ECONOMIC AND ANALYSIS OF THE SHEEP MEAT VALUE CHAIN IN ALGERIA

Hafidh **ZEMOUR** [*]
Ilyes **HADBAOUI** [***]
Malika **ZOUBEIDI**[**]
Abdelkader **BERRANI**[**]
Azzedine **MOUHOUS**[****]
Fathi Abdellatif **BELHOUADJEB**[*****]
Abdelkader **AMMAM**[******]
Mohamed **SADOUD**[*******]

Received: 30/04/2023 Accepted: 19/09/2024 Published:10/11/2024
Corresponding authors: zemourhafidh@gmail.com

ABSTRACT

The main objective of this study is to comprehensively examine and analyze the various stages and components of the sheep meat value chain in Algeria. Specifically, this research aims to investigate the production, processing, distribution, and marketing aspects of sheep meat in a highly productive region within the Wilaya of Tiaret, located in northwest Algeria.

[*] ISTA, University of Larbi Ben M'hidi, Oum El Bouaghi,Algeria zemourhafidh@gmail.com
[***] Scientific and Technical Research Center on Arid Regions (CRSTRA) Biskra, Algeria, hadbaouiilyes@yahoo.fr
[**] Faculty of Natural and Life Sciences, Ibn Khaldoun University, BP 14000, Tiaret, Algeria, zemourhafidh@gmail.com, zoubeidimalika@yahoo.fr, kadibiovet@gmail.com

[****] Faculté des Sciences Biologiques et Sciences Agronomiques, Université Mouloud Mammeri de Tizi-Ouzou, Algeria, mouhousazeddine@yahoo.fr
[*****] Centre de Recherche en Agropastoralisme (CRAPAST), Djelfa 17000, Algeria, belhouadjebfathi@gmail.com
[******] Laboratory of Pharmacognosy, Bio toxicology, and Biological Valorization of Plants, Moulay Tahar University, BP 20000, Saida, Algeria, vetokadi@yahoo.fr
[*******] Hassiba Benbouali University of Chlef, Algeria, m_sadoud@yahoo.fr

A survey was conducted between 2019 and 2021, involving 57 breeders, 22 sheep dealers, 31 butchers, 2 slaughterhouse managers, and 510 consumers. The study identified two distinct marketing circuits for sheep meat in the region: one operating year-round and the other during the religious celebration of Aid El Adha. However, it was observed that the weak organization among the various actors in the value chain led to price fluctuations throughout the year.

The study also revealed that sheep dealers had a lower net commercial margin than butchers, with an average of 5,902 DA per head for the former and a range of 7,200 DA to 8,200 DA for the latter, depending on the carcass category.

The findings presented in this study not only contribute to academic knowledge but also serve as a practical guide for decision-makers, enabling them to implement policies that enhance the organization, efficiency, and sustainability of the sheep meat value chain in the Tiaret region.

KEYWORDS: Commercial margin, Marketing circuit, sheep meat, Tiaret.

JEL Classification: Q12, Q13, P46, R3.

منطقة تيارت التحليل الاقتصادي لسلسلة قيمة لحم الأغنام في الجزائر. حالة

ملخص

الهدف الرئيسي لهذه الدراسة هو فحص وتحليل مكمل لمراحل ومكونات سلسلة قيمة لحم الأغنام. تحديداً، تهدف البحث إلى استقصاء جوانب الإنتاج والتصنيع والتوزيع والتسويق للحم الأغنام في هذه المنطقة في ولاية تيارت – شمال غرب الجزائر، وهي منطقة هامة لإنتاج الأغنام.

تم إجراء استطلاع بين 57 مربيًا و22 تاجرًا للأغنام و31 جزارًا و2 مسالخ و510 مستهلكًا بين عامي 2019 و2021. أظهرت الدراسة وجود دائرتي تسويق متميزتين للحم الأغنام في المنطقة، إحداها تُمارَس على مدار السنة، والأخرى خلال الاحتفال الديني بعيد الأضحى. ومع ذلك، أدت الهيكلة الضعيفة للمختلفين في سلسلة القيمة إلى تقلبات في الأسعار على مدار العام.

كما كشفت الدراسة أيضاً أن لدى تجار الأغنام هامش تجاري صافي أقل من الجزارين، بمتوسط قدره 5,902 دينار للرأس للأوّلين، وتتراوح بين 7,200 دينار إلى 8,200 دينار للثانين، اعتمادًا على فئة الذبيحة. وعلاوة على ذلك، تسهم النتائج المقدمة في هذه الدراسة ليس فقط في المعرفة الأكاديمية ولكن أيضًا كدليل عملي لاتخاذ القرار من قِبل صناع القرار، مما يمكّنهم من تنفيذ سياسات تؤثر إيجابياً على هيكلية وكفاءة واستدامة سلسلة قيمة لحم الأغنام في منطقة تيارت.

كلمات المفتاحية :هامش تجاري، دائرة تسويق، لحم الأغنام، تيارت.

تصنيف جال:.Q12, Q13, P46, R3

ANALYSE ÉCONOMIQUE DE LA CHAÎNE DE VALEUR DE LA VIANDE OVINE EN ALGERIE. CAS DE LA RÉGION DE TIARET

RÉSUMÉ

L'objectif principal de cette étude est d'examiner de manière approfondie et d'analyser les différentes étapes et composantes de la chaine de valeur de la viande ovine. Plus précisément, la recherche vise à étudier les aspects de la production, de la transformation, de la distribution et du marketing de la viande ovine dans cette région,

située dans la wilaya de Tiaret, au nord-ouest de l'Algérie, une zone significative pour la production ovine.

Une enquête a été menée auprès de 57 éleveurs, 22 maquignons, 31 bouchers, 2 abattoirs et 510 consommateurs entre 2019 et 2021. L'étude a identifié deux circuits distincts de commercialisation de la viande ovine dans la région, l'un étant pratiqué tout au long de l'année et l'autre pendant la célébration religieuse de l'Aïd El Adha. Cependant, la faible organisation des différents acteurs de la chaîne de valeur a entraîné des fluctuations de prix tout au long de l'année.

