

Phenotyping intake rate in dairy goats, a repeatable trait which can be measured automatically

Sylvie Giger-Reverdin, Christine Duvaux-Ponter & Nicolas C Friggens

Modélisation Systémique Appliquée aux Ruminants
(Systemic modelling applied to ruminants)

Inra, AgroParisTech, Université Paris-Saclay, France

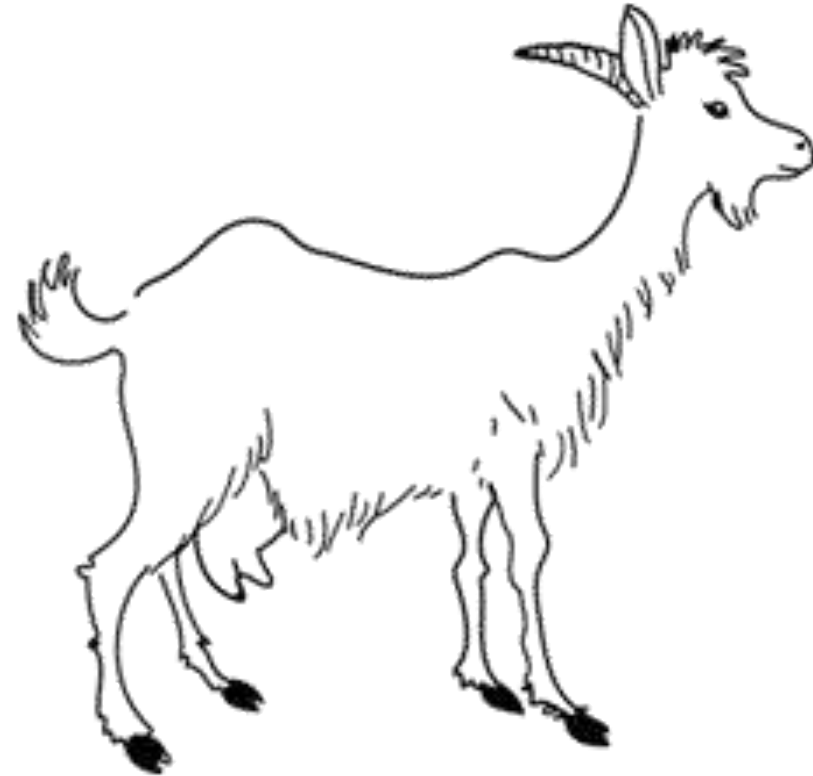
Introduction

- ✓ High producing animals are fed with a high proportion of concentrates
- ✓ They can suffer from **acidosis**
- ✓ **Intake rate**

is a **key-factor** to explain the inter-individual variation in the evolution of **rumen pH** (occurrence of **acidosis**)

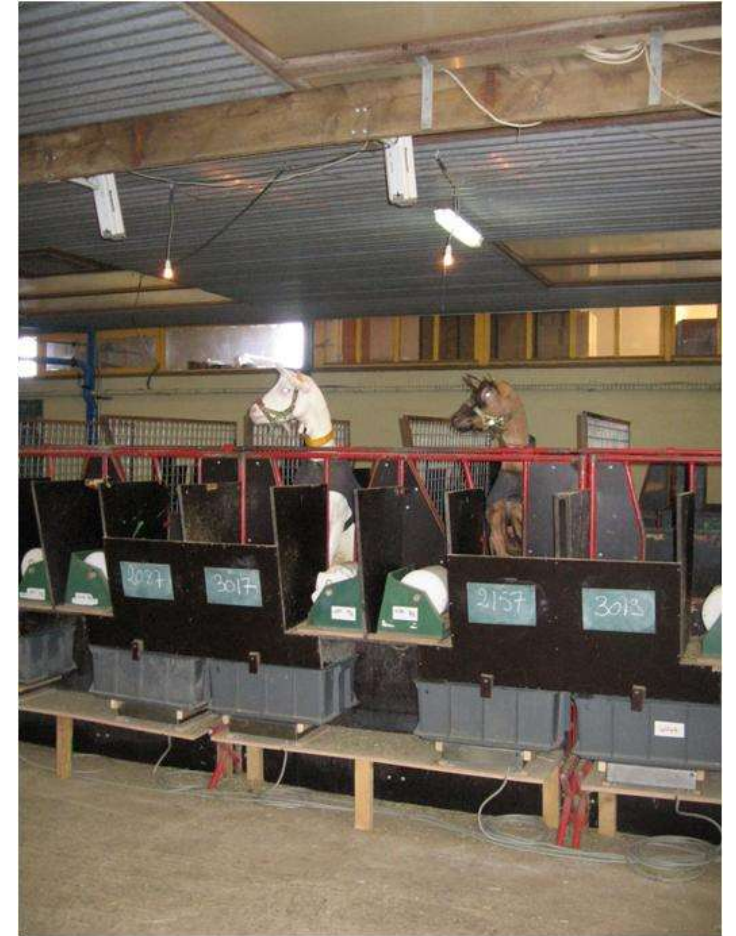
Aim of the work:

To develop **repeatable, pertinent** and **easy** to measure **criteria** to evaluate this trait in dairy goats



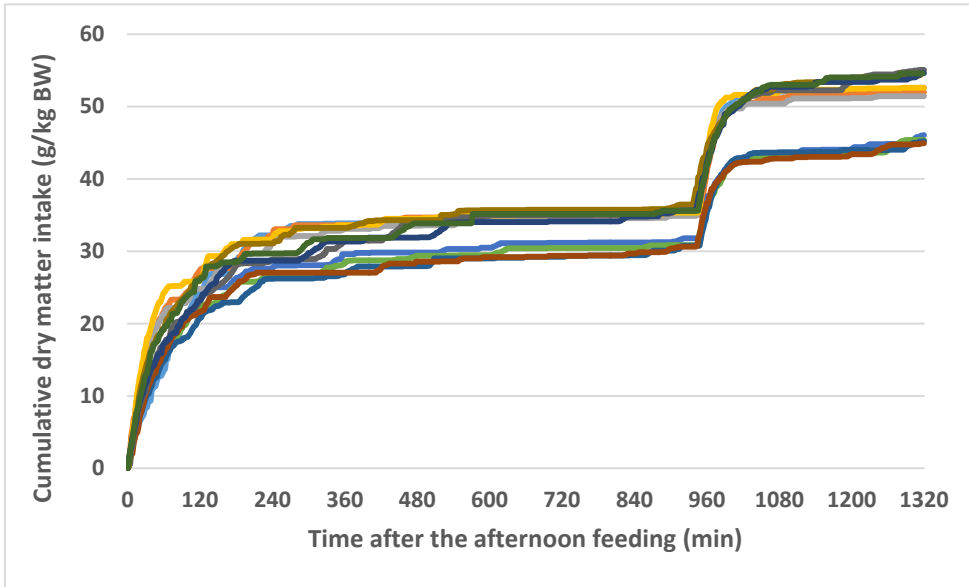
Experimental design

- 35 dairy goats born in 2011
- 1 TMR diet *ad libitum*:
 - 20 % Concentrate
 - 20 % Meadow hay
 - 30 % Dehydrated lucerne
 - 30 % Pressed sugar beet pulp silage
- Automatic measurement of feed intake (2 min.)
- 3 periods (3 or 4 days/period)
 - P1: 1st lactation
 - P2: 2nd gestation & end of 1st lactation
 - P3: 2nd lactation

