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BIODIVERSITY STATE OF ALGERIAN SHEEP BREEDS

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Abstract
The richness of the variability of the sheep genetic resources is untapped. We have noted the presence of 12 sheep breeds in Algeria such as Ouled Djellal, Rembi, Hamra, Berber, Barbarine, D'man, Sidaou, Tadmit, Tazegzawt, Ifilene, Srandi and Daraa, which are well adapted to the conditions of the environments. Unfortunately, anarchic crossings lead to dispersion and an erosion of the genetic capital of the breeds, the increase of consanguinity in the herds and a decrease of the returns of the farms. The medium-term risk is the absorption of certain «breeds" by others, and the loss of certain characters that make the specificity of our breeds. In addition, the documentation on the diversity of sheep breeds in Algeria is minimal or absent, so several breeds require a phenotypic and zootechnical description to know their performance. This document describes the sheep genetic resources present in Algeria and the diversity between them based on surveys that have been carried out for more than 17 years, in 40 wilayas, based on the phenotypic characterization of these "breeds" in their cradles, in order to make an updated breed distribution map and a new breed classification.
Keywords: Biodiversity, sheep, breed, Phenotype. Geographical distribution.

Introduction

The Algerian sheep farming is primarily intended for the production of red meat, it is the main supplier of red meat in Algeria. Culinary and religious habits mean that consumption of sheep meat per year and per capita precedes that of cattle (2614092 vs 1321433 Qx) (MADR 2012). The importance of sheep farming in Algeria (2,688,000 heads (MADR 2013)), lies in the wealth of its genetic resources. Currently, this herd consists of at least 9 breeds (Ouled Djellal, Rembi, Hamra, Berber, Barbarine, D'man, Sidaou, Tadmit and Tazegzawt) with various characteristics of resistance, prolificacy, meat productivity, milk and wool and good adaptability to arid, steppic and Saharan conditions.

In Algeria, the concept of purebred is still a problem in all domestic species for animal production; and this because of the absence of structures for managing animal populations, on the one hand in terms of phenotypic characterization and on the other hand on performance monitoring, for the purpose of setting standards that could constitute the basis of any breeding program in a given species and a given production category.

Moreover, the introduction of foreign "improved" breeds, even if it remains in an experimental frame (Benyoucef and Belhadi, 1990 unpublished; Benyoucef and Bhehioueche, 1990 unpublished; Benyoucef and Bouchoul, 1992 unpublished) can alter the local genetic potential in the event of uncontrolled reproduction. Unfortunately, for some time and especially after the generalization of mechanization in agriculture, a dangerous phenomenon threatens the genetic diversity of our sheep flock by the assimilation and replacement of certain breeds by others, which goes without doubt to reduce the genetic variability of the herd and thus diminish its capacity to respond to a program of conservation or future improvement.

Indeed, in Algeria for the sheep species, the type of majority breeding remains the extensive breeding and its geographical location in steppe zone, constitute factors favoring the difficulties of non management especially of the reproduction.

However, for the maintenance and genetic improvement of a breed, purebred individuals must be registered and followed by structures managed by the Ministry of Agriculture (creation of genealogical books or Breed Promotion Units (UPRA)).

The characterization of the factors governing sheep farming: breeder, rearing types, buildings, numbers, phenotype, performance and genotyping for the purpose of managing this purebred or crossbreeding population is to be improved.

That said, to embark on an effective program to manage and preserve the diversity of Algerian sheep flocks, an important step is necessary. This step consists of a field survey to make an inventory of this animal potential. This survey will enable us to update the knowledge on numbers, breed and migratory flows, and geographic distribution of sheep flocks; whereas for the study relating to the genotyping of this population is in progress.

Materials and Methods

The work presented here was carried out following a series of several missions planned throughout the national territory, where 40 wilaya (representing 83.33% of the national territory) were visited (except: Chlef, Blida, Bouira, Algiers, Tipaza, Aïn Defla, Tissemssilet and Boumerdès) among the 48 existing in Algeria; and this from the year 1998 to the year 2015. This work in cooperation with the Directorate of Agricultural Services (DSA), technical institutes of livestock (ITElv), High Commission for Development of Steppe (HCDS), the technical institute of Saharan agriculture development (ITDAS), the Forest Conservancy and Breeders is based on the one hand on the basis of a questionnaire and on the other hand on the determination of certain phenotypic criteria: color of the skin (head and legs), color of the wool, the state of entoisoning, the presence or absence of the horns, the size of the animal and the taking of photographs.

In 245 breeders, we consulted 14,000 sheep, 325 blood samples were taken for a subsequent genotypic diagnosis. The numbers grouped by order of breed, number of breeders, number of people consulted for blood sampling and the region concerned are shown in Table 01.

This survey allowed us to target the pure breeds in their cradle of origin in order to make photos, blood samples for the genotypic study of these "breeds" and various information specific to typology and zootechnics.

Table 1. Information on sampling of the breeds studied.

