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Effects of management system on performances of the Sicilo-Sarde ewes farmed in Northern Tunisia

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Abstract. The performances of the Sicilo-Sarde dairy ewes were measured in two management systems, practised in Northern Tunisia (region of Béja), that differed by the feeding system, the length of suckling period and the mode of weaning. At Ain Chalou farm, 200 ewes were fed on an improved oat silage and a farm-produced concentrate (18.5% CP) and the suckling period was limited to 45 days. During the last 15 days, ewes were milked twice a day and lambs had access to the residual milk. At Gnadil farm 210 ewes grazing oat were supplemented with commercial concentrate (15% CP). Suckling period was extended to 60 days, where a once a day milking was combined to suckling during the 8 last days. During the milking period, 10 individual milk controls were carried out for all the ewes every 21 days. Body weight variations of ewes from lambing to the beginning of milking, and lambs growth from 30 to 70 days were recorded. Improving the feeding system and shortening suckling period improved total milk production (Ain Chalou: 121 l; Gnadil: 105 l, $P < 0.01$). Losses in ewe's body weight between lambing and the beginning of milking period was lower at Ain Chalou (–37.5 g/day) than at Gnadil farm (–78.6 g/day, $P < 0.05$). Lamb growth at 30-70 days was higher ($P < 0.05$) in Ain Chalou than in Gnadil (respectively 115 and 105 g/day). Under both management systems, the 4-year-old ewes had the highest ($P < 0.05$) milk production than any other age group. Ewes suckling two lambs produced more milk ($P < 0.01$) than those with singles. It was concluded that in the farms studied, the improvement of the feeding system and the shortening of the suckling period in Sicilo-Sarde breed ewes improved the amount of commercialised milk and lambs growth, and reduced body weight losses in ewes. The main factors affecting milk yield were the age of ewes and the number and the sex of suckled lambs.

Keywords. Management – Performances – Sicilo-Sarde – Ewes.

Effets du système de gestion sur les performances des brebis de race Sicilo-Sarde élevées au Nord de la Tunisie

Résumé. *Les performances des brebis laitières de race Sicilo-Sarde ont été mesurées dans deux systèmes de conduite au Nord de la Tunisie (région de Béja). Ils diffèrent par le régime alimentaire et la durée de la période d'allaitement ainsi que par le mode de sevrage. À la ferme Ain Chalou, 200 brebis ont reçu un régime amélioré formé d'ensilage d'avoine et d'un concentré fermier (MAT : 18,5% MS), avec une limitation à 45 j de la période d'allaitement. Pendant les 15 derniers jours, des brebis ont été traites deux fois par jour et les agneaux ont eu accès au lait résiduel. La ferme Gnadil comporte 210 brebis qui pâturent sur un parcours d'avoine en vert et reçoivent une complémentation à base d'un concentré commercial (15% CP). La période d'allaitement était de 60 jours, avec un allaitement combiné à une traite par jour durant les 8 derniers jours. Pendant la période de traite, et pour toutes les brebis des deux troupeaux, 10 contrôles laitiers espacés de 21 jours ont été effectués. Par ailleurs, les variations de poids des brebis de l'agnelage au début de la traite, et la croissance 30-70 des agneaux ont été mesurées. L'amélioration du système d'alimentation et la réduction de la période d'allaitement ont amélioré ($P < 0,01$) la production laitière totale (121 et 105 l respectivement à Ain Chelou et Gnadil). Les pertes de poids vif des brebis entre l'agnelage et le début de la traite étaient plus faibles ($P < 0,05$) à Ain Chalou qu'à Gnadil (–37,5 et –78,6 g/j respectivement). La croissance 30-70 jours des agneaux était plus élevée ($P < 0,05$) à Ain Chalou qu'à Gnadil (respectivement 115 et 105 g/j). Sous les deux systèmes de conduite, les brebis âgées de 4 ans avaient la production laitière ($P < 0,05$) la plus élevée en comparaison avec toutes les autres catégories d'âge. Les brebis allaitant deux agneaux ont produit plus de lait ($P < 0,01$) que celles avec un seul. Il est à conclure que dans les deux fermes étudiées, l'amélioration du système d'alimentation et le raccourcissement de la période d'allaitement chez les brebis de race Sicilo-Sarde ont amélioré la quantité de lait commercialisée, la croissance des agneaux et réduit les pertes sur l'état corporel des brebis. Les principaux facteurs affectant la production laitière du lait étaient l'âge des brebis et le nombre et le sexe des agneaux allaités.*

