

Evaluation of the nutritive value of the diet of Ouled Djellal breed's sheep in semi-arid zone

Djaalab I., Mehennaoui S., Lakhdara N., Haffaf S., Djaalab-Mansour H.

in

Ben Salem H. (ed.), López-Francos A. (ed.).
Feeding and management strategies to improve livestock productivity, welfare and product quality under climate change

Zaragoza : CIHEAM / INRAT / OEP / IRESA / FAO
Options Méditerranéennes : Série A. Séminaires Méditerranéens; n. 107

2013
pages 103-107

Article available on line / Article disponible en ligne à l'adresse :

<http://om.ciheam.org/article.php?IDPDF=7018>

To cite this article / Pour citer cet article

Djaalab I., Mehennaoui S., Lakhdara N., Haffaf S., Djaalab-Mansour H. **Evaluation of the nutritive value of the diet of Ouled Djellal breed's sheep in semi-arid zone.** In : Ben Salem H. (ed.), López-Francos A. (ed.). *Feeding and management strategies to improve livestock productivity, welfare and product quality under climate change.* Zaragoza : CIHEAM / INRAT / OEP / IRESA / FAO, 2013. p. 103-107 (Options Méditerranéennes : Série A. Séminaires Méditerranéens; n. 107)



<http://www.ciheam.org/>
<http://om.ciheam.org/>

Evaluation of the nutritive value of the diet of Ouled Djellal breed's sheep in semi-arid zone

I. Djaalab^{**1}, S. Mehennaoui^{**}, N. Lakhdara^{*}, S. Haffaf^{**} and H. Djaalab-Mansour^{*}

^{*}Laboratoire Gestion Santé et Productions Animales, Université de Constantine, 25000 Constantine (Algeria)

^{**}Laboratoire Environnement Santé et Productions Animales, Université de Batna, 5000 Batna (Algeria)

¹E-mail: imendjaalab@yahoo.fr

Abstract. This study was undertaken to investigate the nutritive value and mineral components of breeding ewes' diet composed of forage from natural pastures. Physico-chemical analyzes were carried according to the methods by AOAC. Major and minor minerals were measured by atomic absorption spectrophotometry with flame. Green fodders are the richest in crude protein and total ash. The concentrate is high in energy because of its high content in organic matter and parietal carbohydrates. Hay despite its timber, contains the highest rate of Ca and P. It is suggested to improve the diet by a supply of minerals by the use of licks.

Keywords. Ewes – Feed – Analysis – Nutritional status.

Évaluation de la valeur nutritive de l'alimentation des brebis reproductrices de race Ouled Djellal en zone semi-aride

Résumé. Cette étude a été entreprise pour étudier la valeur nutritive et les composants en minéraux de la ration des brebis reproductrices composée de plantes fourragères issues de pâturages naturels. Des analyses physico-chimiques ont été effectuées selon les méthodes de l'AOAC. Les minéraux majeurs et mineurs ont été dosés par Spectrophotométrie d'Absorption Atomique à flamme. Les fourrages verts sont les plus riches en protéines brutes et en cendres totales. Le concentré est le plus énergétique par sa teneur en matière organique et en glucides pariétaux. Le foin malgré son caractère ligneux, renferme le taux le plus élevé en Ca et P. Il serait nécessaire d'amener une correction de l'alimentation par des apports nutritifs qui s'accordent avec les périodes critiques de la brebis palliant aux exigences métaboliques imposées. Il est suggéré d'améliorer l'alimentation par un apport de minéraux par l'utilisation de pierres à lécher.

Mots-clés. Brebis – Alimentation – Analyses – Statut nutritionnel.

I – Introduction

Sheep breeding in Algeria is concentrated mainly in the steppe with approximately 60% of the total number of heads, estimated at more than 19 million head. The arab white breed (Ouled Djellal) represents around 63% of animals (MADR, 2006). Today, farming intensification is handicapped by environmental problems of pollution and space maintaining. This intensification resulted in a weak equilibrium between feeding in one hand and animal production and reproduction in the other one (Brunet, 2002). The development of animal production is becoming a priority but there are many problems, being animal feeding one of the most important. The study conducted in the wilaya of Constantine, has allowed the investigation of the influence of nutritional level of the diet of breeding ewes. Food samples were analyzed in order to assess the nutritional value through their mineral and chemical compositions.