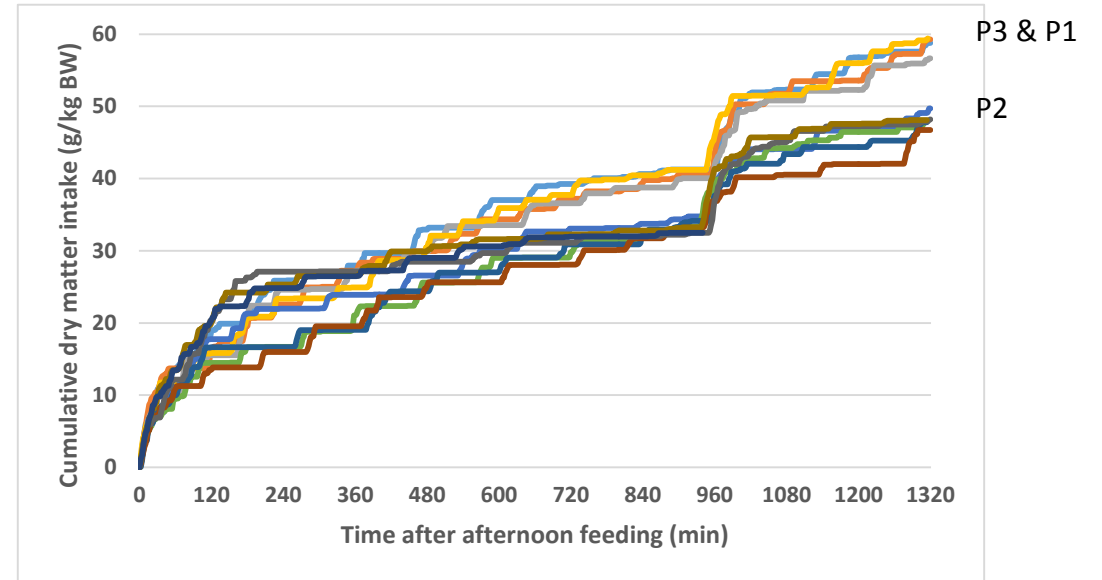




Evolution of daily intake

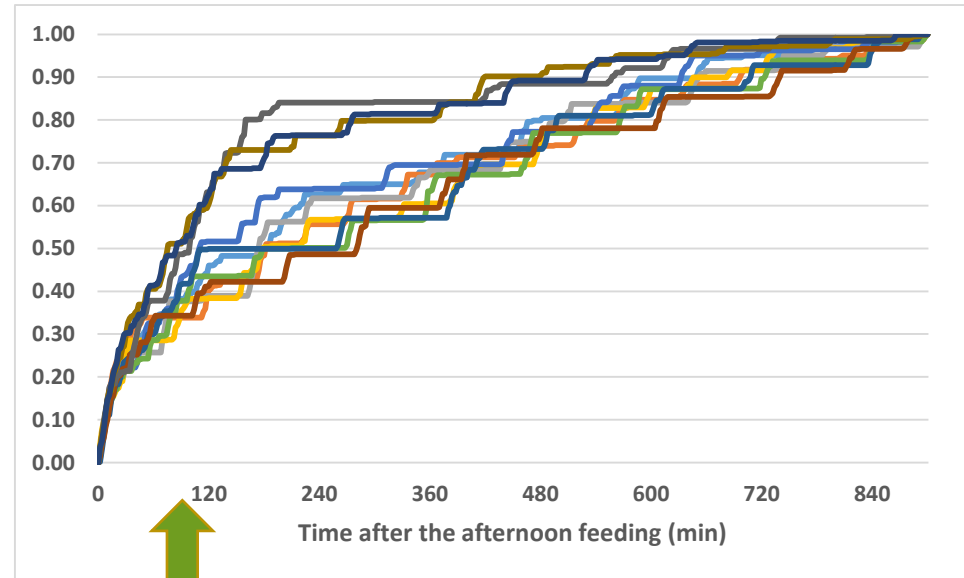
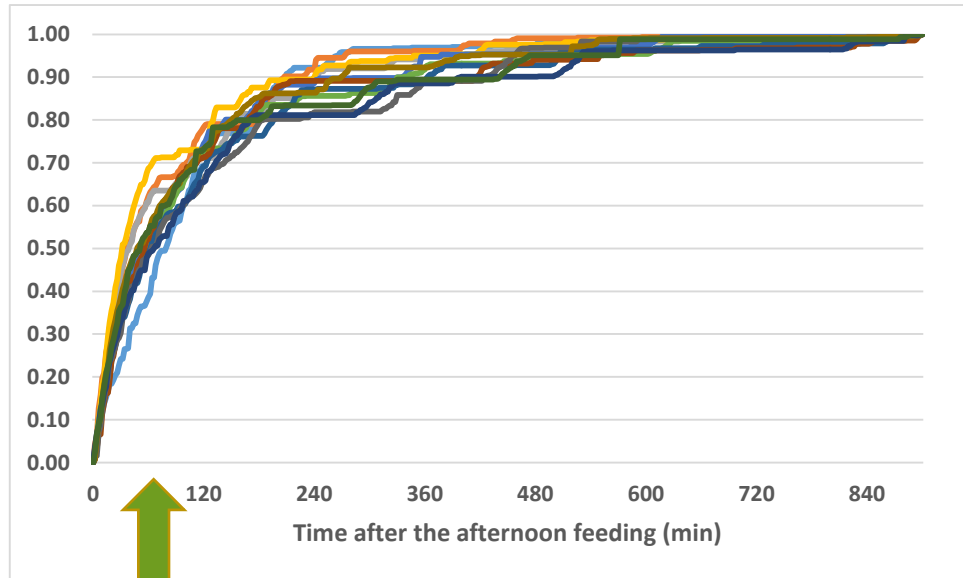


