

## Oral Lesions in Sheep in Mosul Area, Iraq

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**Abstract:** This study was undertaken to investigate the prevalence and pathology of naturally occurring oral lesions in sheep in Mosul area, Iraq. Whether a relationship exists between factors such as age, breed and type of management and the prevalence of the oral lesions was also studied. Oral lesions were found in 104 out of 1130 (88.8%) examined sheep and dental abnormalities were the most common of these lesions and constituted 77.2% of the total number of oral lesions. The various types of oral lesions arranged in order of decreasing frequency were tooth discoloration 81.68%, gingivitis 27.52%, loss of teeth 11.06%, Malarrangement of teeth 10.62%, incisor wear 10.53%, healed ulcers of the gum 6.46%, broken mouth 5.84%, dental caries 2.30%, acute ulcers of the gum 1.41%, abscesses 0.18%, granulomatous reactions 0.18%, papilloma 0.09%, basal cell carcinoma 0.09%, dermatophytosis 0.09% and contagious pustular dermatitis 0.09%. Infection with the microscopic form of *Sarcocystis* sp. was encountered in the tongue of 104 sheep that were examined histopathologically, with a 100% prevalence. Gross and microscopic features of the various types of lesions were similar to those described in the literature. Statistically significant differences were found between the prevalence of the oral lesions in various age groups of sheep. Thus, the prevalence was significantly higher ( $p < 0.05$ ) in sheep of the age group  $>1.5$  to  $<2$  years and the least in the age group of  $>5$  years. The oral lesions were more common in Awassi breed 82.67% than in the Karadi 12.95% and Hamdani 4.38% breeds and these differences were statistically significant ( $p < 0.05$ ). Additionally, the oral lesions were more prevalent among sheep reared indoor 89.04% than in sheep reared outdoor 10.96% and this difference was statistically significant ( $p < 0.05$ ).

**Key words:** Sheep, oral cavity, lesions, pathology, Mosul, Iraq

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### INTRODUCTION

Oral lesions in sheep could accompany many systemic diseases including foot and mouth, bluetongue, orf, ulcerative dermatosis and sheep pox. Other oral lesions are limited to the oral cavity such as abnormalities of the teeth and their supporting soft tissues, malocclusion, bacterial infections and tumors. Dental diseases are often considered the most common oral cavity lesions that affects production and they are the main reason for culling otherwise healthy breeding ewes before the end of their natural reproductive life, leading to increase in flock replacement costs (Navarre *et al.*, 2002; Ridler and West, 2007).

Grazing on rough, rocky pastures or feeding the animals unbalanced diets containing hard food ingredient or foreign objects inflict further injury to teeth or mucosa of the gum, thus constituting additional problem (Rweyemamu and Berrada, 2007). The present investigation was carried out on the oral cavity of sheep to investigate the various pathological conditions of the oral cavity. It was

hoped that results of such study might prove useful to clinicians and owners dealing with sheep.

### MATERIALS AND METHODS

**Animals:** The oral cavity was examined in 1130 randomly selected sheep from four different flocks of sheep, local butcheries and the central abattoir in Ninevha Province during the academic year 2008-2009. A special information format was prepared in which a complete history of each animal is recorded (date of examination, case number, address, breed, sex, age, type of food, system of management and results of gross inspection). In case of animals intended for slaughter or animals that it was difficult to obtain their age record, the age was determined according to dental formula (Navarre *et al.*, 2002; St. Jean, 2002).

**Clinical examination:** The oral cavity of each sheep was examined grossly through wide opening of the mouth in the presence of an assistant restraining the animal.