Mots-clés. *Conduite – Performances – Sicilo-Sarde – Brebis.*

I – Introduction

In Tunisia, the dairy sheep heard is almost exclusively composed of the Sicilo-Sarde breed. The latter resulted from a crossing between the Sarde breed and probably the Comisana brought from Sicily (Jolivalt, 1990). It is integrated with the cereal production, mainly in the large plains of the North. The size of this sheep population is in alarming fall and decreased from 200,000 at the end of the eighties to less than 20,000 ewes currently. Milk production is low and varies from 60 to 120 kg per year. This is mainly related to a mixed-end management, which is little adapted to a dairy breed. Indeed, milk yield is often penalized by a long period of suckling (3 to 5 months) and a short period of milking (averaged 4 months). This situation is worsened by the practice of a free breeding over a duration from 2 to 3.5 months, which implies dispersed lambing making difficult the programming of weaning and milking. The low productivity seems also to be related to a limited genetic potential. Indeed, the number of the ewes registered in the official milk control is low (7%) and insufficient to constitute a basis of selection. This is in addition to the problems of consanguinity. The most of total produced milk is used for cheese making. In the area of Bizerte, milk is transformed industrially into high quality cheeses. Whereas in the region of Béja, it is transformed traditionally by the farmers themselves or by artisans into soft cheeses (Sicilien) or Ricotta, with an output ranging from 15 to 20% (Moujahed *et al.*, 2004). The aims of this work were to study the effect of modification of management, through an early or progressive weaning, and the improvement of the feeding systems on the performance of the Sicilo-Sarde ewes in the region of Béja.

II – Materials and methods

Two farms in the region of Béja (North-west of Tunisia, humid) were used in this study. Ain Chalou is a private farm of 300 ha of surface with 190 ewes (mean 4.95 years old). They are housed in a well-aired sheep barn, with metallic racks and troughs. Gnadil farm is an 818 ha surface cooperative-farm with 202 ewes (average age 5.2 years old). They are housed in a moderately-aired sheep barn, with both fixed and mobile metallic racks and troughs.

At Ain Chalou and during the milking period, ewes are fed mainly oat silage *ad libitum* (mixed with 5% of wheat bran and 0.35 of salt on wet matter bases at ensiling). They are supplemented with 500 g of farm-produced concentrate (CP: 18.5% DM; 55% of barley, 25% of wheat bran, 15% of soybean meal and 5% of mineral and vitamin supplement). At Gnadil farm, 210 ewes were mainly grazing oat and supplemented with 500 g of a commercial concentrate (15% CP).

At Ain Chalou, ewes were suckled once a day during the 4 first weeks after lambing. Then ewes were milked twice a day and lambs were allowed to suck only 15 to 20 min after every milking to obtain residual milk. At the sixth week lambs were completely weaned and ewes were exclusively milked until drying of. At Gnadil farm, suckling period was extended to 60 days, where a once-a-day milking practice was combined to suckling during the 8 last days. In both farms, ewes had free access to water.

During the milking period, 10 individual milk controls were carried out for all the ewes every 21 days, and milk yield was calculated. In each farm bodyweight of a 15-ewes sample was measured monthly and variation between lambing and weaning (LW) or weaning-drying (WD) were recorded. Lambs were weighted every 21 days and growth at 10-30 and at 30-70 days were determined.

Feeds (1 mm screen) were analyzed for DM, ash and crude protein (CP) according to AOAC (1984). Neutral detergent fibre (NDF), acid detergent fibre (ADF) and acid detergent lignin (ADL) were analyzed as described by Goering and van Soest (1970).

