International Scholars Journals

African Journal of Dairy Farming and Milk Production ISSN 2375-1258 Vol. 6 (6), pp. 001-008, June, 2019. Available online at www.internationalscholarsjournals.org © International Scholars Journals

Full Length Research Paper

Histopathological study and pulmonary classification of bovine lesions

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Accepted 15 February, 2019

The partial or total seizures of carcasses or organs by veterinary services during inspection constitute a real constraint for butchers from the economical point of view. Results of a study carried within two years in Tiaret slaughterhouse (west of Algeria) and within three years in Batna slaughterhouse (east of Algeria) have shown a high frequency of pathological pulmonary lesions in 870 bovine lungs that were inspected. 744 lungs were concerned by these lesions. The seasonal impact of the lesions has been highly marked. The hydatid cyst was the most frequently observed lesion with 330 cases (42.64%) followed by pulmonary emphysema with 111 cases (14.35%) and pulmonary congestion with 61 cases (7.89%). According to the localization of these lesions, we have noted that the right lung was the most affected (92.60%) than the left one, and the cranial lobes were more attacked (76.90%) than the caudal ones (71.45%).

Key words: Frequency, lesion, lung, bovine.

INTRODUCTION

The respiratory diseases constitute a serious and major problem as well as for breeders than for veterinarians, because of the major economic losses they cause, and the expenses of the care and preventions that they generate. This work has been achieved in Tiaret slaughter houses (west of Algeria) and in Batna slaughterhouses (east of Algeria), in order to evaluate the impact of the various bovine pulmonary diseases in these regions.

Lungs are the most exposed organs to different aggressions because of their anatomical and histological particularities. The cattle intensification and the deterioration of the hygienic conditions are the most important factors that aggravate and promote pulmonary diseases.

In Algeria, we do not have any precise statistics on pulmonary diseases frequency, and no deepened survey has been led on their epidemiology. However, it appeared interesting for us to lead an investigation on these pulmonary diseases from information's taking at slaughter houses in order to well know them and especially to determine their real prevalence.

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MATERIAL AND METHODS

Geographical situation

The survey has been led in Tiaret and Batna's slaughterhouses

The slaughterhouses

Two major reasons motivated the choice of these slaughterhouses: their accessibility and the concentration of slaughtering especially in the town of Tiaret and Batna (capitals of these two wilayates).

Organization and working

Animals are slaughtered and eviscerated on floor. The hours of working are very variable, and are located between 4:00 and 12:00 a.m. The number of bovines slaughtered per day is variable.

Animal material

The investigation has been done on 870 bovines of different ages and sexes of local and ameliorated cattle races. These animals are

generally originated from the capital of these two wilayates or come from the south or the west. For every animal, the lungs were carefully examined in this work. The determination of age and sex was part of this survey.

Collection of the samples

Scheduled visits have been done previously at the level of these two slaughterhouses. Inspection of lungs has been done within two years in Tiaret and three years in Batna, according to a special calendar taking in account the working time of slaughterhouses (days and hours) and their accessibility. The number of inspection visits was on average of once per week. Concerning examination and collection of lungs, and from the economical point of view, organs without any disease have been observed at the slaughterhouses. The affected lungs are first inspected locally and then sent in coolers to the regional veterinary laboratory.

Organ examination

This examination has been achieved macroscopically and microscopically.

Macroscopic exam

It was a superficial observation of the organs, especially on the visceral and diaphragmatic faces and a deep observation at incision. In case of a parasitic bronchitis, a meticulous exploration of the trachea and the bronchi of the respiratory tract have been made in order to search the concerned parasites. The parasitic cysts have also been identified.

Microscopic exam

Previously found results on adult parasites were further identified and classified with a microscopically observation; some organ's fragments (pieces of pulmonary parenchyma of 1cm depth), were cut and then conserved into a 10% solution of formalin or in Bouin solution. These samples were after sent to the regional veterinarian laboratories in order to complete the Histopathological study.

Histopathological exam

The Hematoxyline-Eosine method of coloration was used in this study.

