THE *CASEOUS LYMPHADENITIS* INCREASES THE VULNERABILITY OF THE SHEEP HERDERS IN ALGERIA (CASE OF THE ZIBAN-EAST PROVINCE)

Hicher Azzeddine[1]*, and Abdelmadjid Bairi[2]

[1]University of Mohamed khider, Biskra- Algeria (RP145, Elallia, Biskra 7000, Algeria)
[2]University of Annaba- Algeria
*Corresponding Author

(Received September 2021 – Accepted June 2022)

ABSTRACT

Azzeddine, H., and Bairi, A. (2022). The *Caseous lymphadenitis* Increases the Vulnerability of the Sheep Herders in Algeria (Case of the Ziban-East province). *Lebanese Science Journal*, 23(2) : 111 - 117.

The pastoral sheep system in Algeria is organized on the sale, particularly to male over six months old, on the occasion of the religious festivities. For the sake of its wide emergence and enormous economic losses, Caseous lymphadenitis (CLA) can put this type of animal production suffering and its sustainability may be in suspicion. The aim of this study was to estimate the prevalence ratio of CLA in Algeria (case of Ziban- East province). A cross-sectional epidemiological survey was undertaken (January 2021 to Mai 2021) on 33 randomly selected sheep farms conducted in extensive pastoral care. On the basis of clinical examination of 7265 sheep (1150 male and 6115 female), the farm level infection with CLA in the target area was estimated to be 87.88% [95% confidence interval (CI):71.8- 96.6 %]. The disease was significantly higher in males (7.22%) than in females (4.67%) (χ^2 test, P< 0.005). Moreover, sheep between 6 and 24 months old were significantly the more infected (14%) (F test, P< 0.01). We concluded that C. lymphadenitis infection is widely disseminated in sheep flocks in Ziban-East in Algeria and eradication programs are very necessary.

Keywords: *Caseous lymphadenitis*, Prevalence, Sheep, Sustainability, Algeria.

INTRODUCTION

In Algeria, as in other Islamic countries, sheep have assumed a religious importance. The sale of healthy Lambs, especially for males, over than six months is a requirement and necessity for the religious festival of Aid Elkabir. Thus, the failure of the former could not only increase the vulnerability (Huguenin et al., 2015) of this type of production system but affect its sustainability as well. Nowadays, the emergence of diseases (Véronique et al., 2015) has put this type of production under suspicion.

http://dx.doi.org/10.22453/LSJ-023.2.111-117

C. lymphadenitis is the disease what sheep and goat can be the most species commonly affected (Stoops et al., 1984). It has been noticed in most sheep farming countries with a highly prevalent morbidity rate (Parra et al., 2016); particularly where flocks are mainly conducted in extensive care (Kichou et al., 2017). The CLA can cause important economic losses (Senturk and Temizel, 2006; Zavoshti et al., 2012; Firdaus et al., 2016), because according to (Pépin and Paton, 2010; Windsor, 2016; Osman et al., 2018), it produces a negative impact on sheep productions and on its reproductive performances. The key issue in this study is not only to assess the prevalence ratio of *Caseous lymphadenitis* in Algerian sheep system production but to know the sex and age sensitivity of sheep specie as well.

MATERIALS AND METHODS

A cross-sectional epidemiological survey for a period from 29/01/2021 to 01/05/2021 among 33 randomly selected sheep farms was conducted in extensive pastoral care in a pre-Saharan region, Zribet Eloued. The former is located in the south-east of Algeria as the figure 1 below portrays. Subsequently, an external clinical examination was carried out on 7265 heads: all from a local breed (Oueled djellel breed). The sample was both of different ages (4095 adults, 1049 sub-adults, and 2121 juveniles) and sex (6115 females and 1150 males). Data on abscesses; their presence, shapes, distribution in the animal body, sex, and age of the affected animal was organized in an Excel 2007 file and then was imported into the statistical software R version 3.6.0 for more complex analysis.

After the data were cleaned, screened for anomalies, and divided into groups according to their genders and ages. The non-parametric Chi-square test for independence (known as the Pearson Chi-square test) is used to compare the prevalence ratio of CLA in each of these groups.