II – Materials and methods

This work was conducted in the pilot farm of El-Baaraouia, City of El Khroub located 12 km southwest of Constantine. In order to determine intakes of nutrients and mineral elements in this

exploitation, a survey was conducted among shepherds to determine the routes most commonly used. Plant uptake was determined using the equal area blocks along a diagonal (Maach *et al.*, 2000). The identification of forage species is predominated by *Trifolium stellatum* (Clover star) associated with *Sinapis arvensis* (wild mustard) and *Hordeum murinum* (Barley rats).

The dietary supplement is served to the trough-based coarse food (oats vetch hay, wheat straw) and concentrates (barley and bran). Chemical analysis of foods, as recommended by AOAC (1999), is carried out in the laboratories of Animal Science and Soil Science, University of Batna. It focused on the determination of dry matter, organic matter and ash; total proteins by the Kjeldahl method; parietal carbohydrates (NDF, ADF, ADL) by the method of Van Soest; the crude method Weende; the total fat by the method of ether extract or continuous Soxhlet extraction. At environmental health laboratory and animal production, mineral extraction is performed using nitro-perchloric digestion (Kamoun, 2008), for assaying Ca, P, Mg, Na, K, Fe, Mn, Cu, Zn by atomic absorption spectrophotometry flame.

III – Results and discussion

Figures 1, 2, 3 and 4 below represent the dry matter (DM), analytical dry matter analysis (aDM), total ash (TA), organic matter (OM), insoluble ash (IA), nitrogen content (Crude protein), fat (MG), crude fiber (CF), neutral detergent fiber in (NDF), acid detergent fiber (ADF), cellulose, hemicellulose and lignin contained in the food eaten by the sheep (expressed as% DM).

The physico-chemical analysis revealed that the green fodder are the richest in nitrogenous matter and total ash ($p < 0.05$). The concentrate feed is the richest in energy due to its high content of organic matter ($p < 0.01$), in addition, it contains the largest concentration in the cell walls. In contrast, it has the highest rate in crude fiber ($p < 0.01$).

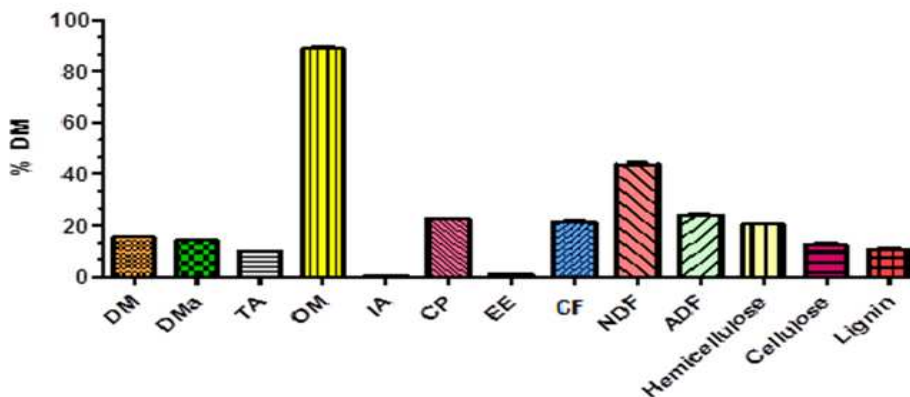


Fig. 1. Chemical composition of green fodder.

Green forage contains a greater value of nitrogenous matter than the results obtained by Arab *et al.* (2009) (12.75 -15% DM) but near the values of Lemnouar-Haddadi (2001) (17% DM). Indeed, the nitrogen sources are particularly important since in addition to pasture, the concentrate should cover the nitrogen requirements during lactation.

For the extraction of crude fiber, green fodder values are comparable to those found by Jarrige (1988) (16-28% of DM). In contrast, this content in the concentrate is lower (2-14% DM), but remained higher in the hay (28.1 to 37.6%) compared to results of Jarrige (1988).