The General Linear Model procedure (GLM) of SAS (1985) was used to analyze data. Duncan's multiple range test was used to compare treatment means.

III – Results and discussion

Chemical composition of the main used feeds is presented in Table 1. The farm-made concentrate used in Ain Chalou was higher in CP than the commercial concentrate of Gnadil farm.

Table 1. Chemical composition of the main feeds (% DM)

	Ash	CP	NDF	ADF	ADL
Ain Chalou					
Oat silage	12.6	10.8	50	32	8.1
Concentrate†	3.9	18.5	23	5	1.3
Gnadil					
Oat (grazing)	12	12	46	29	7.2
Concentrate††	6.8	15	25	6	1.6

†Farm-made concentrate.
††Commercial concentrate.

The effect of management system on milk yield is presented in Table 2. Milk yield during the milking period was higher ($P < 0.01$) in Ain Chalou than in Gnadil (121 and 105 l, respectively). Theses productions are higher than the mean value in private farms of the region, estimated as 68 l/ewe (Moujahed *et al.*, 2004). The difference may be attributed to the improved feeding system and the relative shortening of the weaning time. Indeed, Sicilo-Sarde flocks are generally fed in extensive context (Ben Hammouda and Zitoun, 1988). In unpublished enquiry, it was found that feeding dairy ewes is mainly based on hay, straw and harvesting residues, with small amounts of concentrate supplement. Furthermore, farmers practice a long sulking period ranging from 3 to 5 months. The significant difference between the two farms could be ascribed to the differences in the milking period duration (233 and 224 days respectively in Ain Chalou and Gnadil) and mainly to the improvement of the feeding system (higher level of CP in concentrate).

Table 2. Effect of management system on ewes' milk yield and bodyweight variation and lamb growth rate at 10-30 and 30-70 days

Parameters	Management system		SEM
	Ain Chalou	Gnadil	
Milk yield (l)	121[a]	105[b]	1.97
Duration of milking period (days)	233	224	
Body weight change (g/day)			
LW period	–37.5[a]	–78.6[b]	12.40
WD period	46.9	50.0	8.12
Lamb growth (g/day)			
10-30 days old	126	130	2.01
30-70 days old	105[a]	115[b]	1.22

[a,b]Values in the same line followed with different superscripts are significantly different ($P < 0.05$).

Lamb growth 10-30 and 30-70 days are presented in Table 2. No differences were observed in growth at 10-30 days between the two farms while at 30-70 days growth was higher ($P < 0.05$) in Gnadil than in Ain Chalou (respectively 115 and 105 g/day). This found result is in agreement with those reported by Djemali *et al.* (1995) and was influenced by the mode of lambing. In fact, in

Sicilo-Sarde breed, lamb growth was generally lower than that in the other dairy ewes and single lambs had higher growth than the twins (Gargouri, 1990).

Under both management systems, the 4-years-old ewes had the highest ($P < 0.05$) milk production than any other age group (Table 3). Our result confirms those reported by several authors (Ben Hammouda and Zitoun, 1988; Djemali *et al.*, 1995) for Sicilo-Sarde and others (Fuertes, 1997; Othmane, 2002) for Churra breeds. In fact, in Sicilo-Sarde ewes, milk yield is higher in mutiparous than in primiparous (Khaldi, 1979). Furthermore, according to Ben Hammouda and Zitoun (1988), Sicilo-Sarde ewes have the highest milk yield generally between the forth and the fifth lactation.

Table 3. Effect on age of ewes on average milk yield

Production	Age (years)							
	2	**3**	**4**	**5**	**6**	**7**	**8**	**SEM**
Milk yield	130^{c}	181^{ab}	208.4^{a}	45.9^{bc}	152.5^{b}	154.2^{b}	150.4^{b}	56.5

^{a,b,c}Values with the same letter do not differ significantly ($P < 0.05$).

