Recording grazing time of dairy cows

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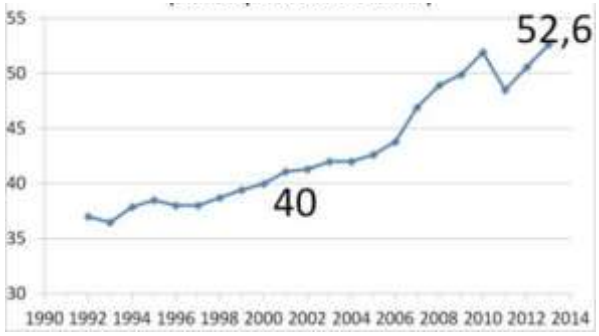
ICAR 2016

FP7-SME-2012-314879-AUTOGRASSMILK

Context

An increase in the farm size and productivity, a change in the farming systems (AMS doubled since 2010)… … a decrease in the grazing

Average dairy herd size in France



Grazing positive effects

- Cow is…an herbivore

And

- Economic advantages
- Animal health and welfare (lameness,…)
- Milk quality
- Consumers and society vision of livestock farming
- Valorisation of unusable surfaces for other productions (crops)
- …

AutoGrassMilk Project

2007 - 2013

FP7-SME-2012-314879-AUTOGRASSMILK

WP1	WP2	WP3	WP4
Optimum feeding strategies	Optimize the integration using **new technologies**	Increase the **sustainability**	**Economic assessment**

Innovative and sustainable systems combining automatic milking and precision grazing

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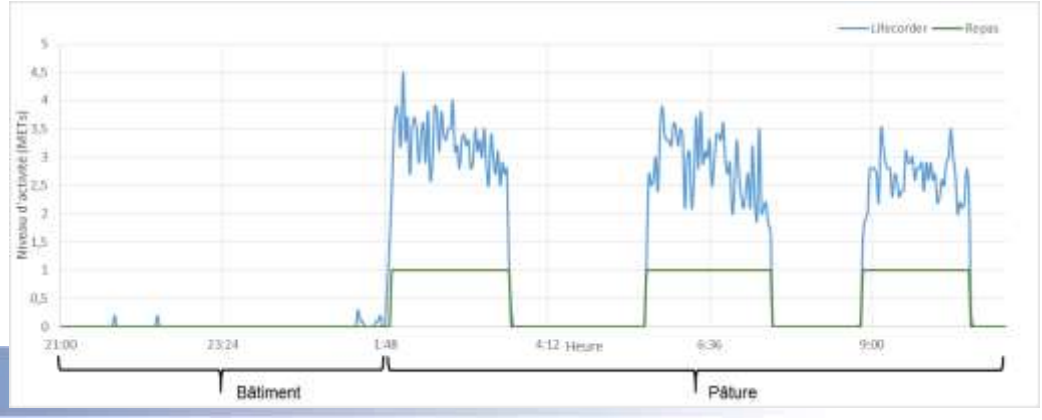
Validation of the Lifecorder + sensor

Lifecorder + sensors

- Lifecorder + = Uniaxial accelerometer
- Combination with in/out antennas

- Algorithm (R. Delagarde, INRA) : Signal → binary information (eating yes/no) : eating time, nb of meals

