

TYOLOGIES AND CHARACTERISTICS OF SHEEP FARMING SYSTEMS IN THE COMMUNE OF SFISSIFA, WILAYA OF NÂAMA (WESTERN ALGERIA)

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Abstract

The objective of this study is to identify and characterize the different types of livestock systems in the region of Sfissifa, wilaya of Nâama (Western Algeria).

To this end, 50 livestock farmers were surveyed in this region, and the results of the field investigations revealed three main categories of livestock farmers: semi-sedentary to sedentary livestock farmers, small sedentary livestock farmers, and large livestock farmers. The livestock farmers surveyed had acquired at least one level of education thanks to the reforms undertaken by the public authorities in terms of rural development, at a time when livestock farming was no longer the preserve of illiterate people. 42% of the farmers surveyed are between 51 and 67 years old, and the animals raised are of the Ouled Djellal and Rembi breeds, in view of their hardiness and productive potential in terms of growth.

The viability of any breeding system depends on the conciliation between its three poles: the breeder needs the ewe, and the ewe needs the food provided by the environment.

Keywords: hardiness, grazing, sedentary, lifestyle, steppe.

1. INTRODUCTION

The Algerian steppe is located between the isohyets 400mm in the north and 100mm in the south. It covers an area of 20 million hectares, between the southern limit of the Tellian Atlas in the north and the southern foothills of the Saharan Atlas in the south. It is generally accepted that traditionally the dominant activity in the steppe was nomadism par excellence. This way of life is based on transhumance to the North and to the South (Achaba and Azaba), dictated by the need for fodder in favourable areas (pre-Saharan rangelands in winter, cereal- growing areas in summer) and regulated by tacit agreements between tribes.

The natural vegetation of the rangelands of this vast area is mainly made up of steppes based on esparto (*Stipa tenacissima*), white wormwood (*Artemisia herba alba*), sparte (*Lygeum spartum*) and steppes based on remt (*Arthrophytum scoparium*) (Aïdoud et al., 2006).

Livestock farming activities are marked by the mobility of sheep flocks and men within vast rangelands for collective use, constituting a fragile ecosystem where pastoral populations evolved. The latter survive by exploiting the natural resources of these rangelands (Bourbouze, 2000). It is precisely here that pastoral resources constitute the main source of income for 9 million inhabitants (MADR, 2018).

Today the situation has evolved in the direction of a trend towards sedentarisation and the gradual disappearance of nomadism.

Furthermore, the diagnosis of a livestock system consists of "analyzing and assessing the ways in which the rural area is used in a given area and on a given scale, in relation to the objectives of knowledge and development of this rural area". It is therefore a finalized operation which should make it possible to identify the main constraints to the development of livestock farming (Lhoste, 1984).

In the framework of this work, it is a question of establishing a diagnosis relating to the breeding in the region Sfisifa wilaya of Nâama (West of Algeria) and to draw information from it. The aim is to list and characterize the different types of existing breeding systems. Faced with socio-economic changes, accelerated population growth and climate change, many questions surround the modes of conduct of sheep at the level of the region of Sfisifa and which are mainly summarized in a main question:

What are the farming systems encountered in the Sfisifa region and what are their characteristics?
The present study tries to find answers to these questions.

2. MATERIALS AND METHODS

2.1- Study area:

The framework chosen to conduct this study is located in the geographical context of the western high steppe plains of Algeria. Our area is located in the Ksour mountains in the southwest of the wilaya of Nâama (Figure 1).

The commune of Sfisifa, whose chief town is about thirty kilometers from the city of Ain Sefra, is a repulsive area because of its low development potential due to the difficult nature of the land and its geographical location as a border area with the Kingdom of Morocco and the attraction of Ain Sefra as a much more important center. It is even a municipality that is depopulating if we consider that the population counted in 1987 (8479 inhabitants) is more important than that of the last RGPH in 2008 where the population is estimated at 7 704 inhabitants or 3.16 (Hab/Km²).

Most of the populations of the commune of Sfisifa are breeders whose main activity is sheep farming (919 breeders), which results in strong pressure on the steppe rangelands. The number of livestock practiced in the region is 145527 sheep, 2 981 cattle, 9 474 goats and 118 Horses (DSA, 2020).