Breed	Number of breeders	Consulted number	Animals measured	Blood sampling	Area
Ouled Djellal	60	10000	250	66	In the 40 wilayas visited
Hamra	12	1000	100	43	Saïda, Nâama, ElBayadh, Souk-Ahras, Tébessa, El-Tarf
Ifilène	05	100	-	11	Illizi, Tamenrasset, Laghouat, Adrar, Bechar
Sidaou	10	500	-	33	Illizi, Tamenrasset, Laghouat, Adrar, Bechar
Rembi	10	200	104	64	Tiaret, Nâama, Djelfa, Ain- témouchent, Laghouat
Tâadmit	05	300	100	30	Rilizene, Nâama, Djelfa
D'man	26	500	354	13	Adrar, Bechar, Ouargla
Berbère	10	300	100	28	El-Tarf, Souk- Ahras, Skikda, Annaba, Tlemcen
Barbarine	05	200	80	22	Oued- Souf, Saïda
Tazegzawt	16	300	74	34	Béjaia, Tizi- Ouzou, Nâama
Srandi	31	400	70	13	All wilayas except southern Algeria (Tindouf, Adrar, Béchar, Ouargla, Illizi, Tamenrasset, Ouargla, Oued Souf, Gharaïa)
Darâa	55	200	50	10	Dans les 40 wilayas visitées
Total	245	14000	1272	367	In the 40 wilayas visited

Results and discussion

This study has allowed us to update the following points:

- The current geographical distribution of sheep "breeds"
- The number of sheep breeds
- The number of different breeds

This survey also allowed us to establish a precise map concerning the distribution of the different Algerian sheep breeds on the national territory (Figure 1) and to classify them into two broad categories according to their numbers in:

- Breeds with high numbers
- Breeds with limited numbers

Indeed, a classification was made in 1857 by Mr Bernis (Imperial Zoological Society of Acclimatization, 1859) which divided the sheep flock into three categories:

- The sheep Touareg, which is called by the naturalists "Sheep Morvan", these sheep have no wool; they are coated with short hair.
- The big-tailed sheep of the province of Constantine, these sheep have been found over a large part of the province, the fat tail is very developed especially in the males.
- The wool and common-tailed sheep in the west of the province of Constantine and that of Algiers and Oran.

A second classification in two groups composed of 8 breeds was born after an observation of the evolution of the numbers (Chellig, 1992):

- The main breeds: Ouled-Djellal, Hamra, Rembi and Taâdmit;
- The secondary breeds: D'man, Sidaou, Berber and Barbarine.

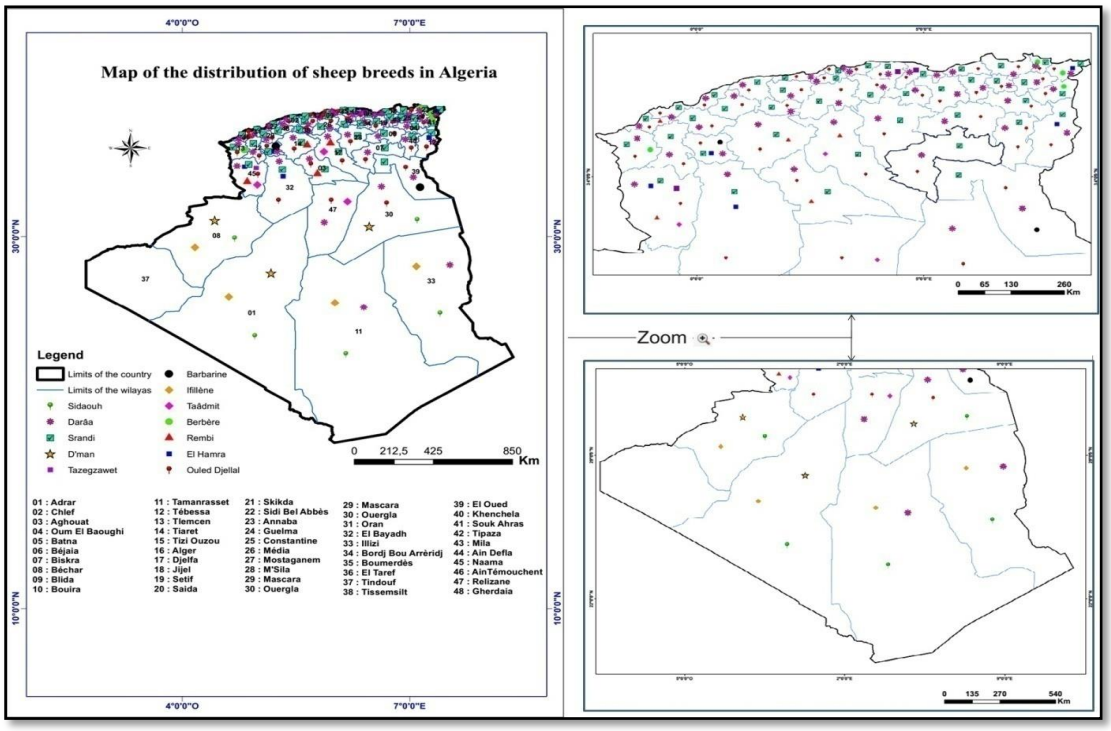

Figure 1. Distribution of sheep breeds studied in the Algerian territory.

If this classification according to the numbers was established on the basis of certain phenotypic criteria established by Sagne (1950), Trouette (1929) and Chellig (1992), it seems today outdated because incomplete.Since then, this population has undergone great changes in the numbers of breeds and their cradle. The evolution of the floks has meant that the classification of numerical order of importance is as follows:

- High numbers breeds: Ouled-Djellal, Hamra, Ifilene and Sidaou;
- Limited numbers breeds: Rembi, D'man, Taâdmit, Berber, Barbarine, Tazegzawt, Srandi and Darâa.

