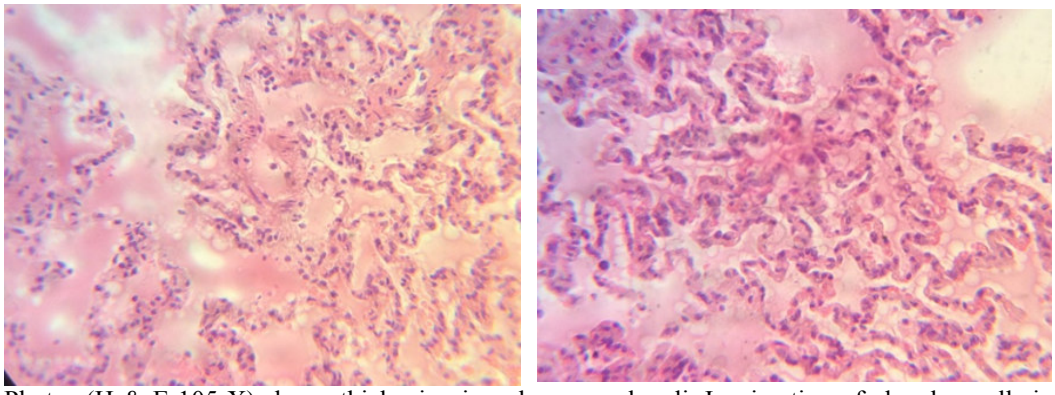
Photos revealed thickening of the walls of pulmonary alveoli and bronchioles in the microscopic field (Left photo H & E 142 X). (Bronchopneumonia) Magnification of a bronchiole illustrates the thickening of its wall resulting from infiltration of polymorphonuclear inflammatory cells. Thickening of the wall results in creating projections towards bronchiolar lumen (Right photo H & E 420 X).

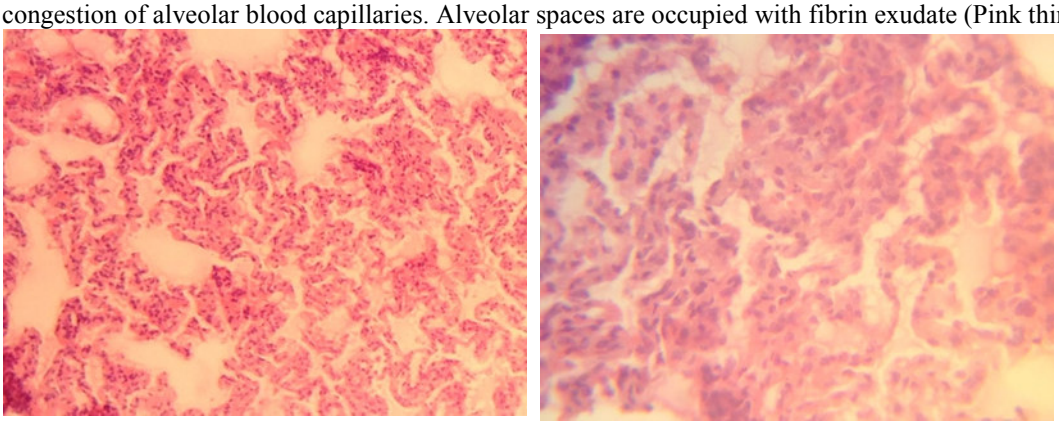
Left photo (H & E 142 X) shows bronchopneumonia: Wall of bronchioles are thickened resulting in formation of inward projections and surrounded by fibrous tissue, the lumen is occluded by fibrin exudate with inflammatory cells and cellular debris. Right photo (H & E 420 X) reveals magnification of the bronchiole: Proliferation of the goblet cells with cells lining the bronchiole adding the appeance of stratified epithelium.

Left photo (H & E 142 X) reveals fibrinonecrotic inflammation of the lung: The pulmonary tisuue is covered by fibrinous exudate in addition to infiltration of polymorphonuclear inflammatory cells. In addition, coagulation necrosis is obvious on all the pulmonary tissue. Patches of pus foci surrounded by neutrophils are in the lower-left side of the microscopic field. Right photo (H & E 420 X) reveals the magnification of necrotic area of alveoli surrounded by patches of pus and neutrophils.