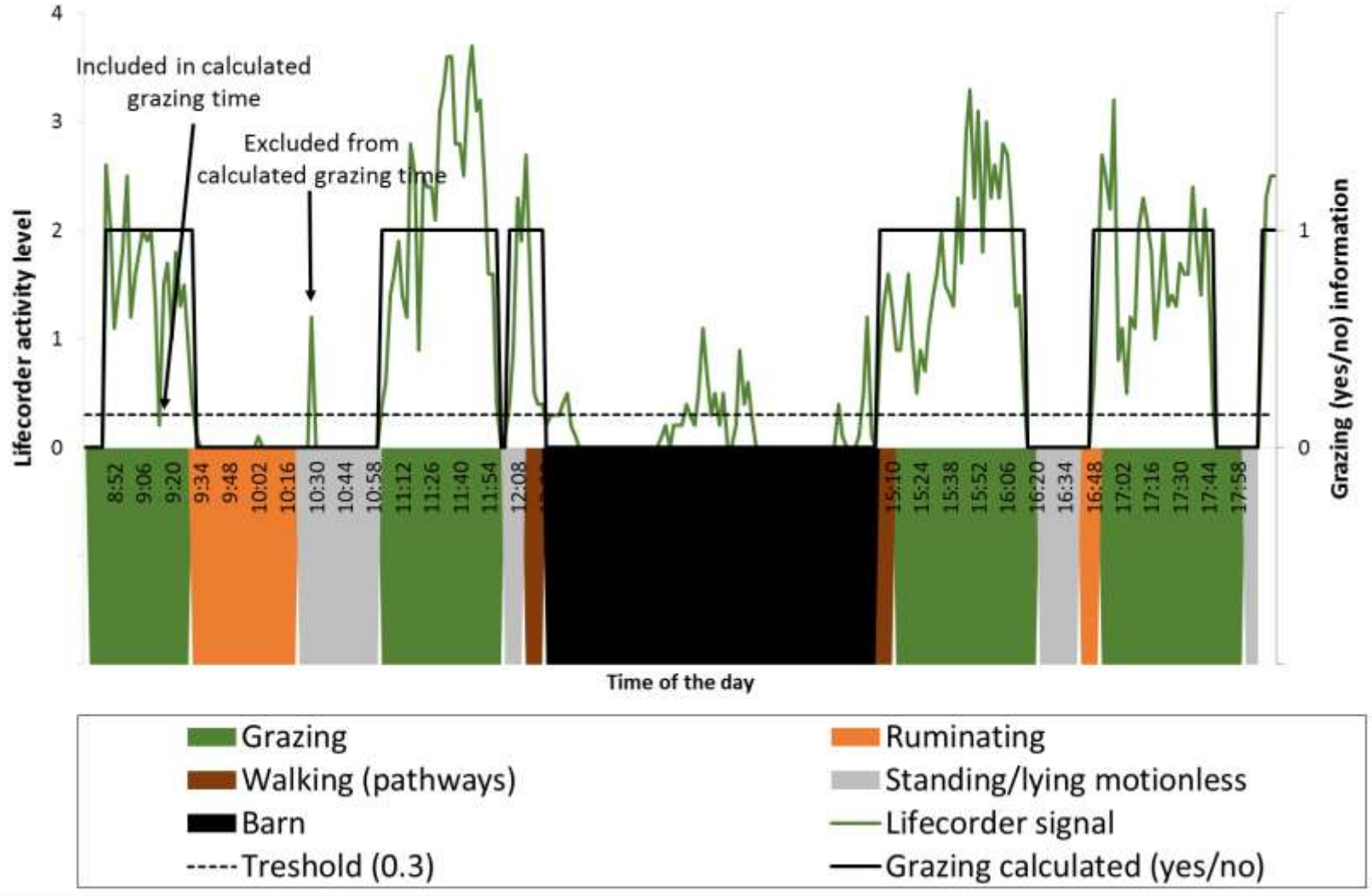


Evaluation protocol

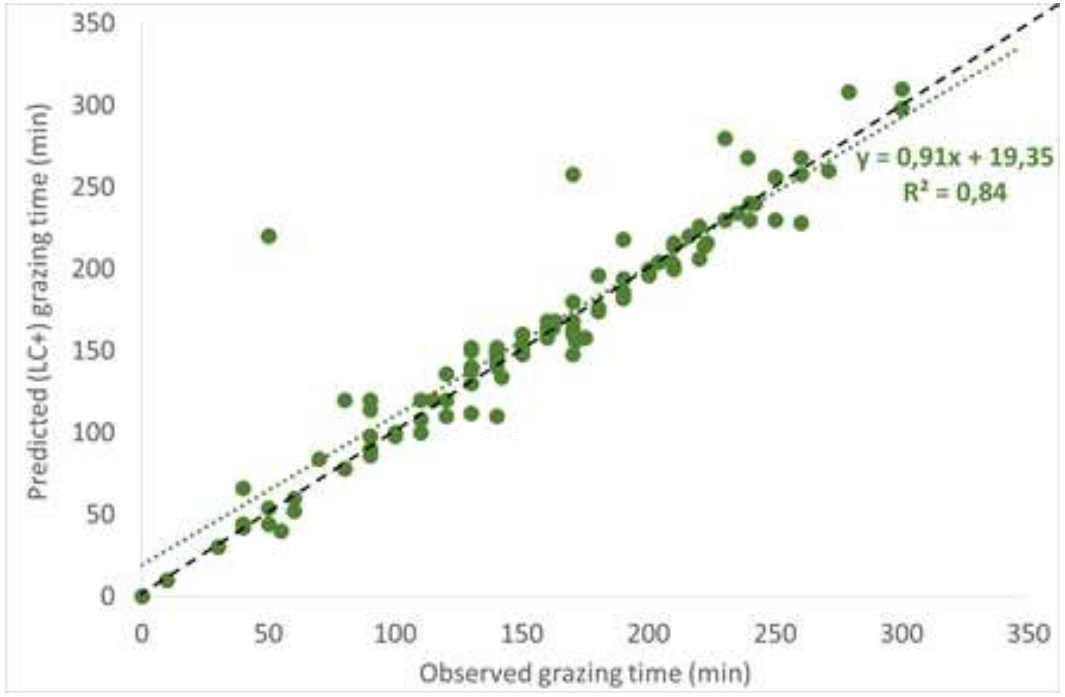
- **Tested in 2 experimental farms**
  - 25 cows equipped in Derval Farm
  - 14 cows equipped in Trévarez Farm

- **Observations as reference**
  - Scanning every 10 min
  - Registered activities : eating, ruminating, standing/lying, walking

Lifecorder + vs. observations



Reliable tool to measure grazing time