L'étude a également révélé que les maquignons avaient une marge commerciale nette inférieure à celle des bouchers, avec une moyenne de 5 902 DA/tête pour les premiers et de 7 200 DA à 8 200 DA pour les seconds, en fonction de la catégorie de la carcasse. En outre, les conclusions présentées dans cette étude contribuent non seulement aux connaissances académiques mais servent également de guide pratique pour les décideurs, les habilitant à élaborer des politiques ayant un impact positif sur l'organisation, l'efficacité et la durabilité de la filière viande ovine dans la région de Tiaret.

MOT CLÉS : Marge commerciale, Circuit de commercialisation, Viande ovine, Tiaret.

JEL CLASSIFICATION : Q12, Q13, P46, R3.

INTRODUCTION

Sheep breeding plays a pivotal role in Algeria's economy, contributing significantly to the nation's livestock sector and red meat production. The Tiaret region, in particular, stands out for its local breed known as "Rumbi," renowned for its productivity and resilience. This rectangular-shaped breed, with rams weighing up to 80 kg, constitutes around 11% of the national livestock in Algeria (Cerquiera et al., 2011; Moula et al., 2013; Laoun et al., 2015; Djaout et al., 2017).

With 29 million heads of sheep and an annual sheep meat production of approximately 5,291,695 quintals, Algeria's sheep industry is a major player in the Maghreb region. Despite competition

from chicken and beef, sheep meat remains the most consumed in the region. Its economic impact is substantial, contributing over 50% to national red meat production and comprising 10 to 15% of the country's GDP, amounting to approximately 5 million dollars. Furthermore, it represents 35% of overall agricultural production (Moula, 2018; Smaali, 2019; MADR, 2021).

Rangelands, providing 80% of the ration for sheep in pastoral systems, are a critical resource for sheep breeders. However, the sedentarization of the nomadic population has led to flock concentration in specific areas, impacting the dynamics of sheep farming (Benabdeli, 2000; Mouhous, 2007; Bensalem, 2011). The interdependence between sheep breeding and cereal cultivation is evident, with both activities being essential for the livelihood of breeders (Zoubeidi, 2006; Daoudi et al., 2013). The primary objective within Algerian sheep breeding systems is to produce and fatten lambs for the national market, with wool and milk considered secondary products (Yabrir et al., 2015).

Recognizing the value chain as a promising approach for economic development, this study delves into mapping the value chain of sheep meat in the Tiaret region. As one of the potential areas for sheep breeding, understanding the structure of links in the chain and assessing the available information on the marketing circuit are crucial. This type of analysis forms the foundation for any agro-pastoral improvement initiative in the steppe region, addressing both economic and organizational factors to ensure inclusive development (Fetoui et al., 2020).

The concept of the value chain, introduced by Michael Porter in his 1985 book "Competitive Advantage: Creating and Sustaining Superior Performance," entails breaking down the activities in the chain into sequences or series at each link to identify potential sources of competitive advantage (Miller and Jones, 2013). By applying this approach, this study aims to provide a comprehensive analysis of the

sheep meat value chain in Tiaret and to identify key factors that affect production, distribution, and market dynamics.

Overall, this study offers valuable insights for stakeholders in the sheep meat value chain and can inform policymakers aiming to improve the organization and efficiency of the sector. Specifically, it can assist decision-makers by providing detailed analyses of the current challenges and inefficiencies within the value chain, subsequently highlighting areas for improvement. It identifies key factors affecting production, distribution, and market dynamics, which secures the formulation of targeted interventions. By understanding these dynamics, policymakers can develop strategies to enhance productivity, ensure better market access for farmers, optimize resource allocation, and ultimately improve the economic sustainability of the sheep meat sector.

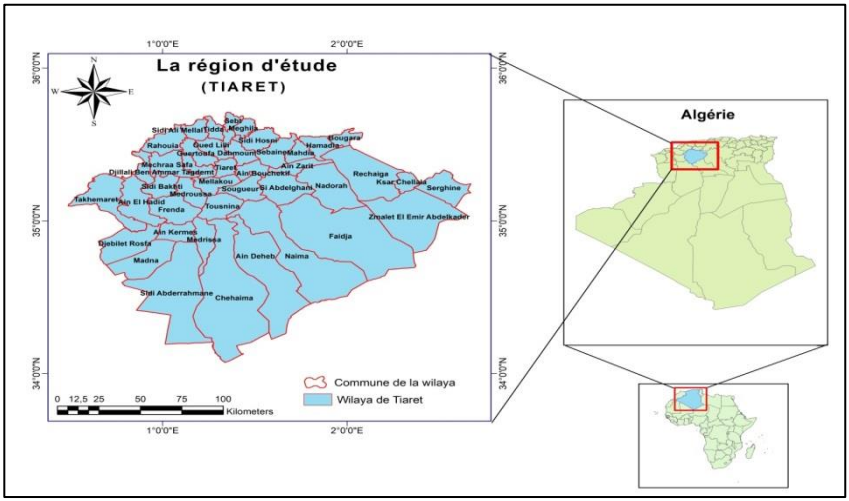
1- MATERIAL AND METHOD

1.1- Presentation of the Study Area

The Tiaret region is located in the northwest of the country, approximately 340 km from the capital, Algiers. It serves as a transitional zone between the North and the South. The wilaya's territorial sector consists mainly of mountainous areas in the North, high plains in the center, and semi-arid spaces in the South. The total area of the Tiaret wilaya is 2,005,005 hectares, characterized by an agro-pastoral nature with an extensive agricultural territory (DSA, 2019).

Figure 1. Geographic Location Map of Tiaret Wilaya

Source:



Source: (Zemour, 2022).

1.2- Sampling

The present study involved interviews with a total of 622 individuals, including 57 breeders, 22 sheep dealers, 31 butchers, 2 slaughterhouse managers, and 510 consumers surveyed between 2019 and 2021. Field information is a crucial aspect of our research for a better understanding of the regional value chain, including the structure of farms, production methods, technical parameters of sheep meat production, and the strategies of value chain actors (breeders, sheep dealers, butchers, and consumers). Importantly, it facilitates a deeper analysis of the value chain from economic and social perspectives through field surveys. The latter aim to collect and synthesize data and provide insights into the organization of livestock farming, along with the challenges faced in production, collection, processing, and distribution of the product. The survey method makes it possible to approach the reality of the organization of the value chain with short lead times (Lhoste, 2001).

