

CAMEL MEAT PRODUCER'S TYPOLOGY IN THE ALGERIAN NORTHERN SAHARA - CASE OF THE REGION OF SOUF -

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Abstract

A field survey involving 144 camel meat producers from Souf region the Algerian northern Sahara was implemented in order to establish a typology of camel meat producers and collect data on camel production strategies, and camel rearing place. The collected data allowed to identify 3 homogeneous groups of producers well distinguished between them after cluster analysis. (traditional rural breeders, breeders-fatteners and fatteners). The present study confirmed the predominance of camel fattening in the study area compared, to traditional camel rearing. In-depth technical and economical studies on the different types of producers are mandatory to evaluate the vulnerability of the different systems in order to ensure camel-rearing production sustainability in the arid region of the country.

Keywords: *Camel, Fattening, Meat, Production, System, Ouargla.*

TYPOLOGIE DES PRODUCTEURS DE VIANDE CAMELINE DANS LE SAHARA SEPTENTRIONAL ALGERIEN - CAS DE LA REGION DU SOUF -

Résumé

Une série d'enquêtes investigatrices a touché 144 chameliers incarnant un système d'élevage viandeux dans la partie Orientale du Sahara Septentrional Algérien, à travers la région du Souf. L'objectif de l'étude réside à établir une typologie des producteurs de viande cameline et de situer les stratégies des acteurs locaux. Les données collectées et traitées ont permis d'identifier 3 groupes homogènes de producteurs bien distincts, et ce, après l'analyse des clusters. (Éleveurs traditionnels naisseurs, éleveurs-engraisseurs et engraisseurs). La présente étude a confirmé la prédominance de l'embouche cameline dans la région d'étude par rapport à l'élevage traditionnel. Cependant, des études complémentaires de nature technico-économiques approfondies ayant trait aux différents types de producteurs s'avèrent impératives pour évaluer la vulnérabilité des différents systèmes d'élevage afin d'assurer la durabilité de l'élevage camelin.

Mots-clés : *Dromadaire, Engraissement, Viande, Production, Système, Ouargla.*

Introduction

The camel, the animal without which the great nomadic civilizations could have never existed, occupies a prominent place in the economic and social life of the Saharan communities. In Algeria, it is one of the greatest assets of the Saharan

territory; its presence is of capital interest, because of its high processing capacity of scarce food resources into vital products. While between camel rider and camel was born an intimate relationship with regard to the adaptation performances of the animal and its multipurpose uses that make of this

species a vital element for Man and for the desertic area.

In Algeria, it is one of the greatest assets of the Saharan territory, yet the least recognized as such. Considered a reservoir of resources, this native species account meadow near 435,214 heads [1] confined to three main breeding areas (Southeast, Southwest and extreme south) and distributed across 27 wilayas, 83% are confined in 18 Saharan wilayas and 17% in 9 stepic wilayas. Given its strategic role in the Sahara, the camel is of particular interest, because it evolves in an environment where the existence of alternative livestock would be random and expensive.

This has led Leupold to state that he sees no future for the dromedary other than as a meat animal [2]. The carcass weight is 55-65% of live weight and contains approximately 53-77% meat, 4-8% fat and 16-38% bone. According to Wilson, a carcass is likely to provide, in addition to 40 kg of bone, 160 kg of meat and 10 kg of fat to cover 5 days of energy requirements and 35 days of protein requirements of an adult male [3]. From the point of view of characteristics, camel meat has a different

Method

The method adopted highlights the meat chain approach through the production segment and more specifically the camel meat producers located in different zones.

The collection and processing of data allowed the identification of a typology of actors.

Study area

The Souf region is located in the South-East of Algeria, 600Km of the capital

texture from that of cattle: the muscle fibers are thicker and in the ambient air it keeps a fresh appearance much longer than beef [4]. In terms of appearance, color and flavour, it is similar to beef. In Algeria, meat is the main speculation among camel products [5], while camel meat represents 2 % only of the total red meat produced in the country [6].