RESULTS AND DISCUSSION

Classification of pulmonary lesions, Table N° 01

According to our results, we have deducted that the *Echinococcus* hydatidosis represent the most frequent pulmonary pathology with a rate of 42.64%. This frequency is more important than those reported by Zanad (1984) and Al-Sultan (1987) with the rates of 25% and 28% respectively. In comparison, Dahman (1979) and Kamil (1990) reported a frequency of 5.26% and 11.12% in ovine species respectively. In goat's species, Al Joboury (1989) reported a frequency of only 5.88%. However, the hydatidosis correspond to the most insidious pathology and its frequency varied with age (reformed and aged cows are more often affected than the others). This disease is bound to the practice of grazing and the simultaneous presence of animals on the same prairies. Then, in youngest cows and bulls, the hydatidosis has less luck to persist, because of their early sacrifice, interrvened to an age where the parasites can not reached their fertility stage; this what has been confirmed by Zahor (1983). This author has reported a rate of 80% of hydatidosis in culled cows, 58.94% in oldest ones, and 23.8% in youngest bovine (of less than two years old).

These results confirm in a clear manner, the variation of the disease frequency with age. Indeed, the hydatid cyst represents a real curse which hinders the production development in our cattle herds. This disease is at the origin of considerable economic losses, especially if we refer to the seizures of organs at slaughterhouses, and in regard to the reduction and the least quality of milk, meat and wool production (Acha and Szyres, 1989a).

Our results on bovine respiratory tract lesions show clearly that the hydatidosis constitutes the most dominant pathology in our herds. Indeed, Ali-Lemouyes (1978) reports an infestation rate of 16%. Zerouala (1984) and Hamouda (1985) reported the frequencies of 49% and 50% of hydatid cysts respectively. It is to note to this subject that the hydatidosis, disease studied since many decades remind very frequent, dangerous and wide-spread in our country. In France, the rate of infestation by *Echino-coccus* is estimated to 1.3% for adult bovines (Soule, 1994). Around Sousse area in Tunisia, the de-gree of infestation in 1981 was in bovine of 1.5% (Jaiem, 1984). However, the hydatid cyst is the lesion which is observed around the year with an increase in frequency during autumn and winter seasons (Photo 1a, b).

The pulmonary emphysema has been observed at a frequency of 14.35%, taking the second place in frequency after the hydatid cyst. These results are highly superior to those reported by Habacha (1993) with a rate of 5.07%. It often presented like a secondary lesion, following a perforation of the lung by a foreign body coming from the reticulum in the case of the traumatic pericarditis or pulmonary abscess (Blood and Henberson, 1976). It presented as interlobular or intralobular shape (interstitial emphysema), observed especially among aged cows.

In bovine species, the emphysema can be a conesquence of pulmonary strongylosis (Villemin, 1974) or can be also due to infections by RSV (Vallet and Fostier, 1994). Pulmonary emphysema can reach a rate of 16.50% in summer and 16.76% in spring, whereas during winter and autumn seasons, it decreases respectively to a rate of 13.23% and 11.33%. This disease is often regu-larly associated to the dictyocaulose and accompanied by a suppurated form of bronchopneumonia (Espinasse et al., 1985) and some forms of viral pneumonias (Cabanie and Schelcher, 1997).

This survey permitted us to distinguish the critical periods, favorable to the apparition of some lesions in rela-

Photo 1a. Macroscopic aspect of a poly cystic pulmonary parenchyma.

Photo 1b. Open cyst containing the hidatic liquid.

tion to others

The pulmonary congestion has been observed as a frequency of 07.89%, this result proves to be superior to the one reported by Habacha (1993) with a rate of 3.8% but present a certain likeness with the one reported by Al-Sultan (1987) with a rate of 8%. This affection is initiated by an influx of blood in the lungs due to the obstruction of the pulmonary vessels. It is sometimes followed by pulmonary edema that, when the intravascular liquid spills in parenchyma and the alveoli (Blood and Henderson, 1976). Most cases of congestion have especially been observed at the time of meteorisation in cold and rainy time that disrupts the thermal regulation of the animal is a favorable reason (Vallet and Fostier, 1994). It follows a too strong pressure of the rumen on the diaphragm what provokes a compression of pulmonary vessels and an increase in artério-capillary debit.

