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

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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


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 Khourob 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.](image)

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).
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 miners 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.
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