Examination of the cheek teeth in the living animal required good restrain and the application of oral speculum or gag. Oral examination aimed at recording any broken, worn or missing teeth; ulceration, cracking or swelling of the mucosa of the gum, dental pad and tongue and any fetid or abnormal odor. Pathological examination, tissue specimens were collected from lesions involving the muzzle, lips, gum, tongue, oral mucosa and the mandibles. The specimens were fixed immediately after collection in 10% neutral formalin solution for 48-72 h and then washed under tap water, dehydrated in ascending grades of alcohol, cleared in xylol and embedded in paraffin wax (60-62°C melting point). Sections of 4-6 µm thickness were cut and stained with hematoxylin and eosin. Special stains were also used in some cases and included the Gram's stain, trichrome stain and the van Gieson stain (Kiernan, 1999).

**Statistical analysis:** The effects of age, breed and type of management on the prevalence of the oral lesions were analysed by the student t-test (Perrie and Watson, 1999).

## RESULTS AND DISCUSSION

The pathological lesions observed during the present study, were as shown in Table 1. Examination of the oral cavity of 1130 sheep revealed various types of lesions in 1004 animals amounting to a prevalence of 88.84%. Among the 1004 sheep positive for oral lesions, many animals showed >1 type of oral lesion. Dental abnormalities were the most common oral lesion and constituted 77.28% of the total number of oral lesions. Among the dental abnormalities, discoloration of teeth was the most common with a prevalence of 81.68%. The other types of oral lesions arranged in order of decreasing frequency were gingivitis 27.52%, loss of teeth 11.6%, discoloration of teeth 10.62%, incisor wear 10.53%, healed ulcers of the gum 6.46%, broken mouth 5.84%, dental

caries 2.30%, acute ulcers of the gum 1.41%, abscesses 0.18%, granuloma 0.18%, papilloma 0.09%, basal cell carcinoma 0.09%, dermatophytosis 0.09% and orf 0.09%. In addition to these lesions, microscopic *Sarcocystis* sp. was incidentally diagnosed following the microscopic examination of the tongues of 104 sheep and the prevalence was 100%. The gross and microscopic features of the various types of oral lesions were similar to those described in this study (Fig. 1-10).

The distribution of the oral lesions in the various age groups of sheep is shown in Table 2. From the data presented in Table 2 it is evident that the oral lesions were most common in the age group >1.5 to <2 years and the least prevalence in sheep of >5 years 0.79%. These differences as well as differences in the prevalence of oral lesions in the other age groups were statistically significant ( $p < 0.05$ ). As far as the effect of breed, oral lesions were more common in Awassi breed 82.67%, followed by the Karadi 12.95% and then the Hamadani 4.38% (Fig. 11). Differences between the prevalence of oral lesions in various breeds of sheep were statistically



Fig. 1: Front view of incisors of a sheep showing elongation of the incisors, redness and swelling of the gingiva and redness of the internal aspect of the lips

Table 1: Oral lesions that were diagnosed in 1130 sheep examined in Ninevha Province, Iraq

Pathological condition	No. of cases	Over all percentage out of total animals examined	Percentage out of total no. of lesions*
Tooth discoloration	923	81.68	51.65
Gingivitis	311	27.52	17.40
Loss of teeth	125	11.06	6.99
Malarrangement of teeth	120	10.62	6.72
Incisor wear	119	10.53	6.66
Healed ulcers of the gum	73	6.46	4.08
Broken mouth	66	5.84	3.69
Dental Caries	26	2.30	1.45
Acute ulcers of the gum	16	1.41	0.89
Abscesses	2	0.18	0.11
Granulomatous reactions	2	0.18	0.11
Papilloma	1	0.09	0.06
Basal cell carcinoma	1	0.09	0.06
Dermatophilosis	1	0.09	0.06
Contagious pustular dermatitis	1	0.09	0.06

\*A number of animals exhibited >1 type of lesions and the total number of lesions was 1787





Fig. 2: Front view of the closed mouth of a sheep exhibiting redness and swelling of the gum, wear of the incisors and the presence of space between the incisors