The other pulmonary changes observed at rates not least important than the others at the slaughterhouses are respectively.

Atelectasia and hepatization have been observed respectively at a rate of 5.03% and 2.32%. These results are distinctly lower to those observed by Gourlay (1970), who reports a rate of 73% for atelectasia. In comparison with results found in the ovine species, our results are always distinctly lower to those reported by Boudilmi (1984) with a rate of 16.2% for atelectasia and 39% for hepatization. These lesions are classically localized in the apical and cardiac lobes, and more rarely in the diaphragmatic one, seem to come with infections with mycoplasma and pasterella (Ahmed, 1998; Benmahdi, 1989; Blood and Henderson, 1976). The presence of exudates or parasites in bronchial lesions accompanying lung atelectasia (4.50% in summer, 3.94% in autumn, 6.86% in winter and 4.79% in spring), allows us to conclude to an infectious or parasitic reason (Photo 2).

The pulmonary edema has been observed at a frequency of 0.51%, this result is significantly lower to the one reported by Al-Sultan (1987) with a rate of 7% and can be also owed to the infection by the RSV (Vallet and Fostier, 1994).

The fibrinous pneumonia and pleuropneumonia have been observed respectively at a rate of 4.52% and 2.85% in this study. These two lesions were often associated. Our rates are lower to those reported by Al-Sultan (1987) with the respective rates of 10% for the fibrinous pneumonia and 6% for the pleuropneumonia and by Habache (1993) with a rate of 9.6% for the fibrinous pneumonia. Hussein (1979) noted the rates of 16% and 13% also respectively for the fibrinous pneumonia and the pleuropneumonia (Photo 3).

The suppurated pneumonia, the necrotic nodules and the parasitic nodules have been observed at a respectively rate of 3.61% for the two first lesions and 3.88% for the parasitic nodules (Photo 4) . The rate of suppurated form of pneumonia (Photo 8d) observed during our survey is distinctly lower to the one found by Habacha (1993) with a rate of 30.7% and a rate of 15% by Al-Sultan (1987) and 16.8% by Omar (1966). Abscess constitutes in general a consolidated infectious; the pus and the cockle of the abscess correspond to a reaction of the organism against a bacterial multiplication or a past infectious phenomena (Brunet, 1991).

The tuberculosis has been observed at a rate of 0.45%, the obtained results are in accordance with those noted by Benateya (1980) of 0.02% and by Zerouala (1984) of 4.09%. The tuberculosis is in upsurge and remains a troubling illness in our country (Photos 6a, b) in regard to the danger that represents tuberculosis for the public health and the economic losses caused by the seizure of

Table N° 01. Distribution of the pulmonary lesions according to the seasons.

Season (Nbr bovine)	Summer (185)		Autumn (208)		Winter (278)		Spring (198)		Total (870)	
Type of lesion	Nbr	%	Nbr	%	Nbr	%	Nbr	%	Nbr	%
Congestion	15	07.50%	13	05.91%	15	07.35%	19	11.37%	61	07.89%
Oedema	01	00.50%	01	00.49%	02	00.98%	00	00.00%	03	00.51%
Emphysema	33	16.50%	23	11.33%	27	13.23%	28	16.76%	111	14.35%
Atelectasia	09	04.50%	08	03.94%	14	6.86%	07	04.79%	39	05.03%
Hydatid cysts	74	37.00%	93	45.81%	94	46.07%	69	41.31%	330	42.64%
Lung Parasits	01	00.50%	00	00.00%	03	00.98%	01	00.59%	04	00.51%
Parasitic nodule	10	05.00%	14	06.40%	04	01.47%	04	02.39%	29	03.88%
Necrotic nodule	11	05.50%	07	03.44%	09	04.90%	00	00.00%	28	03.61%
Pn. Fibrin	08	04.00%	08	04.43%	09	03.92%	12	05.98%	35	04.52%
Pleuro-Pneumonia	03	01.50%	06	02.95%	05	02.94%	08	04.19%	22	02.85%
Pleuro-Pn .P.T	03	00.50%	03	01.47%	00	00.98%	00	02.39%	06	01.30%
Suppurative pneumonia	09	04.50%	05	02.46%	10	04.41%	05	02.99%	28	03.61%
Interstitial Pneumonia	08	04.00%	06	03.44%	01	00.49%	01	01.19%	18	02.32%
Hemorragical Pneum.	01	00.50%	01	00.49%	00	00.00%	02	00.59%	02	00.39%
Hepatisation	02	01.50%	07	03.44%	01	00.49%	06	04.19%	18	02.32%
Vascular Alteration	12	06.50%	08	03.94%	11	04.90%	02	01.19%	33	04.27%
Tuberculosis	00	00.00%	00	00.00%	02	00,72%	02	01,10%	04	00,45%
TOTAL	200	22.99%	203	23.33%	204	23.45%	167	19.20%	774	88.97%

