



Periodontal diseases and tooth wear in sheep flocks in the State of Goiás, Brazil¹

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ABSTRACT.- Martins A.S., Silva T.A., Athayde F.R.F., Saraiva J.R., Mendes J.G., Cardoso M.V.S., Dutra I.S. & Borsanelli A.C. 2023. **Periodontal diseases and tooth wear in sheep flocks in the State of Goiás, Brazil.** *Pesquisa Veterinária Brasileira* 43:e07367, 2023. Departamento de Medicina Veterinária, Escola de Veterinária e Zootecnia, Universidade Federal de Goiás, Rodovia Goiânia-Nova Veneza Km 8, Goiânia, GO 74690-900, Brazil. E-mail: anaborsanelli@ufg.br

Dental and periodontal affections consist of health concerns of great importance in sheep flocks, as they affect the health and welfare of animals and represent one of the main causes of premature slaughter. Studies on the occurrence of these conditions in sheep are scarce in Brazil. The present study aimed to evaluate the prevalence of periodontal diseases and tooth wear in sheep flocks in the State of Goiás. For this, a clinical oral examination was conducted on 325 sheep from seven farms in six municipalities of the State. Periodontal lesions, characterized by gingival recession in at least one incisor tooth, were observed in 48.3% (157/325) of the sheep, while in cheek teeth it occurred in 13.2% (43/325) of the evaluated sheep. Dental wear on cheek teeth was identified in 69.2% (255/325) of the sheep, and 10.7% (35/325) of the ovines showed dental wear on incisor teeth. Sheep older than 36 months had an increase in the frequency of tooth wear. A total of 171 (52.62%) out of the 325 examined sheep had signs of bleeding on probing, which is compatible with gingivitis, and 69 (40.36%) were older than 36 months. Thirty-eight (11.69%) out of the 325 evaluated ovines had gingivitis in all teeth, among which 21 (55.26%) were older than 36 months. Logistic regression analysis allowed the observation that age was associated with the occurrence of gingivitis. Less frequent changes such as periodontal pockets and loss of at least one tooth were also observed in 4.9% (16/325) and 17.8% (58/325) of the sheep, respectively. It indicates that the presence of periodontal diseases and tooth wear is a common occurrence in the evaluated flocks. Therefore, there is a need to include the oral health of sheep in the routine of the farm as an essential preventive measure to improve the quality of life, animal welfare, and zotechnical indices.

INDEX TERMS: Periodontitis, gingivitis, tooth wear, dental diseases, periodontal disease, sheep, Brazil.

RESUMO.- [Doenças periodontais e desgaste dentário em rebanhos ovinos no Estado de Goiás, Brasil.] As afecções dentárias e periodontais constituem uma preocupação sanitária de grande importância em rebanhos ovinos, uma vez que afetam a saúde e o bem-estar dos animais, e representam uma das principais causas para o abate prematuro. No Brasil,

estudos sobre a ocorrência dessas afecções em ovinos são escassos. Assim, o presente estudo teve como objetivo avaliar a prevalência de doenças periodontais e desgaste dentário em rebanhos ovinos no estado de Goiás. Para isso, realizou-se o exame clínico bucal em 325 ovinos em sete propriedades rurais de seis municípios do estado. As lesões periodontais,

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caracterizadas por recessão gengival em, pelo menos, um dente incisivo, foram observadas em 48,3% (157/325) dos ovinos, enquanto nos mastigatórios ocorreu em 13,2% (43/325) dos ovinos avaliados. O desgaste dentário em dentes mastigatórios foi identificado em 69,2% (255/325) dos ovinos e 10,7% (35/325) dos ovinos apresentaram desgaste dentário em dentes incisivos. Ovinos com idade superior a 36 meses tiveram um aumento na frequência do desgaste dentário. Dos 325 ovinos examinados, 171 (52,62%) apresentaram sinais de sangramento à sondagem, compatíveis com o quadro de gengivite, sendo que 69 (40,36%) apresentaram idade superior a 36 meses. Dos 325 ovinos avaliados, 38 (11,69%) apresentaram gengivite em todos os dentes, dos quais 21 (55,26%) apresentaram idade superior a 36 meses. Pela análise de regressão logística, foi possível observar que a idade mostrou associação com a ocorrência de gengivite. Alterações menos frequentes como a bolsa periodontal e a perda de, pelo menos, um elemento dentário também foram observadas em 4,9% (16/325) e 17,8% (58/325) dos ovinos, respectivamente. Os resultados do presente estudo indicam que a presença de doenças periodontais e desgaste dentário é uma ocorrência comum nos rebanhos avaliados. Portanto, enfatiza-se a necessidade de incluir a saúde bucal dos ovinos na rotina da propriedade como uma medida preventiva essencial para melhorar a qualidade de vida e o bem-estar dos animais, bem como os índices zootécnicos.

