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Weaning weight and compensatory growth in lambs from Ouled *Djellal* breed (Algeria)

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Abstract. As a leading supplier of red meat in Algeria, sheep are the only animals of high economic value to be able take advantage of pasture areas, especially in the steppe. Despite the existence of other breeds, sheep farming is dominated by the *Ouled Djellal* breed, which is well adapted to the conditions of the environment. Nevertheless, the low productivity contributes to an insufficient production of red meat and little scientific work is devoted to it. In a previous work, we showed that, in this breed, birth weight influences preweaning growth. In the present study, we propose to measure the influence of weight at weaning on growth and check the ability of this breed to catch up with growth (compensating growth). For this purpose, thirty *Ouled Djellal* lambs, born in autumn and weaned at four months of age, were divided into two lots of fifteen according to their weight. The average daily gain of the "skinny" lot was 158 ± 14 g and 139 ± 8 g for the two periods ranging from 120 to 150 and 120 to 210 days of age respectively. That of the "Normal" lot was 130 ± 13 g and 98 ± 9 g for the two periods ranging from 120 to 150 and 120 to 210 days of age respectively. The growth rate is statistically different (p = 0.002) between the two groups for the period 120-210 days of age. All the lambs were fattened for three months under almost similar conditions, especially feeding. At the end of the post-weaning growth period at the seventh month of age, the lambs weighed 29.1 ± 5.1 kg for the light group and 36.4 ± 4.1kg for the heavy group (p = 0.109). This would confirm the ability of this breed to adapt to rearing conditions by, for example, an appreciable compensatory growth. This will constitute an additional parameter of adaptation of this breed to the conditions, often unfavorable for breeding. Further studies are needed to confirm and quantify this compensatory growth.

Keywords. Lambs – *Ouled Djellal* – Post weaning – Compensatory growth – Fattening.

Poids au sevrage et croissance compensatrice chez les agneaux de la race Ouled Djellal (Algérie)

Résumé. *Premier fournisseur en Algérie de viande rouge, le mouton est le seul animal de haute valeur économique à pouvoir tirer profit des espaces de pâturage notamment la steppe. Malgré l'existence d'autres races, l'élevage ovin est dominé par la race Ouled Djellal bien adaptée aux conditions du milieu. Néanmoins, la faible productivité concourt à une insuffisance de la production de viandes rouges et peu de travaux scientifiques lui sont consacrés. Dans un précèdent travail, nous avons montré, chez cette race, que le poids à la naissance influence la croissance pré-sevrage. Dans la présente étude, nous nous proposons, cette fois ci, de mesurer l'influence du poids au sevrage sur la croissance et vérifier l'aptitude de cette race à rattraper sa croissance (croissance compensatrice). Pour ce faire, trente agneaux de race Ouled Djellal, nés en automne et sevrés à quatre mois d'âge, ont été répartis en deux lots de quinze selon le poids. Le lot 1 « Chétif » est constitué d'agneaux relativement Chétifs, alors que le lot 2 « Normal » est constitué des agneaux plus lourds. Le gain moyen quotidien du lot « Chétif » a été de 158 ± 14 g et 139 ± 8 g pour les deux périodes allant de 120 à 150 et de 120 à 210 jours d'âge respectivement. Celui du lot « Normal» a été de 130 ± 13 g et 98 ± 9 g pour les deux périodes allant de 120 à 150 et de 120 à 210 jours d'âge respectivement. La croissance est statistiquement différente (p=0,002) dans les deux groupes pour la période de 120 à 210 jours d'âge. La totalité des agneaux ont été engraissés durant trois mois dans des conditions d'élevage quasiment similaires, l'alimentation notamment. A la fin de la période de croissance post-sevrage, soit l'âge de sept mois, les agneaux des deux lots ont enregistré des poids statistiquement identiques (p = 0.109) soit 29,1 ± 5,1 kg le lot dit « Chétif » et 36,4 ± 4,1kg pour le lot «Normal». Ceci confirmerait l'aptitude de cette race à s'adapter aux conditions d'éle-*

vage par, notamment, une croissance compensatrice appréciable. Ce qui constituera un paramètre supplémentaire d'adaptation de cette race aux conditions, souvent défavorables d'élevage. Des études complémentaires sont nécessaires pour confirmer et quantifier cette croissance compensatrice.