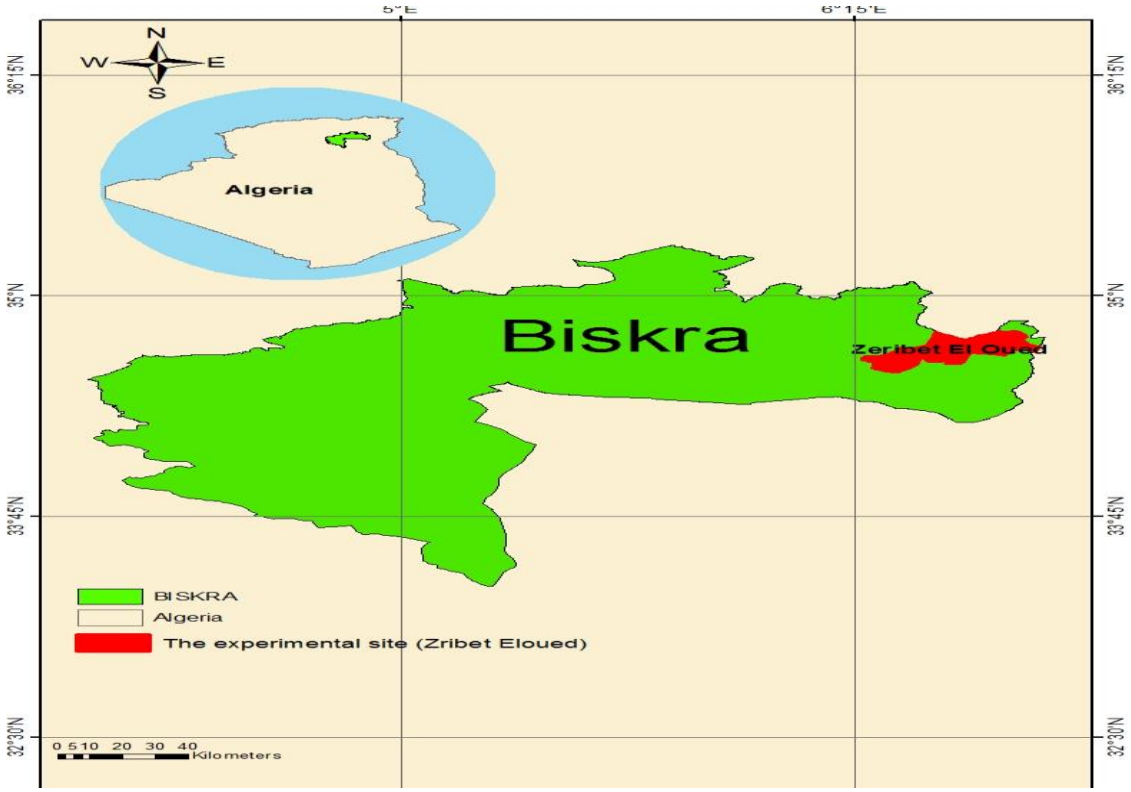

Figure 1. The geographical location of the experimental site.

RESULTS AND DISCUSSION

Global prevalence rate of Caseous lymphadenitis in sheep farms in the study area

The analysis of the survey data allowed us to detect 29 farms infected by the Caseous lymphadenitis on the basis of 33 farms. As a result, the global prevalence of sheep farms was on average 87.88% [IC95%: 71.8- 96.6 %]. Even if the finding appears to be better than that of (Guimarães et al., 2011) in Minas Gerais province in Brazil with prevalence ratio of 95.9% [IC95 %: 89.8- 98.9%], it is quite contaminated compared to some other countries in the world whose morbidity rates are presented in the table below (Table 1). The high funding rate in the target area of this study may be due to the herder's practice because 100 percent of the respondents stated that they did not do any hygienic or prophylactic intervention against this disease. While Windsor and Bush (2016) have cited that the change in management and practices can reduce the morbidity rate of the CLA.

Table 1. Sheep morbidity rate by *C. lymphadenitis* in a few countries around the world.