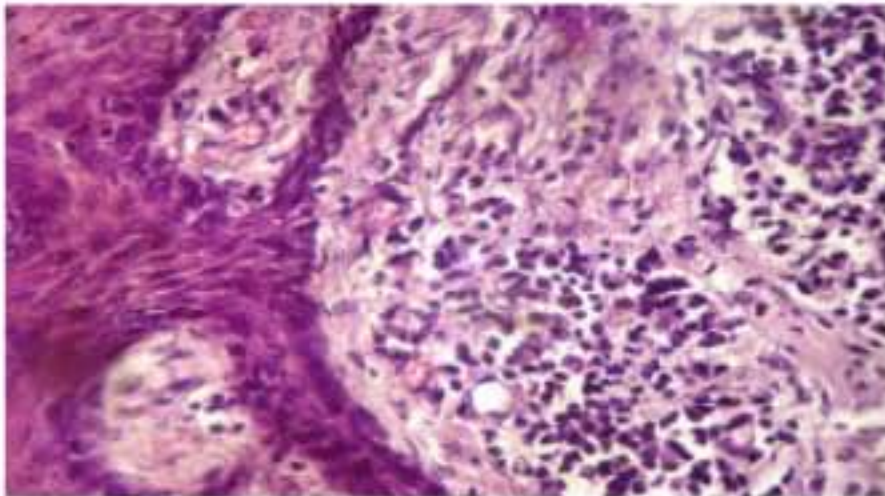


Fig. 3: Potomicrograph of the gum of a sheep with broken mouth. Note heavy infiltration of inflammatory mononuclear cells in the submucosa. H&E X115

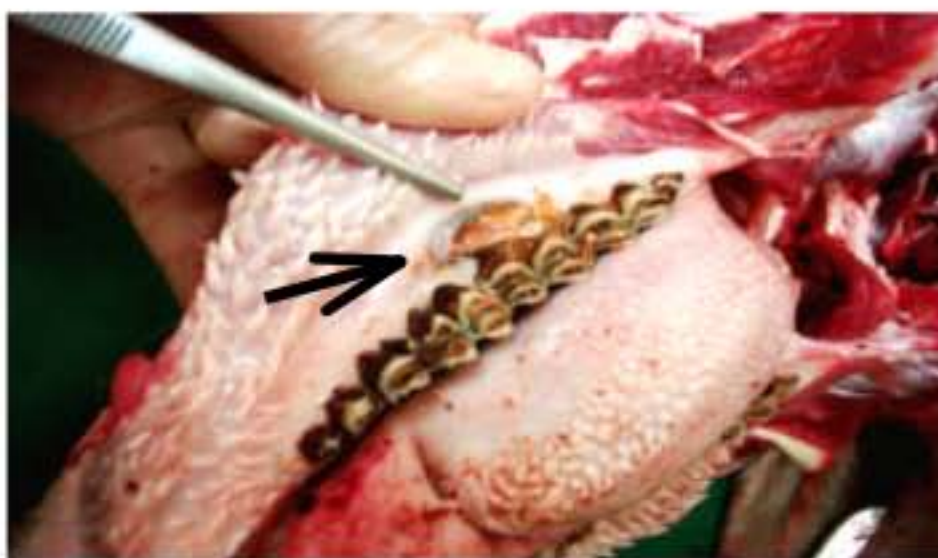


Fig. 4: Opened oral cavity of a sheep with pyogranulomatous lesion in the internal surface of the cheek. Note the presence of an opening of the fistula into the oral cavity (arrow)

significant ( $p < 0.05$ ). Oral lesions were more common in sheep reared indoor 89.04% than in outdoor reared sheep 10.96% (Fig. 12). This difference was statistically