The Sfisifa region was selected because it had several important elements for our study:

- 1-A region with a pastoral vocation, which means that most of the local rural economy is strongly, linked to the practice of a set of livestock activities
- 2-Livestock activities conducted mainly in an extensive manner on rangelands rich in steppe vegetation.
- 3-This region is characterized by a vast pastoral area and historically by one of the sheep breeds most adapted to the conditions of the south, the Hamrabreed, replaced by the Ouled-djelal breed whose cradle is located between Djelfa and Laghouat.

4-The location of the region which is considered a border area with the Kingdom of Morocco and the attractiveness of Ain Sefra as a much more important centre

5-A transition zone between the Saharan territory and the steppe itself (hence its sensitivity to climatic changes).

From a natural area characterized by a stepic environment in the region of Sfisifa wilaya of Nâama (West of Algeria), 50 breeders were randomly selected working in agriculture and breeding. The farms were located in a lower arid bioclimatic zone with cool winters.

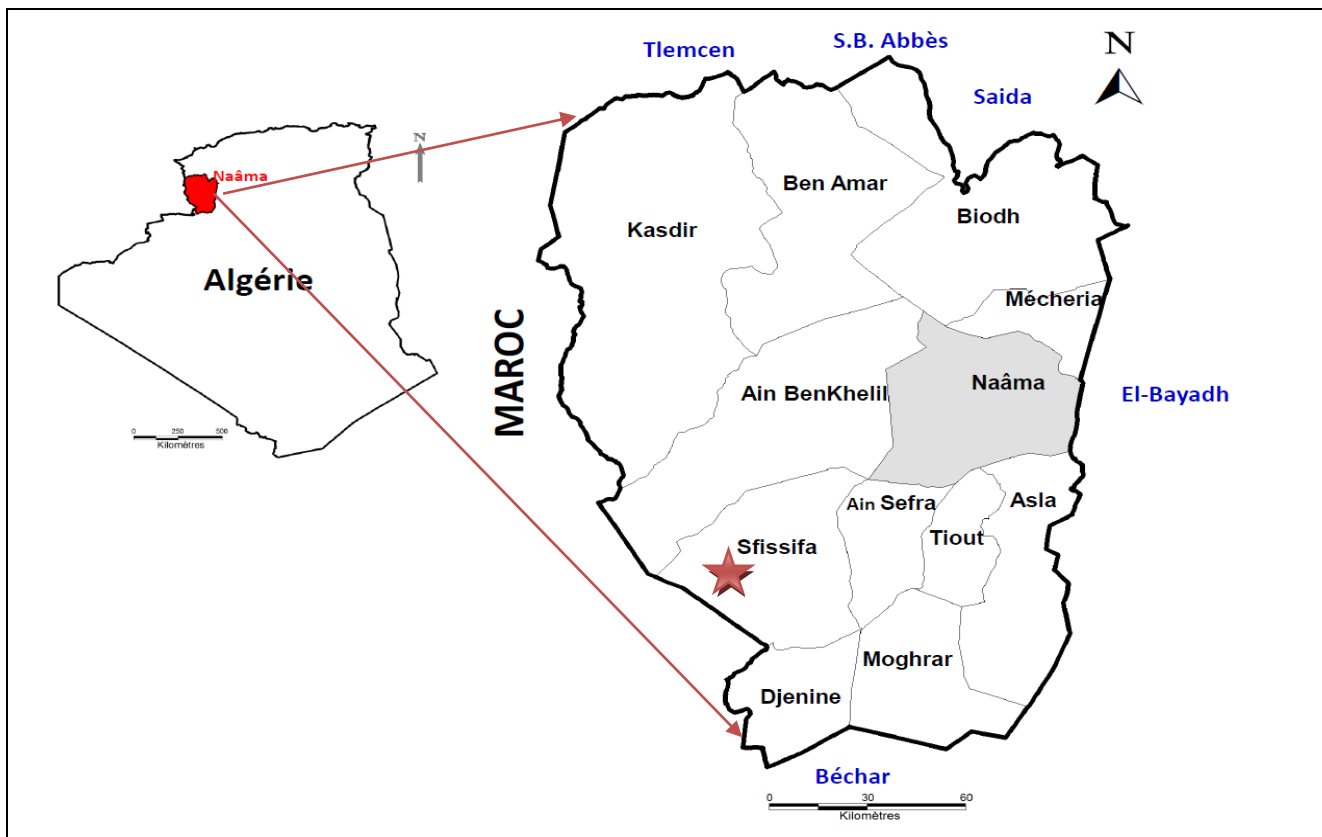


Figure 1. Location map of the commune of Sfisifa (DPSB, 2020)

