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Milk production of ewes rose in feed lot or on pasture of several forage species

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Abstract. The objective of this research is to study the forage production of several forage species and the milk production of dairy ewes on pasture (P) from these forages. The milk produced with this feeding system was compared with the milk coming from the feedlot (FL) type of feeding one in the Mediterranean region. The FL regimen was based on oat silage, whereas pastures were green barley (GB), vetch (V), ray-grass (RG) and triticale (T). The concentrate supply varied from 300 to 600 and 0 to 400 g/day/ewe for FL and P feeding system, respectively. The dry matter forage production was 2.2, 4.2, 5.5 and 6.0 t/ha for GB, RG, T and V, respectively; the largest period exploitation was for the ray-grass. Milk production did not differ among GB, V and RG pastures (617 ml/day). This production level OF the three forages was significantly higher than FL one (363 ml/day) while the amount of concentrate feed was nearly twice smaller. Triticale pasture resulted in a higher milk yield (735 ml/day); which was twice higher than FL ewes receiving the same supply concentrate. Milk fat and protein content (g/kg) were often higher for ewes in FL than for ewes rose on all pastures. However, the last had usually higher fat and protein yields (g/day) than the first. To have cultivated pasture-based diets during all lactation period, the lambing season should be the winter where green forage is available. For this season, the milk production was 650 *vs* 400 ml/day for autumn lambing one. In conclusion, for the Mediterranean region, there are several opportunities for forage production. Several cultivated pastures resulted in higher ewe's milk production comparing to feedlot system. They need low concentrate supply, which permit to reduce the feeding cost.

Keywords. Forage species – Ewes – Milk production – Feedlot – Concentrate.

Production laitière des brebis conduites en bergerie ou sur pâturage de plusieurs espèces fourragères

Résumé. *L'objectif de cette synthèse est d'étudier la production fourragère de plusieurs espèces et la production laitière de brebis conduites sur pâturage (P) de ces fourrages ou en bergerie (FL) dans la région de la Méditerranée. En bergerie, l'alimentation est à base d'ensilage d'avoine ; les pâturages ont concerné l'orge en vert (GB), la vesce (V), le ray-grass (RG) et le triticale (T). La complémentation en concentré a varié de 300 à 600 et de 0 à 400 g/brebis/jour respectivement pour les systèmes alimentaires FL et P. La production fourragère en tonnes de matière sèche/ha était respectivement de 2,2, 4,2, 5,5 et 6,0 pour GB, RG, T et V ; la plus longue durée d'exploitation était avec le ray-grass. La production laitière était similaire avec le pâturage de GB, V et RG (617 ml/j). Ce niveau de production était significativement supérieur à celui du FL (363 ml/j), alors que la quantité de concentré était pratiquement 2 fois inférieure. Le pâturage du triticale engendre un niveau de production plus élevé (735 ml/j) ; il est deux fois plus élevé que celui des brebis du FL recevant la même quantité de concentré. Les taux butyreux et protéique (g/kg) sont souvent plus élevés avec le système FL qu'avec le système P. Mais les quantités de matières grasse et protéique (g/j) sont toujours plus élevées avec le dernier système. Pour avoir des pâturages cultivés durant toute la lactation, la saison d'agnelage devrait être l'hiver où le fourrage vert est disponible. Pour cette saison, la production laitière était 650 vs 400 ml/j pour les agnelages d'automne. En conclusion, pour la région de la Méditerranée, il y a plusieurs opportunités de production fourragère ; ces pâturages cultivés, avec de faibles apports en concentré, engendrent plus de lait que le système bergerie, ce qui permet de réduire le coût de l'alimentation.*

Mots-clés. *Espèces pastorales – Brebis – Production laitière – Feedlot – Concentré.*

I – Introduction

In the Mediterranean area, sheep feeding is based on natural resources, range land and stubble. Dairy ewes were conducted similarly to other breeds on these resources or in feedlot on hay, silage and concentrates which price increased dramatically. However, the humid and sub-humid regions present an important forage fodder potential and must play a more determining role in ruminants feeding. Traditionally in these areas, oat and barley are the most immature cereals used as grazing forage for sheep. However, several other forage species could be successfully cultivated. Thus, the objective of this study was to compare forage production of these species and the Sicilo-Sarde ewe's milk produced on grazing of these cultivated forages or in feedlot.

