

Benefits of clinical examination of incisors in Algerian Ouled Djellal transhumant sheep

Mokhtar Benchohra^{*1}, Houari Hemida¹, Karim Amara¹, Rachid Kaidi²

Abstract

The aim of the present study was to assess the characteristics and eventual abnormalities of permanent incisors in Ouled Djellal sheep, an Algerian native breed, in transhumance-supplementation rearing system. The study was conducted on 170 sheep from five flocks, during 2015-2016 in Tiaret region (western- Central Algeria). Clinical examination was performed to evaluate incisors' number, crown length of central incisors, wear state, dental occlusion and, eventually, abnormalities. Results showed that wear process occurred properly due to the good dental occlusion, allowing to determine the sheep age up to 60 months. The age of the studied animals was relatively high (39% \geq 60 months). However, the incidence of abnormalities of incisors was low (20%), mainly corner defect (6.5%), protrusion (5.9%), brachygnathia (1.7%) and prognathism (1.2%). We concluded that clinical assessment of sheep incisors was a useful tool to evaluate the efficiency of a followed rearing mode and alimentary system.

Keywords: Dental wear, grazing, food complementation, incisor characteristics, Ouled Djellal sheep

¹ Department of Animal Health, Institute of veterinary sciences, Univ-Tiaret, Algeria.

² Institute of Veterinary Sciences, Univ-Blida, Algeria.

*Corresponding author: mok.benchohra@yahoo.fr

Introduction

The Algerian steppe located between the Tellian Atlas in the north and the Sahara Atlas in the south is an important pastoral area that supports an ovine population of approximately 15 million heads and about 8 million inhabitants (Kanoun et al., 2007). The available steppe area is in a continuous decrease because of the growing population and increasing reared sheep flocks as a solely source of meat and income. Hence, nomadic pastoralists have adapted to these constraints by developing a complex system of sheep rearing based on permanent mobility by integrating transhumance (towards the steppe) and renting of pastures in the northern plains area. However, sheep are supplemented with barley or wheat bran during the dry periods and grass shortage. This rearing mode has proved to be quite effective, allowing animals to be kept in acceptable condition throughout most of the year. However, long periods of drought are likely to overextend the financial reserves of nomadic pastoralists, challenging this rearing system. The Ouled Djellal sheep is the main breed, and their flocks are distributed over the vast Algerian territory (steppe and grassland) (Harkat et al., 2015). In the absence of laboratory diagnostic methods such as densitometry and microtomography (Tatara et al., 2014), the clinical assessment of incisors is easily used to determine the age of sheep, and to evaluate feeding efficacy of a rearing mode (Ridler and West 2010; McGregor and Butler, 2015; Benchohra, 2015).

This study aims to characterize the Ouled Djellal transhumant sheep permanent incisors, and to determine the possible spillover effects of the followed rearing system on dentition.

Material and methods

Animals' identification and rearing

This study was carried out in Tiaret region in western-Central Algeria during 2015-2016 summer period on 170 adult Ouled Djellal sheep, randomly selected from five flocks. The flocks are raised in transhumance system. During summer, the nomadic breeders move their flocks northward to the *Tell* region, seeking for stubble (cereal crop residues) and water points. However, during poor periods (in winter) or pastures' shortage (in the late summer), feed supplementation with one kilogram of barley or wheat bran for each animal per day is required.

Clinical examination of incisors

Clinical examination of permanent incisors of selected animals was performed. After restraining the head and retracting the lips, incisors were observed and assessed for order of eruption, number and characteristics (incisors wear), dental occlusion (incisors apposition to the upper jaw pad) as well as the presence of abnormalities (Ridler and West, 2010). Sheep showing excessive incisor wear were discarded from central incisors crown length measurement (Morris et al., 1985), but considered for the other parameters.

