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an integrated infrastructure for increased research capability and innovation in the European cattle sector

Digestibility and intake become repeatable traits in young bulls with at least 7 days of measurement

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Objectives and scientific hypothesis

- Intake (**VDMI**) and Total Tract digestibility (**TTD**) are determinants of Nutrient Use efficiency.

- To realize those measurements, usually animals are held in digestibility stalls

10 to 15 days of restricted movement in digestibility stalls

Animal Welfare **Precision of the measurement**

Reducing the time spent in the stalls without loosing precision

- **Repeatability of measurements is crucial to phenotype animals**
  - **Higher repeatability ➔ Lower experimental error**

How much time spent in the stalls, it will take to have repeatable TTD and VDMI measurements?

II. *Management* of the bulls and feeding system

Ad libitum

Repetition 1= R1

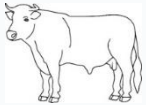
Repetition 2= R2

Free Stall

Digestibility stalls

Free Stall

Digestibility stalls

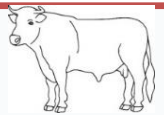


Same Diet

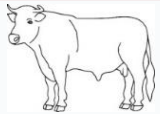
n=8

Diets ≠

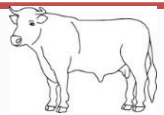
n= 4



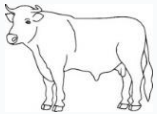
Diet HIGH N (173 g/DM)



n= 4



Diet LOW N (116 g/DM)



Age: 314 ± 23 d
Weight: 413 ± 16 kg

Age: 429 ± 11 d
Weight: 576± 27 kg

3 weeks | **3 weeks** | **2 weeks** | **9 weeks** | **2 weeks**

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III. Calculations and statistical analysis

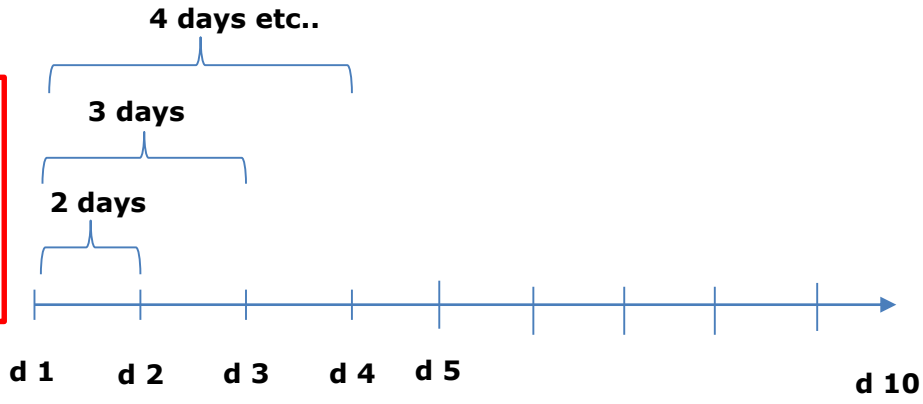
1

Differences between R1 and R2 for LI (Level intake), VDMI (voluntary dry matter intake) and TTD (total tract digestibility) over 10 d were tested by ANOVA: Mixed model

$$Y_{ijk} = \mu + Diet_i + Repetition_j + diet \times repetition_{ij} + animal_k + e_{ijk}$$

2

TTD and VDMI were measured during 2, 3, 4, 5, 6, 7, 8, 9 and 10 consecutive days



Repeatability of TTD and VDMI was calculated as the correlation coefficient between R1 and R2 adjusted by the diet effect

Individual repeatability for animal characterisation and phenotyping

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IV. Results

	High CP		Low CP		SEM	P value		
	Rep 1	Rep 2	Rep 1	Rep 2		Diet	Repetition	Diet × Rep
LI (kg DM: 100 kg BW)	1.73	1.62	1.81	1.66	0.008	0.430	0.030	0.670
VDMI(kg)	7.27	8.64	7.78	8.68	0.152	0.614	0.001	0.266
TTD (%)	66.2	68.5	65.4	66.7	0.348	0.334	0.000	0.161

Animals digested more efficiently during R2 than R1 in relation to their lower level intake

Animals with HIGH CP content DIET digested more efficiently than those with LOW CP DIET,
(numerically but not significantly)