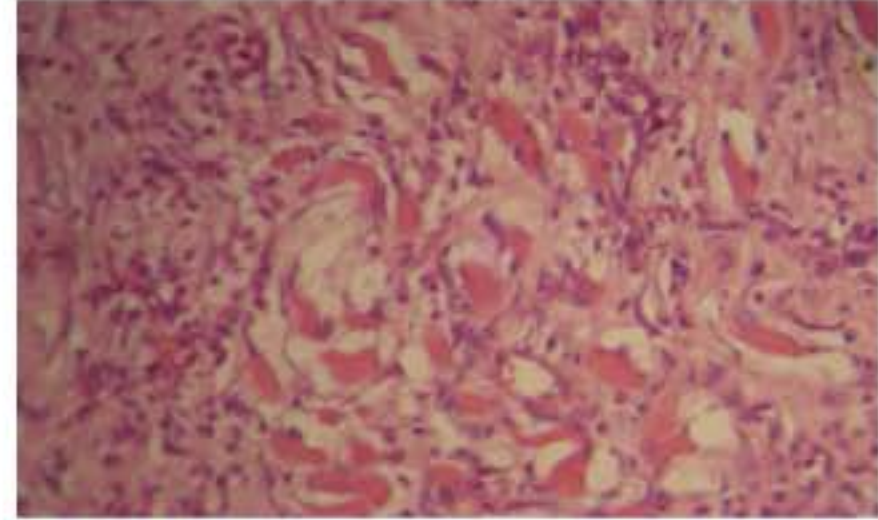


Fig. 5: Potomicrograph of the subcutaneous tissue close to the lesion shown in Fig. 4. Fibrous tissue and the infiltration of mixed type of inflammatory cells are evident. H&E X 650



Fig. 6: The oral cavity of a sheep with a growth replacing two of the incisors (arrow)

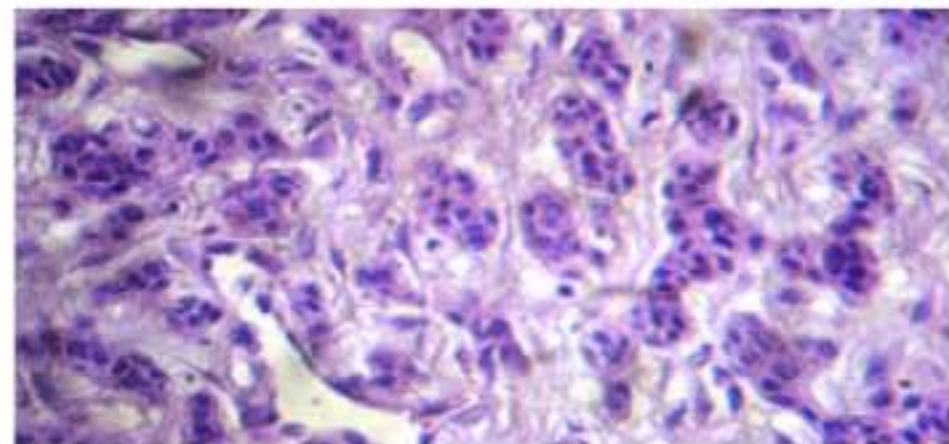


Fig. 7: Photomicrograph of a growth in the gum of a sheep (Fig. 6). Nests or masses of neoplastic basal epithelial cells could be seen. H&E X 450

significant ( $p < 0.05$ ). In the present study, oral lesions were very common in sheep 88.84%. This high prevalence of the oral lesions is expectable since the oral cavity is constantly bombarded with ingested substances that are moved around by the tongue and the many systemic