- Relative Prediction Error : 17%
- Delagarde and Lamberton (2015): R^2=0.98 and RPE = 7%
- Possible tool to monitor eating behaviour and to manage grazing
- Other marketed tools available

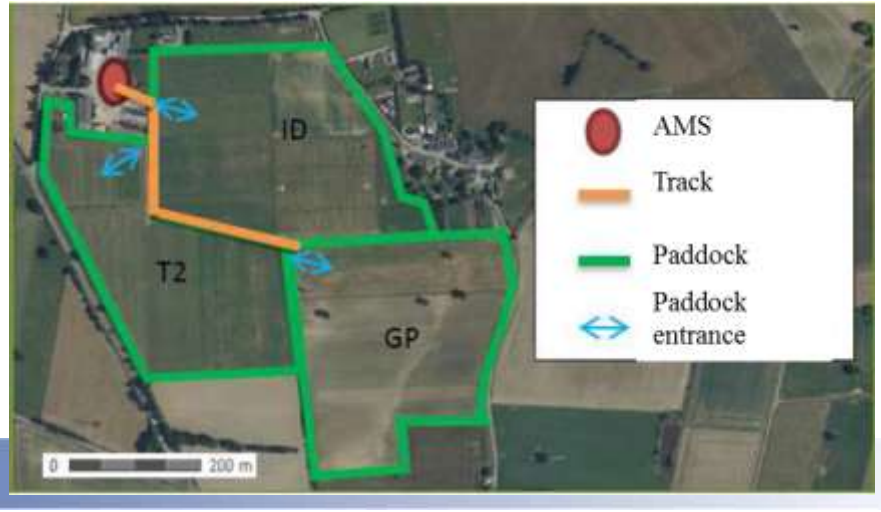



Use of the grazing time to assess grazing behaviour in an AMS farm

Derval experimental farm

Herd management

- Delaval VMS, 2008
- Saturated AMS, 2,000 kg/day
- 72 Holstein, 9,500 kg/cow/year

