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## **Growth Performance of Ouled Djellal Male Lambs at Semi-Arid Region of Setif/Algeria**

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**Abstract:** Herd sheep is the leading supplier of red meat in Algeria, which places fattening lambs the animal speculation of choice. Despite the extent of this practice and its importance in the national economy, few studies have been devoted to characterizing it. Precisely, the aim of the present work is to study the growth performance Ouled Djellal lambs male in the fattening phase at semi-arid region of Serif. A set of 43 weaned lambs aged 7 months and over are monitored and weighed regularly every ten days for two months. The animals are fed with a commercial concentrate, wheat straw and water *ad-libitum*. The results obtained on the male lambs growth remain acceptable. Thus, the initial average live weight is  $33\pm 1.48$  kg and the final average live weight is  $43\pm 1.44$  kg, which gives us an average daily gain (ADG) of  $165\pm 45$  g/d. This reveals the growth potential of Ouled Djellal lambs and its preferred choice by breeders-fatteners. While remembering that the majority of lambs were grass-fed before fattening period. There is therefore poor exploitation growth potential of these lambs, food deficits and poor management breeding are probably the cause.

**Keywords:** Male lambs, Ouled Djellal, Growth, Fattening, Meat

### **Introduction**

A polygastric herbivore ruminant, sheep is not a direct competitor to man. Formerly domesticated by humans, it is among the most efficient livestock species. It enhances grass it grazes on, even when it concerns plants rich in parietal carbohydrates; it transforms poor quality fodder into high biological value proteins. Sheep meat comes from a wide farming systems variety using extensive outdoor or intensive indoor rearing methods with different ages at slaughter animals. There are strong country-specific preferences meat quality sheep, linked to production system characteristics such as pasture-based systems (Prache et al., 2022).

Algeria occupies a strategic geographic position in Africa. The heterogeneity of its bioclimatic levels gives it a natural capital of animal biodiversity and plant genetic resources. Sheep farming is practiced almost throughout the national territory. However, its concentration is greater in North Country, and even with a greater concentration in steppe and semi-arid cereal-producing high plains. It represents 25 to 30% in animal production and 10 to 15% in agricultural production and provides more than 50% red meat production national (MADR, 2020). Ouled Djellal breed is the first and main sheep breed in Algeria in number and distribution terms. It is characterized by its hardiness and its most extreme environmental conditions tolerance (Chellig, 1992).

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One objectives observatory sheep is, through long-term monitoring, to highlight income factors main and their evolution. These factors can be external (economic conditions, support linked to agricultural policies) or internal, linked to routes and technical performances. These vary greatly and have a strong impact on technical and economic results (Benoit & Laignel, 2006). Considerations for improvement must focus on herd rational exploitation in addition to increasing numbers, as well as an evaluation of performance and their genetic improvement.

Supplying animal proteins local market with a population that continues to evolve requires need to increase livestock systems productivity and diversification their products. This requirement to supply sufficient quantities from meat local production, milk and eggs is the justification intensive systems development, the only ones capable guaranteeing productivity gains desired (Chniter, 2013). However, for them to be profitable, sheep must be well managed. This requires application of certain well-reasoned management practices to ensure herd overall well-being (Boujenane, 2005).

Little research work is devoted studying growth Ouled Djellal breed lambs performance finished at the trough. In this regard, we have started this study whose main objective is to characterize lambs growth performance at fattening phase (live weight and ADG) of lambs kept extensively. Moreover, this contribute to resolve an economic problem, which is animal productivity improvement. In other words; know where to intervene? To improve said trough finishing phase growth performance.

## **Method**

### **Animals and Experimental Conditions**

Our study focused on 43 males aged 7 months and over, sold after fattening. All animals belonging to Ouled Djellal breed, given that it is the dominant breed in numbers terms not only on a national scale, but also in the east country, which constitutes breed cradle (Figure 01). The lambs tracked were identified by an ear tag bearing a number for each lamb tracked.



