# Feeding behaviour, explained by temperament and dominance, impacts feed efficiency in beef cattle

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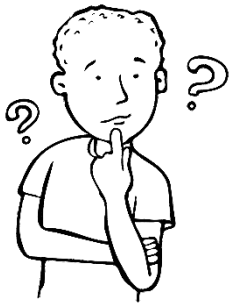
# Feeding behaviour & performance

- Feeding behaviour has been found to associate with feed efficiency and growth in beef cattle
- Longer feeding time and more frequent feeding bouts are associated with higher productivity.



...what determines feeding behaviour?

Schwartzkopf-Genswein et al., 2002; 2003; Nkrumah et al., 2007; Kelly et al., 2010;

# From temperament to performance

- In cattle (social animal), **feeding behaviour** may be determined by **hierarchy and dominance** rank.
- **Excitable temperaments** have been associated with **shorter feeding** bouts and **lower intake**.
- Differences in temperament and behaviour could **impact productivity** and **feed efficiency**.

Voisinet et al., 1997; Cafe et al., 2011; Turner et al., 2011

# Objective

- Investigate how feeding behaviour is associated with productivity and whether this can be explained by temperament and dominance rank in beef cattle.

# M&M: Performance measures

- Six groups of 14 steers (n=84) were housed during 8 weeks
- Dry matter intake
- Body weight
- Fat depth

} Residual Feed Intake (RFI)

# M&M: Temperament and behaviour

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Feeding behaviour

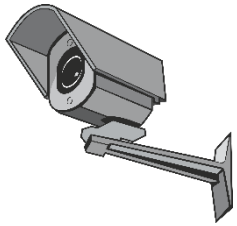
- Feeding frequency (x day)
- Total feeding time (x day)
- Feeding bout duration

Temperament

- Crush score: Handling excitability
- Flight speed: Escape velocity at release

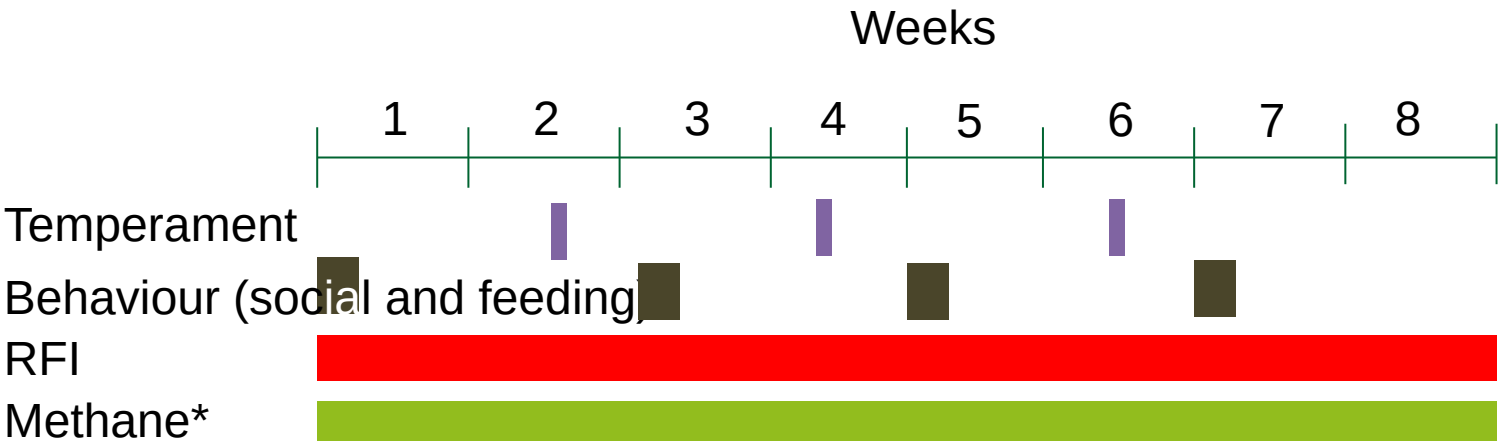
Social behaviour

- Displacements (frequency and index)
- Aggressions (frequency and index)



# M&M: Experimental design

- 84 steers (castrated male beef)
- Factorial 2x2
  - Diet: concentrate - forage
  - Breed: Luing – Charolais crossbred




- Stats: Multivariate mixed models (stepwise)

# Results

In forage fed steers, a longer time feeding increased feed efficiency (decreased RFI)