2.2-Methodology:

The methodological approach followed to carry out our study requires the use of appropriate observation or survey methods and the use of analysis means adapted to the situations encountered. In this context, the means used for the realization of this work are based on documentary research, surveys, and observations. The aim of our survey is to establish a typology of the livestock systems present in the commune of Sfisifa wilaya of Nâama. The survey guide was field-tested with 30 farmers in order to reformulate the questions according to the respondents' answers, especially the questions not perfectly understood by the respondents, and then to correct them before conducting the actual surveys. The questionnaire included various questions relating to the three poles of the farming system.

The breeding poles are composed of three elements (man, animal and resources) (Landais,1992). Thus, the survey conducted among farmers covers several indicators that can determine these three aspects, including indicators related to the farmer's profile, the size and composition of the herd, the management of the farm, the feed and the habitat.

We have put together a series of questions in an attempt to explore and better understand the steppe livestock system, particularly the livestock system in the Sfisifa area, whose geographical and bioclimatic characteristics are as described above. This includes several necessary points (Figure 2):

Pole 01 (Breeder): General information on the breeder (age and level of education...etc) and his herd

Pole 02 (Herd): flock size, average age of the flock, number of ewes, breeds, location, type of building, hygiene of the building, etc.

Pole 03 (Territory): Type of feed used (type of forage, type of forage and storage method, grazing time and duration, concentrated feed, water availability, etc.).

