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in

López-Francos A. (ed.), Jouven M. (ed.), Porqueddu C. (ed.), Ben Salem H. (ed.), Keli A. (ed.), Araba A. (ed.), Chentouf M. (ed.).  
Efficiency and resilience of forage resources and small ruminant production to cope with global challenges in Mediterranean areas

Zaragoza : CIHEAM

Options Méditerranéennes : Série A. Séminaires Méditerranéens; n. 125

2021

pages 343-346

Article available on line / Article disponible en ligne à l'adresse :

<http://om.ciheam.org/article.php?IDPDF=00008020>

To cite this article / Pour citer cet article

Caillat H., Duprat A., Bruneteau E., Ranger B., Paraud C., Bossis N., Jost J. **Use of grazing according to the kidding period to improve the sustainability of dairy goat farms in France.** In : López-Francos A. (ed.), Jouven M. (ed.), Porqueddu C. (ed.), Ben Salem H. (ed.), Keli A. (ed.), Araba A. (ed.), Chentouf M. (ed.). *Efficiency and resilience of forage resources and small ruminant production to cope with global challenges in Mediterranean areas.* Zaragoza : CIHEAM, 2021. p. 343-346 (Options Méditerranéennes : Série A. Séminaires Méditerranéens; n. 125)



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# Use of grazing according to the kidding period to improve the sustainability of dairy goat farms in France

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**Abstract.** France is the largest producer of goat's milk in Europe with about 550 millions of liters collected. Since 2000, goat farms have moved towards intensive farming, largely increasing their need in purchased inputs, particularly feeds. To increase productivity, grazing has been gradually abandoned and indoor breeding has been developed. Resorting again to grazing could be a solution for improving the sustainability of goat farms, with a better control of feeding costs and a greater security of systems. In 2012, a system-experiment in Western France was designed at Inra to determine if this low-input solution would lead to high-performance farming systems. The system-experiment aimed at evaluating 2 independent farms of 60 Alpine goats differing in kidding period (February, GF or September, GS). Gastrointestinal parasitism was controlled every month by measuring strongyles' faecal egg excretion on faecal group samples. Between 2015-2018, annual mean grazing duration and average milk yield were higher for the GF farm (+ 37 days.year<sup>-1</sup>, +25%; + 71 L.goat<sup>-1</sup>.year<sup>-1</sup>, +11%). However, the amount of concentrates and dehydrated feed was higher for GS farm (+14 kg.goat<sup>-1</sup>.year<sup>-1</sup>) despite a high proportion of herbage in the ration (68 ± 4%). Purchased feed costs were generally low (147 ± 34 € per 1000 L), and higher for the GS farm (+ 47€ per 1000 L). This higher purchase cost had no consequences because the price of milk was higher for the GS farm (+ 56€ per 1000 L). Annual mean flock excretions of strongyles were low (178 ± 233 eggs per gram of faeces), but varied highly after the period of the year. Increase in grazing of high value grasslands seems thus to be an interesting option to improve the sustainability of dairy goat systems in France, whatever the kidding period.

**Keywords.** Dairy goat – Grazing – Kidding period – Feeding cost – Sustainable.

## *Utilisation du pâturage selon la période de mise-bas pour améliorer la durabilité des systèmes d'élevages caprins en France*

