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Sheep farming systems and management options under semi arid conditions: case of Saouaf farm in Tunisia

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Abstract. The study was conducted at the farm of Saouaf belonging to the Office de l'Elevage et de Pâturage (OEP). Five sheep flocks are hosted at the farm represent two local breeds namely Barbarine or fat tailed, structured in four flocks (2 representing the black head and other 2 representing the white head types), and West thin tailed structured in one flock. The main objective of the present study was to highlight management options of the flocks, reproduction parameters and strategies of amelioration followed by OEP. All parameters of reproduction (fertility, prolificacy, fecundity, etc) were low especially for Barbarine breed. Productivity (weaned lambs/mated ewes) for both breeds was low (<100%). Artificial insemination application was traduced by an increase of prolificacy and other parameters. Results of the present study suggest that technical training of shepherds is the success key of breeding in the farms of Saouaf. Other factors such as selection of breeding rams either towards natural mating or for artificial insemination could be a useful tool to enhance productivity in both breeds.

Keywords. Sheep – Reproduction – Growth-performances – Barbarine.

Systèmes de production ovine et option de son management sous des conditions de semi-aride: cas de Saouaf

Résumé. *Cette étude a été menée dans la ferme de Saouaf qui appartient à l'Office de l'Elevage et de Pâturage (OEP). Le suivi de la ligne de conduite, les paramètres de reproduction et le calendrier fourrager ont été portées sur cinq troupeaux (Barbarine et Queue fine de l'Ouest) et ce depuis 2011/12 jusqu'à 2016/17. Les résultats de paramètres zootechniques sont considérés faibles et ne répondent pas aux normes. La formation technique des bergers pour le suivi correcte du troupeau est nécessaire afin d'améliorer la productivité du troupeau. D'autres tentatives d'amélioration telles que le recours à l'insémination artificielle et la création d'un centre d'élevage bélier semblent être une voie prometteuses pour améliorer la productivité du troupeau.*

Mots-clés. *Ovin – Reproduction – Performances de croissance – Barbarine.*

I – Introduction

In Tunisia, sheep breeding sector is characterized by large variety and repartition in the different parts of the country. Animals of local breeds (Barbarine, West thin tailed and black of Thibar) are raised mainly (95%) for meat production, and to a small extent (5%) for milk production (Sicilo Sarde). In 2017 the national inventory was registering about 7 million heads, from which 3.737.000 were breeding females (OEP, 2017), and raised by 274.000 breeders. Sheep breeding is mainly located in the country's northern (41%) and the central regions (42%). Nowadays, sheep contribute to 42% of the total national red meat production (120.000 tones/year), while cattle contribute equally (43%). The main objective of the present study was to investigate mating management options and the evolution of animal performance (reproduction parameters and average daily gains, ADG) of lambs in the farm of Saouaf during six consecutive years.

II – Material and methods

The farm belongs to Office d'Elevage et des Pâturages (OEP), located in Saouaf region (government of Zaghouan) in the south of Dorsal Tunisian chain mountains. It covers 1523 ha from which 639 ha are cultivated rangelands (acacia, spinless cactus, atriplex, etc.) and 182 ha natural rangelands. It is a semi arid region (precipitation varied between 200-400 mm/year). Livestock production is based on sheep and goats breeding. The total sheep inventory is estimated to 1044 heads in 2017, subdivided in 5 flocks composed of two local breeds: four flocks are Barbarine (50% black head and 50% white head) called also the fat tailed, and one flock is of West thin tailed breed. Goats, a cross-breeding between Boer and Damask breeds, are regrouped in one flock composed by 224 breeding females. Based on reported data on lambing (Table 1), reproduction parameters (fertility, fecundity, prolificacy, productivity, etc) were calculated on six consecutive years (2011/2012-2016/2017) as follow:

- Fertility rate = (lambing ewes/matted ewes)*100;
- Prolificacy rate = (born lambs/lambing ewes)*100;
- Fecundity rate = (born lambs/mated ewes)*100;
- Lamb mortality = mortality in lambs/born lambs;
- Adult mortality = (mortality in ewes/mated ewes)*100;
- Productivity rate = (weaned lambs/mated ewes)*100

Table 1. Data reported on lambing in Saouaf farm during the study years

Items	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
Mated ewes	1319	1167	1027	1046	1002	1044
Lambing ewes	1054	971	893	901	822	807
Born lambs	1100	1011	1066	982	953	929
Mortality in lambs	70	32	51	30	31	53
Mortality in ewes	120	78	58	75	37	93

Lambs were individually weighed at two periods and average daily gain (ADG) was calculated, at 10-30 days (ADG_{10-30}) and at 30-70 days (ADG_{30-70}). Growth data were also used for selection purposes.