Results

Sheep aging and incisors wear

Fig.1 (a-d) show the mouths of sheep aged 15 months (mo.) (two-tooth) to 40 mo. (eight-tooth). In animals that had complete permanent dentition (full mouth), we considered the process of wear to identify the approximate age of sheep. A significant wear of the central (I_1) and the middle (I_2) incisors would correspond to 50 mo. of age and that extending to the lateral incisors (I_3) indicated 60 mo. (Chambon, 1987) (Fig.1e). When wear extends to all incisors, they become reduced in length and we talk about levelling; afterward, they undergo shaving and sheep is considered old. Finally, incisors become spaced due to the loss of coating, resulting in incisor loss (broken-mouth) (Fig.1f).

Table 1: Sheep incisors lengthening (mean \pm SD) and wear occurrence according to age groups

Age (months)	Incisors length (mm)				Sheep with incisors wear (N**)
	N*	Mean	SD	Variation coefficient (%)	
15	18	13.9	1.5	10.8	--
22	13	15.4	2.1	13.6	5
30	12	16.8	2	12	11
40	-	-	-	-	14
50	-	-	-	-	31
> 60	-	-	-	-	66

N* number of sheep included in incisors' length measurement

N**number of sheep not included in incisors' length measurement because of wear and abnormalities.



Figure 1: (a) Two-tooth mouth (15 mo.) (b) Four-tooth mouth (22 mo.) (c) Six-tooth mouth (30 mo.) (d) Full-mouth (40 mo.) (e) Shaped incisors (60 mo.) (f) Reduced incisors (broken mouth)

Evolution of permanent central incisors (I_1) length is summarized in Table 1. Results revealed moderate central incisors' length in young ewes (two-tooth) that increases with age by a slight elongation of I_1 in four-toothed ewes, and reaches the maximum length in six-toothed ewes. Thereafter, incisors undergo regular wear so that the crown lengthening measurement was not performed in animals aged more than or equal to 40 mo., and also in 16 sheep of 22 and 30 mo. of age because of their excessive wear (Table 1).

The relatively small coefficient of variation ($\leq 15\%$) showing a grouped distribution around the mean indicated homogeneity within each age group (Table 1).

Age of flocks

Age group distribution showed that the largest group consisted of ewes older than 60 mo. (39%) followed by the young ewes group of less than 30 mo.(35%). However, animals aged 40 and 50 mo. represented only 26%.

Malocclusion and incisors' abnormalities

Dental malocclusion was observed in 15 sheep (8.8%) among the studied animals, including 10 cases (5.9%) of incisors' protrusion (Fig. 2a), three cases (1.7%) of brachygnathia (Fig. 2b) and two cases (1.2%) of prognathism (Fig. 2c). Surprisingly, the rate of the corner defect was important (6.5%). Seven animals had absence of both corners, one had one corner, while three had rudimentary corners (Fig. 2d). Interestingly, few defects

were noted regarding the incisors' wear because of the good occlusion of pad jaw and incisors, with three ewes showing a V-shaped wear of central incisors (1.7%) (Fig. 2c). Three ewes showed regression of the gum (1.7%), which is responsible for mobility and premature fall of incisors (Fig. 2e). We also observed a slight rotation (about 45°) of two incisors in one sheep (Fig. 2f), one case of slight incisor torsion (Fig. 2g) and one case of fracture of the upper crown (Fig. 2h).



Figure 2 : (a) Incisor protrusion, (b) Brachygnathism, (c) Prognathism with V-shaped wear of central incisors, (d) Rudimentary incisor, (e) Incisors spacing and gum retraction, (f) Slight rotation (45°) of left I3 and corner, (g) Slight torsion of right incisors, (h) Fracture of upper part in left I2

Discussion and conclusions

In view of our results, the studied sheep flocks are relatively aged. In fact, the regular incisor wear observed in most animals was mainly due to good incisors' occlusion (Morris et al., 1985; Ridler and West, 2010, McGregor and Butler, 2015), which allow owners to keep sheep for a longer production period. For nomadic breeders, if a sheep is in good condition, advanced incisors' wear will not constitute a sufficient reason for cull. So, aged ewes are culled more due to the condition rather than teeth, in agreement with Coop and Abrahamson (1973). It was reported (West, 2002; McGregor, 2011), that a rich and varied regimen combined with periodic parasitic control treatments as conducted by the majority of transhumant pastoralists, would be in favor of less dental wear. However, considering the long periods spent on the steppe, incisors' wear of the transhumant sheep would be accelerated by grazing woody plants such as sparte, alfa and white willow. Moreover, the degree of wear of incisors would also be influenced by the hereditary character of some sheep breeds (Mayer et al., 1983).