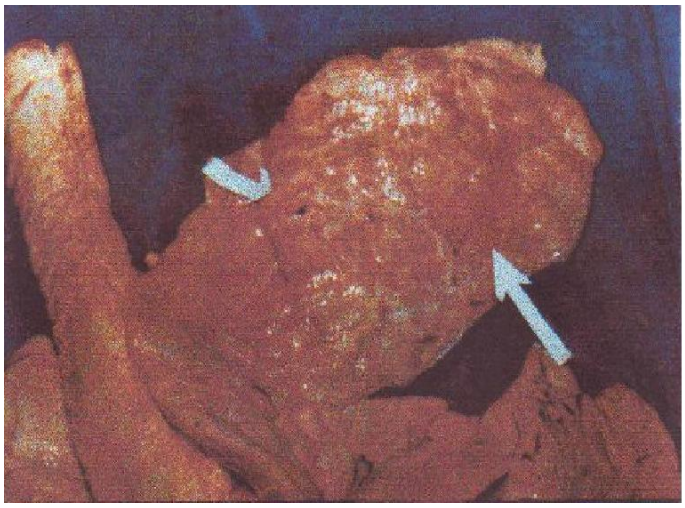

Photo 2. Macroscopic aspect of a hepatization with muco-pus.

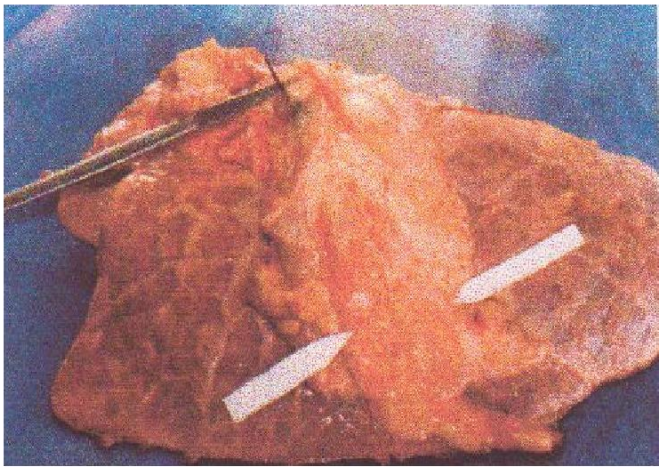

Photo 3a. Macroscopic aspect of a fibrinous pleuropneum cause by a foreign body (general view).

carcasses in slaughterhouses; several authors were interested to this infection. Ali-lemoys (1978) found a rate of 1.55% in Constantine area, Dahmane (1979) at a rate of 0.92% in Skikda area; Benataya (1980) at a rate of 0.20% in Constantine area and finally Khaldoun (1985) at a rate of 0.21% in Oum El Bouaghi area. In Tiaret and during the year of 1997 and the first quarter of 1998, we have recorded 3 cases of tuberculosis. Our result proves to be similar to those reported by the authors mentioned above, and with the one reported by Brunet (1991) with a rate of 0.33% but lower to the one reported by Al-Sultan (1987) with a rate of 3%.

Let us note that tuberculosis is more often observed among oldest females because it is of chronic nature and that the possibility of an exhibition to the infection increases with age (Acha and Szyfres, 1989).