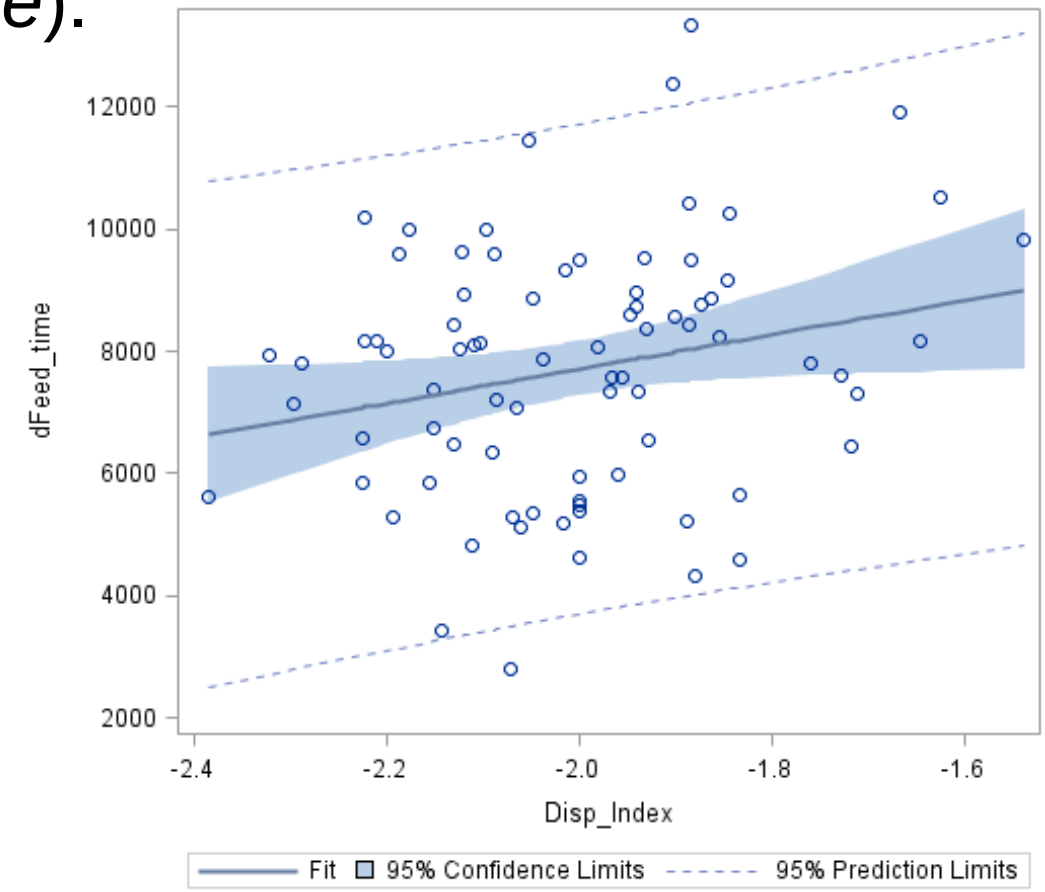
$$RFI = \mu + diet + breed + \mathbf{diet*dFeed\_time}$$

| | **μ** | **diet** | **breed** | **diet*dFeed_time** |
|---|---|---|---|---|
| Factor | | concentrate | charolais | forage |
| *b* | 1.687 | -2.44 | -0.37 | -0.0014 |
| *p-value* | <0.01 | *<0.01* | *<0.01* | *<0.05* |

# Results

Dominant animals (*Displ_Index*) spent more time feeding (*dFeed_time*).

