Grazing in a dairy goat farm to design sustainable production systems in France

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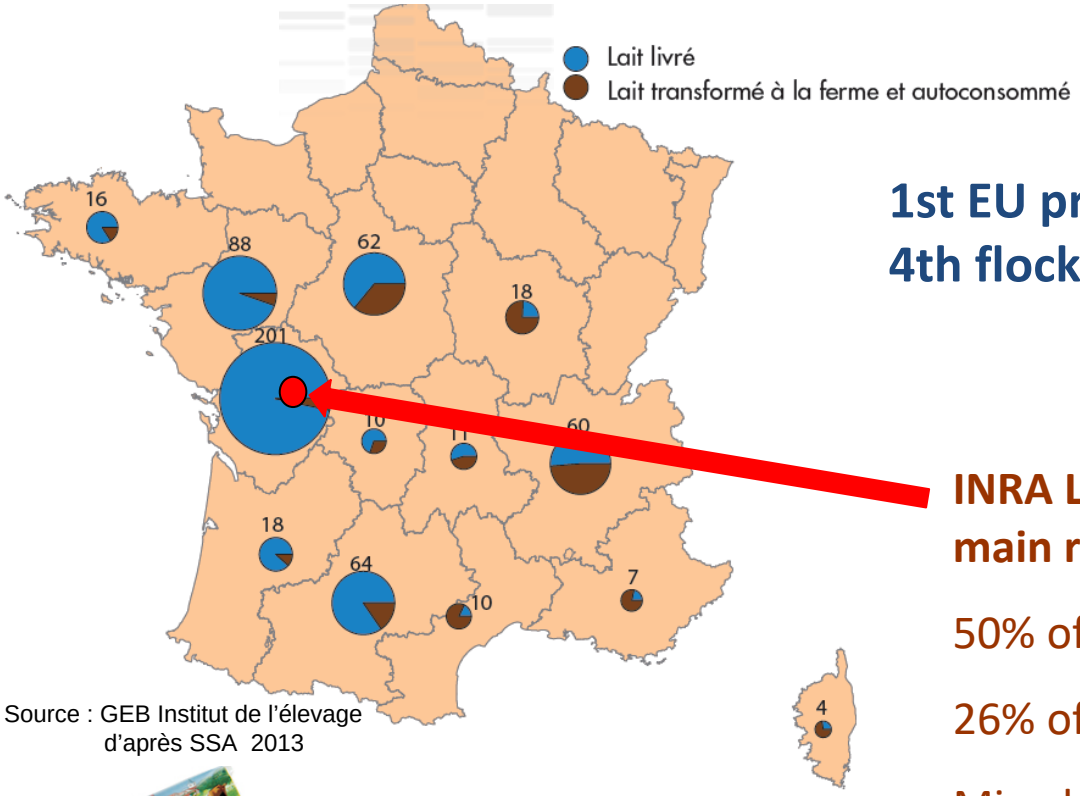
FRANCE: the country of goat's milk in EU



Source : GEB Institut de l'élevage
d'après SSA 2013

1st EU producer: 550 millions liters collected
4th flock: 1.2 million of goats

INRA Lusignan research center is based in the main region of goat milk industry

50% of national delivered milk collection

26% of French goat flock

Mixed farming systems region

Oceanic climate with dry summers

…but a low feed self-sufficiency!

Feed self-sufficiency = 53 % ± *26%* (88% in French dairy cows systems)

Due to :

- Intensification of dairy goat systems
- Stopping of grazing because of parasitism

Today, only 5% of goats graze in the main region of production!!!

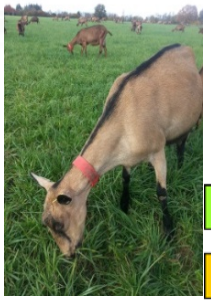
Main challenges of goat sector: develop sustainable dairy goat systems