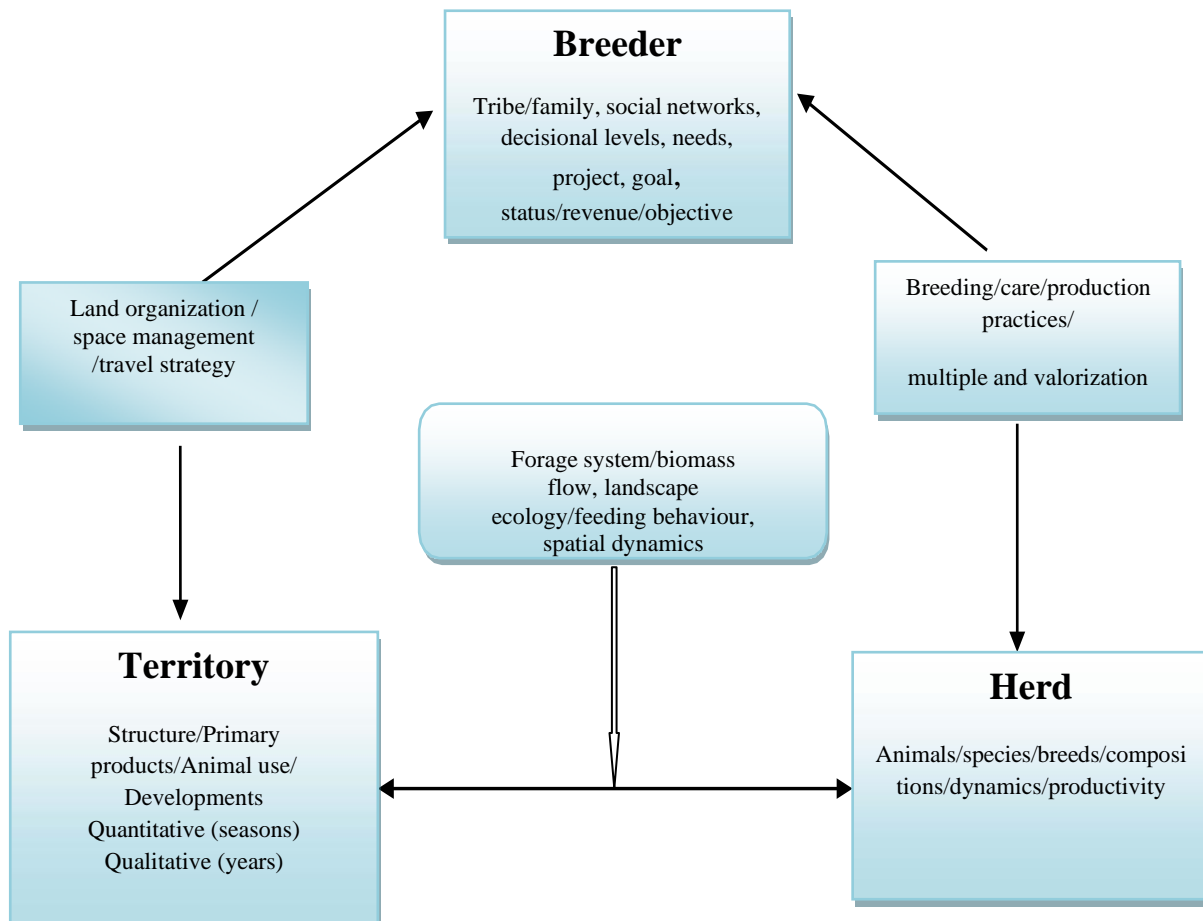


Figure 2. The three poles of the breeding system according to Jordan and Moulin (1988)

3. RESULTS

3.1-Identifier of operators:

Sheep farming in the steppe environment is a valuable activity and an important living resource. The aim of this type of farming is to produce lambs and/or fatten them for the national and local markets (more than 56% of the farmers surveyed). Wool, meat and a small amount of milk are secondary objectives.

Owner-herders represented 74% of the farmers surveyed and 26% are shepherds. 42% of the farmers are aged between 51 and 67 years, 28% of the farmers are aged between 36 and 50, 22% of the farmers are aged between 20 and 35 years, while 8% of the farmers are over 67 years (Figure 3). Concerning the level of education of the herders, 52% of the herders have a primary level, 26% have a secondary level and between 6% and 8% have an illiterate, Koranic and university level (Figure 4).

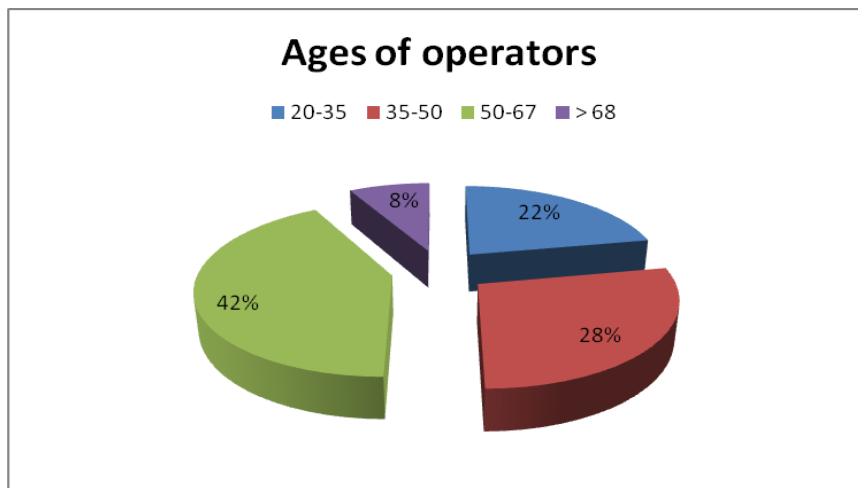


Figure 3. Ages of the farmers in the commune of Sfissifa

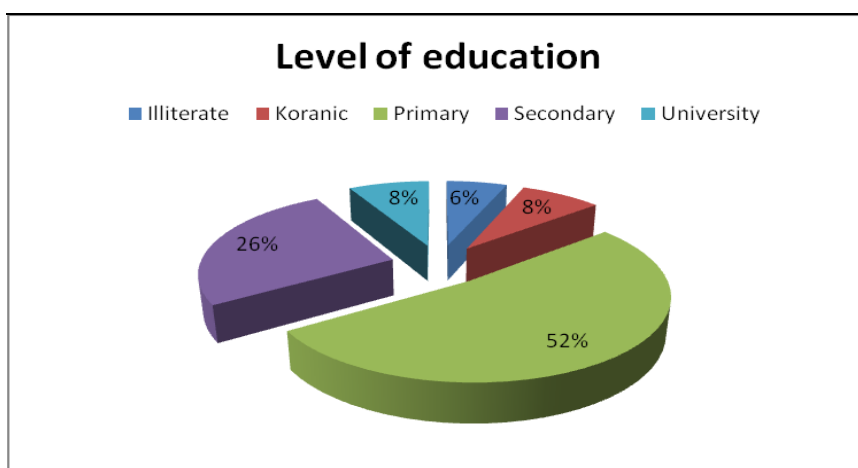


Figure 4. Level of education of farmers in the municipality of Sfissifa

3.2- Herd size and breed:

The farmers surveyed can be divided into three categories according to herd size. Large farmers with more than 300 head (up to 1000 head or more) represented only 3% of the population surveyed, medium farmers with 100 to 300 head represented 58% and small farmers with less than 100 head represented 39% of the population surveyed.