TERMOS DE INDEXAÇÃO: Periodontite, gengivite, desgaste dentário, doenças dentárias, doença periodontal, ovinos, Brasil.

INTRODUCTION

Sheep are heterodont and diphyodont animals, that is, they have differentiated teeth and two successive dentitions throughout life. The deciduous dentition is composed of 20 teeth and the permanent one of 32 teeth, i.e., eight incisors, 12 premolars, and 12 molars (König & Liebich 2011). Given that sheep do not have maxillary incisor teeth, these animals have a dental pad, known as dental pulvinus, composed of dense connective tissue and collagen, covered by keratin (Weinreb & Sharav 1964, Cutress et al. 1972). Incisor teeth in sheep have the function of gripping and cutting food and molar and premolar teeth are important in the chewing process (Pugh 2004).

Food digestion occurs dynamically in ruminants. The digestive process begins in the mouth from the apprehension, chewing, and rumination of the food content although cellulose digestion is closely associated with the ruminal microbial ecology. Thus, oral conditions such as periodontal diseases and excessive tooth wear can act as a risk factor for early slaughter, increasing costs related to the replacement of sheep in the full productive and reproductive phase (West & Spence 2000).

Periodontal diseases consist of multifactorial and polymicrobial infectious diseases that affect the structures that support and protect the teeth. Among the different clinical manifestations, gingivitis is characterized by the reversible nature of the periodontal disease and, classically, by the presence of edema, discoloration, and spontaneous gingival bleeding or on probing (Ramos et al. 2019). The progression of gingivitis can result in periodontitis, a more serious form of manifestation, which is destructive and irreversible to the

periodontium, with the presence of bone and/or ligament destruction, tooth mobility, and tooth loss (Borsanelli et al. 2016, Silva et al. 2016).

In contrast, tooth wear is characterized by the loss of the clinical dental crown and can occur due to repetitive mechanical contact between the teeth, chemical agents present in saliva and diet, and, possibly, the microbial action in the proteolysis of the acquired pellicle (Cleaver et al. 2023). Both diseases co-occur in ruminants (Campello et al. 2019) and result in impairment of the masticatory and rumination process, with consequent weight loss and eventual death from starvation (Dutra et al. 2000, Pugh 2004).

The occurrence of oral diseases in sheep and other ruminants is neglected by professionals in the area and breeders, mainly due to the lack of knowledge regarding the occurrence and productive impacts that these diseases cause and the lack of habit in examining the oral cavities of animals. Moreover, the epidemiological aspects of dental and periodontal diseases in Brazilian sheep flocks are rare despite the importance that these diseases may represent for sheep survival. Thus, this study aimed to evaluate the occurrence of periodontal diseases and tooth wear in sheep flocks in the State of Goiás and possible risk factors.

MATERIALS AND METHODS

Animal Ethics. This study was conducted following the criteria established by the Ethics Committee for the Use of Animals (CEUA) of the “Universidade Federal de Goiás” (UFG) under protocol No. 078/20.

Flocks. Visits were carried out from August 2021 to August 2022 in seven farms in the central region of the State of Goiás to conduct the oral clinical examination of 325 sheep. The study farms were located in the municipalities of Goiânia, Trindade, Santa Rosa de Goiás, Inhumas, Pirenópolis, and Hidrolândia (Fig.1). The ovinos were reared in different production systems and the diet provided also varied on each farm. Regarding pasture, on the seven farms evaluated, the sheep were fed pastures of *Urochloa*, and on two farms the sheep were also fed pastures of *Panicum maximum* cv. Massai and *Cynodon* spp. cv. Tifton 85 or received hay from these grasses. Regarding food supplements, in three farms silage was offered to sheep as a winter supplement. Furthermore, on one farm the sheep received corn-based feed, on another farm the sheep received whey and corn feed and on another farm the animals received cassava peel as a food supplement. On all farms, sheep received a commercial mineral supplement.