By its best use of pastoral areas in the Saharan territory, the dromedary camel is by excellence the only species adapted to the local ecological roughness and remains the only animal converting lean vegetation into vital products [7, 8].

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However, this part is more important in the desert wilayas and despite its interest for the food security of the local population, little is known about its production potential and production systems, for that purpose this study was conducted in Souf region with the general objective of characterizing camel meat production systems and identify the different camel meat producers.

Algiers on the northern borders of the Eastern Erg (33° to 34° N and 6° to 8° E). It is bordered to the east by the huge Tunisian Chott El-Djérid, to the north by Merouane, Melghir and Rharsa Chotts, to the west by the Chotts of Oued Rhigh and to the South by Ouargla [9].

The localization of the representative zones of the study region are illustrated in **Figure 1**.

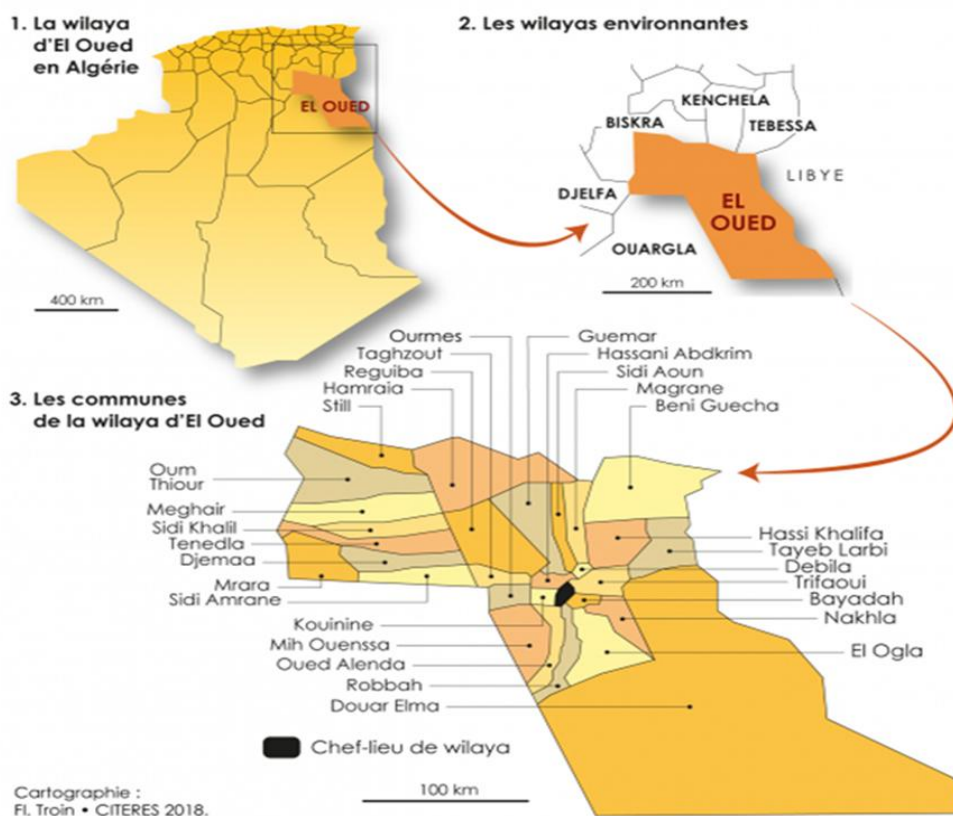


Fig. 1- Geographical location of the study area. [10]

The choice of the Souf region was not fortuitous; the following two main reasons guided the choice of the study area; *i*/- The Souf region contains one of the largest live camel markets at national level and *ii*/- the greatest number of camel heads in Algeria's Northern Sahara.

Sampling and surveys

Furthermore, the study method used for data collection is explained in detail in (Figure 2).