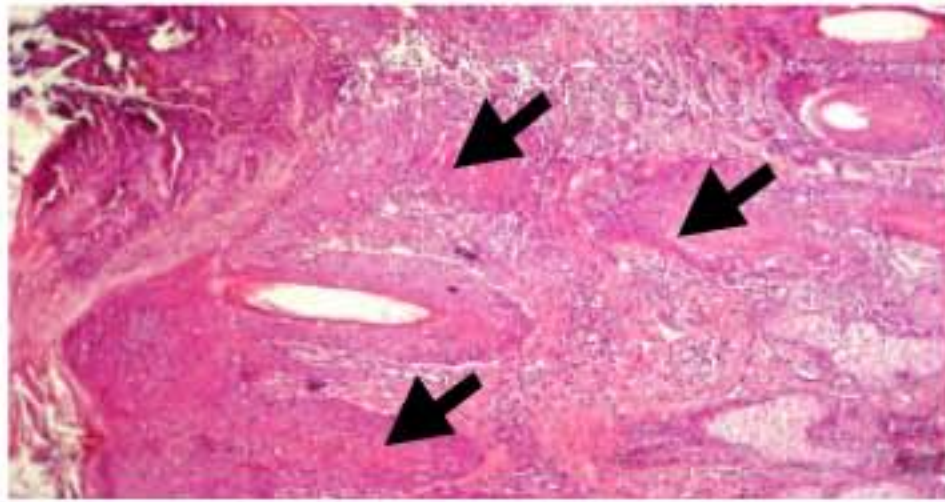


Fig. 8: Photomicrograph of a crusty lesion in the skin at the commissure of the mouth of a sheep with contagious pustular dermatitis. Note extensive hyperplasia of the epidermis (arrows), the presence of crust (C) and the infiltration of mixed types of inflammatory cells in the dermis. H&E X 90

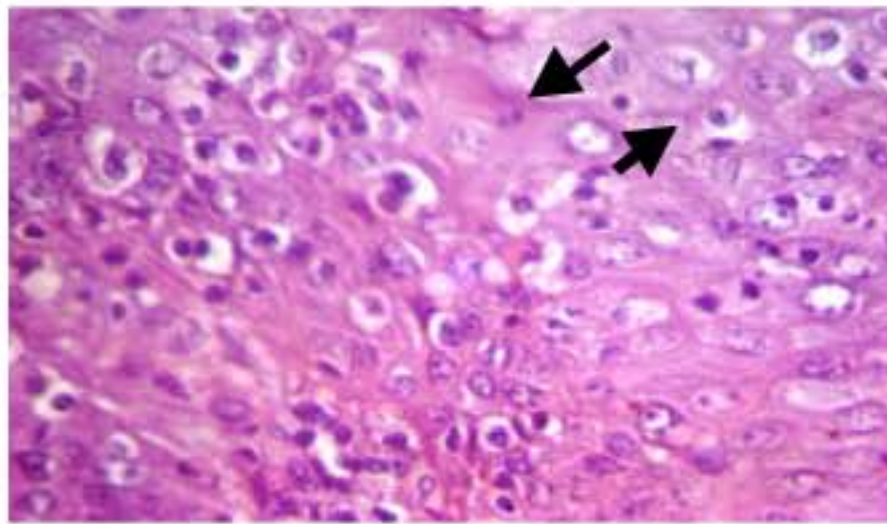


Fig. 9: Same lesion shown in Fig. 8. Note epidermal hyperplasia, intracellular edema and the presence of intracytoplasmic inclusion bodies (arrows). H&E. X 650



Fig. 10: Photomicrograph of the tongue of a sheep infected with *Sarcocystic* sp. Note the presence of the cyst without tissue reaction. H&E. X165

diseases in which the oral cavity is the site of secondary lesions (Spence *et al.*, 1988; Toplu, 2004; Kitching and

Table 2: Numbers and percentages of sheep affected with oral lesions found following the examination of 1130 sheep grouped according to age\*

Age groups	No. of affected animals**	Percentage
6 months to <1 year	25 <sup>a</sup>	2.21
>1 to <1.5	147 <sup>d</sup>	13.00
>1.5 to <2	290 <sup>a</sup>	25.66
>2 to <2.5	187 <sup>b</sup>	16.54
>2 to <3	166 <sup>c</sup>	14.69
>3 to <3.5	53 <sup>e</sup>	4.69
>3.5 to <4	62 <sup>e</sup>	5.48
>4 to <4.5	37 <sup>f</sup>	3.27
>4.5 to <5	28 <sup>g</sup>	2.47
>5	9 <sup>h</sup>	0.79

\*Gross pathological lesions were not seen in 126 of the examined sheep.