1.3- Questionnaire Development

To characterize sheep farming operations, we created tailored questionnaires for each participant: one for breeders, a second for sheep dealers, a third for butchers, one for consumers, and a specific questionnaire for the abattoir survey.

1.4- Commercial Margin: Data treatment and analysis

The data collected from surveys was processed using the Sphinx V5 program, which allowed for the conversion of survey answers into numerical data. The latter was used for various descriptive statistical calculations using the XLSTAT V2016 and Origin V2022 programs. The data was analyzed to determine the cost of production and commercial margins of the actors. This involved the following calculations:

The gross margin was calculated by subtracting the production costs from the selling price of the sheep using Equation 1.
Net sales margin was then calculated by subtracting the marketing costs from the gross sales margin calculated above using Equation 2. These calculations were based on previous studies by Zoubeidi (2006); Belhouadjeb (2010; 2017).

Equation 1: Gross Margin = Selling Price of Sheep - Production Costs
Equation 2: Net Sales Margin = Gross Sales Margin - Marketing Cost

2-RESULTS AND DISCUSSION

2.1- Basic elements of the sheep meat value chain in the Tiaret region

2.1.1. **Breeders**

The information collected was analyzed to examine breeding practices and identify opportunities for improving the quality and

profitability of sheep breeding. The data in Table 1 illustrate the socio-economic characteristics of the sample studied in the Tiaret region.

Table1. Socio-economic characteristic of breeders (%)

Characteristic	**Staff**	
	Number	**Percentage**
Level of education		
Illiterate	20	35.1
Kuttab (Islamic primary school)	21	36.8
Primary	6	10.5
Secondary	7	12.3
Higher	3	5.3
Type of livestock breeding		
Sedentary	49	86
Nomads	6	10.5
Semi –sedentary	2	3.5
Main Activity		
Breeder - Breeder Fattener	12	21.1
Breeder Fattener	8	14
Farmer Breeder	37	64.9
Age		
Less than 54	13	22.8
54 to 58	11	19.3
59 to 64	12	21.1
65 and above	21	36.8
Years of Professional Experience		
Less than 5 years	3	5.3
5 to 9 years	1	1.8
10 to 39 years	19	33.3
40 years and more	34	59.6
Transportation means		
Yes	36	63.2
No	21	36.8
Other Activities in the Sector		
Intermediary	16	37.2
Butcher	1	2.3
Fattener	26	60.50

Source: Own elaboration

According to the mode of management of the rangelands, there are three types of stockbreeders:

2.1.1.1. **Sedentary**

A group of predominantly sedentary herders with over 40 years of experience in breeding resides on their own land and practices a combination of animal breeding and cereal cultivation. They own means of transportation (trucks and vehicles) that facilitate the buying and selling of products in the market. This group of small-scale family farmers contributes significantly to food security, biodiversity, and resource conservation in the local communities (Himeur et al., 2022).

More than half of the sedentary breeders (58%) have a sheep flock of fewer than 200 head. Fourteen percent of the breeders have between 201 and 399 head, 25% have between 400 and 799 head, and only 3% have a sheep flock of more than 800, up to 1,000 head. This type of breeder finds their interest in fattening activities, especially male animals (lambs, kids, and rams).

Table 2. The average food load of the fattening (DA*)

Animal / Food	Lambs	Antenese	Ram
Mixture (bran +barley)	446	982	1 559
Straw	107	189	315
Forage	102	238	355
Water	6	11	16

**1000 Algerian Dinar (DA) ~ 6, 85 Euro (€) ~7, 29 Dollars USD in 2022*

Source: Own elaboration

2.1.1.2. **Transhumant**

This refers to a category of breeders originating from certain Saharan regions, such as Oued Souf in the southeast. They practice transhumance with their entire families and herds, renting fallow or stubble land during the spring or summer periods to feed their

livestock, at a rate of 20 head per hectare and a payment of 15,000 DA/ha. Their average age is 58, and most are illiterate, with seniority in the profession representing an important sociocultural heritage (Himeur et al., 2022). The leased area does not exceed 11 hectares and depends on the size of their livestock. A minority of breeders rent land through their collective farms and is registered with the HCDS (High Commission for the Development of the Steppe) for the rental of reserved land.

Table 3.Average number of livestock (Transhumant) (heads)

Transhumant / Animal	Farmer breeder	Breeder-fattener	Breeder-breeder fattener
Livestock	111	101	118
Ewes	78	75	85
Ram	7	6	8

Source: Own elaboration

2.1.1.3. **Semi-sedentary**

A seasonal breeding practice known as transhumance involves moving flocks from one pasture to another. Semi-sedentary breeders are often forced to move their flocks due to the limited amount of land they own relative to the size of their sheep flocks. They rent access to private pastures or use public lands to move their flocks. In the sample population, two semi-sedentary breeders from Tiaret (3.5% of the total) move their flocks from one municipality to another in search of rangeland grass. These breeders can have up to 600 head of sheep and employ a shepherd to tend to their animals in exchange for a salary of 25,000 DA for every 100 head kept. They also ensure that their herds can access managed rangelands by traveling long distances (Jemaa et al., 2016; Belhouadjeb, 2017).

2.1.2. **Sheep dealers**

The role of sheep dealers in the marketing of sheep meat in the Tiaret region and steppe regions is crucial as they act as intermediaries between breeders and consumers. They have an efficient information network and knowledge of supply, demand, and price levels. They also provide immediate payment to breeders and have significant financial resources. In the Tiaret region, several dozen sheep dealers operate in markets that are responsive to their activities.

In the Steppe regions, sheep dealers are legally required to register in the trade register and are subject to turnover tax; however, not all traders comply with these regulations. The majority of sheep dealers purchase animals from livestock markets and sell them on the spot to avoid additional costs associated with feeding and transportation. They estimate prices through market rounds and observations.