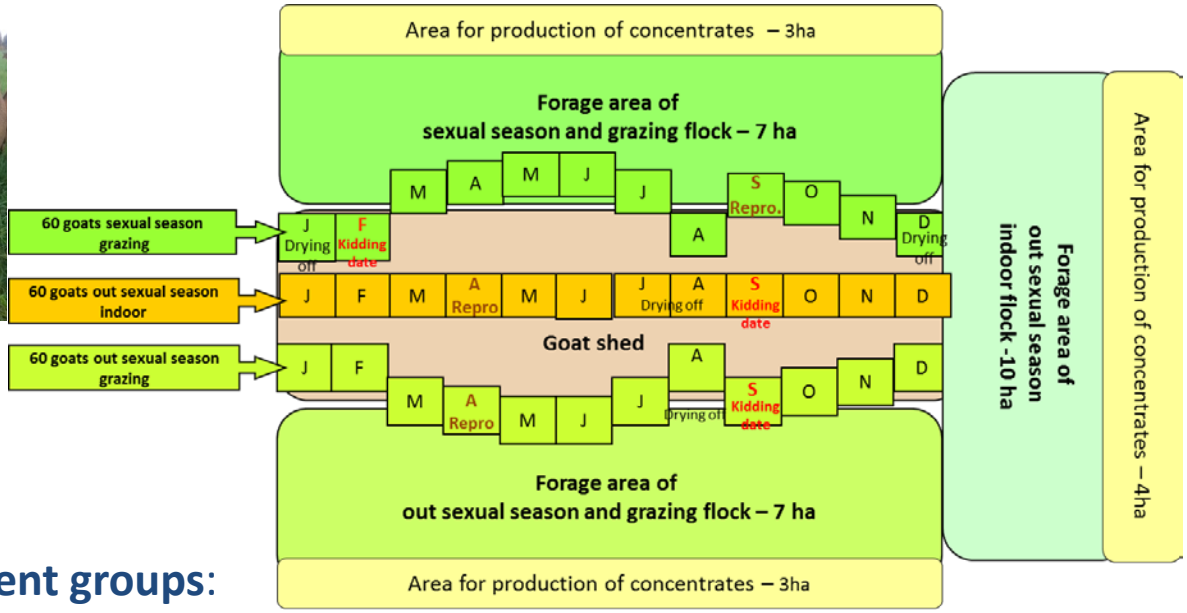
- ✓ Develop grazing and/or herbage utilization in ration
- ✓ Optimize self-sufficiency of goat systems
- ✓ Integrate grasslands in cropping systems

To find a **compromise between economy and environment**

PATUCHEV : THE NEW EXPERIMENTAL GOAT PLATFORM OF INRA

A system-experiment to **assess goat breeding systems using cultivated grasslands**



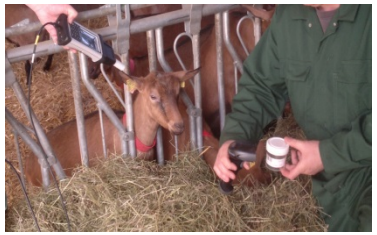


- **30 hectares** of cultivated area
- **180 French Alpine goats**

divided into **3 balanced independent groups**:

➔ **Forage use** : grazing + hay or exclusive hay
➔ **Reproduction**: in or out sexual season

- Solar-heated air dried hay



❖ **Systemic and multidisciplinary approach**

The system's transition & studied period

70's | 2011 | 2012 | 2013 | 2014 | 2015 | 2016

Conventional system

New platform

Goat flock « Les Verrines »
≈160 dairy goats

Kidding in **January**

Farming system
relying on external feeds

Sort

Goat flock « Patuchey »

≈60 dairy goats kidding in **February**
Grazing + hay in winter period

≈60 dairy goats kidding in **September**
Grazing + hay in winter period

≈60 dairy goats kidding in **September**
Indoor + hay all year

Typical ration :
1.8-2 kg complete concentrate
(overpressing lucerne + Ctrates mix)
0.2 kg maize grains
0.5 kg lucerne hay
Straw ad libitum

A multi-challenges grazing

- ➔ maximize herbage intake
- ➔ manage parasitism
- ➔ high yield and high qualities herbage

} **Dynamic rotational grazing**

- ➔ **Offer**: 3 kg DM/goat/day ⟺ 21 m²/goat/day
- ➔ **Paddocks** of 0.5 ha ➔ daily alternate use during 7 days with another

(changes in paddocks stimulates goat intake)

- ➔ **Sward height objectives** ➔ initial: 13-14 cm / final: more 7-8 cm

(« high » to limitate parasites intake)

- ➔ After grazing ➔ make hay **alternate grazing /cutting** to provide a rest period of more 45 days between 2 grazings. *(break parasite's cycle)*
- ➔ When goats **graze more 9 h/day**, the ration is **only about 700 g** of self-produce grains complements