P3: 2nd lactation
 P1: 1st lactation
 P2: 2nd gestation and end 1st lactation



4 days/period

Proportions of feed eaten post afternoon feeding

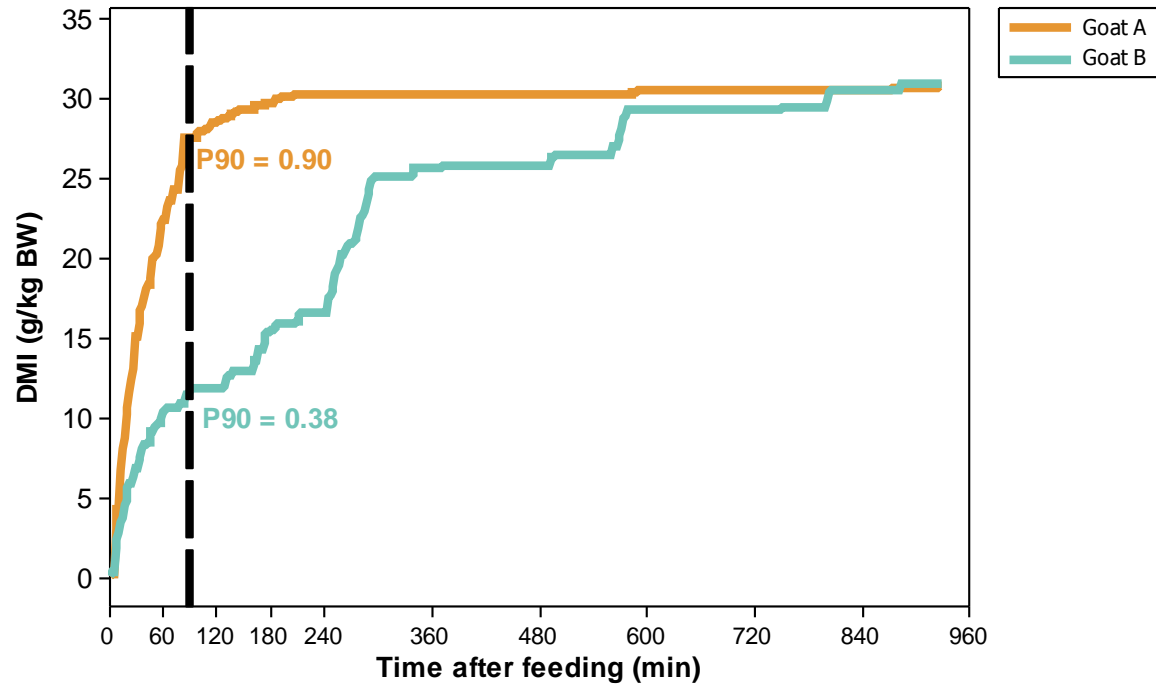


Two Phenotypes measured

Q90: DMI consumed by 90 min post afternoon feed allowance (g/kg BW)