The sheep breeds raised in the region of Sfissifa, we found first of all the breed of Ouled Djellal with a number of 2671 heads, 2114 heads of Rembi breed, 473 heads of Serandi breed and the Hamra breed is represented by 126 heads (Figure 5).

The results of the survey show that rangeland use is varied. This variety is mainly due to the size of the herd and the lifestyle of the farmers, which is directly reflected in the farming system, where we found the following farming systems (Figure 6):

A-Sedentary and semi-sedentary livestock systems: the sedentary livestock system is dominant, practiced by more than 62% of livestock farmers, who represent all small-scale livestock farmers and a large proportion of medium-scale livestock farmers. Semi-sedentary livestock farmers are common among medium-scale livestock farmers (30%), and are farmers who live from livestock farming and agriculture, and sometimes from an ancillary activity. They have a limited number of animals (less than 50 heads), an area of a little over 10 hectares and plough an average of five hectares per year, mainly for barley-based cereals. These farmers have a permanent home and rarely have any means of transport.

B-Transhumance: is practiced only very rarely (8% of the herders surveyed are large-scale herders). This is generally a class of powerful individuals whose interests are turned outward. They use all means to recover the maximum of resources. This is the category of large breeders who manage their farms in a business spirit with a predominance of market logic (speculative breeding). In addition to accumulating a large number of animals, on average more than 300 head, these farmers have managed to appropriate a large area of cultivated and collective land, varying from 22 to 100 hectares.