The interstitial pneumonia (Photo 5) and the hemorrhagic pneumonia have been observed at a respectively frequencies of 2.32% and 0.39%. Our result is distinctly lower to the one reported by Habacha (1993) with a rate of 50% and by Omar (1966) with a rate of 7.2% for the

Photo 4. Macroscopic aspect of a suppurated bronchopneum onia.

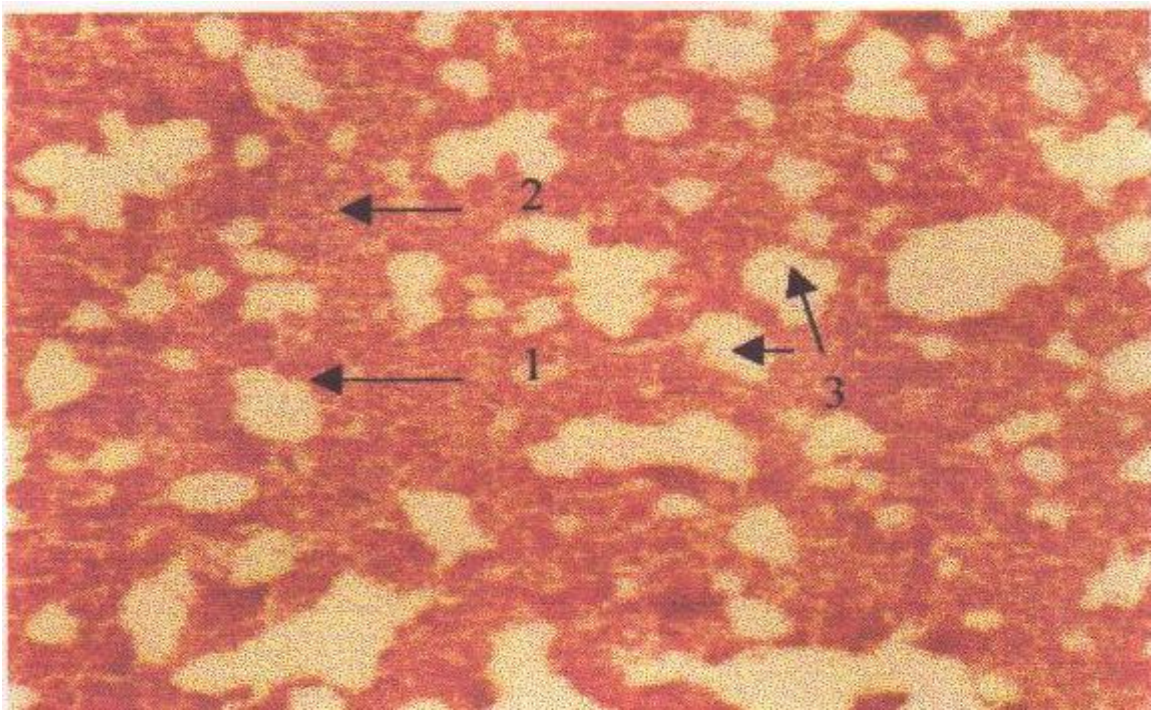

Photo 5 : Histopathological cut of an interstitial pneumonia
1- thickening of the alveolar partitions (infiltration of lymphocytic elements).
2- presence of edema.
3- free alveolar cavities.