II – Material and methods

The experiments were carried out in the dairy experimental farm (Lafareg) of the National Institute of Agricultural Research of Tunisia (INRAT) into seven trials. The region has a sub humid climate with 650 mm annual precipitation. The major quantity (80%) of precipitation occurs between October and May. A flock of dairy ewes from Sicilo-Sarde breed was used during lactation stage. When the feedlot system was studied, regimens were based on oat silage and the concentrate supply varied from 400 to 600 g/day/ewe. Cultivated pastures used in grazing system in rainfed conditions were green barley (GB), vetch (V), ray-grass (RG) and triticale (T) with a concentrate supply varying from 0 to 400 g/day/ewe. For this system, animals were conducted during the day on a rotational grazing; at the beginning of each experiment, the sward height was 15 to 20 cm; when it becomes 7 cm, ewes have been changed for the following paddock and so forth. Herbage yield was determined before entering each paddock by cutting 15 quadrates (0.25 m^2/quadrate) of pasture at 6 to 8 cm above the ground. The whole grass production was estimated according to this sample weight and the paddock area. The samplings were pooled and taken for chemical composition. The last experiment aimed to superpose the lactation stage with the forage grazing availability. For this, the half of the flock (W) was raised on a summer mating season to have a lambing season in winter (W) coinciding with pasture production. The other half (A) was raised under a traditional system, spring mating and autumn (A) lambing season; ewes were fed with oat silage and 600 g concentrate during the first months of lactation (October, November and December). During the same stage, ewes of the W system were fed on ray grass grazing and 300 g of concentrate. For all experiments, ewes were daily milked twice a day during all experimental periods. Individual milk yield was recorded at less twice a month and individual milk samples (20 ml) were kept (4°C) and analyzed for milk fat and protein content.

III – Results and discussion

1. Forage production

Total herbage production and chemical composition of used forages are reported in Table 1. For all cultivated species, an increase in herbage production was noted since the second paddock traducing plant growth, since grazing was rotational. The herb growth allowed a second grazing on the same paddocks for all species. For the annual species, barley, vetch and triticale, the grass production was higher during the first than the second grazing, with higher crude protein and less fibre content for the first grazing. For ryegrass the situation was different; the herb production was higher in second than in the first grazing passage with the same chemical composition. However, total production was more important for ray-grass and vetch than for barley and triticale. Furthermore, the ryegrass culture, with the largest period exploitation, allowed a third grazing or an herb cut for conservation as hay.

Table 1. Total herbage production and mean chemical composition of green barley, triticale, vetch and ryegrass

	Green barley	Vetch	Triticale	Ryegrass
Dry matter (t/ha)	2.2	6.0	5.5	4.2
DM (g/kg)	16.4	14.7	22.2	22.6
Ash (g/kg DM)	11.7	11.3	9.9	13.3
Crude protein (g/kg DM)	13.6	18.8	11.0	12.4
Crude fibre (g/kg DM)	26.0	25.9	26.3	27.5

2. Milk performance

Milk yield and composition for all regimens were reported in Table 2. For ewes in middle lactation and with 25 ewes/ha as a stocking rate, mean daily milk production was similar for green barley and vetch (460 ml) with or without concentrate supply. However, the milk produced on vetch contained significantly more fat ($p < 0.001$) and protein ($p < 0.05$) than that produced on green barley. For both forage species, milk fat content was higher ($p < 0.001$) in not supplemented than supplemented ewes (Atti and Rouissi, 2003). For a higher stocking rate, ewes grazing ray grass supplied with concentrate produced higher ($p < 0.001$) daily milk yield than not supplemented ones. Not supplemented ewes had the highest fat content value (7.65%). Milk fat content is closely and negatively associated with dietary fiber intake (Pulina *et al*., 2007); given the substitution effect of concentrate, supplemented ewes may have consumed less forage and thus less fiber (Avondo, 2005).