The study aimed to establish a typology of camel meat Producer, so, it was prepared, tested and readjusted after previously touched 20 camel producers randomly selected.

Table 1: Distribution of the approached producers

Municipalities	Number of producers
Taleb Larbi	20
Douar Elma	21
Ben Guecha	23
Hassi Khalifa	8
Debila	4
Reguiba	11
Mih Ouansah	19
El Magrane	8
El Rabah	17
El Oued	13
Total	144

The survey involved 144 camel meat producers, distributed over 10 municipalities of the study area (**Table 1**).

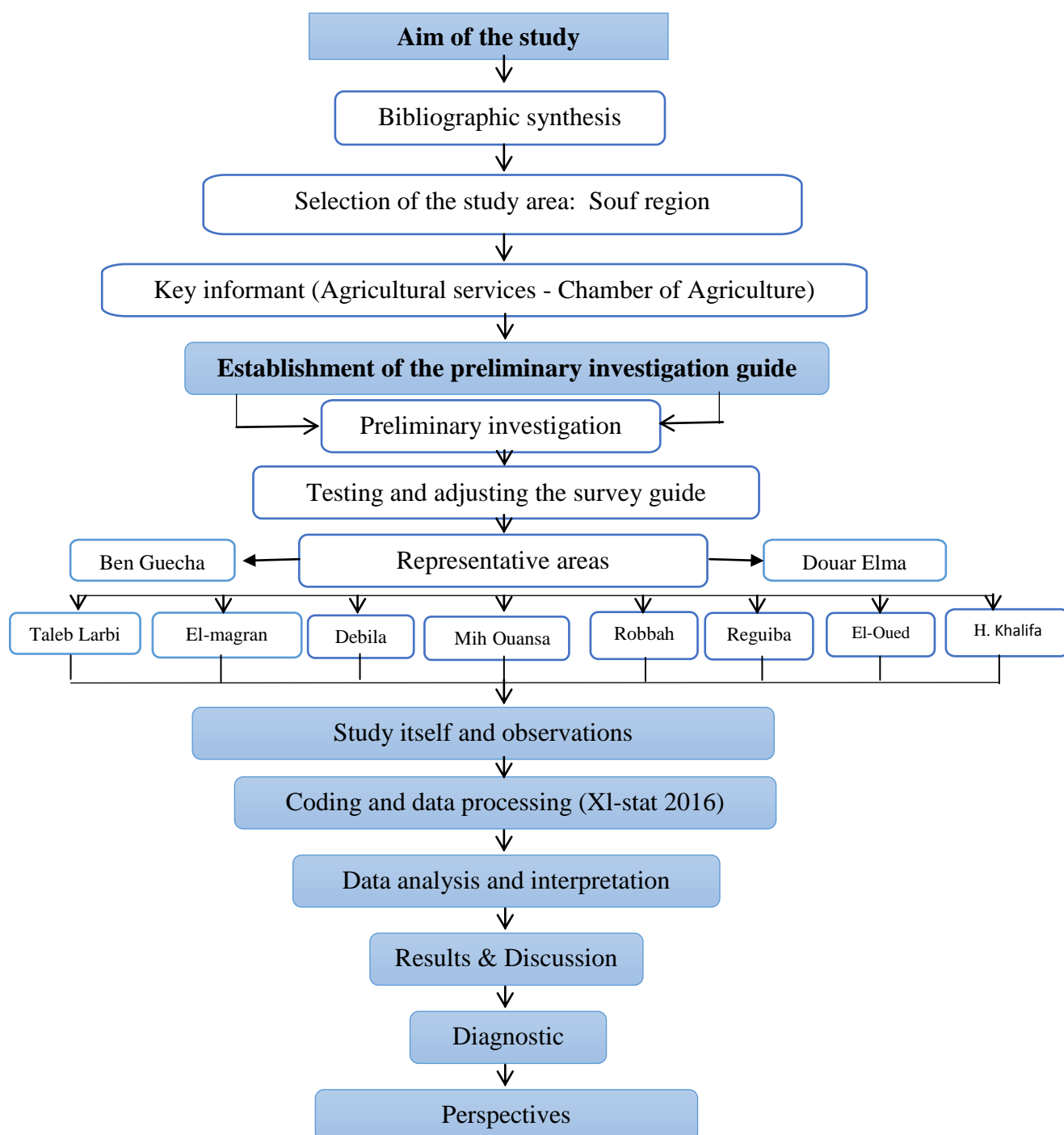


Fig. 2- Adopted methodology

Statistical analysis

A multiple correspondence analysis (MCA) followed by a hierarchical clustering were used on our databases to identify the different groups of producers. Chi-square tests were applied to the contingency table of modalities to

distinguish producers' groups from each other. These analyses were carried out using Excel-stat software version 2016 (Addinsoft ©, 2016). Variables used for the statistical analysis, are presented in (**Table 2**).

Table 2. List of variables, modalities, and percentages by modality used in the multivariate analysis

Variable	Code	Value	% by modality
Producer age	A-1	20 à 49	39.6
	A-2	50 à 64	32.6
	A-3	+ 64	27.8
Municipality location	MI-1	Rural	47.2
	MI-2	Urban	52.8
Feeding	F-1	Rangelands	38.2
	F-2	rangelands + supplementary	52.8
	F-3	Concentrate	9.00
Selling mean age	SMA-1	-1 year	2.80
	SMA-2	1 à 2 years	91