We conducted a survey involving 22 livestock traders who willingly participated in our study. These traders are active at both the Sougueur and Hamadia markets. Specifically, 54% of our sample, totaling 12 traders, operate at the Sougueur market, while the rest conduct their activities at the Hamadia market. Furthermore, additional livestock traders from various regions, including Algiers, Sétif, Djelfa, Tissemsilt, and Ain Defla, are also involved in this practice.

2.1.3. **Butchers**

A survey was conducted with 31 butchers in two slaughterhouses in Frenda and Sougueur to gather data on their activities. The surveyed butchers are primarily aged between 38 and 55, with an average age of 45 years. Most butchers (67%) have been in the business for at least a decade, while the rest learned the trade from their parents during childhood.

Butcher shops are the most common sales point for sheep meat, with many throughout the country. Most purchase meat from sheep dealers based on customer requests, though some buy directly from

breeders. In terms of lamb, 45% of butchers trade an average of 9 to 17 sheep per month, while 26% trade between 18 and 26 sheep.

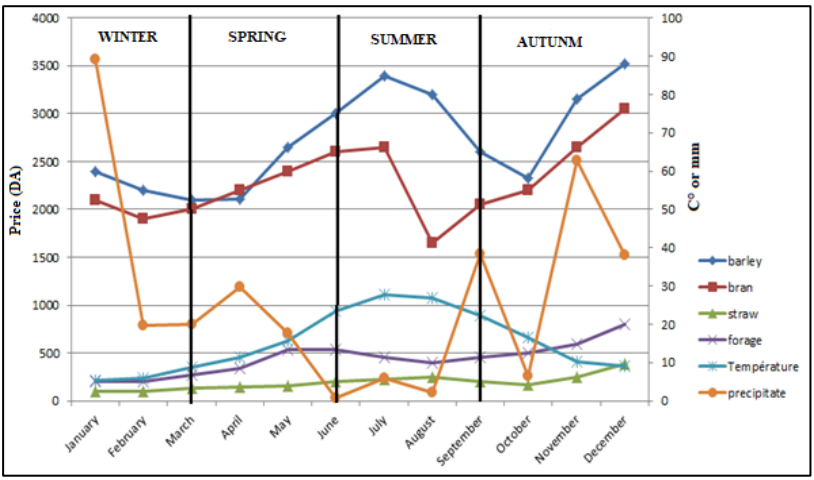
2.1.4. **Consumers**

We aim to delve deeper into consumer behavior by exploring aspects such as meat consumption frequency, perceptions of pricing, and the identification of income groups more inclined to consume meat. The survey findings revealed that 49% of respondents prioritize purchasing meat from their preferred butcher shop, emphasizing the importance of fostering positive relationships with sellers. Regarding sensory preferences, 52% of participants showed a preference for the dark red color of meat, with a majority favoring lamb chops and legs.

2.1.5. Livestock feed

From Figure 2, we found that the weather in 2019 had a significant impact on feed prices, indicating that high rainfall leads to a decrease in feed prices. Therefore, in the winter season, barley prices drop to 2,200 DA/q. On the other hand, in July, prices rise to 3,400 DA/q due to strong demand from fatteners and stockbreeders. Clearly, barley plays a crucial role in the formation of production costs, which significantly impacts the prices of animals and, consequently, the actors involved in sheep meat production. In this context, farmers may diversify their sources of feed to reduce dependence on barley alone. This can include exploring alternative grains, forages, or supplements that are less affected by climate variations. Farmers can also invest in proper storage facilities to stockpile feed during times of abundance, allowing them to have a reserve during periods of scarcity when prices are high.

Figure 2. Relationship of monthly average feed prices with climate during 2019.



Source: Own elaboration

2.2-Marketing of sheep meat

2.2.1. Livestock market

The market is a place of price formation, making it the best area to monitor trade among different operators, including breeders, intermediaries, and retailers. In this context, the Tiaret market is considered nationally important as a transit point for animals between different regions of the country. The study also includes a detailed survey to understand the market dynamics of its various actors.

2.2.1.1. **Breeders**

The survey conducted on breeders revealed that 23.5% of them consider the Sougueur market the most salient market for purchasing animals due to its regional and national reputation and the availability of transportation. The Hamadia market ranked second with 17.1%, followed by the Medrissa market with 11.2%, and other

markets following next. Furthermore, 86% of breeders purchase sheep year-round, while 8.7% prefer to buy during the winter period due to the availability of funds. Additionally, 5.3% prefer to buy in the autumn due to the availability of food, specifically straw and fallow land after the summer cereal harvest.

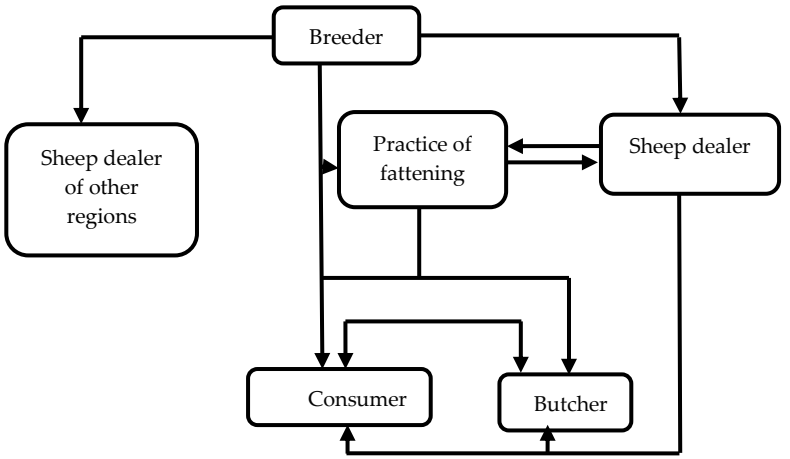
2.2.1.2. **Sheep dealers**

The sheep dealer is an important component of the marketing circuit. According to the organization, the articulation of the elements of the circuit and the time of marketing, two types of marketing circuit of the sheep meat in the region of Tiaret can be distinguished:

2.2.1.2.1. Marketing circuit outside the Aid El Adha period

In this short circuit (Figure 3), the sheep dealer is not present, and as a result, the butcher has to purchase the live animal in a manner similar to that of a sheep dealer who is also a consumer. This situation allows the butcher to gain access to valuable information about the animal and the market, in the form of carcasses and meat

Figure 3. Marketing circuit for sheep outside the period of Aid El Adha.

