BOKU
Institute of
Livestock Sciences

International perspectives on feed intake phenotyping and feed efficiency in cattle

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ICAR
THE GLOBAL STANDARD
FOR LIVESTOCK DATA

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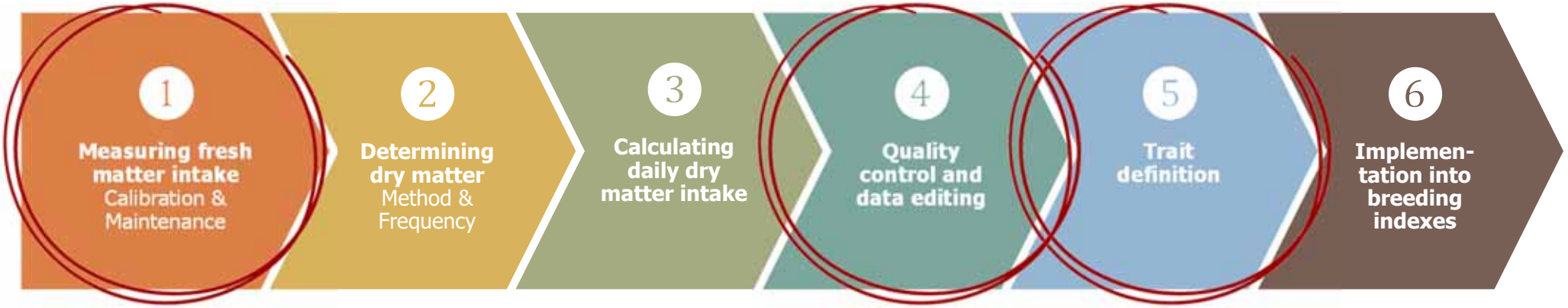
Objectives

Background

- Increased focus on feed efficiency as a new trait in the breeding goal
- The number of phenotypes for feed intake under commercial settings is increasing
- Existing knowledge gaps regarding practical routines, i.e. calibration, cleaning, data editing, etc.



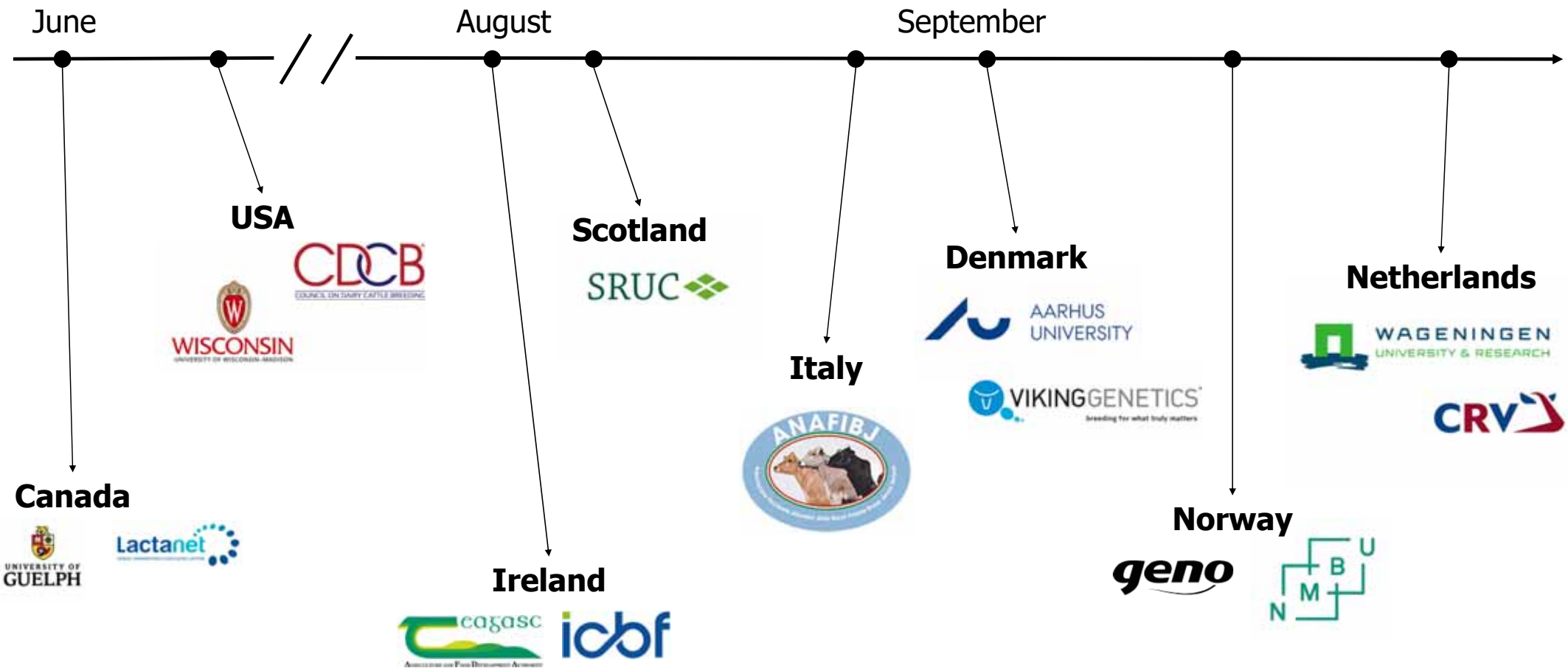
Aim of the Brian Wickham Young Person Exchange Programme:

(1) document **practical procedures**

(2) revisit **feed efficiency definitions**

(3) investigate **genetic relationships** between feed intake and other traits

My travels in 2025



Practical procedures

Calibration

	Research farm	Commercial farm
How		
Frequency	 weekly monthly trial start annually when needed	not always a specific protocol
Who	• farm staff • researcher • technicians of the manufacturer	• farmer • technicians of the manufacturer

Practical procedures

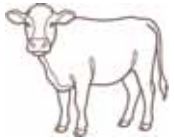
Maintenance

	Research farm	**Commercial farm**
How	• RFID tag readers • air hoses • additional damages	• sensors • bins • underneath the bins
Frequency	every 3 months at the end of trial once per year	daily when needed twice a week weekly
Who	• farm staff • researcher	• farmer • technicians of – the breeding association – the manufacturer

Practical procedures

Data editing

First steps: checking data for consistency

Is there data for every  or  ?

+ removing duplicates, zeros and negative values

Thresholds (Examples)

visit duration
30 – 1,500 s

visit intake
0.1 – 1.5 kg

intake rate
>2kg/minute & >2kg in total
→ removed

long visits, low intake
<0.5 kg & >1,000 s
→ removed

visits per day
1 – 500

Outlier correction – daily feed intake

Fixed thresholds
- fresh matter intake: 0 – 100 kg
- dry matter intake: 8 – 55 kg

Statistical thresholds
- mean ± 4 SD
- studentized residuals > 5

Further restrictions:
e.g., at least 30 daily feed intake records per animal

Feed efficiency definitions: What is feed efficiency to you?

An efficient cow is one that is a good producer without eating excessively, which should not affect her health or fertility

I believe different approaches to feed efficiency can be used depending on the breeding goal and variance

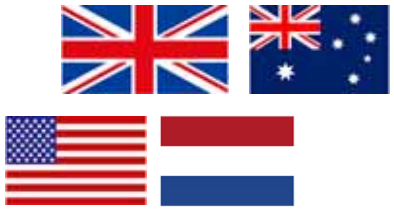
The ability of a cow to produce the same amount of milk as another cow, but consuming less feed

The amount of fat and protein yield produced per unit of feed intake

Feed efficiency definitions: Implemented traits

Feed Saved / Saved Feed / Feed Efficiency

(genetic) residual feed intake or dry matter intake combined with feed required for maintenance (or similar)



expressed as:
saved feed (costs) per lactation

genetic residual feed intake

$GEBV_{gSavedFeed} = \beta_1 * GEBV_{ECM} + \beta_2 * GEBV_{\Delta BW} - GEBV_{DMI}$

expressed as:
relative breeding value

(index units correspond to a defined amount of feed saved per lactation or productive lifetime)

Feed intake

kilograms of feed consumed by progeny

expressed in: EUR

predicted Feed Efficiency

ratio between FPCM and pDMI

pDMI = (0.372*FCM + 0.0968*MBW)

expressed as:
relative breeding value

References: Pryce et al. (2015); de Jong et al. (2019); Finocchiaro et al. (2020); Kelly et al. (2020); Gaddis et al. (2021); Jamrozik et al. (2021); Li et al. (2021); Jamrozik et al. (2022); Abdalla et al. (2024); Jamrozik and Sullivan (2024); Stephansen et al. (2025).