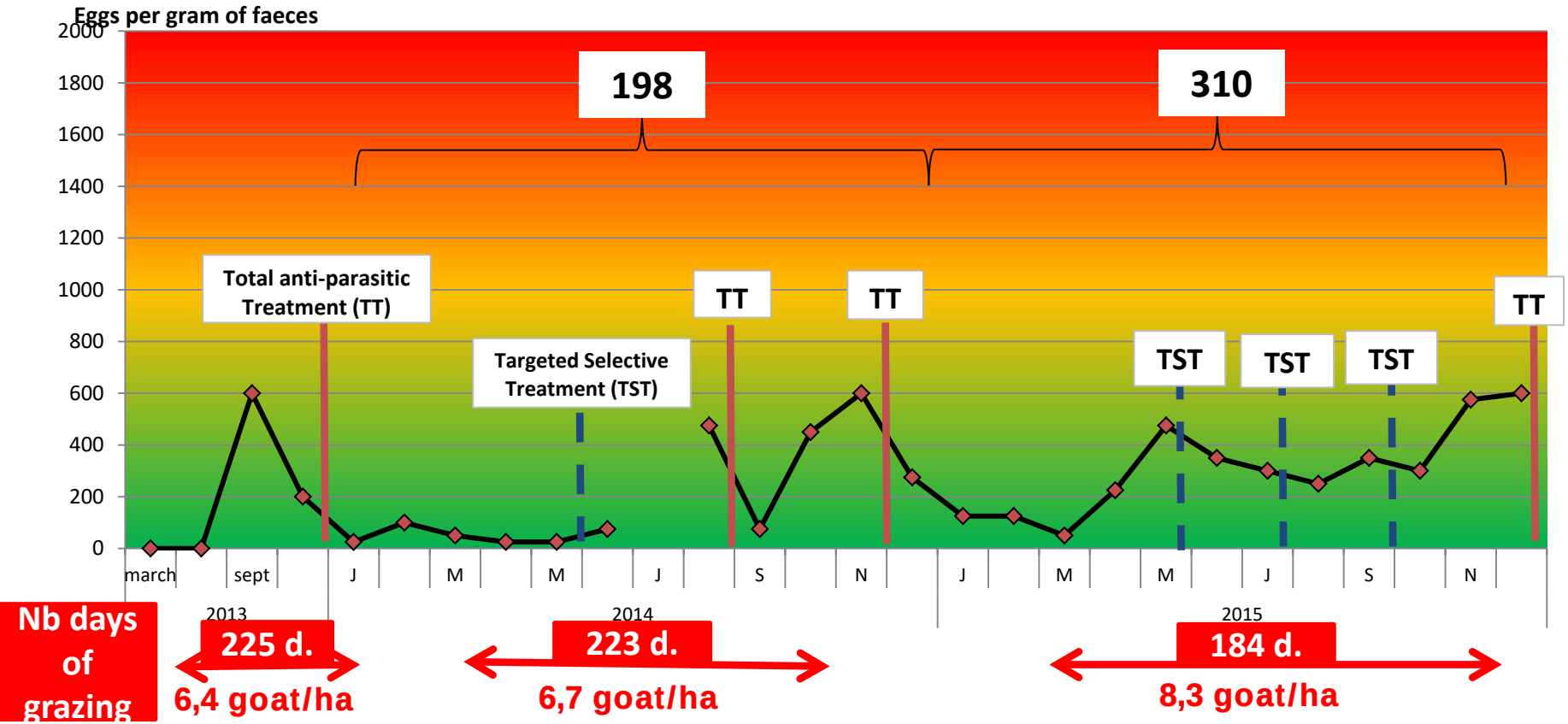
➔ Herbage average yield (2014-2015)**: 10 Tons DM/ha**

(only organic fertilzer)

Cutting: 6.5 T DM/ha + Grazing*: 3.5 T DM /ha

*(estimated by feed intake method from Inra 2007 tables)