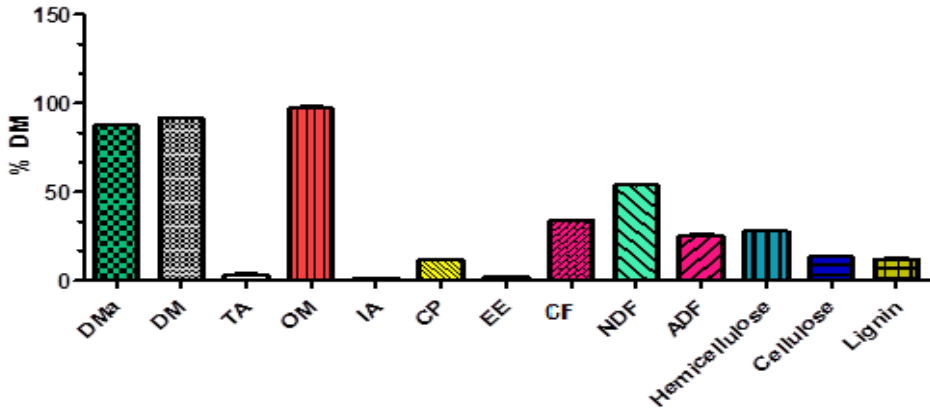


Fig. 2. Chemical composition of oat hay.

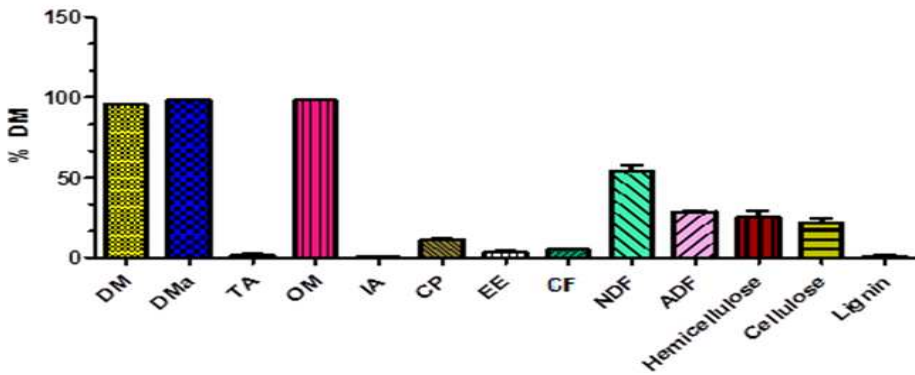


Fig. 3. Chemical composition of concentrate.

Concentrations in cell walls of concentrate are significantly higher compared to those recorded by Dønnem *et al.* (2010) (18.1%), Dias *et al.* (2010) (31.6%) and Rekik *et al.* (2010) (33%). Contrary to our results, the rate of NDF concentrate prepared by Abbeddou *et al.* (2010) is higher (67.2%). According to Arab *et al.* (2009), the proportions of fibers ADF and NDF of forage plants studied are indexes of their nutritional value; NDF give a fairly accurate estimation of the total fiber of foods and a prediction of the amount of DM intake. When NDF increase, the voluntary consumption of DM decreases. For ADF fibers, they are usually inversely related to the digestibility and energetic feed value.

Hay contains largest value in CT due to the presence of the highest rates of Mg (3.92 g/kg DM), Na (5.09 g/kg DM), K (34.14 g/kg DM), Cu (12.25 mg/kg DM) and Mn (35.10 mg/kg DM). Meanwhile, the hay has high levels of Ca (4.57 g/kg DM), P (7.36 g/kg DM) and Fe (157.68 mg/kg DM), while rates in major minerals and minerals for concentrate are lowest. For zinc, green fodder and concentrate respective contents have very close (63.31 ± 1.14 and 63.31 ± 12.94 ppm) as opposed to hay (40.42 ± 4.88 ppm). According to Meziane (2001), leaching of plants by rain and the time of storing food (hay and concentrate) are all factors that influence their low levels of nitrogen content, fat, and total ash.

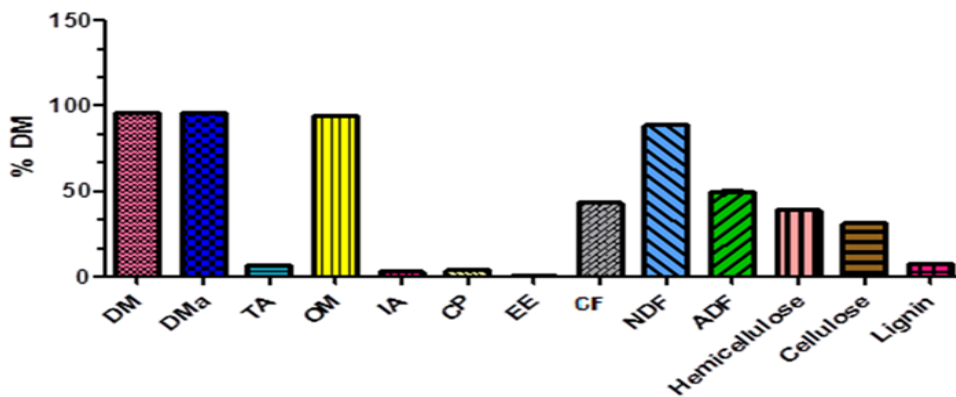


Fig. 4. Chemical composition of wheat straw.