High number breeds

Table 2. Major Characteristics of high-Rated breeds

Breeds	**Ouled Djellal**	**Hamra**	**Ifilène**	**Sidaou**
Wither height (WH)	♂ : 96.32±8.95 cm ♀ : 85.02±5.79cm	♂ : 82± 1.26cm ♀ : 73.46±2.79cm	ND	ND
Live weight (BW)	♂ : 80 à 140 kg ♀ : 55 à 75 kg	♂ : 68 à 72 kg ♀ : 40 à 42 kg	ND	ND
Head colour	White	Mahogany	Multiple	Multiple
Leg colour	White	Mahogany	Multiple	Multiple
Wool colour	White	White	-	-
Fleece	Non-invasive	Semi invasive	Hairs	Hairs
Ears	Long and drooping	Averages	Long and drooping	Small
Tail	Medium and fine	Avearge and fine	Average	Long

Table 3. Major Characteristics of Limited numbers Breeds.

Breeds	Rembi	D'man	Berbère	Barbarine	Tazegzawt
WH (cm)	♂:84.15±4.51 ♀:77.24±2.87	♂: 72.3±0.65 ♀: 63.9±0.21	♂ :68.82±3.58 ♀:66.66±3.35	♂ : 77.00±2.36 ♀:62.08±4.08	♂:87.11±5.47 ♂:79.39±4.31
BW (kg)	♂:70-80 ♀: 50-65	♂:41.6±1.05 ♀: 33.6±0.23	♂:45-50 ♀:35-40	♂:40-50 ♀:30-40	♂:80 - 90 ♀: 50 - 60
Colour of head	Red or slightly greyish	All types of pigmentation possible (black. brown. white and red)	White. brown or black	White. brown or black	White with bluish black spot
Colour of legs	Rousse				
Wool colour	White		White	White	White
Fleece	Semi invasive	Starter wool.Open fleece	Semi-invasive	Semi-invasive	Semi-invasive
Ears	Medium	Medium	Medium	Medium	Medium
Tail	Medium	Long and thin	Medium	Medium	Medium

WH= wither height, BW= body weight

Ouled Djellal breed

The Ouled-Djellal breed (called white Arab breed) occupies most of the northern regions, at the level of the steppe and also establishes north of the Sahara according to our investigation.

Historically, this breed was introduced by Beni-Hilal came to Algeria in the eleventh century, Hijaz (Arabia) through Upper Egypt under the Khalifa Fatimids. It should be noted, that the sheep breeds of the Middle East and Asia are all fat-tailed breeds. It is for this reason that, according to Trouette (1929), the fine-tailed Ouled-Djellal breed with fine wool was introduced by the Romans, great lovers of wool, in the fifth century from Taranto in Italy where this type of sheep exists so far. It is also represented on the tombstones of the ruins of Timgad (Batna) (Chellig, 1992).

According to Sagne (1950), the qualifier of Arabic is related to the territory inhabited by a majority of Arab-speaking breeders; and not introduced by the Arabs "Beni-Hillal" (Trouette, 1929). The ovine population of the steppes was later than the Roman occupation and prior to the Arab conquest. It is therefore in obvious relation with the Zenetes invasions and the development of the great nomadism, born from the appearance of the dromedary in North Africa (Sagne, 1950 and Turries, 1976). This breed also exists in Tunisia under the name of "Bergui or Fine tail of the West" (Snoussi, 2003).

But recently, this breed has expanded at the level of the tell, the steppe and the northern Sahara (Figure 1), which has caused the narrowing of the ranges of breeds: Hamra, Berber, Barbarine, Taâdmit, Rembi and D'man. On the zootechnical level, this extension is accompanied in the western regions by a drastic reduction in the weight of rams that does not exceed 70 kg in an extensive breeding system while it can easily reach 100 kg for the same breeding system and can exceed 130 kg for the rams of exposure in its cradle of origin (East: Sidi Khaled to Biskra). This situation can be explained by the uncontrolled crossbreeding and especially the unsuitability of this breed to live in these regions (this state of affairs is reported by the breeders).

Although the breeding performance is not superior to that of other Algerian breeds, however, the hardiness in the different conditions and the weight productivity of this breed explains its rapid distribution throughout the country, where it tends to replace certain Breeds in their own cradle, such as the Hamra breed (Lafri et al., 2011), this hardiness is conferred on the breed only in the case where the spread of the latter is by assimilation, these effects being the result of the introgression of resistance traits by the indigenous breed. The introduction of this breed especially in the West of the steppe to cause real ecological problem due to its uprooting behavior of plants during grazing (this is not the case of the Hamra breed).

Phenotypic description: The individuals of the Ouled Djellal breed studied are powerful; the major characteristics are presented in Table 2. The cephalic profile is convex, the animals surveyed are clods whereas Chellig (1992) indicated in its description of this breed that the rams have medium spiral horns and absent in ewes (with some exceptions especially in the variety Djellalia). It is a mixed race conducted in an extensive mode (Snoussi, 2003). This breed would be the best meat breed in Algeria according to Harkat et al., (2015).