A rapid but controlled GIN infestation

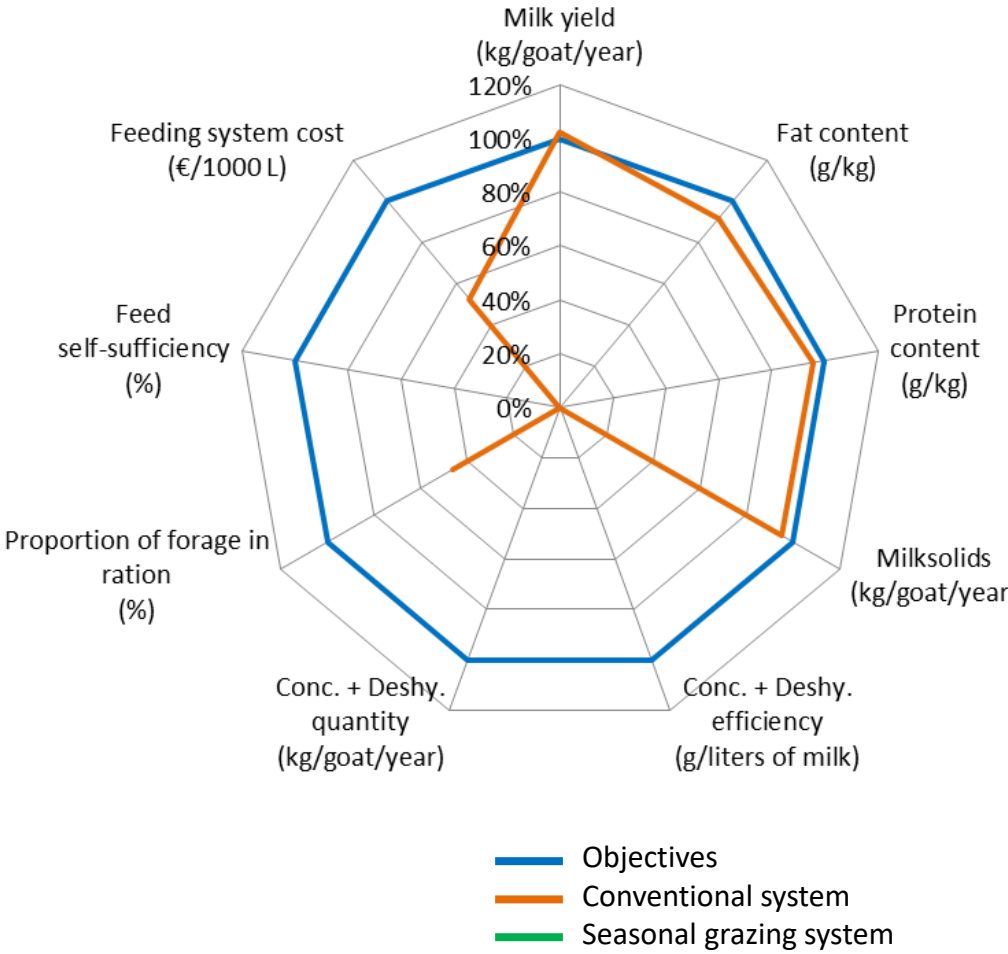


- Main GINs : *Oesophagostomum* and *Teladorsagia/Trichonstrongylus*
- **TST + alternating AH molecules : only 2 to 15% of goats** *(FEC individual level)*