The effect of number and sex of suckled lambs on average milk yield is presented in Table 4. Ewes suckling twins (whatever the sex) produced more milk than those with singles. These results are in line with those reported for Sicilo-Sarde by Djemali *et al.* (1995) and for Churra by Fuertes (1997) and Othmane (2000), but are not in line with those reported by Ben Hammouda and Zitoun (1988). Physiologically, our result could be explained by the fact that more lambs correspond to a larger surface of placenta which induces a higher level of mammogenic hormones and more developed mammary glands (Chene *et al.*, 1988 cited by Othmane, 2000).

Table 4. Effect of number and sex of suckled lambs on average milk yield

Production	Sex and number of suckled lambs†					
	1	**2**	**3**	**4**	**5**	**SEM**
Milk yield	140.3^{c}	111.6^{c}	223.3^{a}	192.7^{ab}	183.6^{b}	36.8

†1: ewes suckling one male; 2: ewes suckling one female; 3: ewes suckling two males; 4: lambs suckling two females; 5: ewes sucking one male and one female.
^{a,b,c}Values with different superscripts are significantly different ($P < 0.05$).

IV – Conclusions

It was concluded that in the studied farms, the improvement of the feeding system and the shortening of the suckling period in Sicilo-Sarde breed ewes enhanced the amounts of commercialised milk comparatively to local references, improved lambs growth, and reduced body weight losses in ewes. The main factors affecting milk yield were the age of ewes and the number and the sex of suckled lambs.

References

AOAC, 1984. *Official Methods of Analysis*. Washington DC, USA: Association of Official Analytical Chemists.

Ben Hammouda M. and Zitoun K., 1988. Effet du milieu sur la quantité moyenne de lait par jour de traite en race Sicilo-Sarde. In: *Revue de l'INAT*, 3(1). p. 81-89.

Djemali M., Ben M'Sallem I. and Bouraoui R., 1995. Effets du mois, mode et age d'agnelage sur la production laitière des brebis Sicilo-Sarde en Tunisie. In: *Options Méditerranéennes, Series Cahiers*, Vol. 6. p. 111-117.

Fuertes J.A., 1997. Estudio de la producción, composición, recuento celular de la leche y de la morfología mamaria en el ganado ovino de raza Churra: Aplicación al control lechero oficial. PhD Thesis: Universidad de León (León, Spain). 196 p.

Gargouri M., 1990. L'expérience tunisienne en matière de control laitier sur la race Sicilo-Sarde. Project BNA/CEE. Journées d'informations OEP, 22-24 November 1990. 10 p.

Goering H.K. and van Soest P.J., 1970. *Forage Fiber Analysis*. Agricultural Handbook, No. 379. Washington DC, USA: Agricultural Research Service, USDA. p. 1-9.

Jolivalt M., 1990. La brebis laitière Sicilo-Sarde, en milieu unité coopérative de production agricole-UCPA: Historique, conduite, production, possibilités et limites de son amélioration. In: *Journées d'information – Débat "L'élevage ovin laitier et son organisation"*. Projet d'assistance technique aux UCPA BNA/CEE. 22-24 November 1990.

Khaldi G., 1979. Influence du sexe de l'agneau et de l'age de la brebis sur la production laitière de la race barbarine. In: *Ann. INRAT*, 52(2).

Moujahed N., Kayouli Ch., Damergi C. and Jounaidi A., 2004. Performances de la brebis Sicilo-Sarde et transformation fromagère dans le Nord de la Tunisie. In: *Développement des Régions Méditerranéennes, Scientifique Conference of the Symposium International Cheese Art 2004*, Ragusa, Sicily (Italy), 2004.

Othmane M.H., 2000. Paramètres génétiques de la composition du lait de brebis et du rendement fromager en laboratoire. PhD Thesis: Universidad de León (León, Spain). 211 p.

Othmane M.H., 2002. Genetic parameters for lactation traits of milking ewes: Protein content and composition, fat, somatic cells and individual laboratory cheese yield. In: *Genet. Sel. E.*, 34. p. 581-596.

SAS (Statistical Analysis Systems Institute), 1985. *SAS User's Guide: Statistics*, *version 5.* Cary, NC, USA: SAS Inst. Inc.