	SMA -3	3 à 4 years	2.80
	SMA-4	≥5 years	00
	SMA -5	All category	3.40
Selling liveweight	Sw-1	- 80 kg	2.7
	Sw-2	80 à 110 kg	38.20
	Sw-3	110 à 150 kg	52.8
	Sw-4	120 à 160 kg	0
	Sw-5	200 à 250 kg	2.8
	SL-6	80 à 250 kg	2.1
	SL-7	110 à 350 kg	1.4
Weight category of sold animals	CS-1	skinny	43.1
	CS-2	Moderately fattened to fattned	56.9
Calve production cost	CPC-1	Low	43.5
	CPC-2	High	56.9
Buyer type	Bt-1	Breeder	0
	Bt -2	Middlemen	47.2
	Bt -3	Butcher	0
	Bt -4	Middlemen butcher	52.8
Selling location	SL-1	Livestock market	15.3
	SL-2	Rangelands	25.7
	SL-3	Livestock market and rangelands	55.6
	SL-4	Livestock market and Fattening unit	3.40
Producer main activity	PA-1	Breeder	60.4
	PA-2	Farmer	0.70
	PA-3	Breeder farmer	25
	PA-4	shepherd	1.40
	PA-5	Official	00
	PA-6	Worker	3.50
	PA-7	Fattener	9
Bred species	BS-1	Camel+ small ruminants	72.2
	BS-2	Camel	20.8
	BS-3	Camelin + small ruminants + Bovine	4.90
	BS-4	Camel + Bovine	2.10
Camel herd size	CS-1	3 à 20 heads	13.9
	CS-2	21 à 50 heads	42.4
	CS-3	51 à 100 heads	33.3
	CS-4	101 à 200 heads	6.20
	CS-5	+200 heads	4.20
Dromedary sex	S-1	female	91
	S-2	Male	9

Results and discussion

Data processing resulted in the following analyses:

Multiple correspondence analysis (MCA)

The first two axes of the multiple correspondence analysis explain 74.46% of the total variance. Thus, expressing the most important source of variation, the interpretation of the results was limited to these two first factors (**Figure 3**).