➔ **reduces costs, AH resistance and negative impacts on the environment**

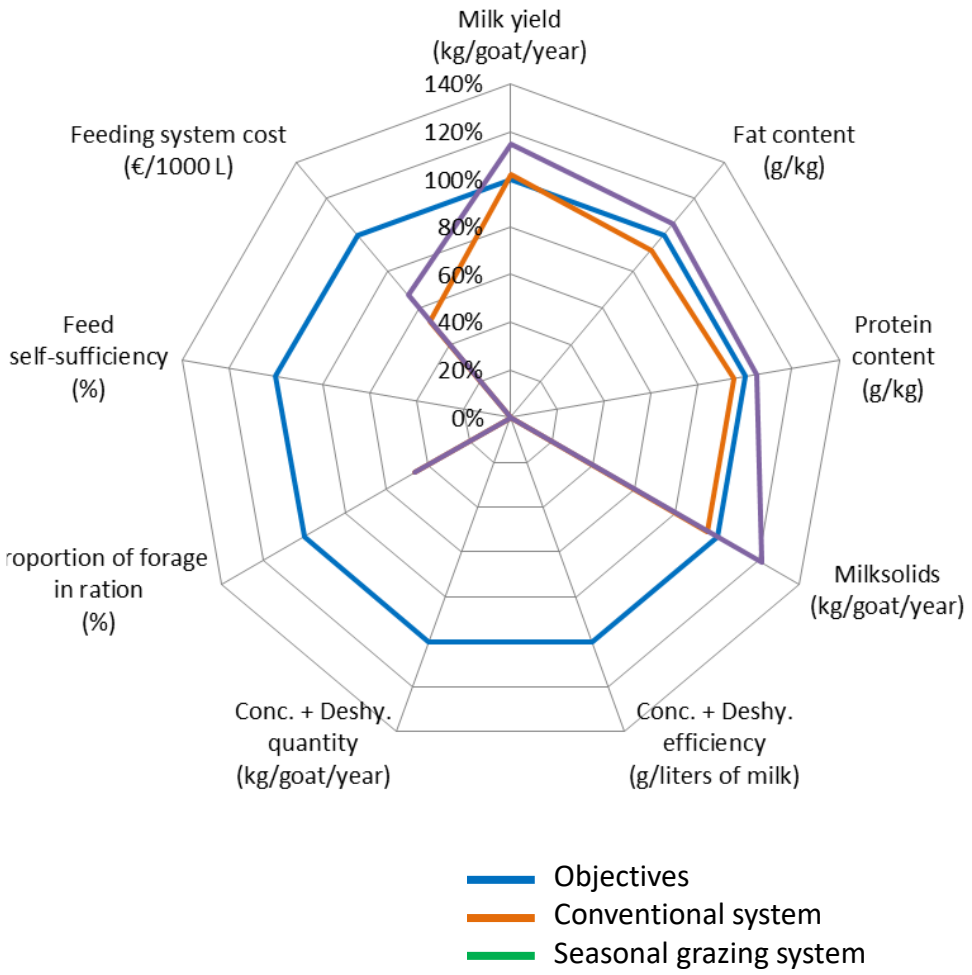
Lower milk performances but cheaper feed costs

Techno-economic criteria	Objectives for a more sustainable goat system	*Conventional system*
Milk yield[1] (kg/goat/year)	**850**	**868**
Fat content[1] (g/kg)	**38**	34.9
Protein Content[1] (g/kg)	**33**	31.5
Milksolids[1] (kg/goat/year)	**60**	**57**
Conc. + Deshy. efficiency[2] (g/liters of milk)	**360**	918
Conc. + Deshy. quantity[2] (kg/goat/year)	**300**	790
Proportion of forage in ration (%)	**65**	30
Feed self-sufficiency (%)	**80**	0
Feeding system cost[2] (€/1000 L)	**290**	428



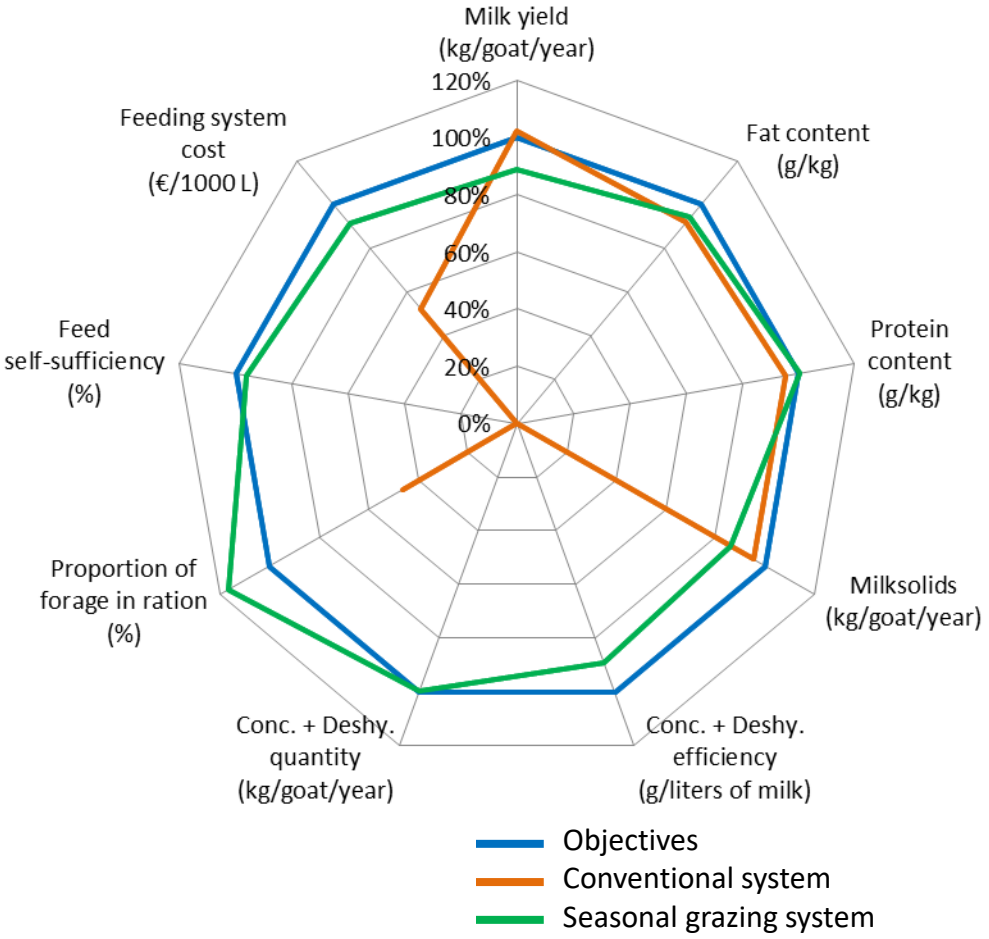
Lower milk performances but cheaper feed costs