Figure 1. Lambs fattening in a sheepfold.

Figure 1. Lambs fattening in sheepfold

### **Method Breeding**

With same origin, all lambs have in common particularity of having been raised generally in the same way: extensive breeding since lambs were raised only on range from their second month of age and without their mothers separation (that is to say without weaning), they then underwent a fattening period of approximately 2 months before their sale.

## The Breeding Method

The fattening diet consists concentrate commercial and wheat straw, introduced gradually at fattening start, then distributed at will until removal day. Antiparasitic treatment was started. Like all domestic herbivores, lambs need receive a transitional ration before switching new diet to preserve rumen health. The adaptation period allows the microbial flora to new diets adapt. Water was available ad libitum.

## Collection of Data

The measurements were carried out for all lambs retained at pilot farm MAKHLOUFI Aïssa ; located in El Eulma (Sétif) during two months.

## Farm Level Measures

The characteristics and measurements retained for animal assessment:

### Live Weight (PV)

Lambs were weighed individually and regularly every 10 days, until end fattening period (Figure (08) i.e.: two months. Arithmetically, fattening phase is divided into six typical periods (Period 01, 02, 03, 04, 05 and 06). Lambs are weighed using an electronic scale ( $\pm 10g$ ). The seven weighings were carried out before ration distribution. The average daily gains for each lamb (ADG) were calculated between two successive standardized weighings and according following formula:

$$ADG = \text{Initial live weight} - \text{Final live weight} / 10$$

### Quantities of Feed Distributed

Several samples feed distributed (wheat straw and barley) were taken at each visit. And this, to characterize and quantify them with precision. The adaptation period new diet was respected. For this, the new fattening ration was introduced gradually at fattening period start, in order to avoid any possible metabolic deviation. The feed quantities distributed to animals monitored are given in table (01) below:

Table 1. Quantity and feed distributed to animals during the fattening phase

Feeds	Périodes	Period (01)	Period (02)	Period (03)	Period (04)	Period (05)	Period (06)
Pasture (h)		00	00	00	00	00	00
wheat straw (Kg)		03.00	03.00	02.50	01.50	01.50	01.50
Commerce concentrate (Kg)		00.30	00.50	00.750	01.00	01.00	01.00
Water		<i>Ad-libitum</i>	<i>Ad-libitum</i>	<i>Ad-libitum</i>	<i>Ad-libitum</i>	<i>Ad-libitum</i>	<i>Ad-libitum</i>

Centesimal composition of commercial concentrate manufactured by the National cattle Feed Office (ONAB) is recorded in following Table (02):

Table 2. Percentage composition of ONAB commercial concentrate distributed to lambs in the fattening phase

	Corn	Wheat bran	Limestone	CMV	Salt	Non-conventional phosphate
Content (%)	50.00	46.08	02.10	01.00	00.50	00.32

## Statistical Processing

The raw data obtained from carried out weighings are entered into a workbook Excel. They are then subjected to a descriptive statistical analysis (means, standard deviations, standard errors, etc.) using the XLSTAT software

version 2017. In addition, an analysis of variance is carried out to check the effect of the lambs live weight at the start of fattening on the live weight at the fattening phase end.

## Results and Discussion

### Evolution of Live Weights

The overall averages obtained for male lambs live weight gains in our study are represented in table (03) below:

Table 3. Overall average live weight during the different fattening periods

	BW(01)	BW (02)	BW (03)	BW (04)	BW (05)	BW (06)	BW (07)
BW mean (kg)	33	35	37	39	41	42	43
Standard Deviation	08	09	09	09	09	10	10
standard Error	1.21	1.29	1.33	1.32	1.37	1.40	1.44
BW Gain (kg)	01.48	02.11	02.65	01.44	01.26	01.26	00.93