\*\*Different letters in this column mean that there are statistically significant differences ( $p < 0.05$ )

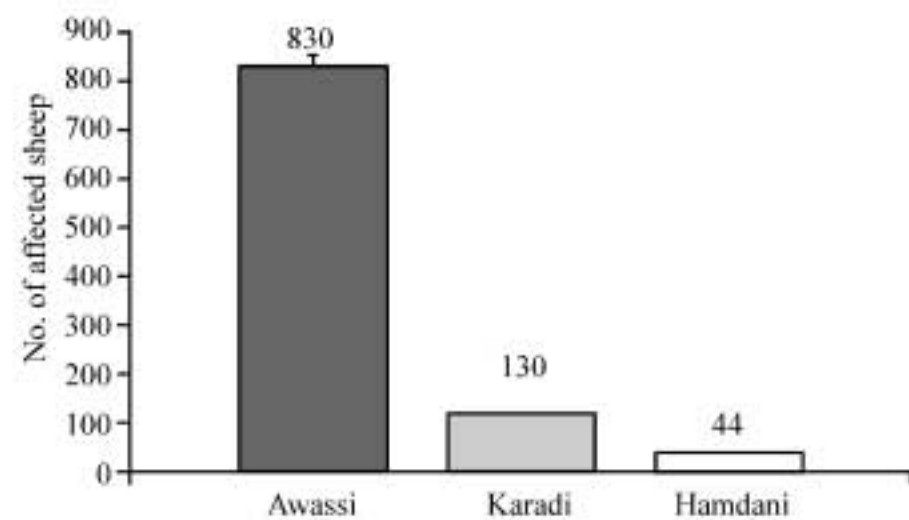


Fig. 11: The distribution of 1004 sheep affected with oral lesions according to the three breeds, Awassi, Karadi and Hamdani

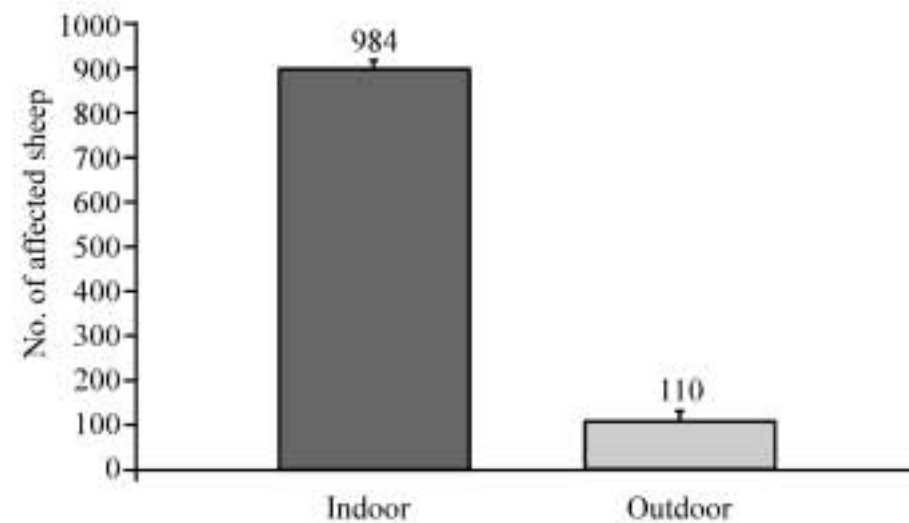


Fig. 12: The distribution of 1004 sheep affected with oral lesions according to system of management, indoor and outdoor