Diapositiva 8

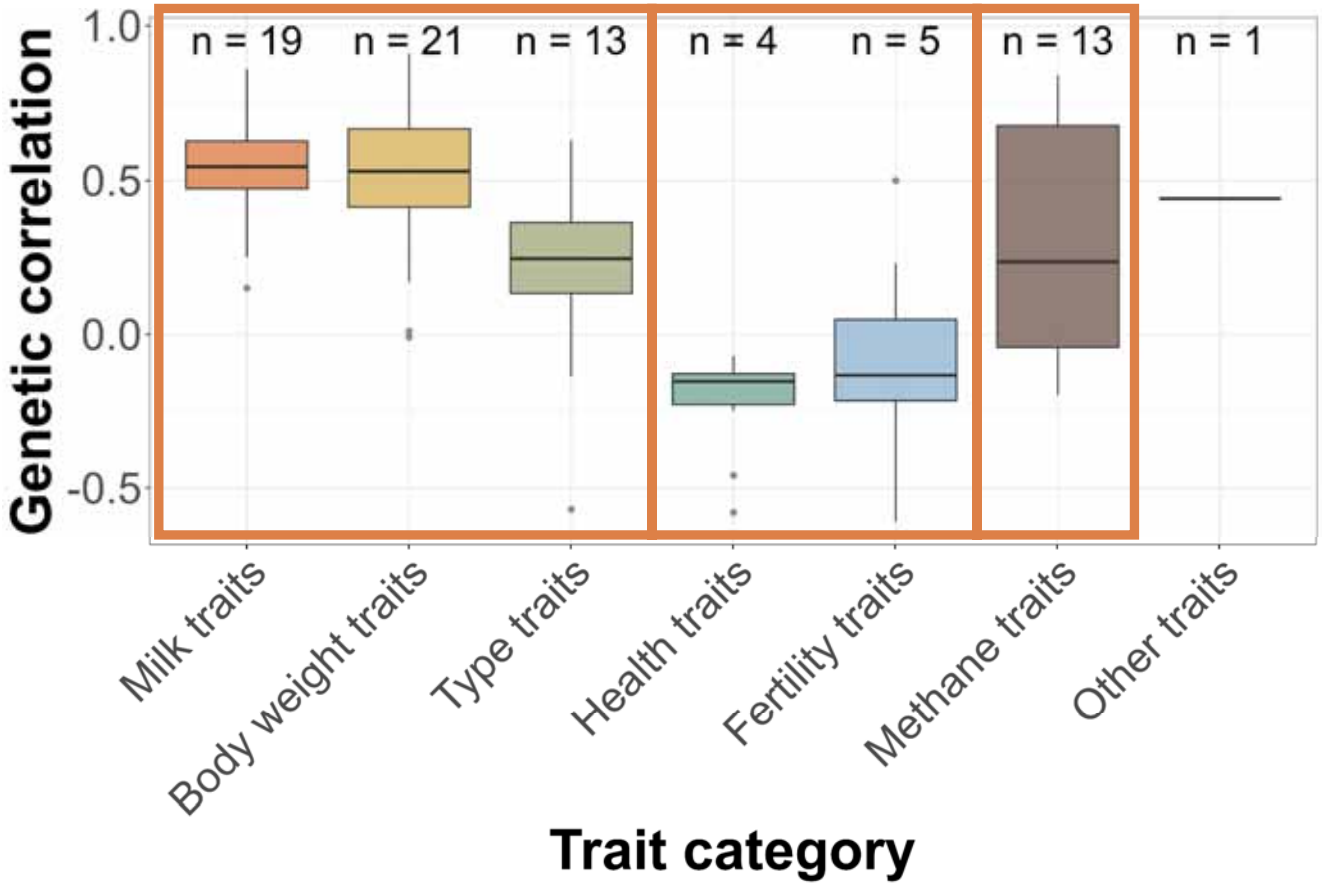
SJB2 evtl noch anpassen!
Sarah-Joe Burn; 29/05/2026

Genetic relationships

supplementary literature search

Total number of references: 36

- most references for milk and body traits
- increasing number of references for methane traits
- only a few number of studies for health and fertility traits



n = number of references

Conclusions and personal remarks

① **Practical procedures**
- robust protocols exist – differences depending on the context

② **Feed efficiency definitions**
- different feed efficiency traits are already implemented

③ **Genetic relationships**
- already quite some knowledge for production traits – still some gaps for health, fertility and methane traits

My main take-aways from the programme:
- A unique international overview of feed efficiency
- Feed efficiency is an even more complex topic than expected
- There is no black and white – despite the (sometimes) strong opinions ☺

Thank you!

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DaFNE

…and all the host organisations and institutions!

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