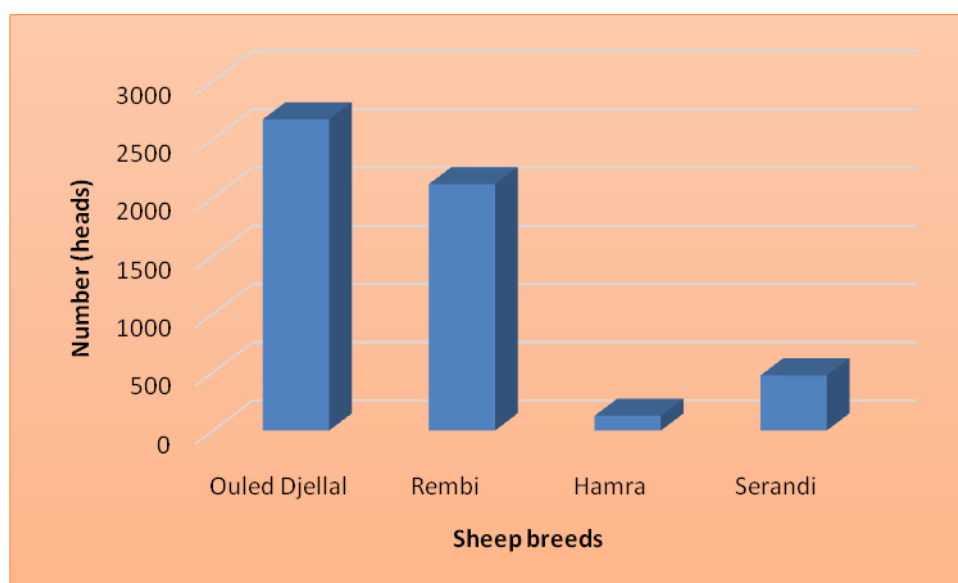


Figure 5. Number of sheep breeds exploited in the municipality of Sfissifa

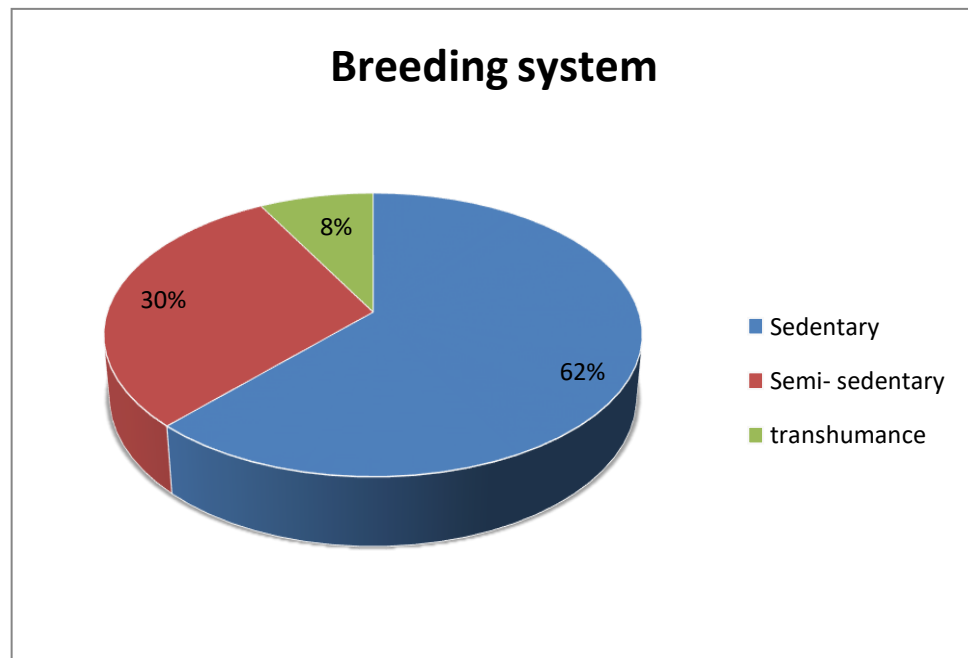


Figure 6. Breeding systems in the commune of Sfisifa

3.3-Food and Habitat:

All the farmers graze alone or mixed (more than 98%) (Figure 7) throughout the day, all year round, with the exception of periods when it is very cold. During the summer period, the herds go out twice a day, early in the morning and late in the afternoon. The supplementation, based on concentrates (barley grain and maize or CMV) generally purchased on the informal market or from state offices, is practiced when the rangelands do not cover the needs of the herd, and during the winter period. The quantity distributed varies from 0.5 to 1 kg/head/day (DSA, 2020). Watering water is conditioned by its availability and the season (stagnant rainwater: the case of wadis for example, troughs whose source of water is a well or borehole, or water bought and brought in by tanker trucks). More than 65% of the time, the water is distributed as much as possible.



Figure 7. Breeding in a steppe environment (pasture) (Photo Faradji, 2021)



Figure 8. Steppe environment (classical sheepfold) (Photo Faradji, 2021)

These studies show that the herders raise their flocks in traditional "Zriba" (Figure 8) or semi-open sheepfolds. The hygiene of the habitat is clean to fairly clean. The building is frequently cleaned and regularly disinfected with lime (4 to 6 times a year). Changing the location of the "zriba" is a more or less common practice. More than 60% of the animals are not separated into batches, but the rest practice this technique (intra-species: sheep/goat or inter-species: sheep: lamb/others).

4. DISCUSSION

Lhoste (1984), defines a breeding system as "the set of techniques and practices implemented by a community to exploit, in a given area, plant resources by animals, under conditions compatible with its objectives and with the constraints of the environment". Landais (1992) states that man, animal and resources constitute the three poles of such a system and if we take the definition of pastoralism by Benlekhal (2004) as "a system of breeding where pasture accounts for more than 50% of the time spent feeding the animals".

Our discussion is based on the three poles of the livestock system; the herder as the pilot of the system, a flock, and through the sheep as the basic unit of the system and the range (steppe environment of the Sfisifa region) as the space of plant resources.

In the region of Sfisifa, sheep breeding (fattening) and agro-pastoralism are the main activities of the breeders (more than 75%), which contributes to supplying the local and regional market with meat. Indeed, the wilaya of Nâama is considered one of the largest financing markets for red meat in Algeria (Atchemdi, 2008). In the past, and during the period of French colonization of Algeria, Algerian sheep meat was exported on a large scale to France and to the major European countries (Bencherif, 2011).