III – Results and discussion

1. General overview on flock size and land occupation of the farm

Data on the evolution of the total inventory of sheep in Saouaf farm is presented in Table 2. A continuous decrease was recorded in the course of the study, estimated at about 21%, which was more pronounced for the Barbarine breed. This trend was against the strategic aim of the farm to increase flock size through buying the parts of the shepherds, after a structured selection process. This decrease is attributed to the prolonged drought period that was recorded for four consecutive years (2012-2016) and resulted in a sharp decline in forage production, recorded at national level during this period (OEP, 2017).

Table 2. Evolution of the sheep inventory in farm Saouaf during the study years

Breeds	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
Barbarine	1122	980	859	858	813	841
West fine tailed	197	187	168	188	189	203
Total	1319	1167	1027	1046	1002	1044

Cereal and forage production is a second activity highly developed in the farm Saouaf. Data on the average forage cultivated area and yield production in the farm is presented in Table 3.

The largest area is occupied by oat for hay (200 ha), which is a common forage in this country. In our farms, oat hay constitutes a basal diet for animals all year round (Table 3). The average yield is at about 40 t (fresh material/ha, which is considered in the norms, but hay has a low nutritional value (0.4 UF/kg DM) (Ammar, unpublished data).

Table 3. Forage and cereal grain annual production in the farm of Saouaf

	Barley (grains)	Oat (grains)	Medic (seeds)	Oat hay	Barley forage
Area (ha)	100	100	180	200	150
Yield (/ha)	15 Qt	15 Qt	1 Qt	40 t/ha	15 t/ha

Grain production of both oat and barley is also an important activity for the farm, each of them occupying an area of 100 ha. These crops are grazed in spring and harvested for grain at maturity, which appears to be a common practice in Tunisia in order to meet the early spring feed deficit in integrated crop–livestock production systems as reported by Keles *et al*. (2013). Kelman and Dove (2009) reported greater economic returns for dual-purpose wheat and oat crops compared with a grain-only option, particularly in dry seasons. The use of grazed cereal crops as a basic tool for reducing grazing pressure on rangeland has also been recommended for the Mediterranean basin (Tolu *et al.,* 2012). In order to reduce the gap of conventional forage production in the farm, about 42% of the total area was designed for shrub plantation such as acacia, spineless cactus, *Medicago arborea*, atriplex, etc. These shrub species are expected to cover nutritional requirements of sheep and goats at critical periods of the year (Table 4), together with grazing on harvest residues of hay or grains of cereals in spring and summer, respectively. Despite the diversity of feeding resources, there is increase in using concentrates, which represents a economic burden since its components, (maize, soybean and barley), are not local products and should be imported yearly.

Table 4. Forage calendar followed in the farm of Saouaf

Items	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Mai	Jun	Jly	Aug
Spineless cactus												
Atriplex												
Acacia												
Med. arborea												
Medique												
Green barley												
Hay residues												
cereal residues												
Hay												

2. Mating management

In farm Saouaf, males and females are entering reproduction at 18th months of age and retire at 6-7 years. Mating is organized during Spring (15 May-15 July) to line up maximum feed requirements with the annual peak of range production, so lambing occurs in the autumn (October-December). According to their body condition score males and females receive an energy supplement (flushing) consisting of 400-500 g of concentrate/barley, one or two months before mating and dur-