Country	**Australia**	**USA**	**Canada**	**Royaume unie**	**Brazil**	**Egypt**	**Morocco**
Authors	**(Middelton et al., 1991)**	**(Sroops et al., 1984)**	**(Arsenault et al., 2003)**	**(Bensaid et al., 2002)**	**(Guimarães et al., 2011)**	**(Al-Gaabary et al., 2009)**	**(Kichou et al., 2017)**
Sheep morbidity rate with CLA	61%	> 43%	36%	45%	> 30%	23.33%	28%

Individual prevalence rate of C. lymphadenitis in sheep flocks in the study area

On the basis of the clinical examination of 7265 sheep of different either in sex or ages, 368 heads were found infected. As a result, the apparent individual prevalence rate of abscess disease in the studied area was on average of 5.06% [95% CI: 4.57-5.6 %].

The finding sheep morbidity rate with CLA in this study seems low compared to what is detected in south Constantine by Alloui et al. (2008). The formers have noticed a prevalence rate of 8.9 percent. The difference between rates is statistically significant ($P< 0.05$, p-value=2.2e-16). As a result, the sheep flocks in the target area have apparently less infected with the abscess disease than other sheep basins in the country. Compared to some neighboring countries, the experiment finding rate of infection by the abscess disease

appears very low and variable depending on the country and the researchers. For example, while Bensaid et al. (2002) have recorded in Sfax (Tunisia) a morbidity rate almost as identical as ours, in Morocco (Kichou et al., 2017), in Egypt (Al-Gaabary et al., 2009) or in Jordan (Oreiby et al., 2014), the found rates were clearly high with 24 %, 22.1 % and 15.7 percent respectively. The sheep herds in current research seem also less affected by this pathology than in others some developed countries such as in Canada, for example, where Arsenault et al. (2003) have estimated a rate of about 21%, De Sa Guimarães et al., (2011) have noticed a rate of 75.8% in Brazil and Paton et al. (2003) have alluded the range of 74-88% in Western Australia. Furthermore, a range of variation in contamination between 5 and 63% in the United Kingdom was recorded by (Baird and Malone, 2005; Malone et al., 2005).

Gender sensitivity of sheep to CLA contamination

The clinical examination of the coetaneous form of *Caseous lymphadenitis* in 7265 sheep heads in the target area of this study has illustrated the sensitivity of males than females with prevalence rates of 7.22% and 4.67% respectively (Table 2).

As it is shown in the table above, the sensitivity of males to CLA is statistically significant (χ^2 test, P= 0.00038). Our finding result is not consistent with that of (Al-Gaabary et al., 2009) or those of (Zavoshti et al., 2012**)** have found. The noted variability may be due to the effect of the sheep race cared as **(**Guimarães et al., 2009) have shown. The target area of this study is dominated by the local sheep breed named Ouled djellel.

Table 2. Distribution of morbidity with CLA by gender of sheep.

Sex	**Character**		
		% of healthy animal	**% of sick animal**
	Female	95.34	4.67
	Male	92.78	7.22

Age sensitivity of sheep to CLA contamination

The sheep herd the subject of this epidemiological study is divided according to its age into 3 categories. Adults (> 24 months), sub-adults (between 6 and 24 months) and lambs (under 6 months of age) whose proportions in the sample are 56%, 30% and 14% respectively. The sub-adult category has the highest morbidity rate with a value of 14% followed by adults with 3.7% and then lambs with 3.2 percent.

The morbidity of sheep with abscess disease between the age range of 6 and 24 months is statistically very highly significant at the 1‰ threshold compared to other categories; adults and young lambs (F test, P< 0.01). While individual prevalence rates for each category vary from country to country, the current research result is fully consistent as well as several authors have indicated (Pépin and Paton, 2010; Stoops et al., 1984; AL-Gaabary et al., 2009).