The feeding system adopted by nomadic pastoralists varies between extensive and semi-extensive, and it is based mainly on transhumance. However, feed supplementation is ensured during winter and grazing shortage, or drought periods. Therefore, such dietary practice ensures the essential nutritional requirements for ewes and lambs. Moreover, food availability has a good effect on the growth of young sheep and, consequently, gives them healthy teeth as reported by McGregor and Butler (2015). However, alimentary penuries can be further complicated by the high cost of livestock feed due to the cause-effect relationship. As a result, nomadic pastoralists are unable to properly feed their sheep flocks during long periods of grass shortages. Corners defects were the second important abnormality observed in our study, and the delayed eruption or the absence of one or more corners may make age determination uncertain. In fact, Cocquyt et al. (2005) observed a delayed eruption of corners until 10 months, and stated that the major causes of this defect would be dietary deficiencies.

In sum, only 20% of the examined sheep showed abnormalities of varying importance. So, incisors' abnormalities due to nutritional deficiencies (Jubb et al., 1992, McGregor, 2011, McGregor and Butler, 2015, Dittmer et al, 2017) and those relating to overgrazing and soil ingestion (Healy, 1967, West, 2002), are not common in the studied Ouled Djellal flocks, reared under transhumance-supplementation

system. In our earlier study, we found that incisors' protrusion was more common in Rembi breed (55%) (Benchohra, 2015) compared to Ouled Djellal sheep (5.9%).

Nomadic pastoralists frequently examine the mouth of sheep, and proceed to culling when dental abnormalities are prominent, or in cases of incisors' loss (broken-mouthed sheep). By contrast, the sedentary sheep farmers in Tiaret region give less emphasis to teeth examination (Benchohra, 2015).

The Algerian Ouled Djellal sheep breed managed in the transhumance-supplementation system has an acceptable dentition, incisors' wear is regular, and incidence of anomalies is very low. This implies a better accuracy in age determination, an appropriate valorization of woody plants of steppe and short pasture, and a long enough productive life. Thus, it seems that this sheep breed adapts well to the modern constraints of transhumance. As expected, clinical assessment of the sheep incisors' characteristics is a useful tool to investigate and evaluate the efficiency of the followed rearing mode and alimentary system, in the lake of advanced tools.

Conflict of interest statement

The authors declare that they have no competing interests.

Acknowledgments

The authors acknowledged the contributions of dr. Mounir Adnane of the Sciences Veterinary Institute, IbnKhalidoun University of Tiaret. Also, we acknowledge the nomadic pastoralists of Djelfa for their courtesy.