Oral clinical examination. The oral clinical status of the sheep was established after physical restraint and inspection of the entire oral cavity. The periodontal evaluation of the teeth was performed using a millimeter periodontal probe (Williams probe), labial retractor, and flashlight. Probing of the gingival margin was performed by positioning the periodontal probe parallel to the tooth axis and uniformly traversing the entire gingival edge of the incisor teeth, according to the criteria established by Ramos et al. (2019). The following dental groups were evaluated: incisor teeth (teeth 404, 403, 402, 401, 301, 302, 303, and 304; labial and lingual surfaces), right upper maxilla (101, 102, and 103; buccal and palatal surfaces), left upper maxilla (201, 202, 203; buccal and palatal surfaces); and only the palatal surface was evaluated in the molar teeth (104, 105, 106, 204, 205, and 206). The oral cavity of sheep does not allow sufficient opening angles for detailed periodontal examination of the last premolar and molar teeth. Thus, a complete evaluation of the periodontium of living sheep is unfeasible.

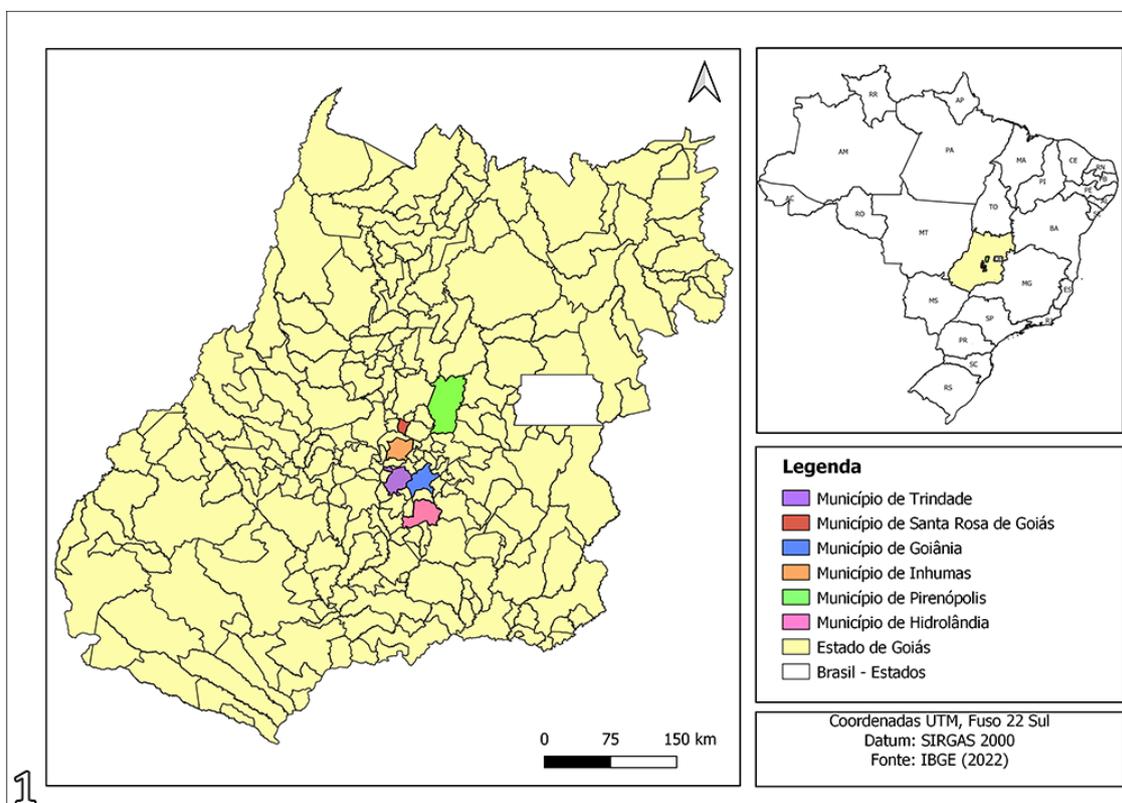


Fig. 1. Map of Goiás, Brazil, highlighting the municipalities from where the studied sheep flocks originated for the assessment of dental diseases.

Individuals (sex, age, breed, or crosses) and general clinical data of the herd data were recorded on an odontogram adapted for this purpose. The frequency and severity of periodontal lesions were classified and categorized according to the following characteristics: presence or absence of gingivitis, presence or absence of gingival recession, depth of the periodontal pocket measured in millimeters, degree of supragingival biofilm, tooth loss, presence of bulging in the mandibular region, and excessive tooth wear.

Periodontal sites with gingivitis were considered those that presented inflammatory alterations such as edema, discoloration, bleeding on probing, or spontaneous bleeding (Ramos et al. 2019). The clinical characterization of periodontitis was established by the presence of gingival recession (from the visualization of the tooth root) and the presence of a periodontal pocket (measured by the distance from the gingival margin to the base of the periodontal pocket) with a depth higher than 5mm (Borsanelli et al. 2017, Campello et al. 2019). Healthy periodontal sites consisted of those in which the marginal gingiva was intact, with no change in color, edema, or bleeding on probing, and absence of gingival recession and/or periodontal pockets deeper than 5mm.