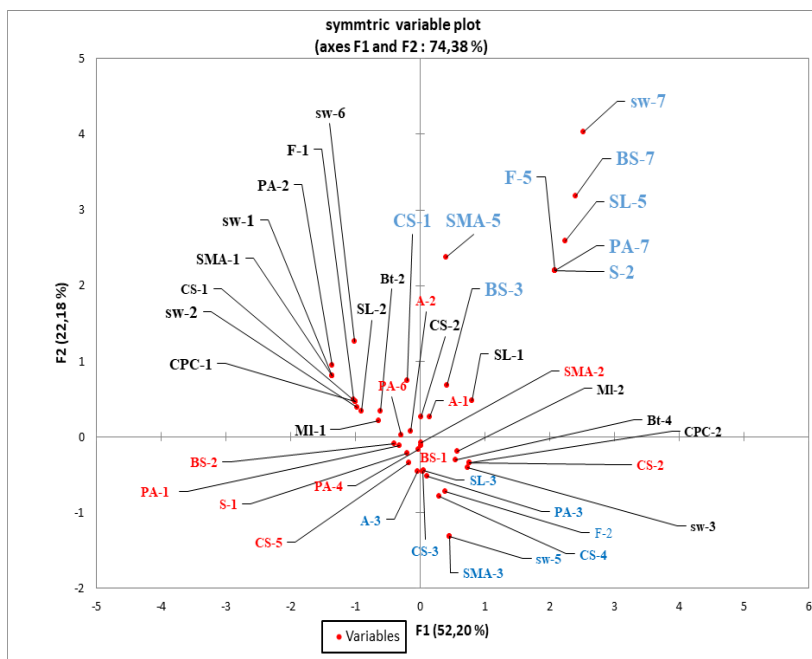


Fig. 3- Projection of the modalities of the variables contributing significantly to the first two factors on the factorial plan (1,2) of multiple correspondence analysis (MCA).

In black, the variables associated to the first factor while in blue, the variables contributing to the second factor.

The first axis opposed:

To the left; Producers located in rural cities, camels’ diet based only on grazing natural vegetation of rangelands, they produce young skinny camels; rangeland was their main location to sell their animals and middlemen were the main buyers of their camels.

To the right appears the producers located in urban cities. Sales operation of live camel had location on rangeland or livestock market; butchers and middlemen were their main clientele.

The second factor separated:

Fatteners, at the top of the factorial plan (1,2), described as producers located in

urban cities, they were fattening small ruminants and bovines besides camels, and almost of the animals’ diet was based on concentrate.

To the breeder fatteners at bottom of the factorial plan, practicing camel breeding and fattening at the same time. For them, agriculture was a secondary activity.

Automatic hierarchical clustering

The hierarchical clustering applied on the approached producers, allowed us to identify 3 groups of camel producers, which accounts for 56.9 % of the total variance (**Figure 4**). Each producer belonging to the same group is supposed to be similar and differs of the producers belonging to another group.