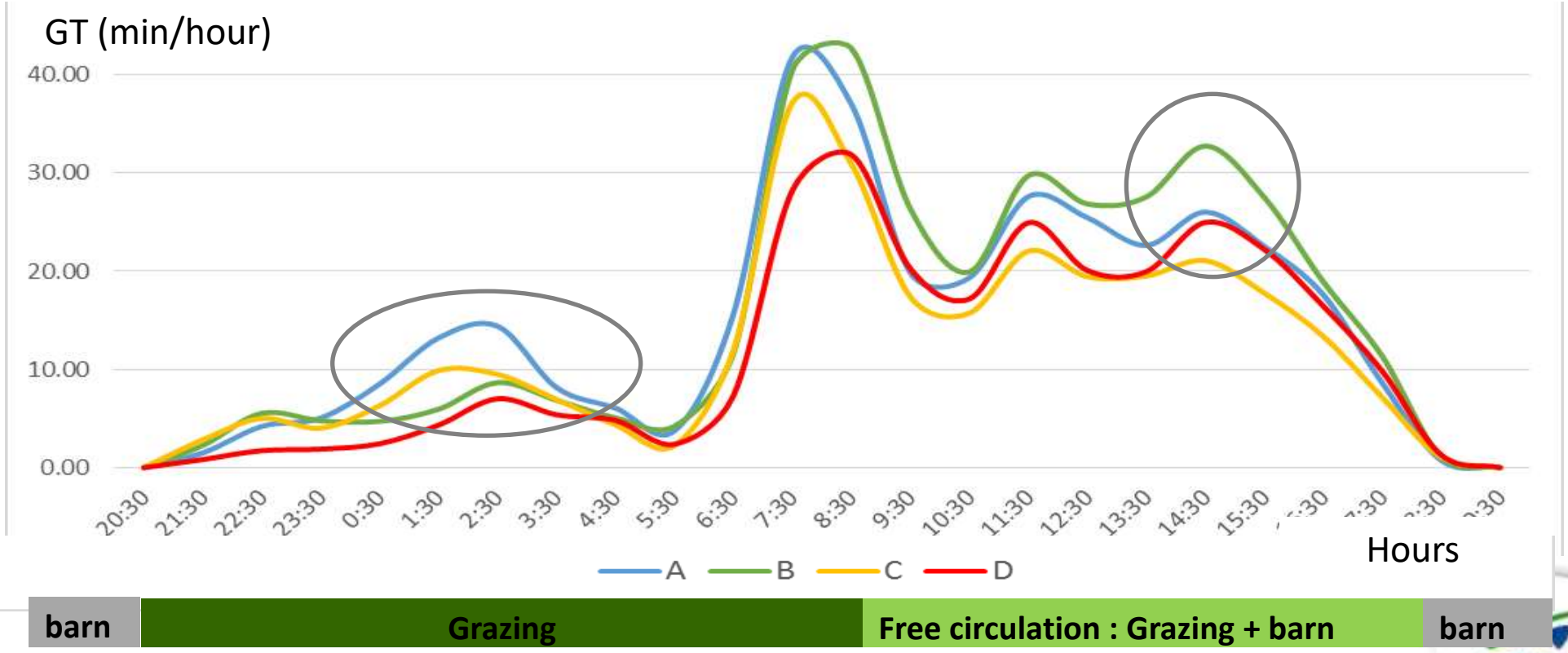


Feeding strategy

- Simplified rotational grazing system
- Supplementation: maize silage

Daily grazing behaviour in Derval

- 23 cows equipped from March to June 2015
- A PCA + HAC were achieved to make groups of individuals with common features



