



# Accuracy of the ytterbium-faecal index method for estimating intake of pasture-fed dairy goats

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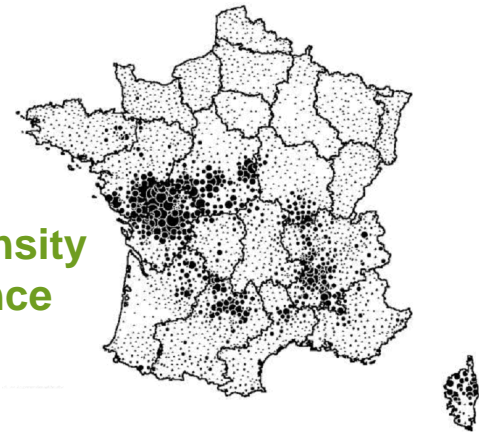
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# INTRODUCTION

Goat density  
in France



- ▶ **Goat dairy sector is important in France (cheese):**  
Low feed self-sufficiency
- ▶ **↑ grazing could increase sustainability of goat production systems**  
Farmers not confident on the ability of grazing systems to feed goats
- ▶ **Scarce references on goat intake regulation at grazing**  
Need for an accurate method for measuring pasture intake  
to study effects of grazing management

# OBJECTIVE

## ► To validate (indoors) a method for estimating intake of goats (at grazing)

- with varying :
- sward composition
  - intake level (grazing management)
  - concentrate supplementation level

**Selected method : « faecal output / faecal index method »**

$$I = F / (1 - D)$$

↓  
Dilution of an  
indigestible external  
marker (Yb)

↓  
Multiple regression from  
faecal and diet nitrogen  
concentrations

# MATERIALS AND METHODS

## ► Four indoors experiments

|                   | Exp 1  | Exp 2  | Exp 3  | Exp 4  |
|-------------------|--------|--------|--------|--------|
|                   | 2014   | 2015   | 2016   | 2016   |
| Forage            | Hay    | Grass  | Grass  | MSS    |
| Season            | Spring | Autumn | Spring | Spring |
| Milkings/day      | 0      | 1      | 2      | 2      |
| Goats / exp       | 6      | 6      | 6      | 6      |
| Periods (14 days) | 4      | 3      | 3      | 3      |



## ► 3 factors studied (2 / exp) :

Feeding level → *ad lib* vs. 80% of *ad lib*

Supplementation → 0 vs. 600 g concentrate/d

Age of regrowth → leafy (20-30 d) vs. stemmy (40-50 d)

*Ytterbium given twice daily (0.15 g/goat/d)*

# Measurements and data analyses

- ▶ **Measurements (5-d):** Feeds offered + refused  
Faecal output (total collection)

} amount + composition

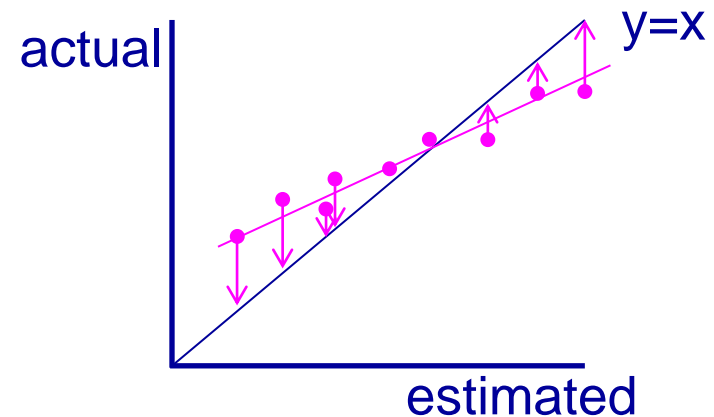
→ **Actual intake and *in vivo* diet digestibility**