Typical periods of the fattening phase							
	P1	P2	P3	P4	P5	P6	P. Globale
BW Gain (kg)	1.48	2.11	2.65	1.44	1.26	0.93	9.88

BW : Body weight

The overall averages live weight gain obtained in our study are different from one period to another. It displays a maximum ( $02.65 \pm 01.33$  kg) in period (03) and a minimum ( $00.90 \pm 01.44$  kg) in period (07) during the fattening period. This difference can be explained by compensatory power of breed following a sufficient feed supply. This observation is already reported by Djellal et al. (2021) for male lambs of the Ouled Djellal breed growing post-weaning and managed extensively at Bordj-Bou-Argeridj region. Contrary to our results, Adaouri (2019) records a better live weight gain of crossbred Ouled Djellal breed lambs (Ouled Djellal  $\times$  D'man), and D'man breed with respective weights of 49.92; 49.13 and 47.95 Kg at the end fattening trial. This can be explained a priori by diet. Indeed, the scientific literature reports that the ration composition is even more influential since some authors (Droguau et al., 2004) managed to measure the differences in body composition generated in lambs by using different nature of cereals in fattening diet. In other words: wheat promotes fixation a higher proportion of fatty tissue than barley which itself gives fatter carcasses than corn. These results confirm that fattening method and diets are behind the variations in fattening state of lambs since they constitute the most influential factors on the composition and quality of both carcass and meat in sheep. Concretely Adaouri (2019) confirms this, expressed in g of DM/kg Metabolic weight, The quantities of average dry matter voluntarily ingested during the entire test period stand at  $89.55 \pm 8.57$  g of DM/kg P0.75;  $80.05 \pm 9.12$  g of DM/kg P0.75 and  $62.01 \pm 11.18$  g of DM/kg P0.75 respectively for crossbred lot lambs, the Ouled Djellal lot and the D'man lot. This quantity ingested is statistically different between three genotypes ( $p < 0.001$ ). The overall weight gain trend line is bearish as shown in Figure (02) below:

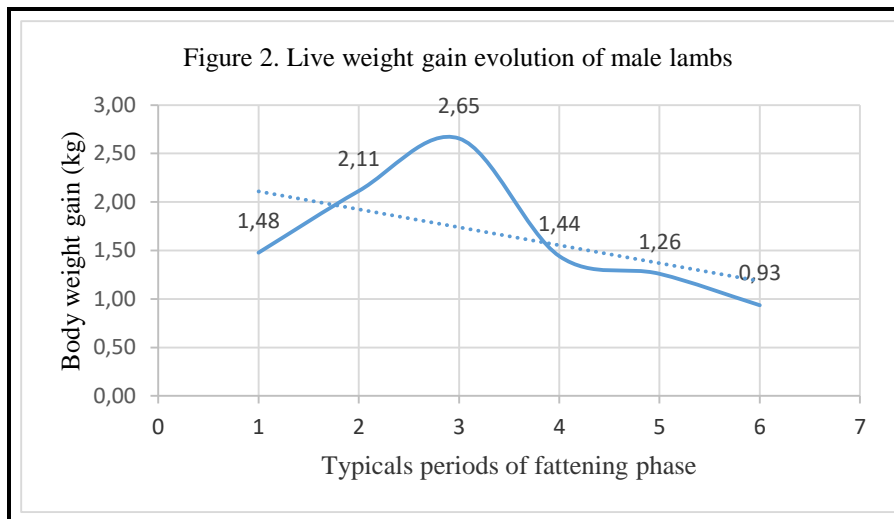


Figure 2. Live weight gain evolution of male lambs

It shows accelerated growth at start of following fattening phase followed by another growth decline (1.48, 2.11 2.65, 1.44, 1.26 and 0.93 kg). This downward trend in live weight gain is widely known in ruminants. After compensatory growth and with animals advancing age we observe consumption index increase. This has a negative impact on sheep live weight gain and growth rate.