The varieties of the Ouled Djellal breed : According to our survey, we determined four varieties according to the format of the animal, while Khelifi (1999) described two varieties for this breed: the high variety which is a big walker and a low variety which evolves in the sub-Saharan rangelands, Harkat et al., (2015) have described five varieties of Ouled-Djellal: Ouled-Djellal, Mouidate, Safra, Baida and Hodnia.

Table 4. Characteristics of the varieties of the Ouled Djellal breed

	Ouled Djellal	**Hodnia**	**Chellalia**
Name	Djellalia	Naïlia Chaouiya	Safra ou chagra
Location	Biskra. Toughourt	Sétif. Constantine. Bousaâda. Batna. M'sila et Oum-El-Bouaghi	Tiaret. Laghouat. Djelfa et Saïda
Animal studied	100	90	60
Major characters	- Very homogeneous herds - Poitrine large - Longiligne. haute sur pattes	more appreciated by breeders	- Smaller and lighter - Light yellow head - Members are thin
Body length	101.32±9.25cm	83.64±7.30cm	73.64±5.50cm
Wither height	92.34±6.13cm	82.20±5.95cm	70.66±6.23cm
Fleece	non-invasive	Semi invasive	Very fine wool
Horns	♂ and ♀ unhorned	♀: unhorned. ♂ : horn	♀: unhorned. ♂ : horn

Photo 1. Ouled Djellal ram (Biskra)

Photo 2. Ouled Djellal ram (Setif)

Photo 3. Ouled Djellal ewes (Tiaret)

Another variety called Samiïa or Mssamia, which is in the region of Souamea, Ouled Derradj (M'sila), it has a larger size than the other varieties, and it is excellent dairy. It is dominating the M'sila region.

Hamra breed (called Deghma in Algeria)

The Hamra breed known as "Deghma" is indigenous to Algeria; it is called Beni-Ighil in Morocco (high Moroccan atlas) where it is raised by the Beni-Ighil tribe from which it takes its name. However, in Algeria this breed is known as "Deghma" because of its dark red color. It is very appreciated for its rusticity but especially for the flavor and the delicacy of its flesh. Its population was estimated at 3.2 million head in the early 1990s (Chellig, 1992) to reach 500 000 in 2003 (Commission Nationale AnGR, 2003), which has declined significantly in recent years. This decrease is due mainly to the massive introduction by breeders of the Ouled-Djellal breed into the cradle of this breed. The cradle of the Hamra breed was spread from Chott Chergui to the Moroccan border (Chellig, 1992).

Currently, the Hamra breed is located mainly in the western region of the steppe at the Wilayas of Saïda, El-Bayed, Nama and Tlemcen (Figure 01). Meradi et al., (2013) indicate that the pure Hamra breed only exists at the levels of state-owned ITELv, CNIAAG, and breeders contracted with ITELV. But our survey showed the existence of this breed also at the level of eastern Algeria (Tébessa, Souk Ahras, El-Tarf and Constantine) where breeders prefer to cross the males of this breed with females of Ouled Djellal or Berber breed to improve the butcher quality of the latter.

Phenotypic description: The animals are of medium size. It resembles the Moroccan Beni-Iguil breed (Boukhliq, 2002) and has the same origin (Chellig, 1992). The animal skin is brown, the mucous membranes are black, the hooves are black and the tongue is blue. The wool is white, spiral horns often streaked in black, of medium size in males, females are unhorned (Table 2). The Hamra breed has an ideal conformation of mutton, and a remarkable finesse of the frame. It was preferred to all other breeds on the French market under the name of Oranis because of its organoleptic qualities (Chellig, 1992). These organoleptic qualities are interesting to use in a selection scheme with a heavy breed like the Ouled-Djellal breed.

The varieties of the Hamra breed: The Hamra breed has an ideal conformation of mutton, and a remarkable finesse of the carcass. It was preferred to all other breeds on the French market under the name of Oranis because of its organoleptic qualities (Chellig, 1992). These organoleptic qualities are interesting to use in a selection scheme with a heavy breed like the Ouled-Djellal breed.

Photo 4. Ewe Hamra in Mecheria (Nâama)

Photo 5. Ewe Hamra in Mecheria (Nâama)

Photo 6. Hamra rams in Saïda (ITELV)

Ifilene breed

The Ifilène breed is native to Mali, Niger and Nigeria (Uda breed) (photo 9), it is exploited mainly by the Tuareg population.

Phenotypic description: This breed is high on legs and is characterized by a hooked chamfer in both sexes, long and drooping ears unlike the Sidaou which has short ears, an elongated body, black or brown white and sometimes a mixture of two colors. The animal is leggy with long limbs, a medium tail, the ram has very bulky horns coiled spirally and the ewes are unhorned. It is a breed with hair; its meat is appreciated by the breeders unlike the meat of the Sidaou and D'man breed.

Photo 7. Ifilene ewes in Djanet (Illizi)

Photo 8. Ifilene Ram in Djanet (Illizi)

Photo 09. Uda rams in Nigeria **(Adebambo *et al.*, 2004)**

The varieties of the Ifilene breed: We noticed two types of this breed according to the color of the body:

- One color (white, brown or black) (photo 7) and
- Two-colored (black and white or brown and white: (photo 8).