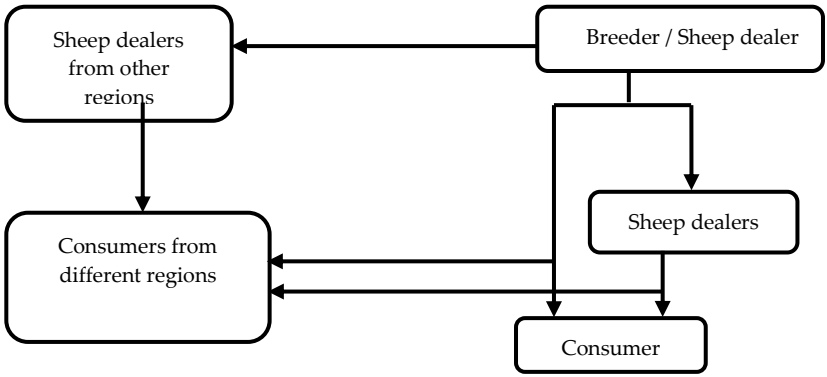


Source: Own elaboration

2.2.1.2.2. Marketing circuit during the Aid El Adha period

The sheep meat circuit in the Tiaret region involves multiple stakeholders (Figure 4), with an increase in transaction points at the market level. This leads to additional food and transportation costs for stakeholders. The presence of external stakeholders increases price competition, contributing to price formation. The market auctioneer reports that the number of sheep can range from 3 500 to 5 000 head, depending on supply and demand. In some cases, sales points are established around the market when the number of sheep exceeds 5 000.

Figure 4. The marketing circuit of the chain of sheep meat in the period of Aid El kbir.

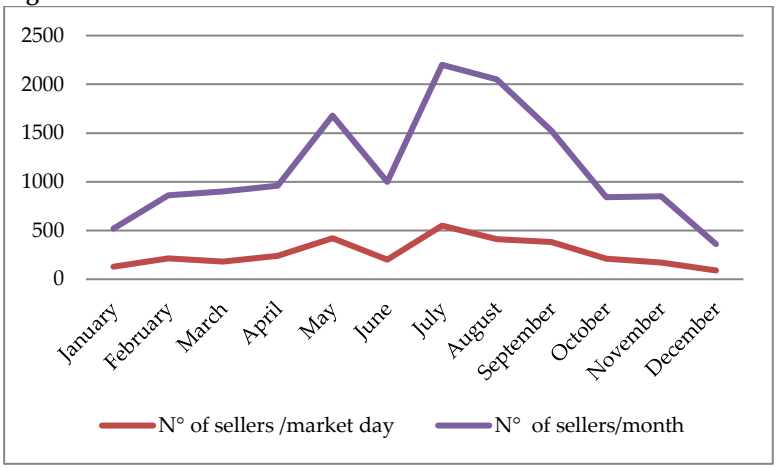


Source: Own elaboration

2.3- Interactions in the livestock market

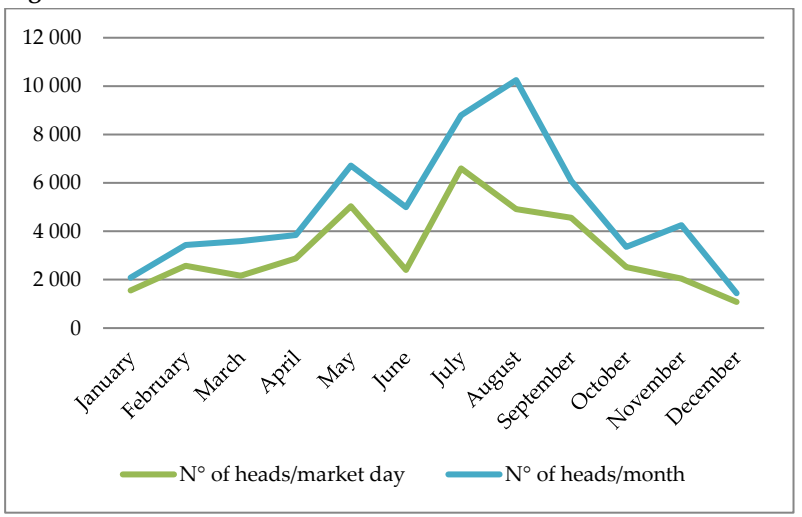
Figures 5 and 6 below show fluctuations in the number of sellers and heads of livestock at the market throughout the year. May and July exhibit the highest number of sellers and heads of livestock. It is worth mentioning that this period coincides with religious holidays.

Figure. 5. Number of sellers in the market in 2019.



Source: Own elaboration

Figure 6. Total heads of livestock in the market in 2019



Source: Own elaboration

2.4- The slaughterhouse

It is the place where live animals are transformed into carcasses and also provides fresh meat to consumers (Zoubeidi, 2006). Livestock slaughter in the Tiaret province exceeds 3,000 quintals for sheep meat and 4 000 quintals for cattle meat annually, with the "Frigo Tiaret" and "Ksar Chellala" slaughterhouses having the highest capacity. Indeed, the popularity of the market in each region correlates with the demand for meat. Over 61% of butchers source their meat from sheep dealers at livestock markets, while 39% directly acquire their meat from breeding sites to minimize the risk of disease and associated financial loss.

2.5- The fattener

More than 55% of the fatteners have a relationship with consumers and sheep dealers for the sale of their animals respectively with rates of 30% and 20%. Moreover, the consumers consider these fatteners as families or friends by possessing a bond of confidence that allows them to sell their animals during the holiday periods. On the other hand, the payment modality is made by credit representing 15% for the farmer.