### Lamb Growth

The overall male lamb average daily gains (ADG) during different periods of fattening phase are recorded in table (04) below:

Table 4. Overall averages of average daily gains of male lambs during the different typical periods of fattening

Statistical parameters	Typical periods of the fattening phase						
	P1	P2	P3	P4	P5	P6	P. Globale
Average daily gain (g)	148	211	266	144	126	94	165
Standard Deviation	134	179	106	74	65	52	45
Standard error	20	26	15	11	9	8	7

It should be remembered that from birth to 110 age days, lambs had a weight that was higher the heavier they were at birth. During the milky phase, the average daily gain (ADG) is positively linked to birth weight, despite greater relative growth at the same lambs age (Djellal et al., 2016). After weaning and during the fattening phase, the estimated consumption at same age or the same weight is birth weight independent. The same is true for feed efficiency calculated overall fattening period (Ziani, 2016).

In our study, the highest average daily gains (ADG) are recorded during P3 and P2 and lowest at the end fattening phase; i.e. period P6. The growth speed increase at start of our study can also be explained by the diet adopted. Several studies show existence a positive relationship between diet protein level and carcass muscle tissue development (Lebret and Mourot, 1998). And also, between energy level and fat deposition (Atti et al., 2003). However, research intended to quantify protein level effect of diet on quality and carcass composition still remains limited. Concretely, fattening lambs with barley is a very widespread practice in sheep farming. Many studies have shown effect of diets based on cereals, such as barley, on the rapid growth of sheep and cattle (McDonald et al., 1996).

With an overall ADG equal to 165±45, the sheep weight evolution monitored is considered acceptable. Our results are higher than ADG (110-200 g/d) observed by technical institute of cattle and sheep breeding ITEBO (1995) in Ouled-djellal lambsbreed which reached a live weight varying between 38-40 Kg. Still significantly higher than that provided by Arbouche et al. (2014), reporting one of the most reliable ADG recorded in Ouled Djellal breed lambs in fattening phase (84 g/d), i.e. at 90 days of age.

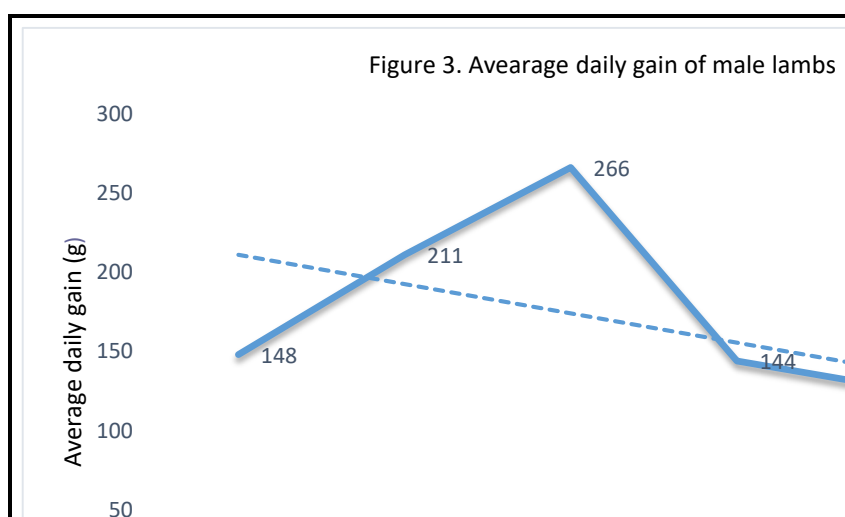


Figure3. Aaverage daily gain of male lambs

However, daily growth rate of our animals is lower than those reported by Ziani (2016) in Hamra breed lambs fed with two different diets (EC vs CC) and which is on average 230.26±15.49 and 213.16± 17.69g/d;