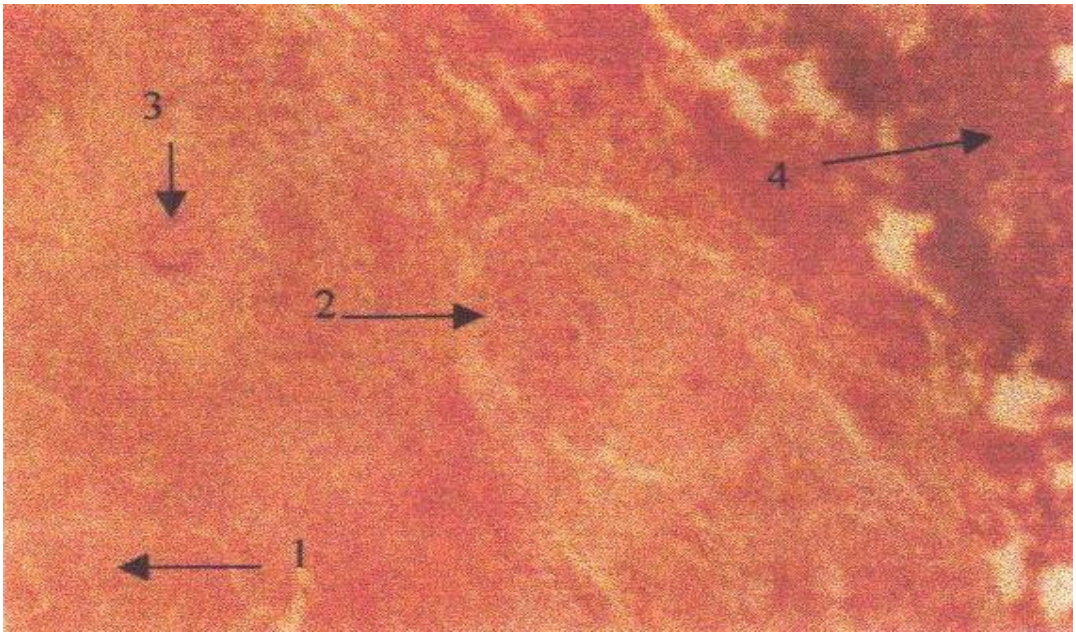

Photo 6a. Histopathological cut of a tuberculosis pulmonary caseo-follicular epitheliogigantocellulaire (total view).
1-Caseous necrosis
2-Epitheloide follicle
3-Gigantic cell
4-pulmonary parenchyma a nearly healthy.

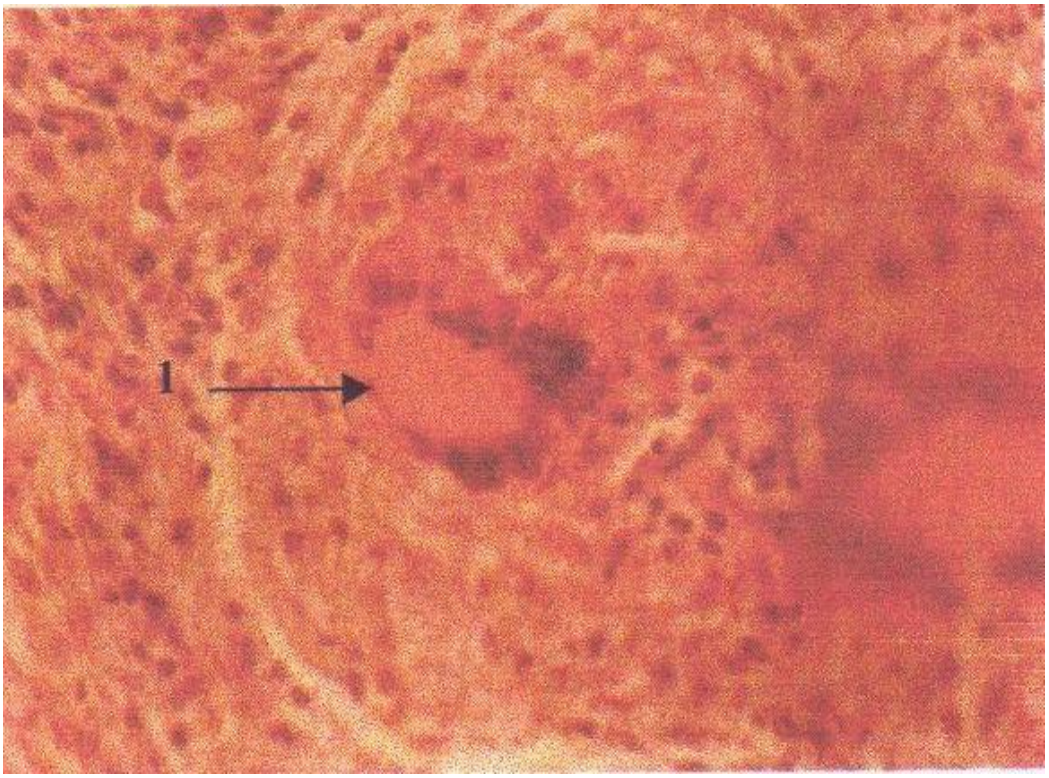

Photo 6b. Histopathological cut of a pulmonary tuberculosis showing the gigantic cell of langhans.
1-Eosinophile multi nucleate cell has a horseshoe-shaped in peripheral disposition.