CONCLUSION

The emergences of animal diseases put the breeding systems under severe stress and have made them more vulnerable. On average of 87.8 percent, *Caseous lymphadenitis* is widely disseminated in sheep herds in Ziban-east province in Algeria and is overlooked by most farmers, resulting in a great economic loss and limiting profitability. Although sheep of male sex and aged over 6 months are the most preferred for sale in these breeding systems, this category is the most sensitive to be infected by this pathology. In order to supply lambs with the quality required, the triggering of the alert for the implementation of eradication programs against this disease is immediately necessary.

ACKNOWLEDGMENTS

We would like to express our thanks to the sheep breeders of Zribet –El Oued for their participation without which the study could not have been undertaken. We thank the Director of the DEDSPAZA Research Laboratory, Department of Agricultural Sciences-University of Biskra for his support. We also thank Dr. Johanne .H -CIRAD-France- who advised us in the scientific process of this study.

REFERENCES

Al-Gaabary, M.H., Osman, S.A., and Oreiby, A.F. (2009). *Caseous lymphadenitis* in sheep and goats: Clinical, epidemiological and preventive studies. *Small Ruminant Research - Elsevier,*87(1-3): 116-121.

Alloui, M.N, Ayachi, A., Alloui, N., Tlidjane, M. and Kaba, J. (2008). Prévalence de la maladie des abcès des petits ruminants dans la région de Batna (Algérie). *Rencontres Recherches Ruminants,*15(1) :87.

Arsenault, J., Girard, C., Pascal, D., Daignault, D., Galarneau, R., Boisclair, J. et al. (2003). Prevalence of and carcass condemnation from maedi-visina, Paratuberculosis and Caseous lymphadenitis in culled sheep from Quebec, Canada. *Preventive Veterinary Medicine,* 59(1-2): 67-87.

Baird, G.J, and Malone, F.E. (2005). Control of ovine Caseous lymphadenitis based on regular ELISA testing. *In:* Proc.6th Int. Sheep Veterinary Congress, Greece, 17-21 June:136-137 pp.

Bensaid, M.S., Ben maitigue, H., Benzarti, M., Messadi, L., Rejeb, A., and Amara, A. (2002). Contribution a l'etude epidemiologique et clinique de la lymphadenite caseeuse chez les ovins- Sfax_Tunis », *Archives de l'Institut Pasteur de Tunis*, (79): 1-4.

De Sá Guimarães, A., Do Carmo, F.B., Pauletti, R.B., Seyffert, N., Ribeiro, D., Pereira Lage, A., et al. (2011). Caseous lymphadenitis: Epidemiology, Diagnosis and Control. *The IIOAB Journal Review:Veterinary Microbiology*, 2(2): 33-43.

Firdaus, F., Umer, M., Abba, Y., Monther, W., Haron, A.W., Saharee, A. et al. (2016). Strategic Management of a Clinical Case of Recurrent Caseaous Lymphadenitis in a Goat Farm . *Research Journal for Veterinary Practitioners*, 4(3): 42-46.

Guimarães, A.S., Seyffert, N., Bastos, B.L., Portela, R.W.D., Meyer, R., Carmo, F.B., et al. (2009).

Caseous lymphadenitis in sheep flocks of the state of Minas Gerais, Brazil: prevalence and management surveys. *Small Rumin Research,* 87(1-3):86-91.

Guimarães, A.S., Carmo, F.B., Heinemann, M.B., Portela, R.W.D., Meyer, R., and Plages, A. (2011). High sero-prevalence of Caseous lymphadenitis identified in slaughterhouse samples as a consequence of deficiencies in sheep farm management in the state of Minas Gerais, Brazil . *BMC Veterinary Research*. BioMed Central, 7(1): 68.

Huguenin, J., Hammouda, R.F., Tasnim, J., and Julien, L . (2015). Évolution des systèmes d'élevage steppiques au Maghreb: adaptation ou métamorphose ? In Cardère (éd.) *ONZIÈMES RENCONTRES INTERNATIONALES DU PASTORALISME :Espaces pastoraux, espaces socioéconomiques particuliers*. France.: 28-31 pp.

Kichou, F., Mechaal, A., Bouslikhane, M., Kadiri, A., Zto, K., and Berrada, J. (2017). Facteurs de risque et caractéristiques cliniques et lésionnelles de la lymphadénite caséeuse ou maladie des abcès chez les ovins au Marroc . *Revue d'élevage et de médecine vétérinaire des pays tropicaux*, 69(2): 79.