Sidaou breed

This breed is also called Targuia because it is raised by the Tuareg which live in the Sahara between Fezzan in Libya-Niger and southern Algeria in Hoggar-Tassili. It seems that the origin of the Targuia breed is Sudan (Sahel) (photo 14 and 15). It had an estimated population of 25,000 (Chellig, 1992). Today, according to the survey we conducted, its population is increasing considerably due to the extension of its range throughout the Sahara; it can be estimated at more than 1 million head (Figure 1). It occupies almost all of southern Algeria and during our investigation we found some heads of Sidaou in the region of Laghouat. This breed is prohibited in the regions of the steppe and the Tell because it reaches us from the Sahel; it is considered by the veterinary services as a healthy carrier of many parasites (Gaouar, 1998, unpublished).

Phenotypic description: The Sidaou sheep looks like a goat except that it has a long tail and a bleating of sheep (Table 2). Its body is black, pale pale, white or with a mixture of two colors (photo 10, 11 and 12), with varieties in the distribution of spots. The horns in the male are either absent or are curved and small. The tail is thin, very long almost flush with the ground, and has a white end (photo 13).

Photo 10. Sidaou ram in Djanet (Illizi)

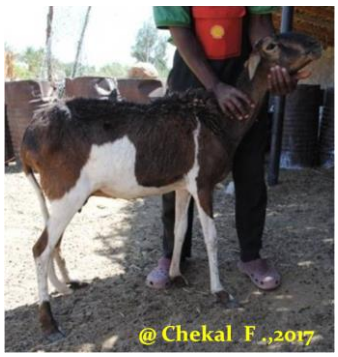

Photo 11. Sidaou ram in Djanet (Illizi)

Photo 12. Sidaou ram in Djanet (Illizi)

Photo 13. Sidaou Ewe in Laghouat

Photo 14. Dubassi ram in Soudan (Djawasra, 2015)

Photo 15. Nili ram in Soudan (Djawasra, 2015)

Rembi breed

The Rembi breed (named "Sagâa" (photo 18) in the region of Tiaret. Historically, the Rembi occupied almost the entire steppe from the east to the west of the country and has a better adaptation to the steppe and mountain range compared to the Ouled-Djellal breed because of its great hardiness. This Rembi sheep is particularly adapted to the regions of Ouarsenis and the mountains of Tiaret. The "Rembi" breed occupies the intermediate zone between the "Ouled Djellal" breed in the East and the Hamra breed in the West. It is limited to its area of extension since it is not found anywhere else (Chellig, 1992).

Currently, according to our survey, its range is narrowing (Figure 1) due to the extension of the Ouled-Djellal breed. Indeed, its cradle has become limited to the central western region of Algeria at the Wilaya of Tiaret and Aïn-Témouchent. It exists only in low numbers in the region of Djelfa and Nama in some breeders, the broodstock production center (ITELV of Tiaret and breeding center in Ain Temouchent) and some pilot farms in these two regions that work in cooperation. We also found this breed in the region of El-Kala and Illizi. This confirms that the distribution of current breeds is anarchic. In addition, its number, estimated at 2.2 million head in 2003, is now drastically reduced and now has only about a thousand animals (Commission Nationale AnGR, 2003).

The varieties of the Rembi breed: Sagne in 1950 presented "Rembi" and "Ouled Djellal" as sub-breed "of the Algerian Arab breed, with two varieties in the" Rembi":

- The Arab sheep with tawny head or sub-breed "Rembi des Amour,"
- The Arab sheep with black head or sub-breed "Rembi de Sidi Aissa".

Other authors (Trouette, 1929; Jores D'Arces, 1947; Magneville, 1959) talked about a single variety of the "Rembi" breed with tawny or yellow head, which people the Oriental, the South of Tiaret and the region of Jebel Amour. According to those authors, the Rembi sheep comes from a cross between the sheep of Djbel Amour (also called "Laroui") and the "Ouled Djellal" breed, because it has the conformation of Ouled Djellal and the color Mouflon that also has huge horns. This breed is particularly hardy and productive; it is highly recommended for upgrading poor mountain pastures (Commission Nationale AnGR, 2003).

Recently, Commission Nationale AnGR, (2003) mentioned two types in this breed:

- Rembi of Jebel Amour (Mountain),
- Rembi of Sougueur (Steppe).

Phenotypic description: The Rembi sheep has practically the same morphological characteristics as the Ouled-Djellal breed (Table 3), except that it has a slightly curved dorsal line and limbs as well as the tawny head (photo 16) or slightly greyish (photo 17) with medium and pendulous ears. The wool is white and covers the whole body up to the knees and hocks. Rams have voluminous and spiral horns (photo 17), and ewes may have horns inclined backwards.

Photo 16. Rembi ewe in Djanet (Illizi)

Photo 17. Rembi ram at El-Kala (El-Tarf)

Photo 18. Red-russeted head with white spot on the neck

D'man breed

It is a Saharan breed of oases in South-West Algeria (Western Erg and Oued Saoura Valley) and southern Morocco (Chellig, 1992). These regions have very close historical links, which explains in large part the presence of the D'man race in both localities (Bouix and Kadiri, 1975). This is not the case in recent years given the political isolation between the two countries; moreover the molecular study that was conducted by Gaouar (2009) proved a clear difference between the two populations. A phenotypic difference also exists; especially concerning the distribution of colours on the body.