Techno-economic criteria	Objectives for a more sustainable goat system	*Conventional system (references of case study)*
Milk yield[1] (kg/goat/year)	**850**	**868 (975)**
Fat content[1] (g/kg)	**38**	34.9 (40.4)
Protein Content[1] (g/kg)	**33**	31.5 (34.7)
Milksolids[1] (kg/goat/year)	**60**	**57 (73)**
Conc. + Deshy. efficiency[2] (g/liters of milk)	**360**	918 (921)
Conc. + Deshy. quantity[2] (kg/goat/year)	**300**	790 (875)
Proportion of forage in ration (%)	**65**	30
Feed self-sufficiency (%)	**80**	0
Feeding system cost[2] (€/1000 L)	**290**	428 (386)



Lower milk performances but cheaper feed costs

Techno-economic criteria	Objectives for a more sustainable goat system	*Conventional system (references of case study)*	Seasonal grazing system "Patuchev"	Stat test[3]
Milk yield[1] (kg/goat/year)	**850**	**868 (975)**	755	***
Fat content[1] (g/kg)	**38**	34.9 (40.4)	35.8	NS
Protein Content[1] (g/kg)	**33**	31.5 (34.7)	**33.2**	***
Milksolids[1] (kg/goat/year)	**60**	**57 (73)**	52	**
Conc. + Deshy. efficiency[2] (g/liters of milk)	**360**	918 (921)	399	
Conc. + Deshy. quantity[2] (kg/goat/year)	**300**	790 (875)	301	
Proportion of forage in ration (%)	**65**	30	76	
Feed self-sufficiency (%)	**80**	0	77	
Feeding system cost[2] (€/1000 L)	**290**	428 (386)	315	



Despite a lower milk yield, feeding system cost is decreased and the objectives of self-sufficiency are reached

[1]data from monthly individual milk recorder
[2] data from systemic approach
[3]Stat test: PROC GLM SAS - *** <0.001, ** <0.01, NS: No significant

Conclusion

- For goat systems, grazing is a real opportunity to improve their feeding self-sufficiency and their sustainability

➔ Milk production is lower but lower feed prod. costs

➔ No major problem on metabolic or health aspects

BUT…

- It is essential:
  - to choose swards and grazing management adapted to goats
  - to respect rules for integrated gastro-intestinal parasitism management

and evidently, to **have access to land areas…**

We need still to improve knowledge on

- **impacts on environment, qualities of milk and cheeses, …**
- **simulations according to economic situations**
- **herbage intake under grazing** (grazing time and offered area)
- **interactions between herbs and complements**