References

1. Benchohra, M., 2015. Etude des caractères des incisives permanentes chez le mouton Rembi. *Livestock Res. Rural.Dev.* <http://www.lrrd.org/lrrd27/8/benc27148.htm>
2. Chambon, R., 1987. Manipulation et intervention sur le bétail: Ovins et Caprins, tome I. INRA, Educagriéditions, p:96.
3. Cocquyt, G., Driessen, B., Simoens, P., 2005. Variability in the eruption of the permanent incisor teeth in sheep. *Vet. Rec.*12 (157): 619-623. <http://dx.doi.org/10.1136/vr.157.20.619>
4. Coop I. E., Abrahamson M., 1973. Effect of teeth condition on intake of grazing sheep, *New Zealand Journal of Experimental Agriculture*, 1:1, 58-64, DOI: 10.1080/03015521.1973.10427617
5. Dittmer, K.E., Morley, R.E., Smith, R.L., 2017. Skeletal deformities associated with nutritional congenital rickets in newborn lambs. *N. Z.Vet.J.* 65(1):51-55.DOI:10.1080/00480169.2016.1241165
6. Harkat, S., Laoun, A., Benali, R., Outayeb, D., Ferrouk, M., Maftah, A., Da Silva, A., Lafri, M., 2015. Phenotypic characterization of the major sheep breed in Algeria. *Revue Méd. Vét.*166 (5-6): 138-147.
7. Healy, W.B., 1967. Ingestion of soil by sheep. *Proc. New Zealand Soc. Anim. Prod.*27: 109-120.
8. Jubb, K. V. F., Kennedy, P. C., Barker, I. K., Van Dreumel, A. A., Palmer, N., 1992. *Pathology of domestic animals: The alimentary system.* Vol 2, 4th Edition 625.
9. Kanoun, A., Kanoun, M., Yakhlef, H., Cherfaoui, M. A., 2007. Pastoralisme en Algérie : Systèmes d'élevage et stratégies d'adaptation des éleveurs ovins. *Renc. Rech. Ruminants*14: 182-184.
10. Mayer, H. H., Aitken, W. M., Smeaton, J. E., 1983. Inheritance of wear rate in the teeth of sheep. *Proc. New Zealand Soc. Anim. Prod.* 43: 189-191.
11. McGregor, B. A., 2011. Incisor development, wear and loss in sheep and their impact on ewe production, longevity and economics: A review. *Small Rumin. Res.*95: 79-87.
12. McGregor, B. A., Butler, K. L., 2015. Wear of permanent incisors with age on commercial Australian Angora goat farms. *Aust. Vet. J.*93: 36-39.
13. Morris, P. L., Whitley, B. D., Orff, M. B., Laws, A. J., 1985. A clinical study of periodontal disease in sheep. *New Zeal. Vet. J.*33 (6): 87-90. DOI: 10.1080/00480169.1985.35176
14. Ridler, A. L., West, D. M., 2010. Examination of teeth in sheep health management. *Small Rumin. Res.*92 (1-3): 92-95.
15. Tatara, M. R., Szabelska, A., Krupsket, W., Tymczyna, B., Łuszczewska - Sierakowska, I., Bieniaś, J., Ostapiuk, M., 2014. Morphometric, densitometric and mechanical properties of mandibular deciduous teeth in 5-month-old Polish Merino sheep. *BMC, Vet. Res.*10:45.doi: 10.1186/1746-6148-10-45
16. West, D. M., 2002. Dental disease of sheep. *New Zeal. Vet. J.* 50 (3): 102 - 104. <http://dx.doi.org/10.1080/00480169.2002.36282>

Koristi kliničkog pregleda sjekutića kod alžirske selidbene Ouled Djellal ovce

Sažetak

Cilj studije je procijeniti karakteristike i eventualne abnormalnosti trajnih sjekutića kod native alžirske Ouled Djellal ovce. U studiju je uključeno 170 ovaca iz pet stada od 2015. do 2016. godine u regiji Tiaret (zapadni-centralni Alžir). Obavljen je klinički pregled kako bi se evaluirao broj sjekutića, dužina krune centralnih sjekutića, stanje istrošenosti, dentalna okluzija i eventualno abnormalnosti. Rezultati su pokazali da istrošenost zuba normalno nastaje zahvaljujući dobroj dentalnoj okluziji omogućavajući određivanje starosti ovaca do 60 mjeseci. Starost ispitanih ovaca je bila relativno visoka (39% ≥ 60 mjeseci), međutim incidenca abnormalnosti sjekutića je bila niska (20%), i većinom je obuhvatala ugaoni defekt (6.47%), protruziju (5.9%), brahignatiju (1.7%) i prognatizam (1.2%). Zaključili smo da je klinički pregled sjekutića ovaca koristan način evaluacije učinkovitosti primijenjenog načina uzgoja i ishrane.

Ključne riječi: istrošenost zuba, ispaša, dohrana, karakteristike sjekutića, Ouled Djellal ovca