The evaluation of dental crown wear on the incisor and cheek teeth was conducted using the classification parameters of dental unit wear suggested by Agostinho (2017), with scores of 0 = intact dental enamel, 1 = discrete wear of dental enamel, 2 = wear up to one-third of the length of the clinical crown, and 3 = wear higher than one-third of the length of the clinical crown. The analysis of the biofilm adhered to the supragingival surface (calculus) used scores from 0 = non-visible biofilm, 1 = discreet amount of adhered biofilm, 2 = moderate amount of biofilm, and 3 = severe amount of adhered biofilm as parameters.

Statistical analysis. Descriptive analyses were performed on the data to estimate the mean, standard deviation, and percentages. The quantitative statistical analyses were performed using a generalized linear model (GLM – logistic regression) in the R software (version 3.5.3; R Foundation for Statistical Computing, Austria). Odds ratios with upper and lower confidence limits (95% confidence interval) were estimated in the logistic regression.

RESULTS

Flocks. Out of the 325 examined sheep, 296 (91%) were females and 29 (9%) males, divided into five breeds, with the most prevalent being crossbred (51.7%), Dorper (34.1%), and White Dorper (12.3%). Regarding age, 82 (25.2%) sheep were up to 12 months old, 86 (26.5%) from 12 to 36 months, and 157 (48.3%) older than 36 months.

Gingivitis. Of the 325 examined sheep, 171 (52.62%) had signs of bleeding on probing compatible with gingivitis. Out of, 51 sheep (29.82%) were aged up to 12 months, 51 (29.82%) from 12 to 36 months, and 69 (40.36%) were aged over 36 months. Thirty-eight (11.69%) out of the 325 evaluated sheep had gingivitis in all incisor teeth and, among them, 10 (26.31%) were aged up to 12 months, seven (18.42%) from 12 to 36 months, and 21 (55.26%) were older than 36 months.

A total of 7,800 incisor and cheek teeth were assessed by partial examination of the dental arch, which allowed the evaluation of even the first molar tooth of the sheep. The condition of gingivitis, assessed by gingival probing, was only possible to be performed on the incisor teeth. Among the 2,600 assessed incisor teeth, 709 (27.3%) teeth showed signs compatible with gingivitis, with 360 (50.78%) teeth being located in the right mandible

and 349 (49.22%) in the left mandible. The incisor teeth with the highest frequency of gingivitis were the first and second left incisors (39.38% and 33.54%, respectively) and the first and second right incisors (37.85% and 34.77%, respectively).

The division of the mandible into hemiarches allowed observing that 41 (12.61%) sheep had gingivitis in the four incisors of the right mandible, and the first and second incisors were the teeth with the most single and shared episodes with each other, with sheep 32, 15, and 32, respectively (Fig.2).

In the left mandible, 41 ovines had gingivitis in the four incisors, with the first and second incisors being the teeth with the most single and shared episodes with each other, with sheep 24, 5, and 43, respectively (Fig.3). The logistic regression analysis enabled the observation that age was associated with the occurrence of gingivitis in the first and second right incisor teeth and the second left incisor tooth (Table 1).

Gingival recession. A total of 157 (48.3%) out of the 325 examined sheep presented gingival recession in at least one incisor tooth and 43 (13.2%) had gingival recession in

at least one cheek tooth. Among the 157 sheep with gingival recession in incisor teeth, 26 (16.6%) were aged up to 12 months, 27 (17.2%) were aged from 12 to 36 months, and 104 (66.2%) were aged over 36 months. Among the 43 sheep with gingival recession in the masticatory teeth, three (7%) were aged up to 12 months, nine (20.9%) were aged from 12 to 36 months, and 31 (72.1%) were aged over 36 months.

A total of 789 (10.1%) out of the 7,800 evaluated teeth showed some degree of gingival recession, of which 31 (3.92%) consisted of cheek teeth in the mandible and 103 (13.05%) in the maxilla. A total of 322 (40.81%) incisor teeth presented recession on the right side and 333 (42.20%) on the left side. The teeth with the highest frequency of gingival recession were the first and second right incisors and the first and second left incisors.