- ▶ **Estimation of** Intake, Faecal output, Digestibility **as at grazing**

$$\text{From: } D_{yb} + [F_{YB}] + [F_{CP}] + [D_{CP}]$$

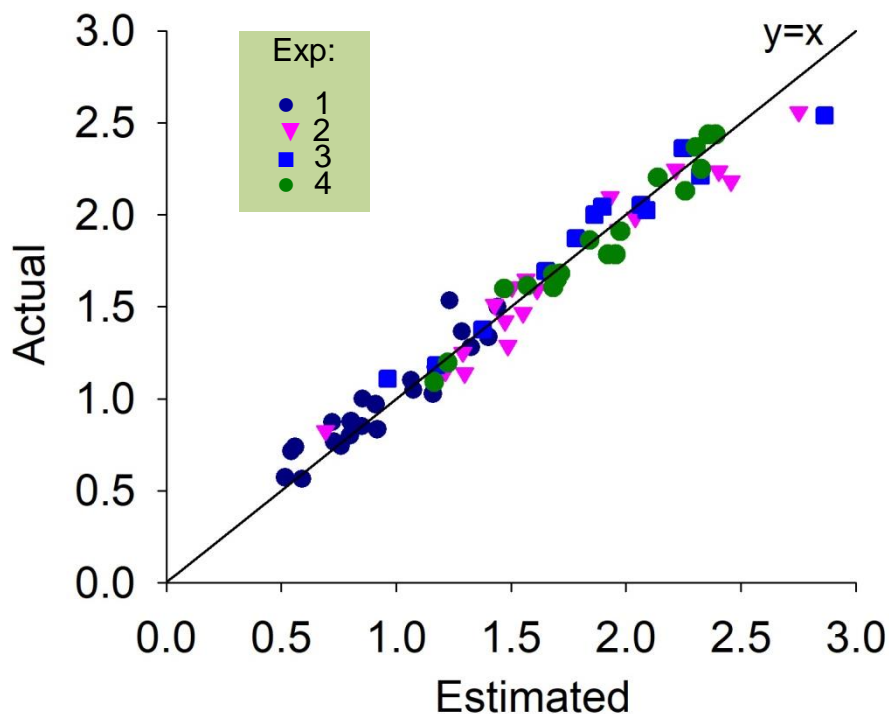
- ▶ **Mean Prediction Error (MPE)**  
(Bibby and Toutenburg, 1977)  
= distance to the first bisector



# RESULTS

Global database : n = 72 goat × week

Pasture intake (kg DM/d)