Mots-clés. *Agneaux – Ouled Djellal – Post sevrage – Croissance compensatrice – Engraissement.*

I – Introduction

In Algeria, sheep farming is very old (Jores d'Arce, 1947; Chellig, 1992). Sheep are distributed throughout the country, with the *Ouled Djellal* breed dominating in the steppe and semi-arid high cereal plains (Khelifi, 1999), as well as in the Sahara, exploiting the resources of oases and desert routes (Kerboua *et al*., 2003). The Ouled Djellal breed thus occupies a preponderant place at the national and even the Maghrebine scales because of these proven qualities; nevertheless, many of its characteristics remain unknown.

Currently, sheep are the largest supplier of red meat in Algeria, and therefore fattening of lambs remains one the relevant animal speculations. Thus, further studies on the exploited breeds are needed in order to improve zootechnical performance and specify some levers of success. The possible exploitation of compensatory growth in this breed is one of these levers, since these animals are subject to more or less severe nutritional restrictions during their breeding period. Feeding remains the most effective way to improve zootechnical performance. Unfortunately, sheep farming in the arid and semi-arid regions of Algeria is facing large fluctuations in pastoral supply. The feeding system of ruminants in these areas is characterized by insufficient forage supply both qualitatively and quantitatively. Even worse, this situation is likely to increase with climate change. In such a difficult environment, imposing an extensive breeding system, it is very difficult to predict the quantity and quality of the dry matter intake from rangelands.

The extensive nature of a livestock system is often linked to the land factor and associated with low production per hectare compared to intensive situations. The economic viability of extensive systems is based on a substantial reduction in consumption by feeding adapted to environmental constraints thus favoring grazing (Beranger 1992). Despite the extensive nature of this livestock system, the national sheep herd continues to grow to around 28 million head in 2017 (FAOSTAT, 2018).

Knowing that the feeding season affects the growth of lambs (Dimsoski *et al*., 1994), domestic ruminants are fed by spontaneous annual vegetation of natural pastures, fallows and agricultural residues, mainly Straw. Different types of dry hay from natural or cultivated grasslands are marketed. It is obvious that any program for improving the performance of a population or an animal breed necessarily requires a phenotypic characterization.

Given its dominance in Algerian sheep flocks, the *Ouled Djellal* breed deserves special attention. Thus, this study was undertaken to provide additional information for a better knowledge of the *Ouled Djellal* breed and the Algerian sheep farm. Its purpose is therefore to verify the impact of weaning weight on the growth of *Ouled Djellal* lambs breed in real production conditions, and therefore to know the ability of the breed to catch up with its growth.

II – Materials and methods

This research was carried out in a pilot farm, in the semi-arid region of Bordj Bou Arreridj (BBA) in eastern Algeria. The region is famous for the production of cereals and sheep farming.

The lambs graze about 8 hours a day, evenly distributed between morning and afternoon, with a modest complement of barley grain and straw cereals in sheepfold. They drink twice a day at the time of their release to the pasture.

Thirty lambs from *Ouled Djellal* breed, born in autumn, were chosen for experimentation. The lambs were raised in the flock. The weight change of the lambs was monitored for three months. Two groups of lambs are made up: the first group of lambs known as “Skinny” with weaning weight less than 25 kg (<25 kg) and the second group called “Normal” with live weight greater than or equal to 25 kg (≥ 25 kg). Lambs were weighed before access to feed in the morning at 120, 150, 180, and 210 days of age using a 100 kg scale (accuracy of 0.5 kg). Average daily gain (ADG) was determined for the following periods: 120-150, 150-180, and 180-210 days of age.

Descriptive statistics and comparison of average daily gain results of lambs between 120-150 and 120-210 days of age were analyzed using the Student t-test by XLSTAT software (version 2016) for ADG analysis of both groups. All means were calculated with their standard errors (mean ± SE).The risk of error is considered at P <0.05.

III – Results and discussion

1. Weight at weaning and at seven months old

The average live weight of Ouled Djellal lambs at seven months of age was 32.74 ± 1.07 kg, similar to the weights reported by Boussena (2013) for the same breed, and by Mahouachi *et al. (*2000) for the Thin tail breed lambs of the West, fed comparable diet. However, they were lower than those observed with Sardi breed lambs (Jorfi *et al.,* 2013) and much lower than those obtained by Prache *et al.* (1986) with Ile-de-France breed lambs, grass-fed supplemented with concentrates *ad libitum*. Again, they were superior to those displayed by D’Man breed lambs in traditional breeding (Boujenane and Kerfel, 1992; Boujenane, 1999). Overall, for the entire trial period (Day 120 – Day 210), the lambs from “Skinny” and “Normal” groups gained 12.47 ± 0.37 and 8.79 ± 0.56 kg liveweight respectively (Table 1).