In the right mandible, 21 sheep had recession in the four incisors, 30 had recession only in the first right incisor, seven only in the second right incisor, and 60 sheep had recession in the first and second right incisors (Fig.4). In the left mandible, 24 sheep had a recession in the four incisors, 31 sheep had

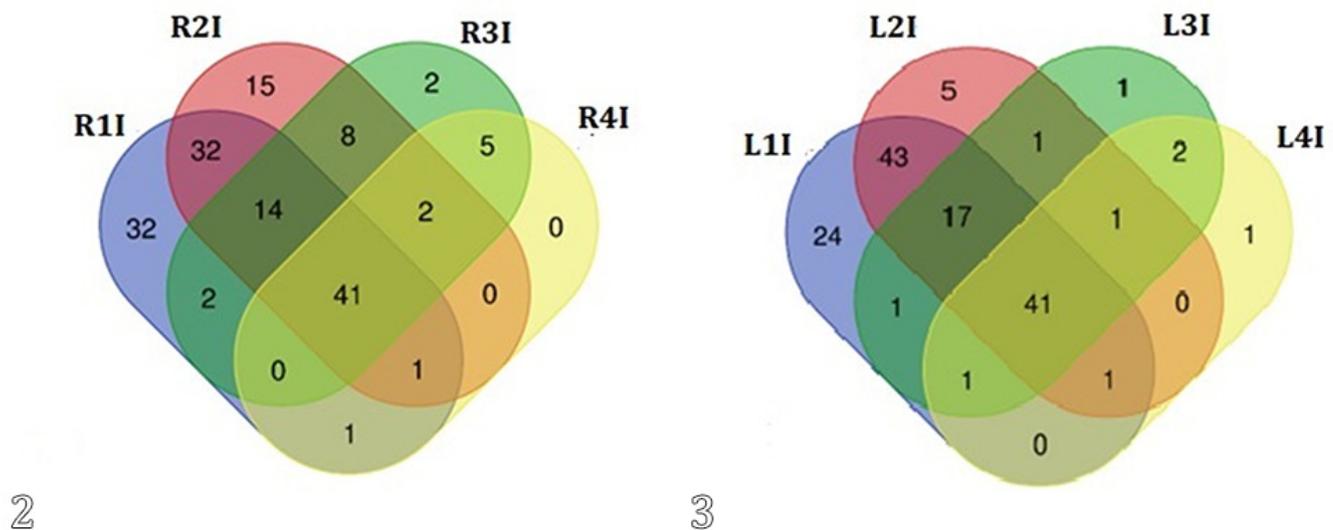


Fig.2-3. (2) Frequency of gingivitis in right incisor teeth, represented by the Venn Diagram. R1I = first right incisor tooth, R2I = second right incisor tooth, R3I = third right incisor tooth, and R4I = fourth right incisor tooth. (3) Frequency of gingivitis in left incisor teeth, represented by the Venn Diagram. L1I = first left incisor tooth, L2I = second left incisor tooth, L3I = third left incisor tooth, and L4I = fourth left incisor tooth.

Table 1. Distribution of occurrence of gingivitis in incisor teeth of 325 clinically evaluated sheep, according to age group and significance

Tooth	Age (months)	Frequency	(%)	p-value	OR	CI 95%
First right incisor	0-12	36	29.3	0.01	0.71	0.54 - 0.94
	12-36	40	32.5			
	>36	47	38.2			
Second right incisor	0-12	38	33.6	0.003	0.65	0.49 - 0.86
	12-36	32	28.3			
	>36	43	38.1			
Second left incisor	0-12	34	31.2	0.01	0.7	0.53 - 0.93
	12-36	33	30.3			
	>36	42	38.5			

OR = Odds ratio, CI = confidence interval.

a gingival recession in the first left incisor, six sheep in the second left incisor, and 57 sheep in the first and second left incisors (Fig.5). The logistic regression analysis showed that age was associated with the occurrence of recession in all incisor teeth (Table 2).

Pigmented supragingival biofilm. A total of 259 (79.7%) out of the total number of evaluated sheep presented supragingival biofilm adhered to the dentition, with 51 (19.7%) presenting biofilm on the incisor teeth and 251 (96.91%) on the cheek teeth, and among them, 127 (49.03%) sheep were older than 36 months.