3- The cost of production of sheep meat

Based on the above data and charges, we can calculate the cost of one kilogram of sheep meat (Table 4). After the calculations of all chargers, we obtain the price of a kilo gram of meat of a lamb which is about 1 353 DA/Kg and for the Young rams is about 1 264DA/Kg. That is to say an average cost per kilo between the two categories of the order of 1 308 DA/Kg.

Table 4. The cost of production of the sheep meat

Age category	Average purchase price (DA/head)	Charges DA/Head	Selling price of the 5th quarter	Total cost of the carcass	Cost of one kg (DA)
Lamb*	29 000	259,19	2200	27 059,19	1353
Young** rams	40 000	309,19	2400	37 909,19	1264

Charges DA/Head= Slaughter cost + transport cost ; slaughter cost= 100+ (carcass weight x 5)

carcass weight=20kg ; carcass weight**=30kg ; transport cost (table 9)*

Charges DA/Head=100+(20 x 5)+59.19=259.19*

Total cost of the carcass= Average purchase price (DA/head)- Selling price of the 5th quarter+ Charges DA/Head ; Cost of one kg (DA)= Total cost of the carcass / carcass weight

Source: Own elaboration

4-The gross margin

Performance is an optimal result obtained through the most efficient use of resources. The apprehension of the economic performance of the activity of sheep breeding will consist in carrying out an analysis of the production that costs inherent in the various phases of the production of sheep meat.

4.1. Gross margin at the breeder level

Table 5. Gross margin at the breeder level

Age category	Selling price (Da/head)	Cost of production (Da/head)	Commercial margin (Da/head)
Lambs	24 000	7 058	16 942
Young rams	31 962	13 502	18 461

Source: Own elaboration

The gross commercial margins for breeders vary based on the categories of animals, with the first category being in higher demand and having higher margins. The average margin between categories is 1 519 DA, and the maximum margin per lamb ranges from 16 942 DA to 18 461 DA. In the region of Sougueur, the average gross commercial margin for breeders is around 200 DA per head. These findings are

from studies conducted by Belhouadjeb, 2017; Zoubeidi, 2006; Zoubeidi and Chehat, 2011.

4.2. Gross margin at the sheep dealer level

The majority of our breeder's survey buys and sells on the same day of the market to capture profit margins that remain high and vary between 4 000 and 7 000 DA per head. Indeed, speculators intervene along the chain in the price formation according to the transactions carried out.

Table 6.The gross commercial margin of a sheep dealer

Age category	Average selling price (DA/head)	Purchase price (DA/head)	Average cost of fattening (DA/head)	Gross commercial margin
Lamb	28 600	24 000	3 382	1 218
Young rams	38 017	31 963	5 783	271

Source: Own elaboration

This table compares the average selling prices, purchase prices, cost of fattening, and gross commercial margins for two types of animals - lambs and young rams. Lambs have an average selling price of 28 600 DA, a purchase price of 24 000 DA, and an average cost of fattening of 3 382 DA, resulting in a gross commercial margin of 1 218 DA per head. For young rams, the average selling price is 38 017 DA, the purchase price is 31 963 DA, the average cost of fattening is 5 783 DA, and the gross commercial margin is 271 DA per head. In 2006, a survey conducted in the Sougueur region found that the average cost of fattening per head was 3 195 DA (Zoubeidi, 2006; Zoubeidi and Chehat, 2011).The gross commercial margin of the sheep dealers of Djelfa varies respectively (during normal periods) between 200 to 500 DA and 500 to 1 000 DA for young rams and lambs (Belhouadjeb ,2010).

4.3. Gross margin at the butcher level

In our calculations, we have considered the categories of lamb and young rams, as they are the most in demand. It is important to note that the price of one kilogram of sheep meat is 1 200 DA. If we take the average weight of a lamb carcass, which is 20 kg, we obtain a selling price of this carcass at 30 000 DA per head, with a purchase price of 24 000 DA per head for this category at live weight, and the price of the fifth quarter at approximately 2 200 DA per kg. Thus, we calculate a margin of 8 200 DA (Table 7). Similarly, for young rams, the margin is 7 200 DA per head. We also obtained the average gross trade margin between the lamb and young rams which is about 1 000 DA/head.

Table 7.Gross trade margins generated by the butcher

Age category	**Average purchase price (DA/head)**	**Carcass weight (kg)**	**Selling price of carcass**	**Selling price of 5em quarter**	**Gross margin DA/head**
Lambs	24 000	25	30 000	2 200	8 200
Young rams	36 000	34	40 800	2 400	7 200

Source: Own elaboration

Despite this, in Zaghouan, Tunisia, the gross margin per kilogram of meat is estimated to be 4.38 Tunisian dinars for short circuits, according to Darej et al. (2019).

5-Net margin

5.1. Net margin at the breeder level

The marketing costs of our sample are made up of all the taxes (entry taxes to the markets and transport costs) (table 8).

Table 8 Net margin at the breeder level (DA/ head)

Age category	Tax of entry to the market	Transport	Gross sales margin	Net sales margin
Lambs	40	58	17 701	17 563
Young rams	80	58	17 701	17 603

Source: Own elaboration

The entry cost to the market for the two age categories differs: 40 DA for lambs and 80 DA for young rams. The transportation cost for both age categories is 58 DA.

For lambs, the net sales margin is 17 563 DA, while for young rams, it is 17 603 DA. Therefore, the net margin decreases with the number of heads sold, which may increase market entry taxes and transportation costs. These figures can help breeders evaluate the profitability of their enterprises and determine the costs associated with producing different groups of livestock. Belhouadjeb (2017) states that in Djelfa, breeders are profitable due to effective management of their sales; however, their gross margins vary from 5 638 DA to 12 443 DA per lamb and from 3 638 DA to 10 443 DA per young ram.

5.2. Net margin at the sheep dealer level

The net commercial margin of sheep dealers is determined by subtracting marketing costs from the gross commercial charge. Marketing costs include average transport costs of 72 DA/head and an entry tax to the market of approximately 80 DA/head.

The estimated net commercial margin for sheep dealers engaged in purchase and sale operations on the same day between 4 448 and 5 902 DA/head, indicating that costs and margins can vary depending on their objectives and location (market of the commune).