P90: Ratio Q90/DMI in 15 hours

Dry matter intake evolution (pm Feed allowance)



(Giger-Reverdin et al., 2009)

Factors of variation of the phenotypes:

Evolution between periods and between-goat variability

	All Periods	P1 (1st Lactation)	P2 (2 nd gestation)	P3 (2 nd lactation)
N observations	105	35	35	35
Q90 (g/kg BW)	16.1 ± 3.63	14.6 ^a ± 3.36	14.8 ^a ± 2.83	18.8^b ± 3.03
P90	0.499 ± 0.1115	0.416^a ± 0.1055	0.524 ^b ± 0.0972	0.556 ^b ± 0.0796

- ✓ Increase in Q90 at P3
- ✓ Increase in P90 as goats are getting older
- ✓ Significant between animals variability

Factors of variation of the phenotypes:

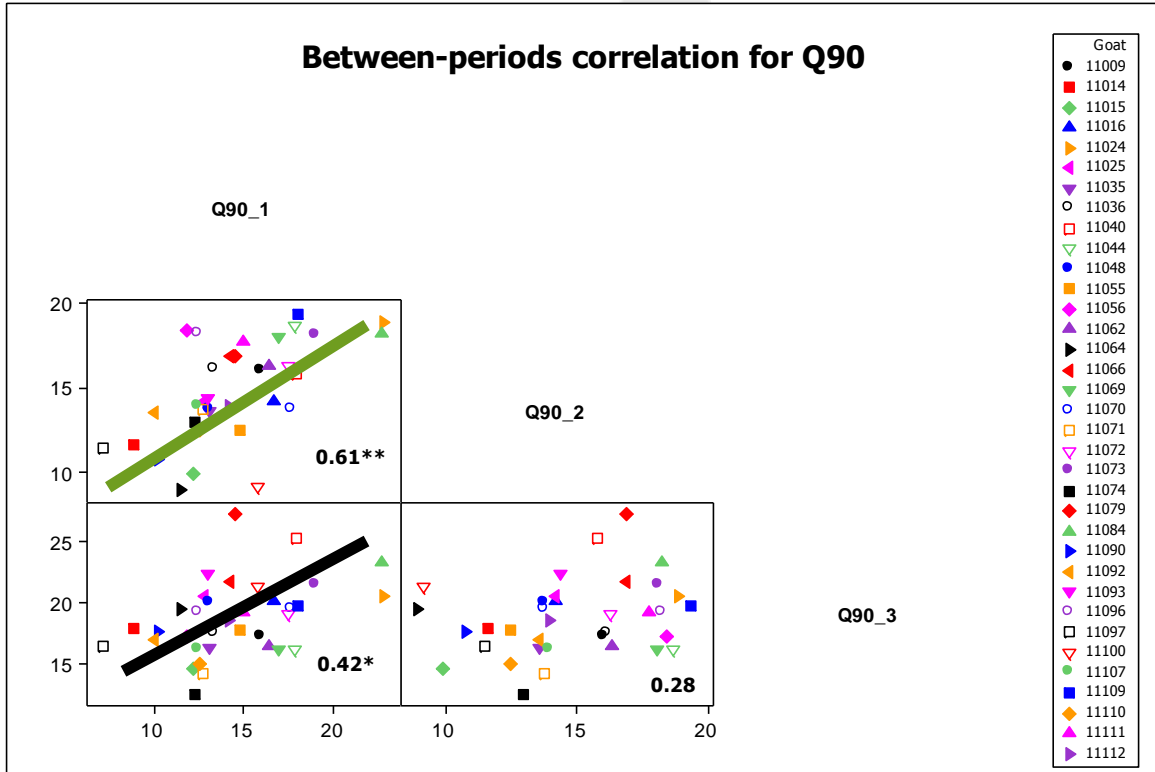
Across animals, average repeatability (standard deviation/goat/period)