Daily grazing behaviour in Derval Farm

Derval farm (n=1,323)						
Groups	**Herd ave.** (SD)	A	B	C	D	P (1)
Nb of animals	**23**	6	4	8	5	
Grazing Time (min)	**320** (102)	360 [a]	365 [a]	294 [ab]	274 [b]	<0.001
Nb of meals	**5.3** (1.8)	5.6 [a]	5.7 [a]	5.2 [b]	4.8 [b]	0.0064
Meals Duration (min)	**64** (23)	69 [a]	69 [a]	60 [b]	59 [b]	0.0003
Access Time (min)	**775** (237)	817 [a]	776 [a]	801 [a]	686 [b]	0,001
Grazing Time/Access Time (%)	**43** (14)	44 [a]	47 [a]	37 [b]	40 [b]	<0.001
Exit time	**1h20**	0h45 [a]	2h00 [b]	0h50 [a]	3h00 [b]	<0.001
Yield (kg/cow/day)	**27.1**	30.0 [a]	21.2 [b]	29.4 [ab]	24.8 [ab]	0.047
Milking Frequency (milk./day/cow)	**1.92**	2.03	1.84	1.96	1.77	0.16

- **Huge impact of the herd hierarchy on GT**
- **Different grazing behaviours and efficiencies**

Effects on grazing time

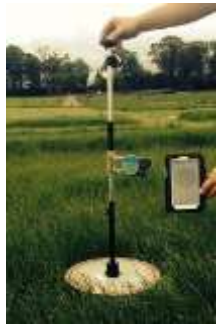
- Animal effect (breed, parity, yield, etc.)
- Farm system effect (complementation vs. full grass, robot)
- Pasture characteristics (species, grass height and composition)
- Grazing management (strip grazing, rotational, simplified)

→ Difficult to use as an absolute value

Potential use of grazing time

Grazing/herd management

- Improve existing tools (plate meters, grazing software, GPS)?
- Cow circulation with robots → use the herd hierarchy and grazing efficiency
- Health issues detection



Certification / welfare assessments

- For the legislator, the consummer and the farmer

Estimation of grass intake in regulated grazing systems (*Van Reenen et al. 2016*)

- Phenotyping feed intake for selection or herd management
- Phenotyping grazing efficiency ?

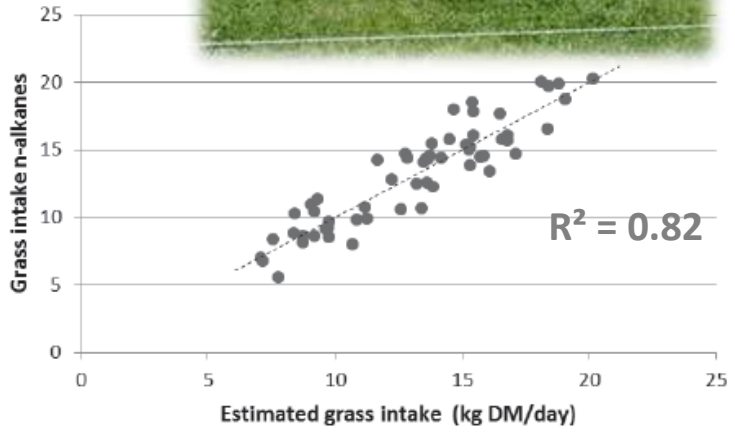


Figure 1. Relationship between grass intake determined with the n-alkane method and grass intake estimated with the use of regression Model 1.

Summary

- **Accurate grazing time measurement is possible with accelerometer sensors**
- **Hundred thousands of animals are equipped worldwide**
- **Huge variability of grazing behaviours between animal**
- **Parameter to be used to**
  - Improve grazing management (in addition of existing tools)
  - Reinsure the consummer…and better pay the farmer (ex. in NL)
  - Phenotyping new traits (grass intake, grazing efficiency,…)?

Questions ?