IV – Conclusions

The nutritive values of diets distributed to the sheep are in accordance of standards recommended by literature. Green fodder is the richest in crude protein and ash especially Mg, Na, K, Cu and Zn. The concentrate is richer in energy and that by its high content of organic matter. In contrast, hay despite its timber character, contains the highest levels of Ca and P. It is recommended to correct the ration by digestible dietary fibers and minerals (salt lick).

References

- Abbeddou S., Riwhi S., Iniguez L., Zaklouta M., Hess H.D. and Kreuzer M., 2010. Ruminal degradability, digestibility, energy content, and influence on nitrogen turnover of various Mediterranean by-products in fat-tailed Awassi sheep. In: *Anim. Feed Sci. Technol.*, p. 1-12.
- AOAC (1999). *The Association of Official Analytical Chemists official methods of analysis*. 16 edn, 5e révisión. VA: AOAC International, Gaithersburg MD (USA). p 25.
- Arab H., Haddi M.L. and Mehennaoui S., 2009. Evaluation de la valeur nutritive par la composition chimique des principaux fourrages des zones aride et semi-aride en Algérie. In: *Revue Sciences & Technologie*, C – No. 30, p. 50-58.
- Brunet F., 2002. Rationnement et maladies métaboliques de la vache laitière. Thèse docteur vétérinaire. ENV Lyon, p. 112.
- Dias I.R., Viegas C.A., De Azevedo J.T., Costa E.M., Lourenço P., Rodrigues A. and Cabrita A.S., 2008. Assessment of markers of bone formation under controlled environmental factors and their correlation with serum minerals in adult sheep as a model for orthopedic research. In: *Lab Anim.*, Oct., 42(4), p. 465-72.
- Dønnem I., Randby Å.T. and Eknæs M., 2010. Effects of grass silage harvesting time and level of concentrate supplementation on nutrient digestibility and dairy goat performance. In: *Anim. Feed Sci. Technol.*, p. 3-11.
- Jarrige R., 1995. *Nutrition des ruminants domestiques, ingestion et digestion*. Édition INRA. p. 133.
- Kamoun M., 2008. *Recueil de méthode d'analyses et de mesures utilisées en alimentation animale*. Ecole Nationale de Médecine Vétérinaire de Sidi-Thabet. Centre de Publication Universitaire. p. 103.
- Lemnour-Haddadi N.F.Z., 2001. Étude comparative de deux pâturages (Jachère et *Médicago*), effet sur le gain de poids et le métabolisme chez les ovins. Thèse de magister. Université de Constantine, p. 156.
- Maach L., Chadli M., Alali S., Zouagui Z. and Sysavane F.M., 2000. Essai de prévention de l'ataxie enzootique de l'agneau au Maroc. In: *Revue, Méd. Vét.*, 151, p. 421-428.
- MADR (Ministère de L'Agriculture et du Développement Rural), 2003. *Rapport National sur les Ressources Génétiques Animales: Algérie*. AMDR, Commission nationale AnGR. p. 45.
- Meziane T., 2001. Contribution à l'étude de la salinité de l'eau de boisson et d'un régime à base de paille

chez la brebis de la race Ouled Djellal dans les hauts plateaux Sétifiens. Thèse de Doctorat, Constantine, p 143.

Rekik M., Ben Salem H., Lassoued N., Chalouati H. and Ben Salem I., 2010. Supplementation of Barbarine ewes with spineless cactus (*Opuntia ficus indica* f. *inermis*) cladodes during late gestation-early suckling: Effects on mammary secretions, blood metabolites, lamb growth and postpartum ovarian activity. In: *Small Ruminant Research*, vol. 90, issue 1-3 May, 2010, p. 53-58.