Actual:  $1.51 \pm 0.55$

Estimated:  $1.52 \pm 0.58$

MPE: 0.11 kg DM/d → 7.4%

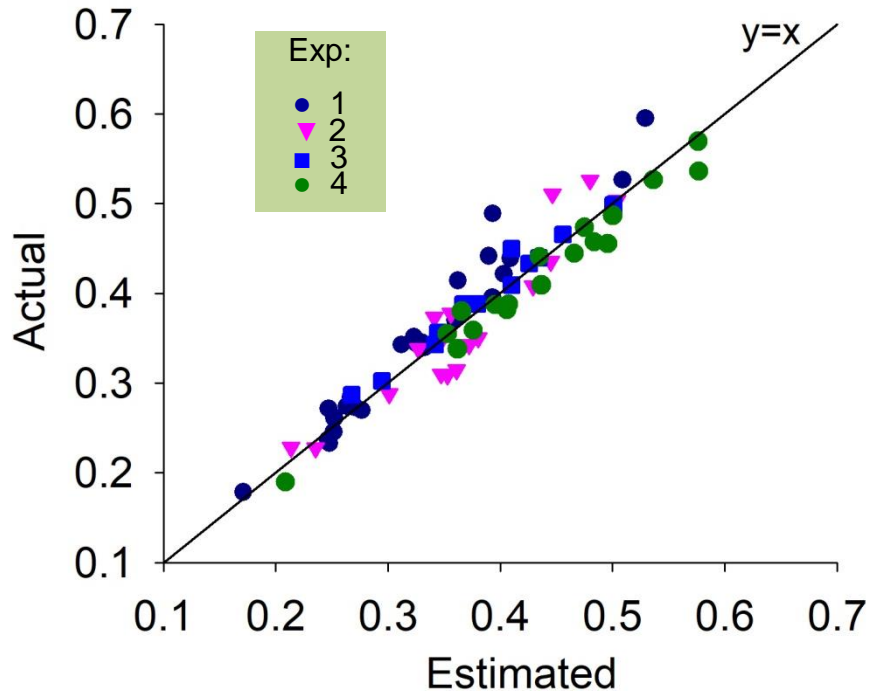
**Good accuracy independently of**

- experiment
- treatment within experiment

# RESULTS

$$I = \textcircled{F} / (1 - D)$$

**Faecal output (kg OM/d)**



**Actual: 0.38 ± 0.09**

**Estimated: 0.37 ± 0.09**

**MPE: 0.027 kg OM/d → 7.1%**

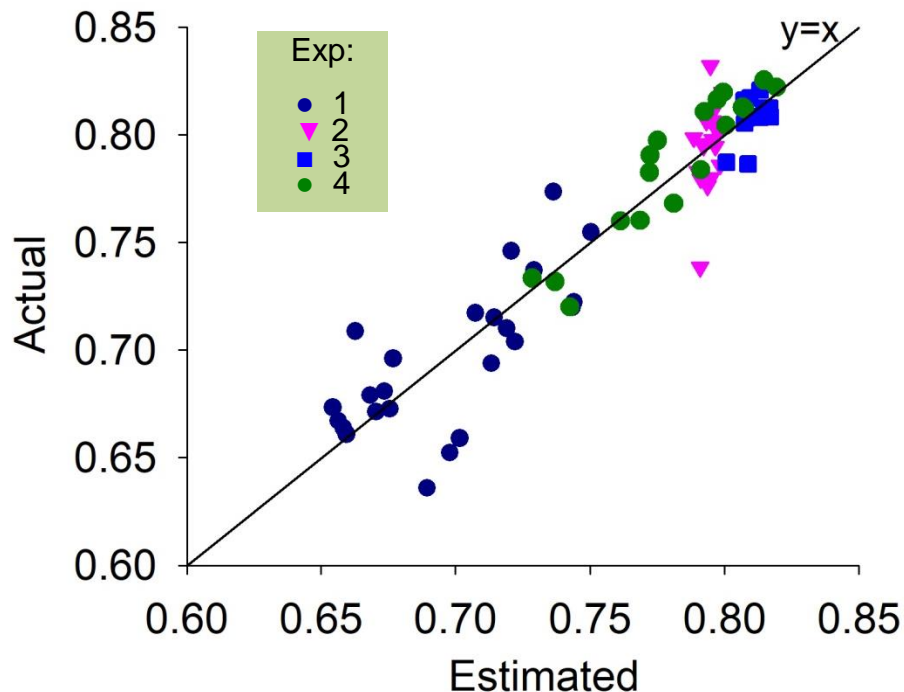
**Yb faecal recovery: 1.01 ± 0.069**

**Unbiased prediction  
of Faecal Output**

# RESULTS

$$I = F / (1 - \textcircled{D})$$

## Diet OM digestibility (g/g)



**Actual:**  $0.762 \pm 0.055$   
**Estimated:**  $0.762 \pm 0.052$

**MPE:**  $0.018 \rightarrow 2.4\%$   
 $\rightarrow 7.3\%$  for  $1 / (1 - \text{OMD})$

**Effects of factors tested  
well predicted from the equation**



# CONCLUSIONS

- ▶ **Good accuracy of the Yb-faecal index method for estimating pasture intake**
  - Faecal output estimated with no bias.
  - *In vivo* digestibility well estimated from faecal composition.
- ▶ **Method suitable for measuring pasture intake of grazing dairy goats**  
on multispecies swards and supplemented or not with concentrate.