**Résumé.** La France est le plus grand producteur de lait de chèvre en Europe avec environ 550 millions de litres collectés. Depuis les années 2000, les élevages de chèvres se sont intensifiés, augmentant largement leurs besoins en intrants achetés, notamment en aliments pour animaux. Pour augmenter la productivité, le pâturage a été progressivement abandonné et une conduite en bâtiment s'est développée. Une utilisation accrue du pâturage peut être une solution pour améliorer la durabilité des exploitations caprines avec un meilleur contrôle des coûts d'alimentation et une plus grande sécurité des systèmes. En 2012, l'Inra a mis en place une expérimentation système dans l'Ouest de la France pour évaluer des systèmes d'élevages caprins plus autonomes et durables. L'expérience-système visait à évaluer deux systèmes indépendants de 60 chèvres alpines différant par la période de mise-bas (en février, GF ou septembre, GS). Entre 2015 et 2018, la durée moyenne de pâturage et la production laitière moyenne étaient plus élevées pour le système GF (+ 37 jours/an, + 25 %; + 71 L/chèvre/an, + 11 %). Cependant, la quantité de concentrés et de déshydratés était légèrement supérieure pour le système GS (+ 14 kg/chèvre/an) malgré une part importante d'herbe dans la ration (68 ± 4 %) pour les deux systèmes. Les coûts d'alimentation étaient faibles (147 ± 34 €/1 000 L) mais toutefois plus élevés pour la ferme GS (+ 47 €/1 000 L). Ce coût d'achat plus élevé a eu peu de conséquences car le prix du lait était plus élevé pour le système GS (+ 56 €/1 000 L). Les chèvres des deux systèmes ont été infestées par des strongles gastro-intestinaux. Les niveaux moyens d'excrétions annuelles sont restés toutefois faibles (178 ± 233 œufs par gramme de fécès), mais les variations étaient fortes selon de la période de l'année. Augmenter le pâturage dans les prairies de bonne qualité constitue une solution intéressante pour améliorer la durabilité des élevages caprins en France, quelle que soit la période de mise-bas.

**Mots-clés.** Chèvre laitière – Pâturage – Période de mise-bas – Coût alimentaire – Durable.

## I – Introduction

Western France concentrates over half of the country's capacity in terms of dairy goat production (70% of national collection – Agreste, 2018). Between the years 2000 and 2010, many goat farms have gradually switched to intensive farming, thereby significantly increasing their need for purchased inputs. To increase productivity, grazing has been abandoned and the indoor breeding system has been adopted. Nowadays, feed self-sufficiency of dairy goat systems is only 55% (Bossis *et al.*, 2014) while that of dairy cow systems in the area reaches 88% (Brunschwig *et al.*, 2012). However, in a context of higher input costs, these systems become now unsustainable. Improvement in feeding self-sufficiency by a greater use of grazing is a major goal for dairy goat farms, so as to deal with the ups and downs of input costs and of climatic hazards, to improve the traceability of feed and to reduce the dependence on imported protein. Consumer's demand of goat cheese is high all year round, while the industry promotes off-season milk production by applying higher milk price in winter to smooth yearlong milk availability. However, a kidding period in September combined with grazing is unusual in France. The aim of this study was to evaluate, under controlled conditions, the benefits of grazing in dairy goat systems, in order to improve sustainability, for different kidding periods.

## II – Material and methods

In 2013, the French Institute for Agricultural Research (Inra) built an experimental goat shed with a solar-heated air hay dryer to design more sustainable goat farming systems: the Patuchev platform. This device is aimed at assessing and proposing innovative goat farming systems in order to lead to low input and sustainable goat farming. This approach associates the research of economic, environmental and social performances in an effort to apply the principles of agroecology (Caillat *et al.*, 2012).

The experimental device is based on conception and long-term evaluation of three farmlets with about 60 French Alpine goats each: two grazing herds, one kidding at the end of the winter (February – GF farmlet) and the other one in autumn (September – GS Farmlet), and a herd fed hay indoors all year round and kidding in autumn (IS Farmlet). This study involved the 2 farmlets with grazing systems (GF and GS Farmlets). The area for each farmlet was set to 10.4 ha. This area was divided between temporary multi-specific grasslands (7.4 ha) and a cereal-protein crops mixture (3 ha).

For each farmlet, milk yield was recorded daily as well as protein and fat contents, while microbial flora and somatic cells were counted 3 times per month. Gastrointestinal parasitism was controlled every month after measuring strongyle faecal egg excretion on faecal group samples. The input and output flows were handled separately for each farmlet and recorded weekly to evaluate the economics results.

Data were recorded in the DIAPASON software (Institut de l'élevage, 2012). The study period was the same for the 2 farmlets. It began on September 1<sup>st</sup> of year N-1 and finished on August 31<sup>st</sup> of year N. A descriptive analysis of technical and economic results of each farmlet was carried out during the 2015-2018 period.