Hughes, 2002; McElroy and Bassett, 2007; Sellers and Gloster, 2008). Dental abnormalities constituted the most common of the oral lesions (77.28%). This finding is similar to that reported by Al-Sadi (1996), who found that the prevalence rates of dental lesions were 53.66, 40 and 60.83% in three flocks of sheep in Mosul area. In this same study, it was found that the prevalence of dental abnormalities in 300 sheep slaughtered in the central



abattoir was 66.33%. Dental abnormalities that were reported in this study included developmental and composition abnormalities, pigmentations, diseases resulting in premature or cheek tooth loss and excessive and/or irregular tooth wear. These abnormalities are similar to those described by others (Bruere *et al.*, 1979; Orr *et al.*, 1986; Spence *et al.*, 1988; Al-Sadi, 1996). Dental lesions are important from the economic standpoint since they affect prehension, tearing and/or mastication of food and leads to a significant decrease in the productivity of the affected flock. Among the dental abnormalities reported in this study, broken mouth is the most significant and it occurred in 5.84% of the examined sheep. In Britain, abattoir surveys have found broken mouth in 60-70% of cull ewes (Moss, 1987). The condition is also a common problem in many areas of Australia and New Zealand (Ridler and West, 2007). In Iraq, the prevalence of broken mouth in three flocks of sheep in Mosul area were 25.33, 15 and 27.08%, respectively. The prevalence of the condition in slaughtered sheep was 30% (Al-Sadi, 1996). Variability of the occurrence of broken mouth in different flocks of sheep has also been reported in other countries and it has been stated that the incidence may be anything between 5 and 70% of the particular age groups and appear any time between 3 and 8 years of age (Spence, 1989). The economic importance of broken mouth depends on its incidence, flock management and farm type (Ridler and West, 2007). On areas poor in pasture, sheep affected with broken mouth fails to maintain their body condition.

In the present study, oral lesions were found most often in sheep of the age group >1.5 to <2 years 25.66% and the least prevalence was in the age group >5 years 0.79%. The difference in the prevalence of oral lesions in the various age groups was statistically significant ( $p<0.05$ ). Laws *et al.* (1988) reported statistically significant differences in dental configuration among different age groups (one year six months, two years six months, three years six months and four years six months). The most statistically significant differences were found in the first age group: one year six months. The result of the present study that oral lesions were of least occurrence in the age group >5 years could be explained by the fact that most sheep slaughtered before they reach this age.

Grouping the sheep with oral lesions according to breed indicated the presence of statistically significant differences in the prevalence of oral lesions in various breeds of sheep. The highest prevalence was in the Awassi breed 82.67%, followed by the Karadi breed 12.95% and the Hamdani breed 4.38%. This finding is difficult to evaluate since the association between breed

and the prevalence of oral lesions in sheep is still controversial. Meyer *et al.* (1983) reported that there are genotype differences in the incisor wear rate of sheep, with the highest rate in ewes from Perendale, Romney and Booroola-cross sires. Laws *et al.* (1988) found that dental configuration differs significantly among the different breeds of sheep (Southdown, Suffolk and Romney, Border Leicester over Romney and Coopworth over Romney). On the other hand, Orr *et al.* (1986) found no indication of any breed differences in the prevalence of excessively worn incisors and periodontal disease.

In this study, oral lesions were more prevalent in sheep that were reared indoor 89.04% in comparison with sheep reared outdoor 10.96% and this difference was statistically significant ( $p<0.05$ ). This finding is difficult to be explained since grazing make the animals more prone to tough diets (root crops) and foreign bodies and thus more injuries of the oral mucosa. However, many of the oral lesions particularly the dental ones have been associated with poor management (Ridler and West, 2007).

## CONCLUSION

Oral lesions are common in sheep in Mosul area, Iraq and the primary lesions were more common than secondary lesions. Dental abnormalities constituted the majority of the oral lesions. Oral lesions were more common in sheep of the age group >1.5 to <2 years and the least in the age group of >5 years. Prevalence of the lesions was higher in Awassi breed than in the other breeds. Similarly, oral lesions were more prevalent in indoor reared sheep than in those reared outdoor.