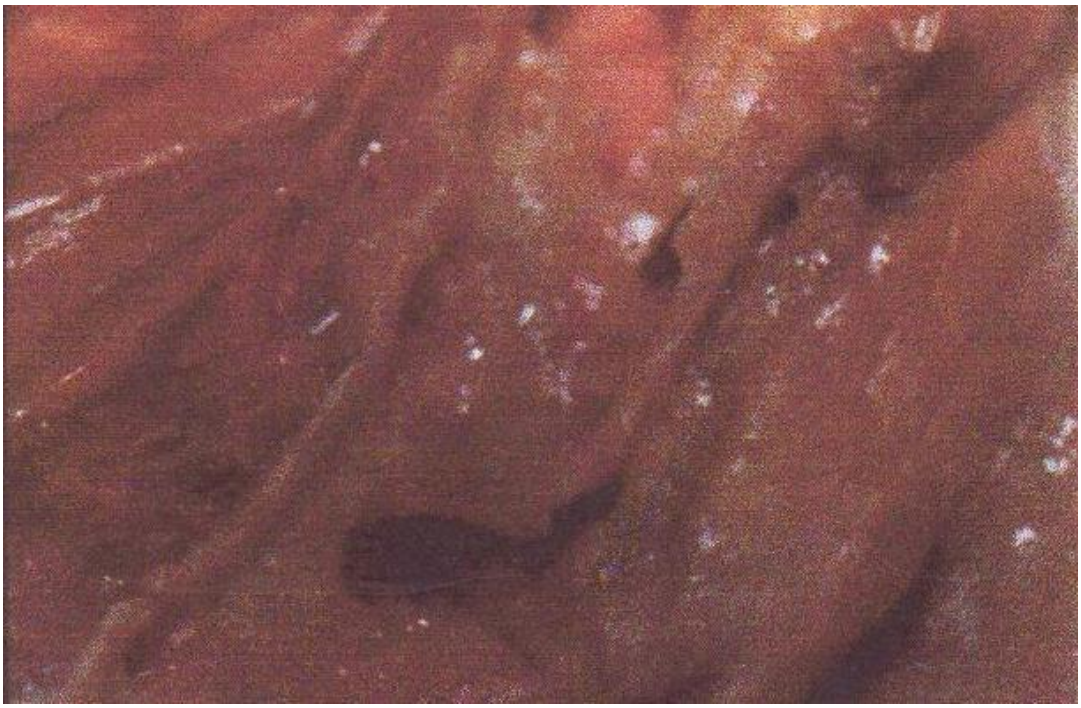

Photo 7. Pulmonary strongylosis macroscopic aspect of a verminous bronchitis (Dictyocaulose).