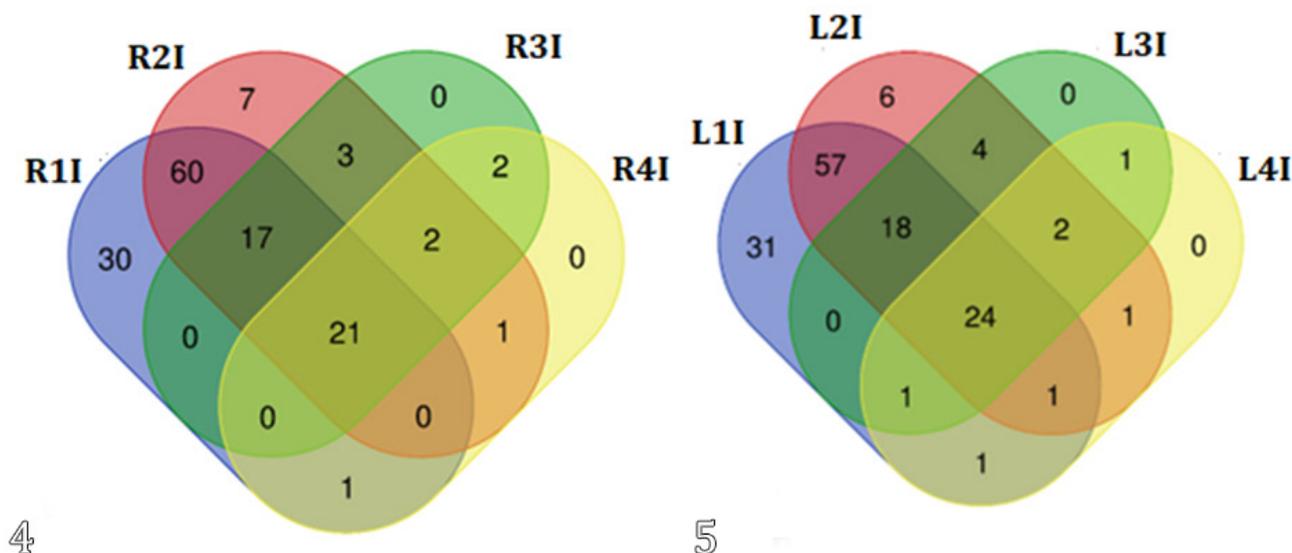


Fig.4-5. (4) Frequency of gingival recession in right incisor teeth, represented by the Venn Diagram. R1I = first right incisor tooth, R2I = second right incisor tooth, R3I = third right incisor tooth, and R4I = fourth right incisor tooth. (5) Frequency of gingival recession in left incisor teeth, represented by the Venn Diagram. L1I = first left incisor tooth, L2I = second left incisor tooth, L3I = third left incisor tooth, and L4I = fourth left incisor tooth.

Table 2. Distribution of the occurrence of gingival recession in incisor teeth of 325 clinically evaluated sheep, according to age group

Tooth	Age (months)	Frequency	(%)	p-value	OR	CI 95%
First right incisor	0-12	24	17.8	5.26x	2.13	1.59 - 2.89
	12-36	18	13.3			
	>36	93	68.9			
Second right incisor	0-12	17	15.0	9.46x	2.2	1.62 - 3.06
	12-36	17	15.0			
	>36	79	69.9			
Third right incisor	0-12	3	6.5	7.18x	2.97	1.8 - 5.63
	12-36	7	15.2			
	>36	36	78.3			
Fourth right incisor	0-12	1	3.6	0.0009	3.63	1.83 - 8.86
	12-36	4	14.3			
	>36	23	82.1			
First left incisor	0-12	24	17.5	1.03x	2.25	1.68 - 3.05
	12-36	17	12.4			
	>36	96	70.1			
Second left incisor	0-12	18	15.7	2.57x	2.01	1.55 - 2.9
	12-36	18	15.7			
	>36	79	68.7			
Third left incisor	0-12	3	6.0	5.08x	2.84	1.77 - 4.91
	12-36	9	18.0			
	>36	38	76.0			
Fourth left incisor	0-12	1	3.2	0.0003	4.03	2.04 - 9.87
	12-36	4	12.9			
	>36	26	83.9			

OR = Odds ratio, CI = confidence interval.

A total of 4,189 (53.7%) out of the 7,800 evaluated teeth presented supragingival biofilm. Among them, 1,894 (1,894/4,189; 45.2%) represented mandibular teeth, 1,916 (1,916/4,189; 45.7%) maxillary teeth, and 378 (378/4,189; 9.1%) incisor teeth.