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## REFERENCES

- Al-Sadi, H.I., 1996. Dental pathology in sheep. Iraqi J. Vet. Sci., 9: 33-46.
- Bruere, A.N., D.M. West, M.B. Orr and M.W. O'Callaghan, 1979. A syndrome of dental abnormalities of sheep: Clinical aspects on a commercial sheep farm in the Wairarapa. N. Z. Vet. J., 27: 152-158.
- Kiernan, J.A., 1999. Histological and Histochemical Methods: Theory and Practice. 3rd Edn. but terworth-Heinemann, Philadelphia, PA., pp: 111-112.

- Kitching, R.P. and G.J. Hughes, 2002. Clinical variation in foot and mouth disease: Sheep and goats. *Rev. Sci. Tech.*, 21: 505-512.
- Laws, A.J., W.M. Aitken and G.F.S. Spears, 1988. Dental configuration among different breeds of sheep. *Res. Vet. Sci.*, 45: 317-323.
- McElroy, M. and H.F. Bassett, 2007. The development of oral lesions in lambs naturally infected with orf virus. *Vet. J.*, 174: 663-664.
- Meyer, H.H., W.M. Aitken and J.E. Smeaton, 1983. Inheritance of wear rate in the teeth of sheep. *Proc. N. Z. Soc. Anim. Prod.*, 43: 189-191.
- Moss, R.A., 1987. Effects of herbage allowance on gummy ewe and sound-mouthed ewe performance during early-mid pregnancy. *N. Z. J. Agric. Res.*, 30: 477-480.
- Navarre, C.B., M.Q. Lowder and D.G. Pugh, 2002. Oral-Esophageal Diseases. In: *Sheep and Goat Medicine*. Pugh, D.G. (Ed.). Saunders, Philadelphia, PA, USA., ISBN: 0-7216-9052-1, pp: 61-67.
- Orr, M.B., K.H. Christiansen and R.C. Kissling, 1986. A survey of excessively worn incisors and periodontal disease in sheep in Dunedin city, Sliver peaks, Bruce and Clutha Counties. *N. Z. Vet. J.*, 34: 111-115.
- Perrie, A. and P. Watson, 1999. *Statistics for Veterinary and Animal Science*. 1st Edn., Blackwell Science Ltd., UK.
- Ridler, A.L. and D.M. West, 2007. Diseases of Oral Cavity. In: *Diseases of Sheep*, Aitken, I.D. (Ed.). 4th Edn., Blackwell Publishing, Oxford, UK., pp: 149-155.
- Rweyemamu, M.M. and J. Berrada, 2007. Middle East and North Africa. In: *Diseases of Sheep*, Aitken, I.D. (Ed.). 4th Edn., Blackwell Publishing, Oxford, UK., pp: 483-493.
- Sellers, R. and J. Gloster, 2008. Foot-and mouth disease: A review of intranasal infection of cattle, sheep and pigs. *Vet. J.*, 177: 159-168.
- Spence, J., 1989. *Dental Disease in Sheep*. 1st Edn., Moredun Institute, Edinburgh, pp: 1-9.
- Spence, J.A., G.U. Aitchison and J. Fraser, 1988. Development of periodontal disease in a single flock of sheep: Clinical signs, morphology of subgingival plaque and influence of antimicrobial agents. *Res. Vet. Sci.*, 45: 324-331.
- St. Jean, G., 2002. Dental and Periodontal Disease. In: *Large Animal Internal Medicine*, Smith, B.P. (Ed.). 3rd Edn., Mosby Publishing, St. Louis, USA., ISBN: 0-323-00946-8, pp: 694-697.
- Toplu, N., 2004. Characteristic and non-characteristic pathological findings in peste des petits ruminants (PPR) of sheep in the Ege District of Turkey. *J. Comp. Pathol.*, 131: 135-141.