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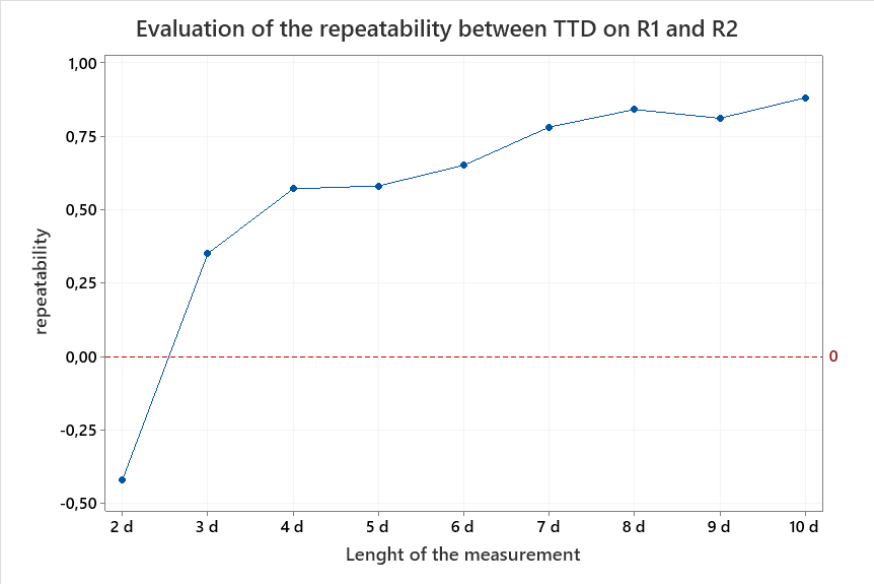
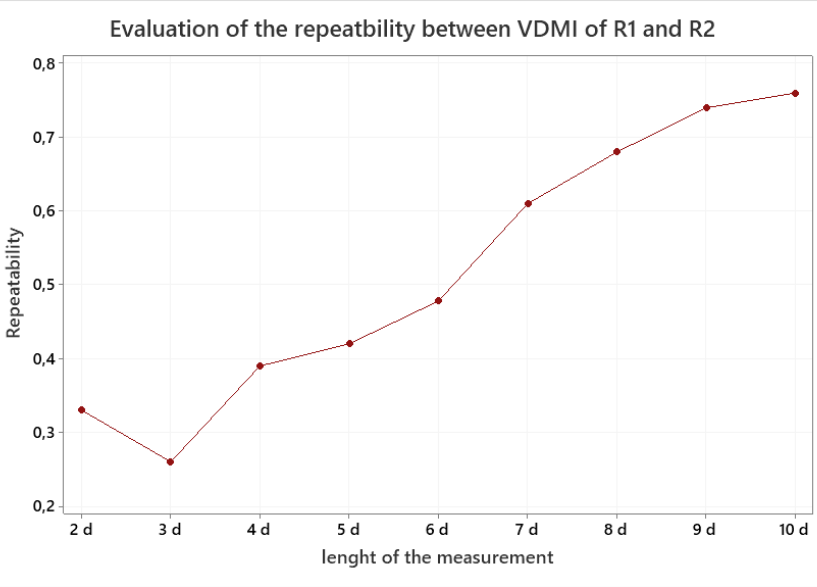
IV. Results





Repeatability of TTD and VDMI increased with length of measurements from:

1. -0.42 to 0.88 for TTD
2. 0.33 to 0.76 for VDMI, between 2 and 10 d, respectively.

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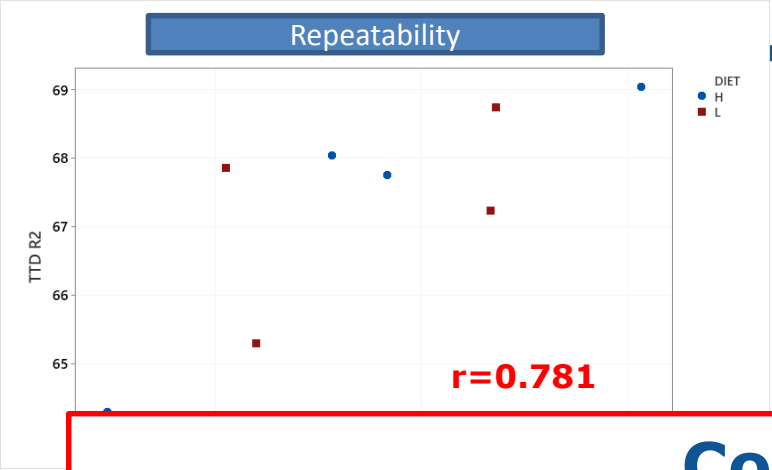
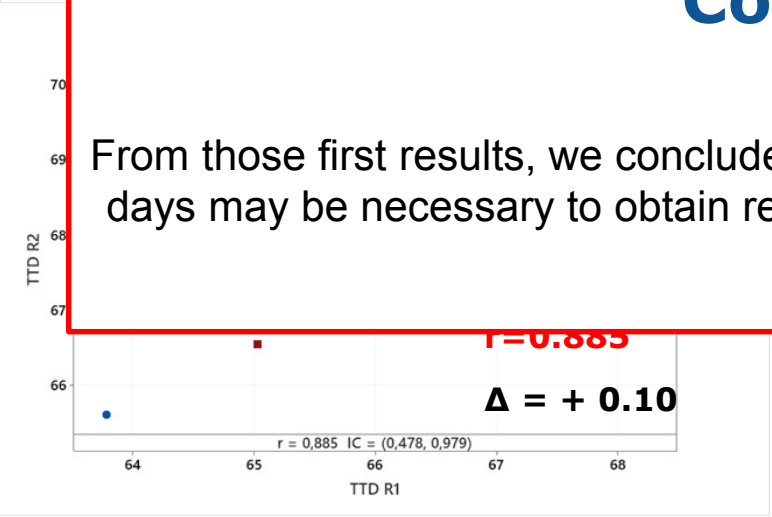
IV. Results