Malone, F.E., Fee, S.A., Kamp, E.M., King, D.C., Baird, G.J., Reilly, K.M. et al. (2005). A comparison of pathological, bacteriological and serological examinations in sheep from four flocks naturally infected with Caseous lymphadenitis. *In*: Proc. 6th Int. Sheep Veterinary Congress, Greece, 17-21 June: 226-227 pp.

Middleton, M.J., Epstein, V.M., Gregory, G.G. (1991). Caseous lymphadenitis on Flanders Island: prevalence and management surveys. *Australian Veterinary Journal*, (68): 311-312.

Oreiby, A.F., Hegazy, Y.M., Osman, S.A., Ghanem, Y.M., and Al-Gaabary, M.H. (2014). Caseous lymphadenitis in small ruminants in Egypt. Clinical, epidemiological and prophylactic aspects. *Tierärztliche Praxis*, 42(5): 271-277.

Osman, A.Y., Nordin, M.L., Kadir, A.A., Saharee, A.A. (2018). The Epidemiology and Pathophysiology of Caseous Lymphadenitis: A Review. Journal of Veterinary Medical Research, 5(3) : 1129. Available online: https://www.jscimedcentral.com/ Veterinary Medicine / veterinary medicine -5-1129.pdf (accessed on 10 September 2020).

Parra, F.S., Garganoa, R.G., Melville, A.M., Benesia, F.J., Azedob, M.R., Marques de Sác, L.R., et al. (2016). Photodiagnosis and Photodynamic Therapy Antimicrobial photodynamic therapy for Caseous lymphadenitis abscesses in sheep : Report of ten cases. *Photodiagnosis and Photodynamic Therapy - Elsevier,* (13):120–122.

Paton, M.W., Walker, S.B., Rose, I., and Watt, G.F. (2003). Prevalence of Caseous lymphadenitis and usage of Caseous lymphadenitis vaccines in sheep flocks. *Australian Veterinary Journal*, 81(1-2): 91-95. Doi : 10.1111/j.1751-0813.2003.tb11443.x.

Pépin, M., and Paton, M. (2010). Caseous lymphadenitis in sheep and goats. *In:* Infectious and Parasitic Diseases of Livestock, (1st ed.). Lefevre, P.C., Blancou, J., Chermette, R., Uilenberg, G., (Eds.). Lavoisier, Paris-France. 1153–1165 pp.

Senturk, S., and Temizel, M. (2006). Clinical efficacy of rifamycin SV combined with oxytetracycline in the treatment of Caseous lymphadenitis in sheep ». *Veterinary Record*, 159(7): 216-217.

Stoops, S.G., Renshaw, H.W., and Thilsted, J.P. (1984). Ovine Caseous lymphadenitis: disease prevalence, lesion distribution, and thoracic manifestations in a population of mature culled sheep from western United States. *American Journal of Veterinary Research,* 45(3): 557–561.

Windsor, P.A. (2011). Control of caseous lymphadenitis. *Veterinary Clinics of North America: Food Animal Practice,* 27(1): 193–202. doi: 10.1016/j.cvfa.2010.10.019.

Windsor, P. A., and Bush, R. D. (2016). Caseous lymphadenitis: Present and near forgotten from persistent vaccination?. *Small Ruminant Research* Elsevier, 142: 6-10.

Zavoshti, F. R., Sioofy Khoojine, A.B., Helan, J.A., Hassanzadeh, B., and Heydari, A.A. (2012). Frequency of Caseous lymphadenitis (CLA) in sheep slaughtered in an abattoir in Tabriz: Comparison of bacterial culture and pathological study. *Comparative Clinical Pathology*, 21(5): 667-671.

Véronique, C., Fabtice, C., Hélène, G., Annelise, T., and Laurance, V. (2015). Changement climatique et agricultures du monde. Emmanuel Torquebiau. Editions Quae, Collection Cirad-EFD: 96-106.