➤ **Pole 01: The breeder**

1- Educational level:

Sheep breeding in the mulieustepics in Algeria in general and the wilaya of Nâam in particular is a family heritage, from father to son. It is a tradition linked to the country. The majority of the breeders in stepic environment in Algeria are old and illiterate (Hadbaoui, 2013). The illiteracy observed is a consequence of long years of colonialism. (Bechchari et al., 2005) describe the breeders as being also old and illiterate. Our survey results show that the rate of primary education is very high (52%) in the pastoral environment of our study region. In fact, 6% of the farmers in our study area have never attended school and 08% of the farmers have a Koranic level. Farmers with a secondary level represent 26% of the total number of respondents and 8% have a university level.

These results indicate that the breeders of the region of Sfisifa have acquired at least a level of education thanks to the reforms undertaken by the Algerian State in the field of rural development and that this trade has not remained the prerogative of illiterate people. This situation has a positive influence on the livestock activity in our study area and facilitates the acquisition of new techniques and livestock practices for the development of this profession in the commune of Sfisifa.

2- Ages:

According to Bechchari et al. (2005) describe the herders as also old and the majority of herders in Algeria's steppe environment are old and illiterate (Hadbaoui, 2013).

In our study, the majority of the farmers surveyed were elderly, with 42% of the farmers surveyed between 51 and 67 years of age, 28% between 36 and 50 years of age, and 8% over 67 years of age. The group of young farmers between 20 and 35 years of age represented only 22% of the total number of farmers surveyed.

The active population represents 22% of the total population of the commune with 586 inhabitants of working age. The main occupation of the population remains trade. The administration and various services offer 73% of the existing jobs in the commune. The other branches of economic activity share the rest of the jobs with 8% for construction and public works (BTP) and only 2% for industrial activity, probably provided by the neighboring town of Ain Sefra (DPSB, 2020).

This explains the lack of interest of young people in pastoral activities and in agro-pastoral activities in general, which has a negative impact on the development of pastoral activities in our study area.

➤ **Pole 02: The animal**

1-Size:

According to Kanoun et al. (2008), there are three classes of breeders (small, medium and large breeders) in the Algerian steppe. At the beginning of independence, the number of owners of 70 or more was less than 100 (Regazzola, 1968 cited by Le Houérou, 1975). Currently, in the Algerian steppe environment the size of the herds is generally average (Laoun, 2007; Hadbaoui, 2013) in contrast to the mountainous areas (Mouhous et al., 2015).

In our study, the average herders ranging from 100 to 300 head represented 58%, large herders with more than 300 head (up to 1000 head or more) represented only 3% of the herders surveyed, and small herders with less than 100 head represented no more than 39% of the herders surveyed.

Small ruminant farming is represented by very small numbers, thus characterizing family farming (Boubekeur and Benyoucef, 2013). In Lebanon, herd size is generally medium (79% of the farms surveyed) against 9% and 12% considered as small and large respectively (Srouret al., 2006).

The examination of the survey results shows that in the Sfisifa region, most households raise small ruminants in association (sheep and goats) and also cattle, with the beginning of the emergence of interest in beekeeping and horses.

The tradition in terms of breeding is embodied mainly by the breeding of sheep, renowned for their rusticity and the valorization of the by-products of the farms and the remains of the household kitchens by their transformation into meat and milk available all year round for the needs of self-consumption.

The majority of the farmers surveyed are agro-breeders where they use organic manure to enrich the land. The most common livestock activity is sheep rearing, while more than 68% of the farmers surveyed rear sheep, and 32% of the farmer's rear sheep with other species of animals (goats, cattle).

This result confirms that of Le Houérou (1975) for whom the animals are too old, culled too late.

2- Race:

This was also observed in Lebanon by Srouret al. (2006) where all the sheep surveyed were Awassi. In Tunisia, Mohamed et al. (2008) identified three breeding systems: crossbreeders, intermediate breeders with a mixture of pure and crossbred animals and purebred breeders. Small-scale breeders, who are very attached to their animals and have limited means, contribute to the preservation of domestic animal breeds (Mohamed et al., 2008). On the contrary, in his study conducted in the Algerian steppe environment, particularly in the Djelfa region, Laoun (2007) estimated that 50% of breeders have two breeds, 34.62% have more than two breeds and the rest have only one breed.