5.3. Butcher's net sales margin

The calculation of the net commercial margin for sheep meat considers various expenses, including slaughter costs and transportation costs between the market, slaughterhouse, and butcher

shop. The net commercial margin is estimated to be approximately 1 290 DA per head for young rams and 2 540 DA per head for lambs (Table 9). However, in the Sougueur region, the net margin for butchers is higher at 1 640 DA per head (Zoubeidi, 2006; Zoubeidi and Chehat, 2011).

Table 9.Net trade margins of butchers

Age category	Gross margin DA/head	Slaughter costs	Transport cost *	Transport cost **	Net margin
Lambs	2 800	200	25,37	33,82	2 540
Young rams	1 600	250	25,37	33,82	1 290

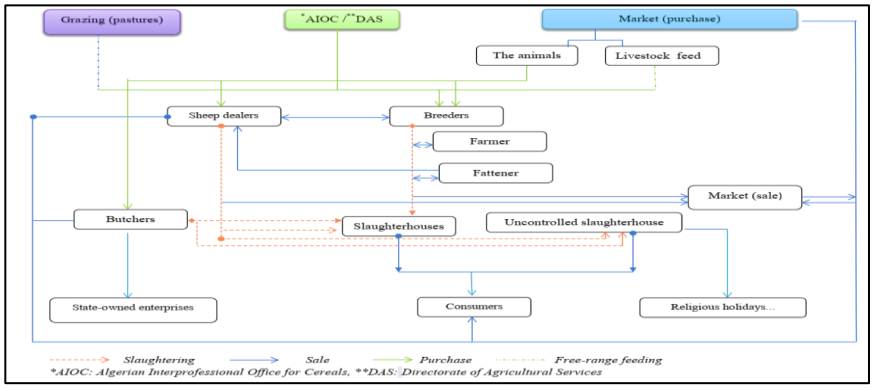
*Transport cost *: is the average transport cost between the slaughterhouse and the market, which equals 25,37 DA; Transport cost **: is the average transport cost between the slaughterhouse and the butchery, which equals 33,82 DA.*

Source: Own elaboration

6-Cartography of the sheep meat value chain

The following figure shows a schematic representation of the organization of the sheep meat value chain in the Tiaret region. Different types of flows are indicated according to the nature of the transaction (sale, purchase, slaughter, etc.).

Figure 7. Diagram of the sheep meat value chain in the Tiaret region



Source: Own elaboration

Sheep breeding is a prevalent practice in the Algerian steppe region, driven by the heightened demand for meat. The sheep trading circuit exhibits a well-established structure, covering extensive areas in the Tiaret region and various parts of Algeria. The process involves multiple transactions before the sheep reach the market (Figure 6). Sheep dealers employ specific strategies to optimize profits, including acquiring livestock at advantageous prices and selling under favorable market conditions.

These dealers cater to local, regional, and national markets, engaging in speculative practices due to the significant number of participants in the trade. Weather variations can profoundly impact sheep supply, causing fluctuations in market prices (Alary, 2005; Zemour and Sadoud, 2021). The sheep market dynamics are influenced by feed prices and negotiation strategies employed by both breeders and dealers. Predominantly, sheep dealers wield substantial influence in the market and tend to assertively negotiate compared to breeders.

In 2019, approximately 58,860 sheep were introduced to the market, with the highest transaction volume occurring in August, coinciding with the celebration of Aid El-Adha. This period aligns with optimal conditions for animal feeding, reproduction, and management (Zemour et al., 2020).

The artisanal butchery tradition holds significant esteem in Tiaret, Algeria, because of its sourcing practices from reputable suppliers and consistent purchasing frequency. This tradition caters to a diverse customer base, demonstrating resilience against market fluctuations. Additionally, it fosters strong social bonds among local actors who collectively share risks. Profitability factors include seasonal demand variations, particularly during religious holidays, and the availability of live animals (Zemour et al., 2020).

Sheep meat consumption in the region is shaped by local habits and diverse consumer preferences influenced by sensory properties, psychological and socio-demographic factors. Key criteria include color, tenderness, flavor, and price, as outlined by Zemour and Sadoud (2021).

CONCLUSION

This research has conducted a comprehensive examination of the sheep meat value chain in the Tiaret region, outlining the distinct commercial margins among key stakeholders, including breeders, sheep dealers, butchers, and consumers. Commercial margins exhibit variability depending on factors such as the age of the sheep and shifts in seasonal demand. It has been concluded that breeders face challenges arising from climatic hazards and volatile feed prices; however, they effectively utilize diverse food resources to meet the needs of both local and national clientele. The challenges faced by producers are intricately linked to consumers' purchasing power, which influences the profitability of the chain. A well-organized value chain with strong relationships among its participants is essential to prevent destabilization and promote developmental progress.

References

Alary .V., Mekersi .S., Redjel .N., Zeghida. A., Bouguera .A & Bendaoud .M., (2005). Les obstacles aux transferts technologiques dans les petites et moyennes exploitations agricoles des zones arides et semi-arides du Maghreb : synthèse des présentations et discussions. Atelier du 31 mars au 2 avril 2003, Tunis.

Belhouadjeb F.A., (2010). Analyse de la compétitivité de la filière ovine Algérienne. Cas des éleveurs de la wilaya de Djelfa; Mémoire de Magister; ENSA (ex-INA), Alger., 2009, pp 44-45.

Belhouadjeb F.A., (2017) . Stratégies des éleveurs ovins en milieu steppique et Contraintes du Marché. Ph.D. Thesis, ENSA (ex-INA), Alger, 2017, pp 130 .

Benabdeli ,K.,(2000). Évaluation de l'impact des nouveaux modes d'élevage sur l'espace et l'environnement steppique: Commune de Ras-El-Ma (Sidi Bel Abbès, Algérie). *Options méditerranéennes*, 39, 129-41.

Cerqueira J. O. L., Feas X., Iglesias A., Pacheco L. F,& Araújo J. P., (2011). Morphological traits in Portuguese Bordaleira de Entre Douro e Minho sheep: divergence of the breed. *Animal Production Science,* 2011, vol. 51, no 7, p. 635-641.