The D'man breed (locally the word D'man means crossed) has a very limited number. Currently, some herds in the region of Bechar, El-Menia (El-Goléa) and Adrar. In addition, this breed, which has a phenotype very similar to the Sidaou breed, can easily be confused with animals crossed between the Sidaou breed and a northern white breed, this finding was confirmed by a study carried out by 22 microsatellite markers (Gaouar, 2009).

After a series of surveys, it has been reported that the introduction of Sidaou rams and breeds of northern Algeria in recent years and their excessive breeding use by breeders of the D'man breed has led to Intense interbreeding of the herd originally from the local D'man breed in several oases of the Adrar wilaya. Currently, only remote oases in urban areas maintain pure D'man breedings in the northern Adrar wilaya (Boubekeur and Benyoucef., 2012).

On the zootechnical level, the D'man breed is characterized by exceptional reproductive abilities such as high prolificacy (200%), sexual precocity and fertility. The sheep D'man is able to reproduce all year long. Boubekeur et al., (2015b) conducted lambing on the four seasons of the year on D'Man ewes in INRAA station in Adrar. D'man's animals are able to take advantage of date nuts; breeders have not noticed this feature on any other breed. These characteristics are important to consider in an introgression selection plan between the D'man and the Ouled-Djellal breed, for example. What would enhance this byproduct of the palmerais and decrease the cost of return of feeding. We talk about introgression because the quality of the meat of the D'man breed of Béchar is of poor quality. But on a sample of 22 breeders of the D'man breed, Boubekeur and Benyoucef (2012) concluded that D'man sheep meat is of good quality and has a sweet taste due to the use of dates in the D'man animal nutrition.

Phenotypic description: The animals studied show great morphological variability. The animal D'man is small and has a thin skeleton; with a thin, narrow head, with a hooked profile, the horns are absent in both sexes, but the male lambs are born with drafts which fall at the age of 3 months, a long thin neck where the absence of pendants, the presence of a white spot on the forehead of animals with long white tailed tail are the dominant characters in the D'man breed.

The varieties of the D'man breed: All the types of pigmentations are admitted:

- The multicolored type: this variety has several color combinations (black, brown, white and red) (photo 29).
- The mahogany or brown type (Adrar): The head, limbs and fleece are dark mahogany color. The wool has mahogany reflections more or less pronounced (photo 20).

- Black type (Bechar): The head, limbs and fleece are black, tail and limbs are black with white tips at the tail (photo 21). This type is phenotypically similar to a variety of the D'man breed in Morocco (Boukhliq, 2002).

Photo 19. Female young lamb D'man à Adrar

Photo 20. D'man ewe in Adrar

Photo 21. D'man ram in ITELV of Saïda

Berber breed

It is the oldest of the "races" Algerian, called "wool azoulaï Berber", it is a breed in the process of extinction, it is located in the mountains of Bouhadjar and Souk Ahras, in the region of El -Tarf, Annaba and the Algero-Tunisian borders and Tlemcen. It is named "A'arbia" by the breeders because they believe that it is the oldest of the breeds Algerian and coming from this region, whereas the breed Ouled Djellal is called "Chaouiya", because it is white and large format. Herds of this breed do not exceed 20 heads per breeder.

According to the bibliography, the range of the Berber breed is the mountain range of northern Algeria (Souk Ahras, Maghnia, Tlemcen, Jijel (Collo), Edough, Ouarsenis, and the mountains of Tiaret **(Chellig, 1992)** But our investigation in the mountainous region of Jijel and the mountains of Tiaret showed that this breed is absent from these regions is replaced by the breed Ouled Djellal and Hamra.The disappearance of this breed is also due to the disappearance of the tradition manufacturing of burnous which partly requires azoulai wool for its design.

During a field trip in Sicily in the area of Vallédel Belice, we noticed the presence of a breed (Vallé del Belice, photos 23) which is very similar to our Berber breed, according to breeders this breed was created there about 100 years ago and would be the result of a cross between several breeds (02 males of the island of Malta, the Sarda breed, the Comissana race and the indigenous breeds of western Sicily), the telescope character would have been transmitted by the males of the island of Malta. This Sicilian breed is also known for its very good milk production; moreover, milk is the origin of controlled origin product). In addition, the Sicilian-Sardinian breed that was introduced by colonists to be coupled with cereal production **(Rouissi et al., 2001)** also resembles our Berber breed.

Phenotypic description: It is small, bright white (Azoulaï) waxy wool, robust, usually white, brown, can be black or a mixture of brown and white or black and white. The head is short, concave, thin with medium, thin and horizontal ears. The wool is long and white, sometimes mixed with brown and black, not frizzy, widely open hanging fleece (photo 22). According to the breeders, it is a good dairy. The milk is used for home consumption. Breeders prefer this breed for its rusticity with respect to parasitic pathologies and cold. The quality of the meat is poor.