TTD

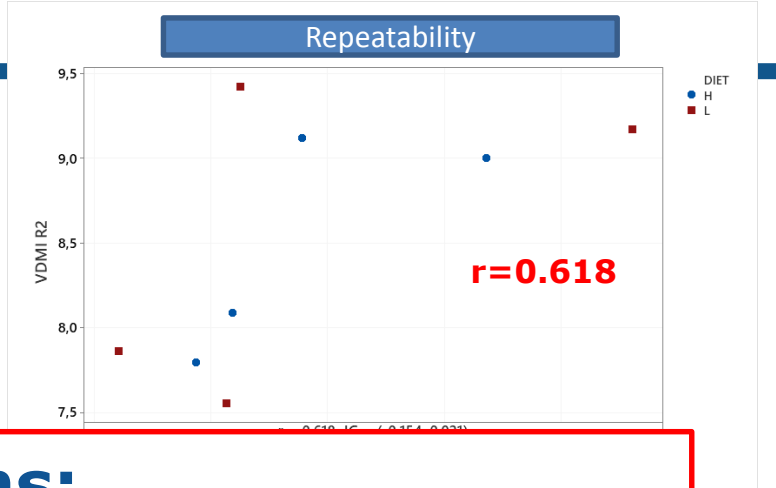


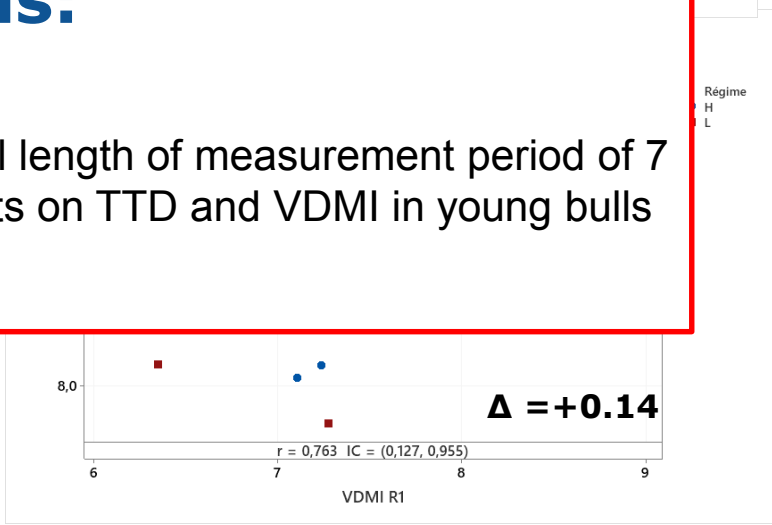
7 DAYS



10 DAYS

VDMI





Conclusions:

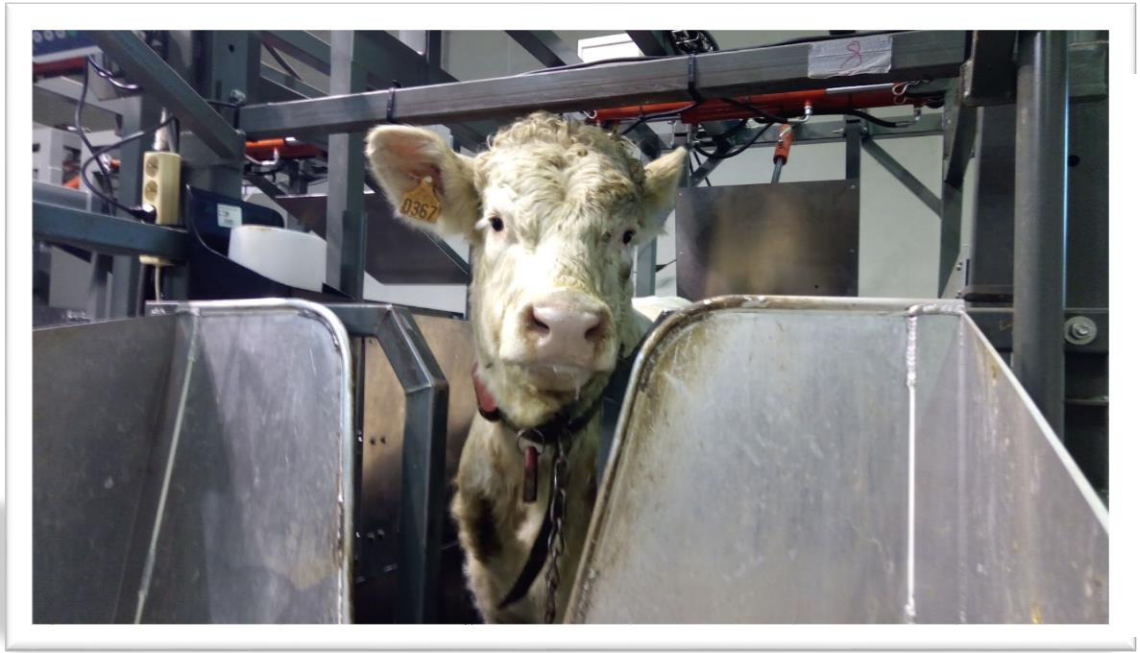
From those first results, we conclude that a minimal length of measurement period of 7 days may be necessary to obtain repeatable results on TTD and VDMI in young bulls fed ad libitum.

1. Repeatability of VDMI and TTD will be assessed using more animals (n=16)

2. The impact of the length of the measurement on the repeatability of nitrogen balance will be soon assessed as the laboratory analysis are in progress

3. We are doing the statistical analysis of animal welfare parameters' in relation to the length of measurement:

- Skin lesions
- Hair cortisol
- Animal behaviour: level of activity and number of times the positions changed



Thank You

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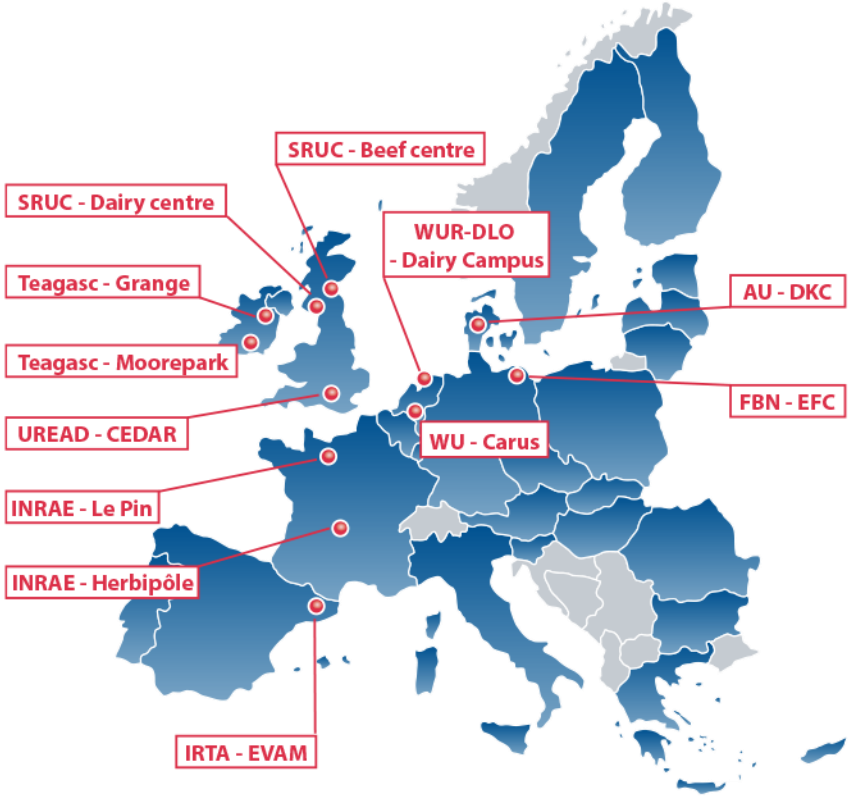
SmartCow at a glance



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- 11 major RIs distributed in 7 EU countries
- 12 locations, which include 18 installations
- 2500 dairy and 1000 beef cows

- **Networking of RIs** to inventorize resources, harmonize procedures, and share data
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- **Interaction with stakeholders** to stay in line with industry needs and improve dissemination

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http://www.smartcow.eu/calls/

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Digestibility stalls

Individual stalls (2.40 × 2.80 m) with individual feeders and drinkers

Designed for optimal collection of refusals and feces and more precision

The walls are movable to allow animals to find comfort

Front side

Back side

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