Daoudi ,A., Terranti ,S., Hammouda ,R. F & Bédrani S., (2013). Adaptation à la sécheresse en steppe algérienne: le cas des stratégies productives des agropasteurs de Hadj Mechri. *Cahiers Agricultures*, 22(4), 303-310.

Darej ,C., Bdiri ,M., Mhamdi ,N.,Chniter, M.,Hechlef, H., Gesmi H & Moujahed, N., (2019). Organization of the sheep meat value chain in North East Tunisia: Case of the Zaghouan region. Organisation de la chaine de valeur de la viande ovine dans le Nord Est de la Tunisie: Cas de la région de Zaghouan., 64 (3) : 4017-4027.

Djaout, A., Afri-Bouzebda, F., Chekal, F., El-Bouyahiaoui, R., Rabhi, A., Boubekeur, A., ... & Gaouar, S. B. S. (2017). Etat de la biodiversité des «races» ovines algériennes. *Gen. Biodiv. J*, 1(1), 1-17.

DSA .,(2019). Direction des services agricoles de la wilaya de Tiaret. Des données numériques fournies par le Bureau des statistiques agricoles, Tiaret.

Fetoui ,M., Dhehibi ,B.,Frija ,A.,Sghaier ,A., Aden A. H., Abdeladhim, M. A., & Sghaier, M.,(2020). Towards an innovative

olive oil value chain: Options for inclusive development in South-Eastern Tunisia. *New Medit: Mediterranean Journal of Economics, Agriculture and Environment***.,** *Revue Méditerranéenne d'Economie Agriculture et Environment*, 19(3).

Himeur, Z., Ikhlef , H, & Madani, T.,(2022). Caractérisation des exploitations agriculture-élevage et origine de l'innovation dans les principaux bassins laitiers de l'Algérie. *New medit: Mediterranean journal of economics, agriculture and environment***.** *Revue méditerranéenne d'economie, agriculture et environment*, 21(3), 47-60.

Jemaa ,T., Huguenin, J., Moulin, C. H & Najar, T., (2016) . Les systèmes d'élevage de petits ruminants en Tunisie Centrale: stratégies différenciées et adaptations aux transformations du territoire. Cahiers Agricultures 22, vol.25.

Laoun ,A., Harkat, S., Benali ,R.,Yabrir ,B., Hakem, A., Ranebi D.,Maftah, A., Madani ,T., Da Silva, A & Lafri M .,(2015) . Caractérisation phénotypique de la race ovine Rembi d'Algérie, *Revue d'élevage et de médecine vétérinaire des pays tropicaux*, 68(10), 19-26.

Lhoste ,P., (2001). L'étude et le diagnostic des systèmes d'élevage. Atelier de formation des agronomes SCV, Madagascar, pp1-32.

MADR., 2021.Ministère de l'agriculture et de développement rural. Des données numériques fournies par la Direction des Statistiques Agricoles, série 2019, Algérie;

Miller, C., & Jones, L. (2013). Financement des chaînes de valeur agricoles: outils et leçons. Technical Centre for Agricultural and Rural Cooperation.

Mouhous, A., (2007). Alimentation des troupeaux des zones steppiques. Cas de la zone de Hadj Mechri (région de Laghouat), Algérie. *Livestock Research for Rural Development*. Volume 19.

Moula ,N., (2018). Élevage ovin en Algérie: Analyse de situation. In 9 ème SIMV December, Constantine.

Sadoud, M , Chehat ,F., (2011) .,Le marché du bétail et de viande rouge dans la région semi-aride algérienne*. Livestock Research for Rural Development*. Volume 23.

Salem ,H B., (2011). Mutations des systèmes alimentaires des ovins en Tunisie et place des ressources alternatives. Mutat. des systèmes d'élevage des ovins Perspect. leur durabilité (ed. E. Khlij, M. Ben Hamouda D. Gabiña), 29-39.

Smaali ,S., (2019). Evolution of the live weight and body condition score of ewes according to the season in an accelerated lambing farm. *Livestock Research for Rural Development*. Volume 31.

Yabrir , B, Laoun , A, Chenouf, N. S& Mati, A., (2015) Caractéristiques des élevages ovins de la steppe centrale de l'Algérie en relation avec l'aridité du milieu: cas de la wilaya de Djelfa. *Livestock Research for Rural Development*., 27, 207.

Zemour ,H & Sadoud ,M .,(2021). Consumer preferences for sheep meat in the Tiaret region of Algeria; *67th International Congress of Meat Science and Technology*, Abstract Book, pp 101.

Zemour ,H & Sadoud, M ., (2021) .Place de l'activité de maquignonnage dans les élevages ovins de la région agropastorale de Tiaret en Algérie. *Medforum Ciheam 2021*. Proceeding, pp 84 .

Zemour ,H., Sadoud ,M & Zoubeidi, M ., (2020).Rôle des marchés aux bestiaux dans la filière viande ovine dans la région steppique de Tiaret en Algérie .*Recueil 3R session économie .Renc. Rech. Ruminants 2020.*

Zemour ,H., Sadoud, M & Zoubeidi, M., (2020). Pratiques de l'activité bouchère dans la région de Tiaret, en Algérie: cas de la viande ovine. *Viandes & Produits Carnés*, 1.

Zemour, H ., (2022). La chaine de valeur de la viande ovine dans la région de Tiaret (Doctoral dissertation, Université Ibn Khaldoun-Tiaret-).

Zoubeidi ,M & Chehat ,F .,(2011). Le fonctionnement du marché des ovins dans les hautes plaines steppiques de l'ouest Algérien: entre contraintes et répartition de la valeur. *Livestock Research for Rural Development*. Volume 23, Article #181. Retrieved March 16, 2023.

Zoubeidi, M., (2006). Etude du fonctionnement du marché des Ovins dans la région de Sougueur (Tiaret) selon l'approche (Doctoral dissertation, INA .structure - comportement – performance (SCP). Mémoire de magister. INA, d'Alger ; pp73- 78- 83 .