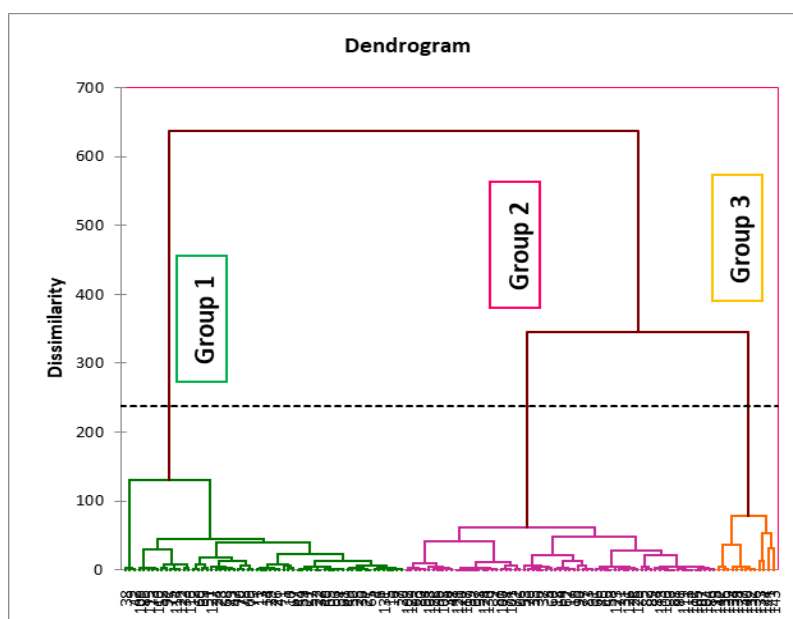


Fig. 4- Producers' groups from the hierarchical clustering.

The chi-square tests were applied to each group of producers. All the explaining variables were significant (**Table 3**).

Table 3: Characteristics of 3 groups of producers

Variable	Code	Group 1(%)	Group 2 (%)	Group 3 (%)
Producer age	A-1	38.71	34.8	69.2
	A-2	37.1	29	30.7
	A-3	24.29	36	
Municipality nature	MI-1	77.4	27.5	7.70
	MI-2	22.6	72.5	92.3
Feeding	F-1	87.1	1.40	0
	F-2	12.9	98.6	0
	F-3	0	0	100
Selling mean age	SMA-1	6.45	0	0
	SMA-2	88.7	94.2	84.6
	SMA-3	0	5.80	0
	SMA-5	4.83	00	15.4
	SMA-6	0	00	00
Category of sold camel	CDPV-1	100	0	00
	CDPV-2	0	100	100
Calve production cost	CPC-1	100	00	00
	CPC-2	00	100	100
Buyer type	Bt-1	0	0	0
	Bt-2	79	23.2	23
	Bt-3	00	00	0
	Bt-4	21	76.8	77
Selling mean weight	Sw-1	6.50	00	0
	Sw-2	88.7	00	0
	Sw-3	00	94.2	84.6
	Sw-4	0	00	0
	Sw-5	0	5.80	15.4
	Sw-6	4.8	00	0
	Sw-7	0	0	0
Selling location	SL-1	8.1	14.5	53.84
	SL-2	48.4	10.1	00

	SL-3	43.5	75.4	7.70
	SL-4	0	0	0
	SL-5	0	0	38.5
Main acivity	MA-1	72.6	60.9	0
	MA-2	1.60	0	0
	MA-3	19.4	34.8	0
	MA-4	1.61	1.4	0
	MA-5	0	0	0
	MA-6	4.80	2.9	0
	MA-7	0	0	100
Bred species	BS-1	70.9	75.4	61.5
	BS-2	24.1	21.7	0
	BS-3	4.80	2.9	15.4
	BS-7	0	0	23.1
Camel herd size	CS-1	22.6	2.9	30.8
	CS-2	43.5	37.7	61.5
	CS-3	25.8	44.9	7.70
	CS-4	3.23	10.1	0
	CS-5	4.80	4.34	0
Dromedary sex	S-1	100	100	0
	S-2	00	0	100

This allowed to identify homogeneous groups well distinguished between them.

Finally, the three groups can be described as follows (**Figure 5**)