Table 1. Live weight (kg) evolution of *Ouled Djellal* breed lambs according typical ages

Typical age	«Skinny» Lambs*	«Normal» Lambs*	All lambs*
120 – 150 Day	17.10±1.17	27.10±0.43	22.10±1.11
150 – 180 Day	21.86±1.32	31.02±0.72	26.44±1.13
180 – 210 Day	25.50±1.25	34.54±1.18	30.02±1.27
120 – 210 Day	29.57±1.54	35.90±0.99	32.74±1.07

*: Mean ± standard error.

Naturally, all lambs end up with a higher weight. However, difference in weight in favor of lambs born “Normal” is to report (35.90 ± 0.99 *Versus* 29.57 ± 1.54 kg).

2. Average daily gain and effect of weaning weight on lambs absolute growth

The weight gain evolution according to the typical ages is variable for the thirty lambs. Nevertheless, a difference is observed in favor of “Skinny” lambs. In fact, the “Skinny” lambs recorded a higher ADG (139 g/day) than “Normal” lambs (98 g / day) with an average difference of 41 g/day (Table 2).

This variation can be explained beforehand by the fact that lambs weaned with light weights tend to ingest more dry matter, obviously accompanied by a better digestion yield. In any case, it is shown that compensating cattle had a heavier digestive tract (Wright and Russel, 1991). It should be noted that in such a difficult environment, imposing both a similar feeding system, it is very difficult to predict the quantities and the quality of dry matter ingested at the levels of the rangelands. This constraint can be explained by many factors related to both the surfaces, the animals, the pe-

riod and the management of grazing (Roguet *et al.,* 1998). Nevertheless, these growth rates are much lower than those reported by Kerfal *et al.* (2005) for D'Man lambs breed in Morocco; averaging 189 g/day from 90 to 135 days old. They are also inferior those obtained by Aboud et *al*. (2016) with Ouled Djellal breed.

Growths between 120 and 210 days are an indication of the growth potential: the lambs are weaned at 120 days of age and the mother milk production factor is no longer involved. Obviously, our initial objective is not the determination of the maximum potentials, but that of the potentials in real breeding environment, comparable to that of a traditional breeding in a difficult environment; semi-arid in particular. Overall, the growth of lambs can seem modest compared to the values obtained with improved breeds, this is due to the unavailability of concentrates and the nature of the breeding practices.

Regardless of the performance control period (J120-J150, J150-J180 or J180-J210), growth levels are characterized by large individual variations in both groups (P <0.001) and are more pronounced among "Skinny" lambs. Our results indicate that low weaning weight has a highly significant effect (p <0.001) on lambs weight (Table 2). In other words, we will note an important manifestation of compensatory growth in lightest animals at weaning.

Table 2. Average daily gain (g/d) evolution of *Ouled Djellal* breed lambs

Periods	«Skinny» Lambs*	«Normal» Lambs*	P Value
120-150 Day	158±14	130±13	0.172
150-180 Day	121±14	117±25	0.900
180-210 Day	136±17	45±25	0.007
120-210 Day	139±08	98±09	0.002

*: Mean ± standard error.

Our present result is similar to that reported by Prache *et al.* (1986). The latter authors, state that weaning followed by finishing in sheepfold results in an increase growth speed which is more important when the animals has had a low growth rate under the mother. By stating that average increase growth after weaning was 134 g/day and 65 g/day respectively for groups of lambs with slow and fast growth rates under the mother. In addition, Allden (1968) showed that sheep undergoing dietary restrictions during the first six months of life were catching up in much more time than those restricted during their second half-year of growth. The first advantage of compensatory growth is the animals adaptation to difficult conditions, thus producing lean carcasses. In this sense, it is sometimes reported in cattle that animals with compensatory growth were leaner than continuously growing animals (Mc Manus *et al*., 1972). In this same context, it is found that moderately trained animals deposit more subcutaneous fat (Wright and Russel, 1991).

IV – Conclusion

It appears that the *Ouled Djellal* lambs are adapting well to difficult breeding conditions, particularly under feeding. Therefore, they are able to compensate their delayed growth caused during the period before weaning. However, a thorough study with larger number of lambs is needed to confirm these results.

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