Photos (H & E 105 X) shows thickening in pulmonary alveoli. Inspissation of alveolar walls is resulting from congestion of alveolar blood capillaries. Alveolar spaces are occupied with fibrin exudate (Pink thin threads).



Photos H & E illustrate atelectasis: Alveoli are compressed together with a less spaces amongst them. Left photo 105 X. Right photo 350X.

3. Discussion

Results of this piece of research represent variant stages of pneumonia. In acute serous interstitial pneumonia the preliminary event is a significant capillary permeability with escape of proteinaceous edema into the alveoli, and demolition of alveolar pneumocytes. Thickening of the proteinaceous material in both alveoli and bronchioles may result in the formation of hyaline membranes; to replace the lost type I cells proliferation of cubic pneumocytes type II and this will occur within some days causing epithelization of the alveolar septa (Van Dijk et al., 2007).

Many reported cases of Fibrinous or fibrinosuppurative pneumonias in cattle are characterized by accumulation of exudates in the bronchiolar and alveolar spaces. Organization of this material is one of the most distinguished phenomenons of the pneumonic lesion in cattle especially when died during severe *M. haemolytica* infection (Lopez, 2012).

Acute fibrinous-necrotizing interstitial pneumonias might be the result of infectious hematogenic causing fibrinoid necrosis of the alveolar septa and severe exudate of fibrinous material into the alveoli that might be associated with numbers of inflammatory cells (Van Dijk et al., 2007).

Emphysema is the increase in amount of air in lungs characterized by dilation of the alveoli. It may be acute or chronic and focal or generalized. Its causes could be bronchitis, atelectasis in adjoining area of lung, pneumonia, allergy, and pulmonary adenomatosis (Chauhan, 2010).

In pulmonary edema, there is accumulation of serous fluid in alveoli of lungs. Simulateously, the causes could be bacterial, viral, or allergic Chauhan, 2010).

Atelectasis might be incomplete distention of the alveoli after birth (congenital atelectasis) or collapse of the alveoli due to complete obstruction of the afferent bronchus/bronchiole with absorption of the retained air (obstruction atelectasis) or due to compression of the alveoli (compression atelectasis) due to space occupying processes in the lungs or the thoracic cavity (e.g. hydrothorax) (Chauhan, 2010).

Atelectasia and hepatization have been observed previously by (Belkhiri, 2009). These results were noticeably lower to those observed by Gourlay (1970).

This study was preceded by some similar studies in Iraq. Therefore, this type of study should be reported frequently for update requirements.

Hemorrhagic, interstitial pneumonia, fibrinous pneumonia, pleuropneumonia in addition to pulmonary edema was also found in Mosul area in a previous study by (Al-Sultan et al., 1987).

Hemorrhagic and interstitial pneumonia have been also previously reported by (Habacha et al., 1993).

(Raji et al., 2010) found in Nigeria abattoir house pneumonia 8.79% and pulmonary emphysema 4.71% amid series of variant pathological organ lesions.

In general and according to a study in Algeria, researchers have deducted that the Echinococcus hydatidosis represented the most frequent pulmonary case. The pulmonary emphysema has been observed at a lower frequency, taking the second place in frequency after the hydatid cyst (Belkhiri et al., 2009).

(Vallet and Fostier, 1994) have attributed some of the bovine pulmonary edema cases to Respiratory Syncytial Virus (RVS).

(Swai et al., 2013) recognized the incidence of contagious bovine pleuropneumonia (CBPP) using abattoir survey in Northern Tanzania.

Additionally, in 2014, in Kerbala province of Iraq, Al-Nassir found pneumonia cases (0.66%) and lung worms cases (0.44%) in its abattoir (Al-Nassir, 2014).

Furthermore, Tsegaye and his team revealed the prevalence of pulmonary Hydatidosis, emphysema, atelectasis, congestion, abscess, and lung parasites during their study period (Tsegaye et al., 2016).

4. Conclusion

Pneumonia represents the most difficult disease to treat if it has been deteriorated. Therefore frequent inspection and checking by vets is an essential step to control the disease as it has getting irresponsive to later stage treatments.

Unfortunately, these findings represent some neglecting aspects in both cattle hygiene and their products in addition to human health concerning his hygiene and meat consumption. Therefore, advices should be directed to follow healthy cow raising, veterinary inspection with periodically checking.

Acknowledgement

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