	All Periods	P1 (1st Lactation)	P2 (2 nd gestation)	P3 (2 nd lactation)
N observations	105	35	35	35
Q90 (g/kg BW)	1.56 ± 0.896	2.05 ^a	1.33 ^b	1.29 ^b
P90	0.0422 ± 0.02321	0.0520^a	0.0406^{a,b}	0.0343^b

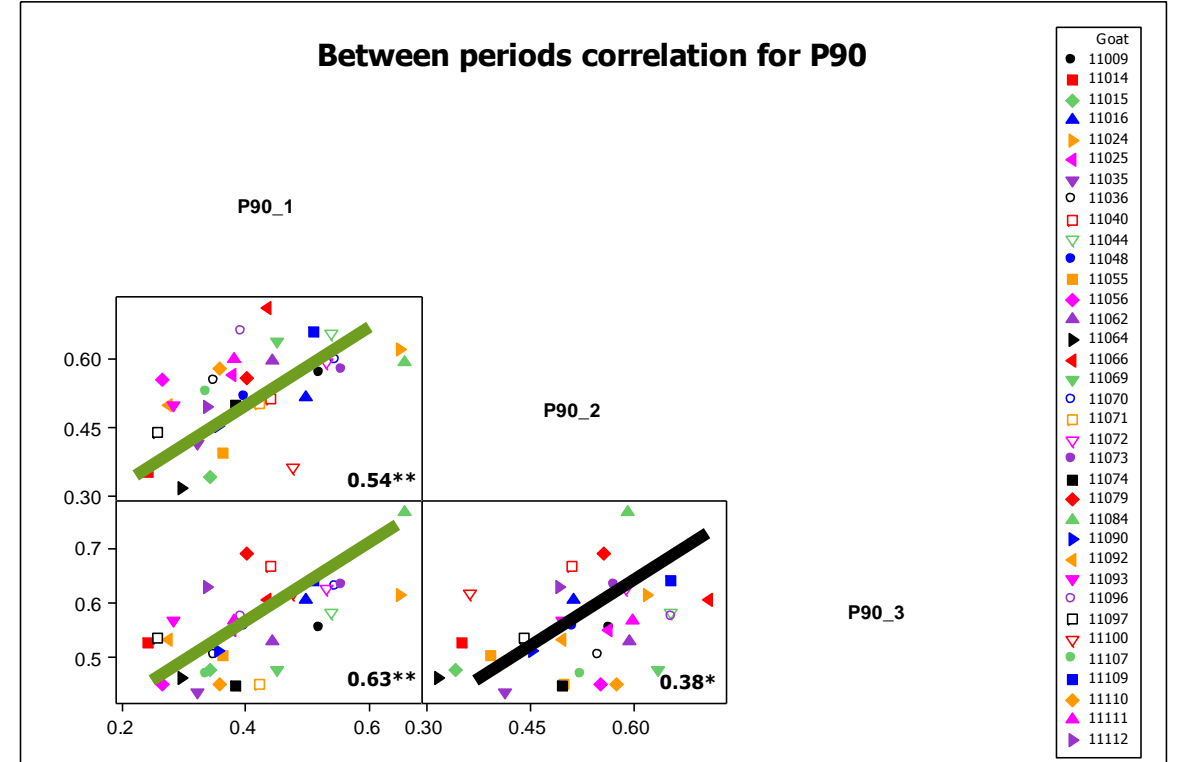
- ✓ Q90 and P90 are more repeatable for each goat within a period as goats are getting older
- ✓ **No goat effect**

Across animals, average repeatability

Between-periods correlation for Q90



Between periods correlation for P90



P90 is more repeatable than Q90

P90 is a characteristic of the feeding behaviour of the goat

Conclusion and practical implications

- High intra-period individual repeatability
 - High between-period repeatability
- Characterisation of the **feeding behaviour** during the **1st lactation**
- Adjustment of feeding in the following lactations to decrease the **occurrence of acidosis**
- Possibility to **phenotype goats on intake rate** in precision livestock farming





Thank you for your attention