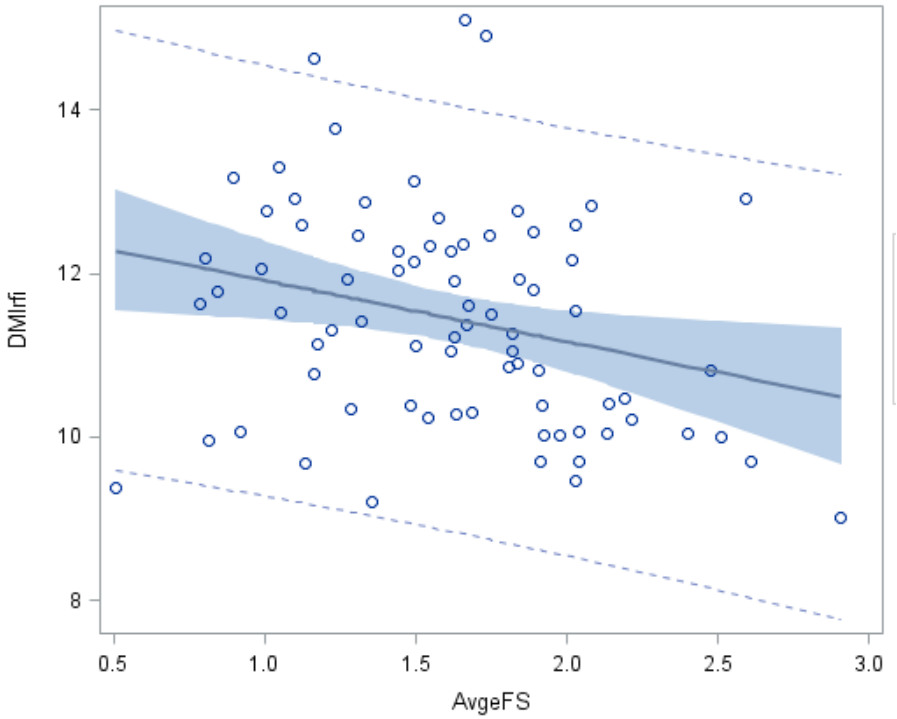
$R^2$=0.053
*p* = 0.0299



# Results

Reduction of intake improves feed efficiency (Llonch et al., 2016)

Temperamental steers (AvgeFS) had lower feed intake




$R^2$=0.072

*p* = 0.0319

# Results

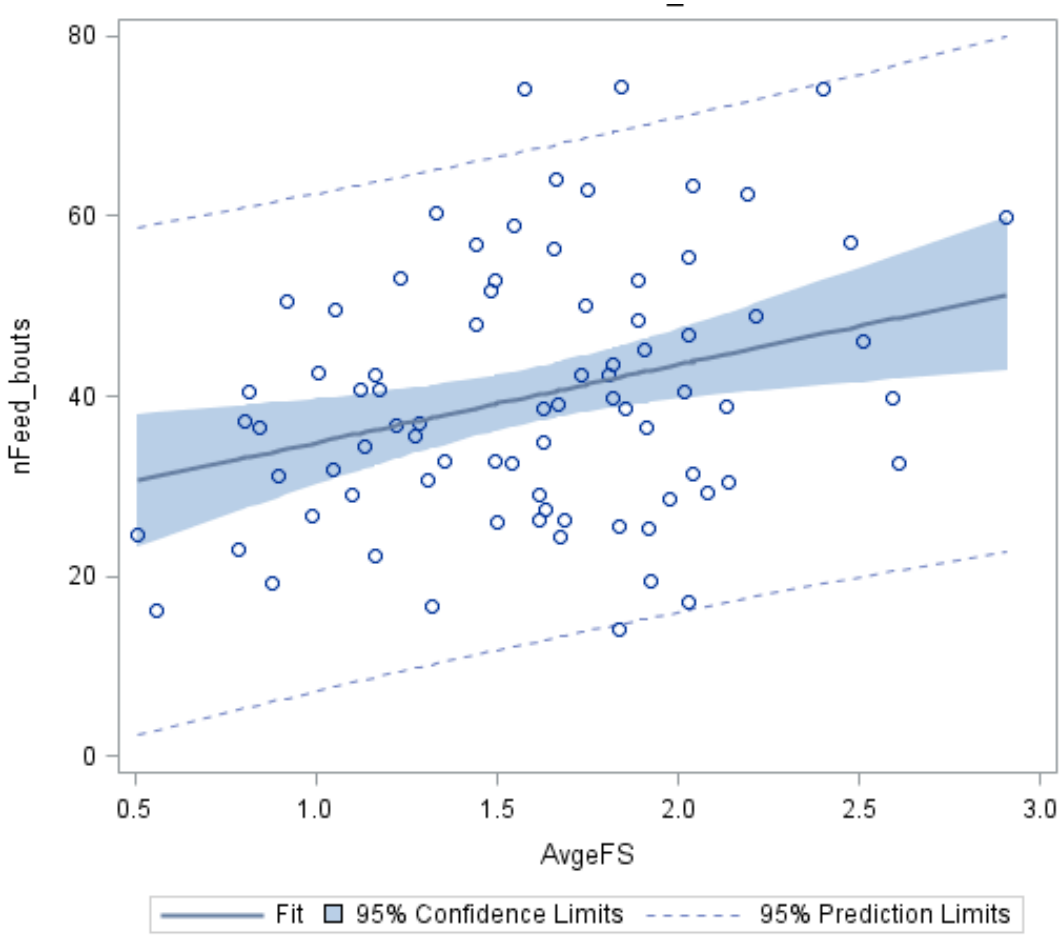
Steers that ate more frequently (nFeed_bouts) emitted less $CH_4$.

$$CH_4 \text{ (g/kg DMI)} = \mu + \text{diet} + \mathbf{nFeed\_bout}$$

| | **μ** | **diet** | **nFeed_bout** |
|---|---|---|---|
| Factor | | concentrate | nFeed_bouts |
| *b* | 58.40 | -44.03 | -0.24 |
| *p-value* | <0.01 | <0.01 | <0.01 |