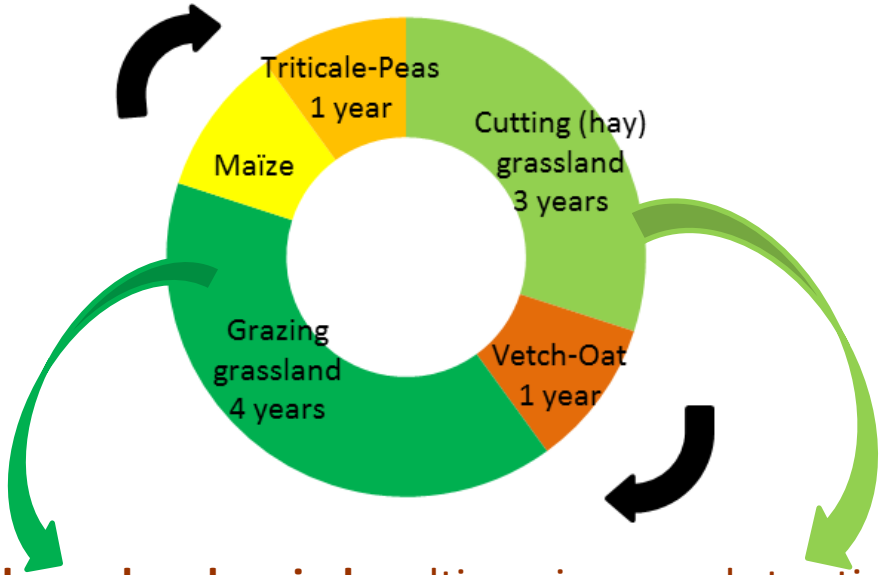
THANK YOU FOR YOUR ATTENTION

http://www.poitou-charentes.inra.fr/en/patuchev

Aknowledgments to experimental staff for measures and fundings

Productive and high feeding value grasslands integrated in rotations

→ A forage area of 10 ha with multi-species swards and mixed crops (10 years rotation)



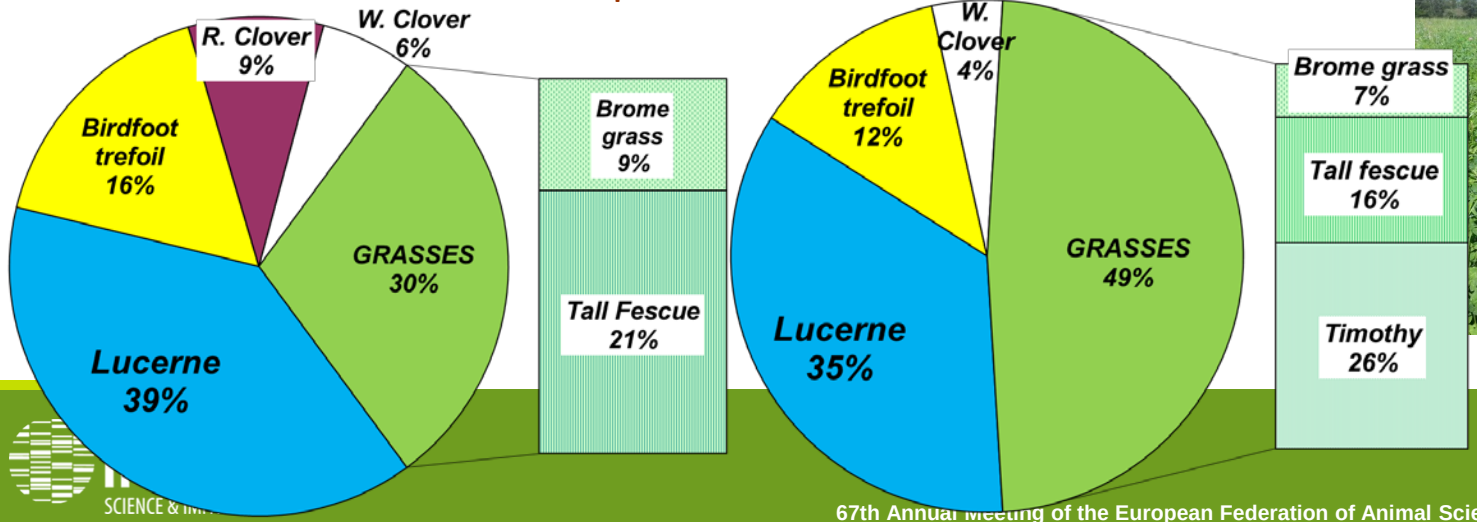
Fresh herbage quality parameters (%DM)*

- OMD: 65.8 ± 6.4
- Crude Protein: 16.0 ± 4.4
- NDF: 49.5 ± 5.3
- ADF: 34.5 ± 5.3
- Ash : 9.9 ± 1.6

8.6 g of Ca / kg DM

*106 samples in 2014-2015

→ **Balanced and varied** multispecies swards to stimulate intake



Impacts on Somatic Cells Score