Our result note that the sheep breeds raised in the region of Sfisifa, the local populations seem to have a first order interest Ouled Djellal and Rembi because of its rusticity and the remarkable ease of its fattening. while neglecting the breeding of the red race (Hamra), although it is considered as

the original breed of the region and known by its preservation of the steppe environment and the quality of its meat

➤ **Pole 03: Territory**

Transhumance was a common practice among the great shepherds. It consisted of a double shift called "Achaba" in summer towards Tel and "Azaba" in winter towards the Sahara in the south to rationalize space and time. Today, sedentary grazing is not at all realistic, but has been replaced by sedentary lifestyles (Bourbouze and Donadieu, 1987). According to Bourbouze and Donadieu (1987), only small herds that benefit from crop residues and the support of attentive family assistants tend to sit. Other herds have to move.

According to Laoun (2007), the quest for grass, water and reproduction of the flock are the three main concerns of the herder. Feeding on rangeland, fallow land and stubble is the main form of feeding for sheep (Yakhlef and Taherti, 1999). Whether in steppe areas (Kanoun et al., 2007; Mouhous, 2007; Hadbaoui, 2013) or in mountainous areas (Mouhous et al., 2007), pastures are used throughout the year. The pastures are used in continuous grazing, without rotation and without fodder reserves already noted (Le Houérou, 1975). During the year, winter pastures, barley invert grazing and spring, summer and autumn pastures are used by herds in the semi-arid zone (Yakhlef and Taherti, 1999). The recourse to supplementation is accentuated especially during the period of low fodder availability and obeys both ecological and economic opportunities (Kanoun et al., 2007; Khaldi and Dahane, 2011).

The results of our study showed the existence of three main groups. In fact, the variation in the structure and composition of the farm influences the type of breeding system, for example, for large farms where there are different agricultural activities such as field crops and arboriculture, we find sedentary and semi-sedentary breeding systems that are more resistant and less dependent on grain feed. On the other hand, in small sheep farms or farms associated with arboriculture only, which have a small area of grazing land, the size of the flocks is small, not exceeding 60 head on average. Among these farms, those engaged in fattening resort to renting land for grazing ("achaba"), while the breeders exploit natural pastures and provide supplements to meet the needs of their flocks.

On the other hand, the category of large-scale livestock farmers who manage their farms in an entrepreneurial spirit with a predominance of market logic or they practice transhumance livestock towards the North and South (Achaba and Azaba), dictated by a need for fodder in favourable areas (pre-Saharan rangelands in winter, cereal-growing areas in summer). In addition to accumulating a large number of animals, averaging more than 300 head, these breeders have managed to appropriate a large area of cultivated and collective land, ranging from 22 to 100 hectares.

As for watering, it is provided by agricultural boreholes and or mobile tanks (Bencherif, 2011; Hadbaoui, 2013). For some herders, the supply of water for watering poses a problem, because the majority of wells are monopolised by individuals who own rangelands that are engdal (i.e. in the process of being appropriated, thus marking their origin in a deliberate way) adjacent to the wells according to a strategy of encirclement that is quite deliberate, as emphasised by Medounietal (2004).

5. CONCLUSION

The majority of the breeders surveyed in the region of Sfisifa wilaya of Nâama are old while 42% of the breeders are between 51 and 67 years old and 28% are between 36 and 50 years old and 8% of the breeders are over 67 years old. The group of young breeders who are between 20 and 35 years old represents only 22% of the totality of the breeders surveyed. The rate of primary education

is very high (52%) in the pastoral environment of our study region. In fact, 6% of the farmers have never attended school and 08% of the farmers have a Koranic level. Farmers with a secondary level represent 26% of the total number of respondents and 8% have a university level.

Grazing is a common practice. The use of supplementary feed concentrates is essential. Small and medium-sized producers dominate, with medium-sized producers ranging from 100 to 300 head accounting for 58%, large-scale producers with more than 300 head (up to 1000 head or more) accounting for only 3% of the surveyed producers, and small-scale producers with less than 100 head accounting for no more than 39% of the surveyed producers.

The varietal composition of the herd is almost uniform, with a predominance of the Ouled- Djellal and Rembi breeds, adapting well to the difficult environmental conditions of the stage and demonstrating excellent production performance. although there is no interest in raising the Hamra (Red) breed, which is indigenous to the region and is known for its preservation of pasture and the quality of its meat. The variation in the structure and composition of the farm influences the type of breeding system, for example, in large farms where there are different agricultural activities such as field crops and arboriculture as well as cattle breeding, we find amore resistant breeding system and less dependence on grain feed. These breeders exploit their agricultural residues better and have the largest area of rangeland. On the other hand, small sheep farms or farms associated with arboriculture only have a small area of rangeland.

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