## III – Results and discussion

### 1. Technical results

During the period considered, the number of dairy goats in lactation was higher for the farmlet with a kidding period in February (GF) (+9 dairy goats in average) but the proportion of primiparous goats was similar (30%). This difference could be attributed to specific fertility's difficulties of GS primiparous goats during the first lactation, which led to stopping their career before the second lactation.

Annual mean grazing duration and average milk yield were higher for the GF farm (+ 37 days.year<sup>-1</sup>, +25%; + 71 L. goat<sup>-1</sup>.year<sup>-1</sup>, +11%). However, the amount of concentrates and dehydrates was higher for the goats with a kidding period in September (+14 kg.goat<sup>-1</sup>.year<sup>-1</sup>), despite a large, on average, herbage proportion in the ration (69 ± 6%). The annual mean flock excretions of strongyles were low (178 ± 233 eggs per gram of faeces in average) but varied widely according to the period of the year, particularly for the GF's goats (Table 1).

**Table 1. Technical results according the kidding period**

	<b>February GF</b>	<b>September GS</b>
<b>Number of dairy goat</b>	61 (± 6)	52 (± 10)
Primiparous (%)	29 (± 6)	31 (± 11)
Mean number of lactation	2.8 (± 1.7)	2.9 (± 2.0)
<b>Milk yield and composition</b>		
Raw milk yield (L/year)	709 (± 43)	638 (± 39)
Fat (g/L)	38.4 (± 1.0)	39.7 (± 1.0)
Protein (g/L)	33.8 (± 0.5)	35.0 (± 0.9)
Milk solids (kg/year)	53 (± 3)	50 (± 3)
<b>Diet</b>		
Concentrates (kg/year)	269 (± 33)	283(± 31)
Days of grazing (nb/year)	174 (± 21)	137 (± 18)
Nb days of grazing / duration of lactation (%)	62 (± 8)	50 (± 9)
Proportion of forages (%)	67 (± 2)	69 (± 6)
<b>Annual FEC (EPG)</b>	255 (± 271)	93 (± 119)

## 2. Economic results

The operating costs were always higher for the farmlet with a kidding period in September (+ 43% in average). Purchased feed costs were low for both farmlets (147 ± 34€ per 1000 L) but the breeding costs were much higher for the farmlet with a kidding period in September (+ 70€ per 1000 L). However, the financial consequences were low because the price of milk and other revenues were higher for the GS farmlet (+ 66€ per 1000 L) (Table 2).

The feeding self-sufficiency was similar and high for the 2 farmlets (79.5% on average).

**Table 2. Economic results and feeding self-sufficiency according the kidding period**

	<b>February GF</b>	<b>September GS</b>
<b>Revenues (€ / 1000 L)</b>		
Value of milk	678 (± 14)	734 (± 23)
Other revenues	127 (± 14)	137 (± 20)
<b>Operating expenditures (€ /1000L)</b>		
Purchased feeding costs	123 (± 13)	170 (± 30)
Breeding costs	186 (± 18)	256 (± 19)
Mechanization costs	134 (± 16)	199 (± 51)
Soil fertilization costs	26 (± 9)	38 (± 10)
<b>Feeding self-sufficiency (%)</b>	80 (± 5)	79 (± 7)

The higher operating costs for the GS farmlet can be explained by a lower milk yield and their standardization to 1000L of milk, but for equal milk yields this farmlet still had higher costs.

## IV – Conclusion

A greater use of grazing is an important factor to improve the self-sufficiency and economic sustainability of dairy goat farms in France. Despite higher operating costs, associating grazing with a kidding period in September is an interesting option, since farm income is higher. However, it is still necessary to aim for a high production volume of milk solids (milk yield, fat and protein contents). Moreover, it appears important for this option to breed primiparous animals to ensure the transition to 2nd lactation and to limit the costs of replacement. Other technical solutions like long lactation periods for these goats or a later kidding date could be evaluated in future.

## Acknowledgments

We gratefully acknowledge the experimental staff of the FERLus unit UE1373 (Lusignan, France).

This research was supported by grants from the Regions Bretagne, Normandie, Nouvelle-Aquitaine and Pays-de-la-Loire, Inra, Irstea and Agrocampus-Ouest in the PSDR4 Grand Ouest FLECHE project.

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