Photo 22. Berber sheep of the Bouhadjar mountains (El-Tarf)

Photo 23. Vallé del Belice ewes (Sicile, Italie)

Barbarine breed

They exist inside these breed two groups:

Photo 24. Barbarine ewe in the Sahara of Oued Souf

Photo 25. Barbarine ram at the ITELV of Saïda

- Semi-invasive closed fleece type (this is the original type) is the type found in the region of Taleb El-Arbi (Oued Souf). These small animals have white wool, the head and limbs may be white, brown, black or pigmented. The horns are developed in the male while some females have short horns oriented towards the rear. The ears are small and semi-horizontal (photo 24),
- Open fleece type with long and pointed wicks (oriental influence), it is the high type in the Saïda ITELV. These medium-sized animals are elongated with almost invasive wool that covers the entire body. The head and limbs are white (photo 25), slightly brown or black. This type has a semi-fat tail

Taâdmit breed

The Taâdmit breed has been replaced by the Ouled Djellal breed in its cradle, and its genetic origin is a cross between the Eastern Merino and an indigenous breed from the Djelfa region (Jore d'Arce, 1947; Sagne, 1950). This cross was started in the 1860s at the experimental station of Taâdmit, hence its name. The main objective of this crossing was to improve the woolen skills of the Ouled-Djellal breed (Chellig, 1992). The Tâadmit breed that was exploited in the central region of the Algerian steppe currently has only a few hundred animals at the level of the Djelfa wilaya especially in the Taâdmit region and a nucleus of herds at INRAA's Research Station of Hmadna (wilaya of Relizane) (Figure 1). It is being replaced mainly by the Ouled-Djellal breed. Created for the purpose of improving the production of wool, this is not the case at present; probably because of the strong consanguinity in the herd.

Phenotypic description: This breed is characterized by a white head with a hooked profile and bulky horns in the male, a long body. The animal is leggy, the fleece is extended, covering the forehead and down to the hocks and sometimes to the knees. The wool is superfine to fine. The tail is long (photo 26 and 27).

Photo 26. Taâdmit ram in Djelfa (Taâdmit)

Photo 27. Taâdmit young ram in Oum El-Bouaghi

Tazegzawt or Ham (Blue) breed

The Blue race is called Tazegzawt in Kabyle and Ham in the region of Mechria (Naama). It has bluish black pigmentations in the eyes, lobes of the ears, muzzle and lower jaw. This breed is high on legs with an elongated body with white and semi-invasive wool (photo 28). The rams have massive horns spirally wound (photo 29). Pendants exist in most animals.

This breed has been found in different parts of the country, but it is more common:

- At the level of the Kabylie mountains (Tizi Ouzou and Bejaia in areas with an altitude of 1200m) or it has a very small population (up to 300 animals). This breed is the subject of several research projects **(Moulla, 2015; El-Bouyahiaoui, 2015)** (photo 28). In this region, mastitis is common in ewes, while inguinal hernia is common in rams.
- At the level of the region of Mechria (Naama) where the breeders give the name "Ham" to this breed which means the blue colour (photo 29). This breed exists in several breeders (at least 400 animals). There is also a variety of the Tazegzawt breed which is called "Chakhma", it is a variety that has the combination of three colours (white, brown and black or blue) in the skin (head and legs) and the wool (photo 30).
- While in the region of Tlemcen, breeders think it is a variety of Sardi or Srandi breed. It is present at low numbers (3 to 5 heads) in some breeders.

Photo 28. Tazegzawt ewe in Béjaia

Photo 29. Tazegzawt ram in Mechria (Nâama)

Photo 30. Chakhma ewe in Mechria (Nâama)

Photo 31. Martinik ewe and ram in France **(Daniel., 2000)**

The coloring of the head and legs of the Tazegzawt breed resembles to that of the Martinik breed (photo 31), which is a French breed of African origin but the dress of this one looks much more like that of a goat than to a fleece of sheep (Daniel, 2000).

Srandi or Sordi or Sardi breed

The Srandi breed with its counterpart Sardi of Morocco, the Ripollesa breed of Spain and the French breed Causses-du-Lot, exists on the Algerian territory, with a rather large number in the regions near the Algerian-Moroccan borders, its origin is not really defined. This breed is highly coveted by breeders and citizens in this region especially at the time of Eid al-Adha.

Phenotypic description: It has a woolless white head with black spots around the eyes, snout, ends of the ears, legs and at the joints (knees and hocks). This phenotype gives it the name of breed with glasses" (Chikhi and Boujenane, 2005). The chamfer is slightly hooked in the male, rectilinear in the female. The horns are absent in the female and present in the male but with a smaller size than those of the Sardi breed of Morocco. The wool is closed to semi closed. The withers height of these animals varies from 70cm to 80cm with a body weight of 50 to 70Kg. The tail of the animals is medium or short; it is the main character that differentiates between the Srandi of Algeria and that of Morocco where the latter has a long tail (Boujenane, 1999; Boukhliq, 2002; MADRPM / DERD, 2007; Chikhi and Boujenane, 2005).

The varieties of the Srandi breed: We found three varieties:

- Animals with black glasses and black spots around the muzzle and ends of the ears and legs (this is the type of Morocco (MADRPM / DERD, 2007) with a medium or short tail) (photo 32).
- Animals that have the same characters as the first variety except that the color of the spots is brown (photo 33). According to Boukhliq (2002), these brown spots are considered to be eliminatory characters for the Moroccan Sardi breed.
- Animals that have black spots spread around the eyes (photo 34), these spots cover almost the entire head, with black pigmentations around the ends of the ears and legs.