ing the whole mating season. Males generally receive oat grains in order to enhance their reproductive capacities. Therefore, based on the forage calendar (Table 3), it appears that nutritional requirements of animals are covered in that period. Likewise, one month before lambing (August), females receive concentrate at about 400-500 g/d as supplement to cover their energy requirements. Even though, fertility, fecundity and prolificacy rates (Table 5) were considered low, particularly for fat tailed breed, and did not correspond to the norms (fertility < 90%); however mortality of lambs mainly during the 1st day after lambing is high (>5%). It is pertinent to mention that all reproduction parameters were calculated including both breeds (fat tailed and thin tailed). Herein one should bear in mind that normally for the fat tailed breed during mating, assistance of the shepherd is indispensable in order to lift the female tail and assist the coitus for the male. However, shepherds for the five flocks of the farm are not competent due to the lack of experience and technicality. Moreover contracted shepherds are too old and young people are not interested as there is no juridical text that ensures their rights. Generally in Tunisia shepherds are not paid in money, but they receive a percentage (10%) on the weaned lambs production. Another issue is that the size of flock is considered too high (>200 heads) for an old shepherd, thus he cannot control all the flock at the same time. On the other hand and in order to increase the size of its own flock (10% of weaned lambs) and its profitability, shepherd buy other weaned lambs from non controlled flocks that could introduce a disease in the original flock. This practice could partly justify the high mortality for both young and adult animals (Table 5) that exceed the norms (>5%). The high mortality of lambs could be due also to the fact that lambing occurs in short period (October-December) and shepherd who maintains large flock cannot control the lambings at the same time and often the lambs die in the first days post lambing, due to mainly the lack of colostrum consumption. Birth weight of lambs is ranging between 3.2 and 3.5 kg, depending on the litter size and sex. Lambs receive an energy supplement at one month of age (100 g/d) till end February (300g/d) and are generally weaned at 6 month age (20 kg liveweight on average). Average weight productivity under these conditions is ranging at about 15.5 and 16.5 kg lamb/ewe. This is considered low and attributed to high mortality rate and low fertility. During the whole period of study ADG10-30 averaged between 270-280 g/d and ADG 30-70 between 200-250 g/d. These were in accordance to the growth performance of local breeds under semi-arid conditions (OEP, 2017). In order to improve reproduction parameters, two tools were adopted by OEP. The 1st consists of the use of artificial insemination that was applied lately (2016) for 182 fat tailed breed females and resulted in 54% lambing ewes and 126% prolificacy rate. The 2nd consists of the creation of a rams selection center that aims to distribute the better males for mating purposes. Actually the number of selected males is continuously increasing, being 192 in 2011 and 456 in 2016.

Table 5. Reproduction performance parameters (%) of sheep flocks in Saouaf farm (different breeds are included) during the six consecutive years (2011/2012 – 2016/2017)

Items (%)	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
Fertility	79.9	83.2	87.0	86.1	82.0	77.3
Fecundity	83.4	86.6	103.8	93.9	95.1	89.0
Prolificacy	104.4	104.1	119.4	109.0	115.9	115.1
Lamb mortality	6.4	3.2	4.8	3.1	3.3	5.7
Adult mortality	9.1	6.7	5.6	7.2	3.7	8.9
Productivity	78.1	83.9	98.8	91.0	92.0	83.9

IV – Conclusions

Results of this present study revealed that, although nutritional requirements of the animals seem to be covered at different critical periods of the year, reproduction performance is considered poor. This should be due to, mainly, the lack of experience of shepherds. Different strategies were followed by OEP in order to enhance productivity of the sheep. Others strategies should be followed for the sustainability of livestock production under semi-arid conditions.

References

Keles, G., Ates, S., Coskun, B. and Koc, S., 2013, September. *Re-growth yield and nutritive value of winter cereals*. Paper presented at the 22nd International Grasslands Congress, Sydney.

Kelman, W.M. and Dove. H., 2009. Growth and phenology of winter wheat and oats in a dual-purpose management system. *Crop Pasture and Science*, 60: 921-932.

O.E.P., 2017. Référentielles techniques: Indicateurs du secteur de l'élevage, produit du système d'information de l'Office de l'élevage et des pâturages, Tunis.

Tolu, C., Yurtman, I.Y., Baytekin H., Atasoglu, C. and Savas, T., 2012. Foraging strategies of goats in a pasture of wheat and shrubland. Animal Production Science 52, 1069-1076.