# Results

Temperamental steers (AvgeFS) visited the feeder more often…

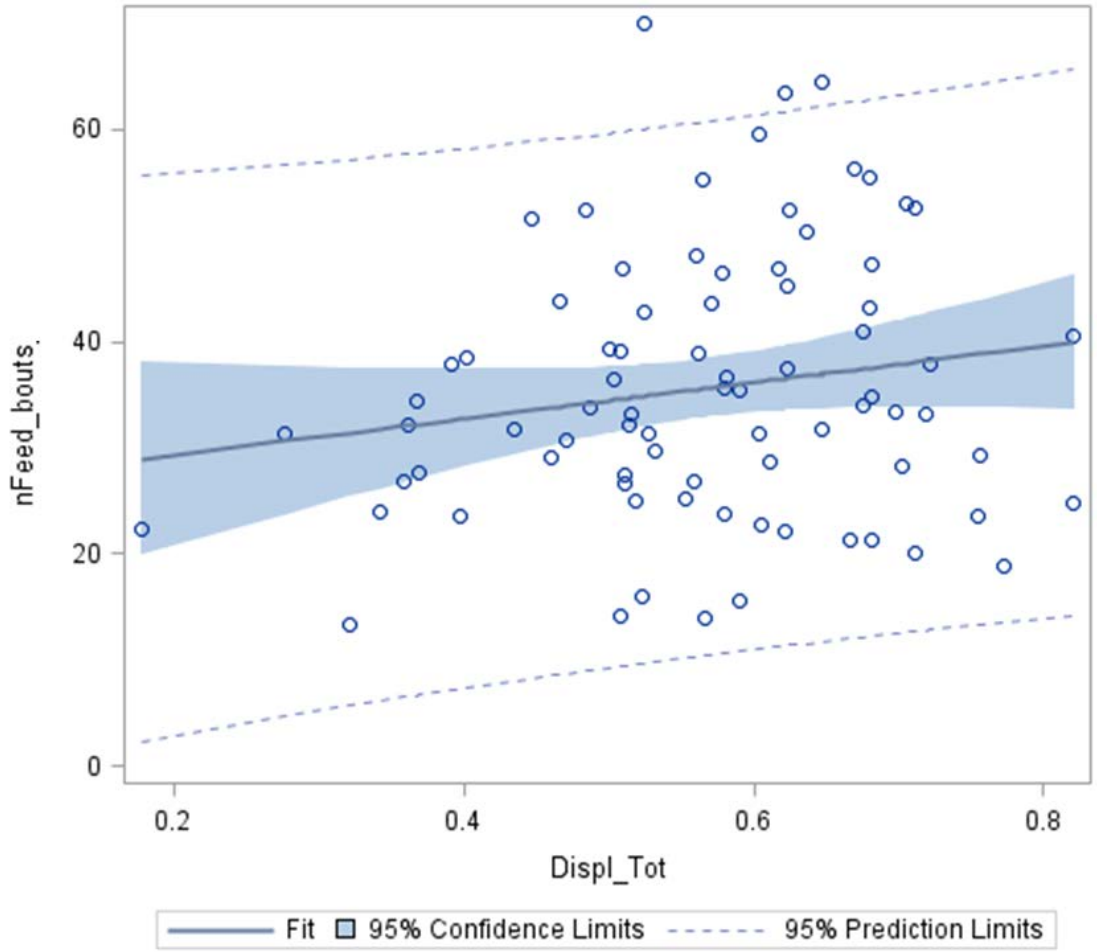



$R^2 = 0.091$

$p = 0.0026$

# Results

… and dominant steers (Displ_Tot) as well.




$R^2 = 0.02$

$p = 0.0207$

# Discussion

1. More time spent feeding is associated with greater feed efficiency possibly due to greater secretion of saliva and increased access of microbiota to fibre.

2. Greater time feeding is explained by increased access to feed in dominant animals. Dominance cannot be manipulated but a reduction of the competence could help increasing the average herd feeding time.

# Discussion

3. Temperamental steers show lower feed intake which improves feed efficiency but at the same time reduces growth.

4. A higher frequency of visits to the feeder, partially explained by high temperament and dominance rank, reduces $CH_4$ emissions. Besides the $CH_4$ effect, higher feeding frequency may help distribute feeding bulks and reduce the risk of acidosis.

# Implications

- Promoting a longer feeding time and frequent and well distributed feeding bouts will benefit beef production efficiency.
- Longer feeding time and higher intake can be promoted by breeding and managing animals towards lower temperament.
- Efficiency, as well as $CH_4$ emissions, can be improved by reducing the dominance rank. As it cannot be manipulated, housing and management strategies may help reducing competence and thus the effect of dominance-subordination on feeding behaviour

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