respectively without any significant difference, with feed efficiency (6.09 vs 5.63). These weight and growth performances demonstrate the satisfactory growth potential of Ouled Djellal lambs. This value is significantly lower than those obtained with Hmra breed lambs (199 g to 227 g per day) by Boujenane (2005) ; El-Fadili, (2009) and El-Fadili and Lakhssassi, (2010), and other values obtained in sheep breeds Moroccan by Chikhi and Boujenane (2005) ; El-Fadili (2009) (Sardi: 282 g/d; Boujaâd: 278 g/d and Beni Guil (195 g per day). While Ibelbachyr et al. (2014) report a lower value (127 g/d) in D'Man breed at Tafilalet oases and averages recorded by Saïdi et al. (2011) in Tunisia Queue Fine de l'Ouest breed lambs (QFO: 101 g/d) and QFO x D' crossbred sheep Man (152 g per day). Finally, Atti and Mahouachi (2011) report that fat-tailed Barbarine (FTB) lambs generally achieve moderate growth with an average daily gain between 100 and 350 g.

One causes could explain this weight gain fluctuation is the increase in body weight and the age of the lamb. This tends to increase nutritional requirements in relation to the increase in lamb weight; maintenance needs in particular. Indeed, diet may be one of the determining causes of this downward trend.

### Effect of Live Weight at Entry into Fattening on Lambs Absolute Growth

The live weight at fattening phase start does not significantly affect ( $P= 0.9$ ) the live weight lambs at the fattening phase end (table 5).

Table 5. Effect of initial live weight at entry into fattening at fattening performance

Live weight at the beginning of fattening (kg)	live weight at the end of fattening (kg)	<i>P</i> value ( <i>P</i> )
33±1.21*	43±1*	0.9

\*: mean ± standard Error

This Result Is Contrary To the growth results displayed by Ouled djellal lambs in the post-weaning period. This result is contrary to growth results displayed by ouled djellal lambs in post-weaning period. According to Djellal *et al.* (2021), whatever considered period (between 120-150 d, 150-180 d, 180-210 d and 120-210 d), the growth levels are characterized by significant individual variations, overall they are more pronounced in skinny animals. It is also reported that lambs sex and ewes parity do not influence growth performance from birth to weaning (Baa *et al.*, 2020). Other studies have shown that food consumption does not increase after food restriction period (Kabbali et al 1992, Turgeon et al 1986). In any case, it has been shown that cattle having compensated had a heavier digestive tract (Wright and Russell 1991), while Kamalzadehab et al. (1998) report that only the weight of the small intestine was higher in cattle compensatory animals. This is also indicated by Pérez-Clariget (1998), stating that at the end of the experiment, the weight of small intestine was higher in the group of sheep that underwent food quality restriction.

### Conclusion

The results obtained on male lambs Ouled Djellal breed growth remain appreciable. Thus, the average weights are 43±10 at end of fattening. Male lambs showed an average daily gain of 165±45 g/d. The live weight at fattening phase start does not significantly affect ( $P= 0.9$ ) the live weight lambs at the fattening phase end This shows the acceptable growth potential Ouled Djellal breed lambs and its preferred choice by breeders-fatteners. However, there is poor exploitation growth potential of these animals, feed deficits and poor breeding management are probably the cause, especially when we know that majority lambs were grass-fed before the fattening period. And often, this phase still fails to fill this deficit. Consequently, these results make it possible to consider the exploitation and optimization performance of this breed in breeding systems oriented towards meat production in the Algerian context.

### Recommendations

The particular interest that we must have in technical aspects of sheep breeding must not make us forget the importance of economic aspects, since the final objective remains the best possible valorization the product, whether meat, wool or milk. At the end of this research applied to Ouled Djellal breed in the semi-arid context of Sétif, it appears that breeding activities of this breed observed and experienced suggest significant margins of progress by applying action plans appropriate technique in relation with breeders who adopt this breed thanks to

better optimization of its production potential on the one hand and technical support services closer to these breeders on the other hand..

## Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPHELS journal belongs to the authors.

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