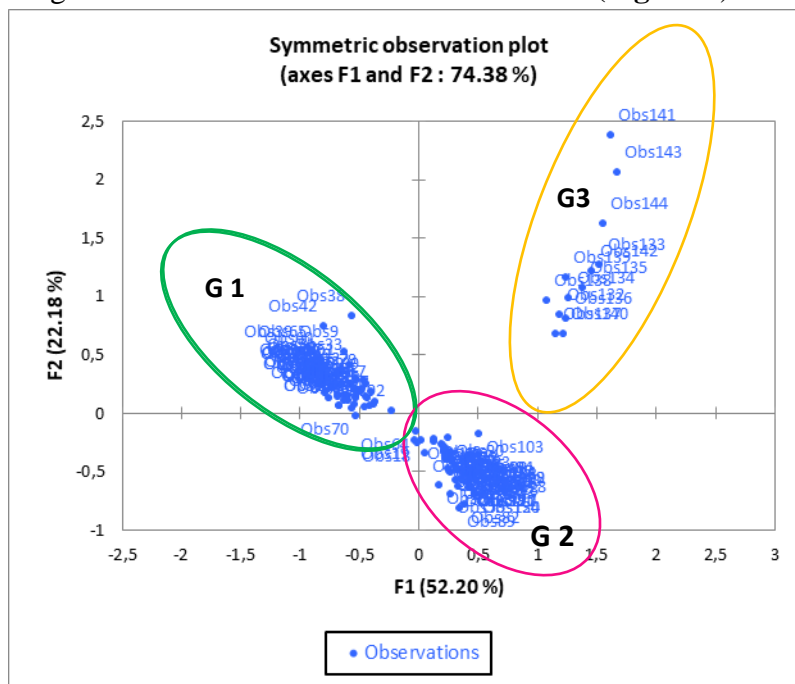


Fig. 5- Projection of individuals from 3 groups on the factorial plan (1x2).

Group 1: They represented 43.6% of the respondents, and camel rearing was their main activity. They were mainly located in rural cities known for camel and small ruminant rearing. For that, the majority were rearing small ruminants beside camels. Their camel herd size ranged between 3 and 20 heads. Camels feeding was based only on grazing the natural vegetation of rangelands; feed supplementation was occasional and depended on the financial status of the herders and the annual rainfall. As a result, these producers only offered skinny camels at low costs, usually intended for fattening [11]. They sold their animals on rangelands to avoid costs related to transportation. Middlemen were their main buyers; they usually visit various camps of the camel breeders near water points and purchase their animals. They are traditional breeders.

Group 2: the most abundant type, with 47.91 % of the approached producers. Camel rearing is not the only earning source; other animal species such as sheep, goats, and cows were also reared for earning purposes. This type of producer was located in urban cities that have extensions toward pastoral rangelands. These cities were known for their agriculture and fattening activities, which explains the presence of farmers and breeders as the main activity. This group, like the traditional breeders in group 1, had traditionally managed camel herds, while fattening young camels was done in small fattening units in cities near camel markets and camel meat consumption areas [11]. They produced mainly fattened young dromedaries (male and female) in order to improve their income from camel-rearing activity. Females were kept in groups 1 and 2 for reproduction purposes, which

explains the dominance of females in their camel herd composition. They are **breeders fatteners**.

Group 3: They represent 9.03 % of the approached producers, and, almost all were practicing only livestock fattening. Compared to traditional breeders and breeder-fatteners, this type of producer did not breed dromedaries they bought dromedaries to fatten them for a short period of time before reselling them [12]. They were located only in the urban cities where camel meat consumption was high [13]. They were young producers; the majority were under 49 years old. The livestock market was their main source of selling live camels. Middlemen and butchers were the main buyers of their animals; they produced all categories of fattened animals, especially young males. Selling young camels in G1, G2, and G3 was due to their customers' preferences. Indeed, those customers prefer tender meat, easier to cook. Unlike that of aged camels [14, 15]. They are fatteners.

Compared to the first group, group 2 and 3 produced camels with high costs due to the usage of concentrate and veterinary products to improve the daily growth of their animals.

Conclusion

The survey achieved among the camel meat producers of the Souf Region in Algeria allowed to clearly identify homogenous groups based on their production strategies. Apparently, the municipality location of the producers and customer preferences were one of the determinant characters to explain camel producers level of integration in the camel fattening practicing; moreover, technical and economic studies have to be implemented for better understanding of the sustainability of the different systems

and identify both resilient and vulnerable systems in order to develop camel rearing in the country.

A sound program that includes research, training, and extension work in the

management of animal and reproductive health as well as improvements to production and commercialization of meat, milk, fiber, and hide will be necessary to advance the dromedary sector.

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