Table 2. Mean milk yield and composition according to experimental diets

	Green barley†	Green barley††	Vetch†	Triticale†	Ryegrass†	Feedlot†
Milk yield (ml/d)	618	460	430	735	630	387
Fat (%)	7.7	7.3	8.5	7.9	8.1	8.4
Fat (g/d)	47.6	33.6	36.6	58.1	50.7	32.5
Protein (%)	5.5	5.2	5.4	5.0	5.3	5.6
Protein (g/d)	34.0	23.9	23.2	36.8	33.4	21.7

† Beginning lactation; †† middle lactation.

For ewes in beginning lactation and with the same concentrate supply and stocking rate, milk production did not differ among GB and RG pastures (617 ml/day). This level was significantly higher than FL one (363 ml/day) where ewes received quite the double of concentrate supply (Atti *et al.*, 2006). Also, ewes grazing triticale pasture had higher milk yield (735 *vs* 418 ml/d) than ewes fed silage and receiving the same supply concentrate (Maamouri *et al.*, 2009).

For all experiments, milk fat and protein content (g/kg) were higher for FL ewes than grazing ones. This phenomenon is in relationship with the higher quantity of concentrate for FL groups, since the distribution of increasing yields of concentrate lead to a considerable increasing in fat and protein milk content (Bocquier and Caja, 2001). The low contents of fat and protein were also associated to a great milk production for grazing ewes and resulted from the dilution effect (Othmane *et al.*, 2002). However, the grazing ewes had usually higher fat and protein yields (g/day) than the FL ones (Table 2).

The lambing season affected ($p < 0.001$) the milk production yield, which was 400 and 650 ml/day for autumn and winter lambing ewes, respectively; despite concentrate supply was

higher (+300 g) for the first group. So winter lactation on forage grazing was higher than autumn one on FL system.

IV – Conclusion

For the Mediterranean region, in rainfed conditions, there are several opportunities for forage production as grazing for ewes. Several cultivated pastures based on triticale vetch, ray-grass etc resulted in higher ewe's milk production comparing to feedlot system with oat silage. They need limited amounts of concentrate supply. So, the pasture for winter lambing season management can be used in sub-humid Mediterranean region to produce more milk and reduce the concentrate feeds and feeding cost.

References

Atti N. and Rouissi H., 2003. Effets de la complémentation sur la production laitière des brebis Sicilo-Sarde en pâturage de l'orge en vert et de la vesce. In: *Ann. INRAT*, 76, p. 209-224.

Atti N., Rouissi H. and Othmane M.H., 2006. Milk production, milk fatty acid composition and conjugated linoleic acid (CLA) content in dairy ewes raised on feedlot or grazing pasture. In: *Livestock Sciences*, 104, p. 121-127.

Avondo M., 2005. Prediction of feed intake in the Italian dairy sheep. In: *Ital. J. Anim. Sci.*, 4, p. 35-44.

Bocquier F. and Caja G., 2001. Production et composition du lait de brebis ; effets de l'alimentation. In : *Prod. Anim.*, 14, p. 129-140.

Maamouri O., Atti N., Ferlay A., Kraeim K., Mahouachi M. and Chilliard Y., 2009. Effects of linseed and *Acacia cyanophylla* intake on performance and milk fatty acid composition in Sicilo-Sarde ewes fed oat silage or grazed triticale pasture. In: *XIth International Symposium on Ruminant Physiology*, Clermont-Ferrand, France, 6-9 September 2009 (ISRP 2009).

Othmane M.H., Carriedo J.A., De La Fuente L.F. and San Primitivo F., 2002. Factors affecting test-day milk composition in dairy ewes, and relationships amongst various milk components. In: *J. Dairy Sci.*, 69, p. 53-62.

Pulina G., Nudda A., Battacone G. and Cannas A., 2007. Effects of nutrition on the contents of fat, protein, somatic cells, aromatic compounds, and undesirable substances in sheep milk. In: *Anim. Feed Sci. Technol.*, 131, p. 255-291.