Excessive tooth wear. Thirty-five (10.7%) out of the 325 evaluated sheep had some degree of dental wear on the incisor teeth and 225 (69.2%) had some degree of wear on the cheek teeth. Among the 35 sheep that showed wear on incisor teeth, five were aged up to 12 months, 11 were from 12 to 36 months, and 19 were older than 36 months. Among the 225 sheep that presented some degree of wear on their cheek teeth, 65 were aged up to 12 months, 47 were from 12 to 36 months, and 113 were older than 36 months. In total, there were 3,674 teeth with wear (3,674/7,800; 47.1%) and, among them, 1,690 (1,690/3,674; 46%) consisted of mandibular teeth, 1,737 (1,737/3,674; 47.2%) maxillary teeth, and 247 (247/3,674; 6.8%) incisor teeth. Sheep older than 36 months presented the highest frequency of tooth wear.

Periodontal pocket. Only 16 (4.9%) out of the 325 examined sheep had periodontal pockets deeper than 5mm, and sheep older than 36 months were the most affected. The first right incisor was the tooth with the highest frequency of injuries, with a total of six pockets.

Other affections. Fifty-eight (17.8%) out of the 325 examined sheep lost at least one tooth. Regarding less frequent findings, three (0.9%) sheep had pulp chamber exposure in the incisor teeth, five (1.5%) sheep had mandibular swelling, and nine (2.8%) sheep had angular cheilitis.

Some examples of lesions are shown in Figure 6-13.

DISCUSSION

The supragingival dental biofilm present in 79.6% of the evaluated sheep represents a dynamic and complex structure that is formed in the dental enamel due to colonization by several species of the oral microbiota (Kolenbrander et al. 2002). The accumulation of dental biofilm may be involved in the development of periodontitis in ruminants (Saraiva et al. 2019). The black-pigmented supragingival biofilm was associated with the highest degree of gingival recession in dairy goats in which most lesions were found on the cheek teeth (Campello et al. 2019), as observed in the sheep of the present study. A similar result was observed in sheep from flocks in the State of São Paulo, with older sheep showing higher degrees of biofilm (Agostinho 2017), corresponding to the results of the present study, in which 49% (127) of the sheep with biofilm were older than 36 months.

Periodontal diseases are described as a group of diseases that affect the tissues that protect and support the teeth. Gingivitis is the initial and reversible form of periodontal disease, caused by dysbiosis of the gingival biofilm (Kistler et al. 2013, Ramos et al. 2019). The diagnosis can be difficult in the early stages of the disease because this condition does not show obvious clinical signs as in periodontitis. Clinically, redness, edema, and spontaneous bleeding or bleeding after probing can be observed (Ramos et al. 2019). In the present study, 52.62% of the evaluated sheep showed signs of bleeding on probing compatible with gingivitis, and the first and second right and left incisor teeth were the ones that most presented episodes of gingivitis according to the increase in age. Age



Fig.6-13. (6) Presence of gingival recession and gingivitis in all juvenile teeth of a lamb aged up to 12 months. (7) This young ewe aged from 12 to 36 months lost three right incisors, and showed bleeding after probing (gingivitis) and supragingival biofilm. (8) Presence of gingivitis in an adult sheep older than 36 months. (9) Presence of necrotizing ulcerative gingivitis in the first right incisor teeth with bleeding on probing in an ewe aged from 12 to 36 months. (10) Adult sheep older than 36 months showing gingival recession in incisor teeth, mainly in the first right incisor. (11) Presence of gingival recession in the first and second incisor teeth and supragingival dental biofilm in an adult sheep older than 36 months. (12) This adult sheep older than 36 months lost the fourth left incisor and had a severe gingival recession in the incisor teeth and tooth wear with loss of the dental crown of the first left incisor. (13) Loss of the second left incisor and presence of a periodontal pocket deeper than 10mm, severe gingival recession, and myiasis in the third left incisor in an adult ewe older than 36 months.

represents a possible risk factor related to the development of periodontal lesions in cattle, as it increases the period of exposure to causal factors of periodontal diseases (Borsanelli et al. 2021). The first occurrence of gingivitis in ruminants in Brazil was reported in a study that evaluated the effectiveness of virginiamycin in controlling periodontal diseases in cattle kept on newly formed pasture (Ramos et al. 2019). Currently, there are no reports of gingivitis in sheep.

In Brazil, periodontitis in small ruminants has already been reported in the North (Silva et al. 2016, 2019), Southeast (Borsanelli et al. 2017, 2021, Agostinho 2017, Campello et al. 2019), and Northeast regions (Wicpolt et al. 2022). This disease is characterized by the presence of periodontal pockets higher than 5mm in depth and/or the presence of gingival recession. Gingival recession is defined as the apical location of the marginal tissue relative to the cemento-enamel junction, with exposure to the root surface (Borsanelli et al. 2016). Trauma and periodontal diseases are factors that contribute to its occurrence.