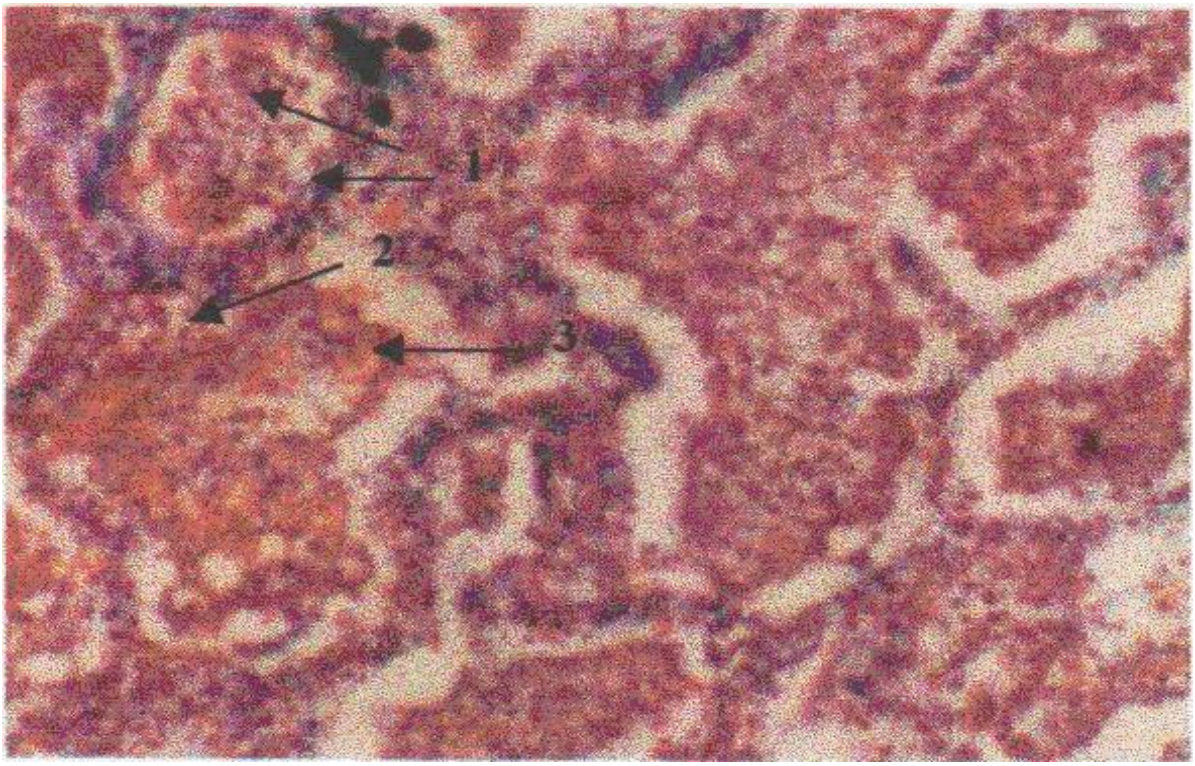

Photo 8. Histopathological cut of pulmonary parenchyma shown a evolutive chronic suppurated pneumonia.
1- Alveolar wall and light filled
with inflamatoiry elements
2- Lymphocyte cells
3- Red blood cells

interstitial pneumonia and a rate of 5% for the hemorrhagic pneumonia (Al-Sultan, 1987). This lesion has especially been observed among the aged cows. The lesions of interstitial pneumonias, when they are primitive, considering the conditions of apparition of the illness and the symptomatology are characteristic of viral pneumonias (Grépinet, 1971). According to Bryson (1985), it seems that Para Influenza III virus (PI3) and the R.S.V (respiratory syncycial virus) are often at the origin of interstitial pneumonia.

The pulmonary parasites remain relatively less frequent with a rate of 0.51% of which 2 cases of pulmonary distomatosis (0.22%) and 2 cases ofdyctio-caulus (0.22%) (Photo 7). This result is lower to those reported by Al-Sultan (1987) with a rate of 5% and by Omar (1966) with a rate of 4.8%. The pulmonary lesion due to fasciola is considered as accidental, because it arrives probably following a migration of immature larva from the liver to lungs (Al joboury, 1989). We can confirm that the trematods are more frequent in the humid regions. Development of evolutive stages re-quires the presence of intermediate host that requires the presence of continual water (Zahor, 1983). Tiaret area is then an unfavorable environment for the survi-val of fascilolosis intermediate hosts "Limnea trunca - tula".The obtained results explain clearly the situation.

Conclusion

The present survey achieved at the level of Tiaret and Batna slaughterhouses, constitutes a starting point toward a better knowledge of ruminants respiratory diseases in our country. It shows also that the slaughterhouse is the best location for screening and monitoring the evolution of lung damage, because slaughtered animals are belonging to the non controlled private sector animals. The obtained results show that the pulmonary lesions are present in a high frequency. The seasonal distribution of the different lesions was important, where the hydatidosis was the most frequent pathology. The oldest ruminants were the more infected.

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