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Figure 32. Srandi ram with black pigments in Naama

Figure 33. Srandi young ram with brown pigments in Mechria (Nama)

Figure 34. Srandi young ram with irregular pigmentation in the Tlemcen area

Daraa or Black

This breed exists throughout the Algerian territory but at low numbers, it is found in flocks with other breeds, it is very similar to the French breed Black Velay (photo 36) (Daniel, 2000), the breed Tunisian black Thibar (photo 37) and a variety of the D'man breed described by Boukhliq (2002) and MADRPM / DERD, (2005). It is estimated that it is between 2 and 5% of the herd. It is characterized by a head and entirely black legs (hence its name Darâa) with a closed or semi-closed wool of brown color (photo 35). The wool of this breed is used for the manufacture of Bernousse. The head is short and thin, the chamfer is rectilinear, the legs are fine, the tail is medium or long, the horns are absent in females but they can exist in males.

According to the breeders, the result of the cross between the Ouled Djellal and the Hamra breed gives birth to animals called Darâa who have black skin (head and legs) and white wool with black or brown spots especially at the shoulders. According to Kanoun et al. (2008), this type is called "Bakâa" in the Djelfa region.

Figure 35. Darâa ewe in the region of Tlemcen

Figure 36. Black French ewe of Velay (Daniel., 2000)

Figure 37. Black ram from Thibar to Zaghouène (Tunisia)

Conclusion

Because of the current situation of sheep farming in Algeria characterized by the absence of any strategy for the preservation and conservation of sheep genetic resources, we are witnessing a loss of certain breeds by phenomena of replacement or assimilation which can lead to the extinction of certain breeds and the creation of others. On the practical level, although these breeds have a great adaptation to very rigorous environments such as the steppe, their loss will generate two consequences. On the one hand, a loss of genetic variability that will lead in the short term, a decrease in the general aptitude (resistance to diseases, reproductive qualities ...) and in the long term a decrease in the possibility of evolving by selection (due to the loss of certain allelic variants). On the other hand, within the species as a whole, the extinction of a breed can lead to the loss of potentially interesting traits and thus a decrease in genetic diversity.

This survey allowed us to establish a map of the distribution of the different Algerian sheep breeds on the national territory (Figure 1) and to notice that the Ouled-Djellal breed occupies most of the northern regions (the Tell and the steppe). This breed also begins an effective implantation at the northern Saharan level. In addition, this direct competitor is the Hamra breed in the Northwest. In southern Algeria, the Sidaou breed and the Ifilene breed occupy almost the entire territory. The other (Rembi, D'man, Berber, Barbarine, Taadmit and Tazegzawt) breeds occupy only very limited areas. While the Srandi and Darâa breeds exist at the level of the whole Algerian territory but with low numbers. These last two breeds as well as the one described for the first time in this article can be the consequence of the non respect of the cradle by the breeders.

Thus, among the 12 breeds (pending confirmation by the molecular tool) those exist on the Algerian territory: Ouled-Djellal, Hamra, Sidaou, Ifilene, Rembi, Taadmit, D'man, Berber, Barbarine, Tazegzawt, Srandi and Darâa, we found following this study the following facts:

- The extension of the Ouled-Djellal breed at the level of the tell, the steppe and the North of the Sahara, and the Hamra breed at the level of eastern Algeria, which caused the narrowing of the ranges of the other breeds.
- The extension of the Sidaou (Targuia) and Ifilène breeds at the level of all the Sahara at the expense of the D'man and Barbarine breeds.
- The extension of the breeds Ouled-Djellal and Sidaou was done either by replacement or (mainly) by assimilation, which has the following consequences:
  - Decreased overall genetic variability of the ovine species due to the loss of a number of allelic variants, presumably due to the decrease in the number of existing breeds.
  - Increased genetic variability of the "breeds" in extension namely the breeds Ouled-Djellal and Sidaou especially in the case where the extension is done by assimilation (integration into the genetic pool of the breed of certain allelic variants of "assimilated' breeds).

In the case of an extension by replacement, we can expect, over time, to lose all the breeds except Ouled-Djellal and Sidaou, but if the extension is done by assimilation, we can expect the creation of many other breeds. This has led to the creation of new breeds, notably Darâa according to breeders. Based on our results, which show changes in numbers, geographical distribution and the socio-economic context in which the different breeds evolve; we have been able to establish a new classification of our Algerian sheep breeds.

In addition, this survey which has been conducted for more than seventeen years, has enabled us to establish a definition of breed that emerges from the socio-cultural context in which the Algerian sheep population is high, and is defined as follows: "The breed is a set of individuals, sharing the same history, the same range at the origin, a very large number of phenotypic and physiological traits and which meet the same socio-economic criteria. Individuals of the same breed necessarily belong to the same species but can come from either a cross between different populations, or the result of a founder effect.

It has also been noted that the change in cultural practices such as the disappearance of nomadism, random crossings and the absence of a ram exchange between breeders accentuates the deterioration of the Algerian sheep flock. In addition, these field trips, allowed us to have a collection of a large number of DNA, 367 samples obtained from unrelated animals belonging to all these breeds and Algerian sheep populations and whose concentrations and the quality proved to be satisfactory. These DNAs constitute the first ovine DNA library in our country. This DNA library is a very important tool for genetic characterization and phylogeny studies between our breeds and also with other "breeds" of neighbouring countries. This DNA library is even more important especially for a country where the technical institutes are devoid of resources and where the animals are scattered over vast territories.

The benefits of this work in the medium term would be:

- Propose a strategy for the conservation of our sheep breeds as a result of their genetic characterization.
- Create national and international research networks in the field of genetic resource management of which our DNA library would be an important part.

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