In the state of São Paulo, Agostinho (2017) reported the occurrence of different degrees of gingival recession in the premolar and molar incisor teeth in 58% of the 129 examined sheep. Campello et al. (2019) reported that 70.7% of 150 dairy goats had gingival recession in at least one tooth and most of the lesions were located in cheek teeth, opposite to what was observed in the present study. However, both studies are similar, as the lesions mostly occurred in older sheep. In the present study, gingival recession was the most prevalent periodontal lesion in the evaluated sheep and the incisor teeth were the most affected (83%). Furthermore, more cases of recession in the incisors were observed on both sides as age increased. Therefore, older sheep tend to have a higher frequency of gingival recession.

A total of 225 (69.2%) out of the 325 examined sheep had some degree of dental wear on cheek teeth. Excessive tooth wear has great economic importance in sheep health, as dental alterations affect the apprehension and digestion of food and may be the cause of several digestive and nutritional disorders, such as pregnancy toxemia (Spence & Aitchison 1986). This disease can occur in natural conditions due to aging, but it is considered pathological when it occurs excessively and generates functional problems or dentin sensitivity (Campello et al. 2019). The loss of tooth structures can occur due to exposure to acidic substances, erosion, and mechanical origin such as wear due to attrition and abrasion, and more than one wear process can occur simultaneously in the same dental element, intensifying and influencing the clinical manifestations (Van't Spijker et al. 2009).

Excessive incisor tooth wear in small ruminants is a health problem commonly found in Australian and New Zealand sheep farming and one of the main criteria for early culling of sheep (Bruère et al. 1979, Orr et al. 1979, 1986, Kane 1984). However, in Brazil, tooth wear is a periodontal disease recently described in flocks of small ruminants in the State of São Paulo, with a prevalence of 88% in 129 ewes and 96% in 150 goats (Agostinho 2017, Campello et al. 2019).

Tooth loss is also considered a criterion for discarding animals from a herd, as it causes changes in occlusion, possibly pain, and formation of dental tips, resulting in reduced feed efficiency (Embrapa. 2007). Studies conducted in England and Scotland drew attention to the fact that 60 to 70% of small ruminants were discarded early because they had a partial or total loss of incisor teeth or because they had periodontal

diseases and, consequently, were not able to feed efficiently (Herrtage et al. 1974, Spence & Aitchison 1985). A study conducted in a sheep slaughterhouse in Spain showed that 56.9% of the evaluated sheep had tooth loss, with the first premolar being the tooth with the highest frequency of loss (Arcaute et al. 2020). Erjavec & Crossley (2010) reported the loss of 84% of premolar and molar teeth in 25 culling sheep. In the present study, 17.8% of the evaluated sheep presented loss of at least one tooth. Trauma and periodontitis stand out among the main causes of tooth loss. Thus, the results of the present study showed a high occurrence of periodontal diseases in the evaluated flocks.

Periodontitis in cattle was popularly known as “swollen face” (Döbereiner et al. 2000) and was considered one of the most important diseases of cattle in the 1960s and 1970s in the Southeast and Midwest of Brazil (Döbereiner et al. 2004). Periodontitis in sheep is known as “broken mouth” in countries such as the United Kingdom and New Zealand, involving the incisors and causing loosening and loss of teeth (Spence et al. 1988). Sheep tend to be more susceptible to periodontal disease than goats (Bartosiewicz 2008), but they are similarly affected in terms of the prevalence and severity of lesions compared to cattle (Holmes et al. 2021). Thus, the results of the present study reinforce that periodontal diseases are common and neglected problems in ruminants.

Several factors favor the occurrence of periodontitis in sheep. In addition to the presence of supragingival biofilm, other causes such as behavioral, environmental, and genetic factors may contribute to the occurrence of the disease. Döbereiner et al. (2004) concluded that outbreaks of “swollen face” were associated with the consequence of deforestation of formerly native areas and their transformation into pasture areas. Silva et al. (2016) also associated periodontitis in sheep in the State of Pará after pasture reform and supply of freshly grown forage, that is, under the same epidemiological conditions of the outbreak described for cattle. In the present study, the evaluated flocks were under different epidemiological conditions and the diet was also different. Therefore, sheep kept on different diets can be affected by these diseases.

CONCLUSION

The high frequency of periodontal diseases and tooth wear identified in sheep flocks in Goiás reinforces the need to consider the oral health of the sheep in the routine of the farm, as it represents an important factor for the animals to be able to meet their energy requirements and ensure welfare, body condition, and reproductive efficiency.

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