PROMISING PARAMETERS TO FORESEE INTAKE AND FEED EFFICIENCY AT PASTURE ?

…a Meta-analysis Approach

BOVAL Maryline & SAUVANT Daniel

PROMISING PARAMETERS TO FORESEE INTAKE AND FEED EFFICIENCY AT PASTURE…

a Meta-analysis Approach

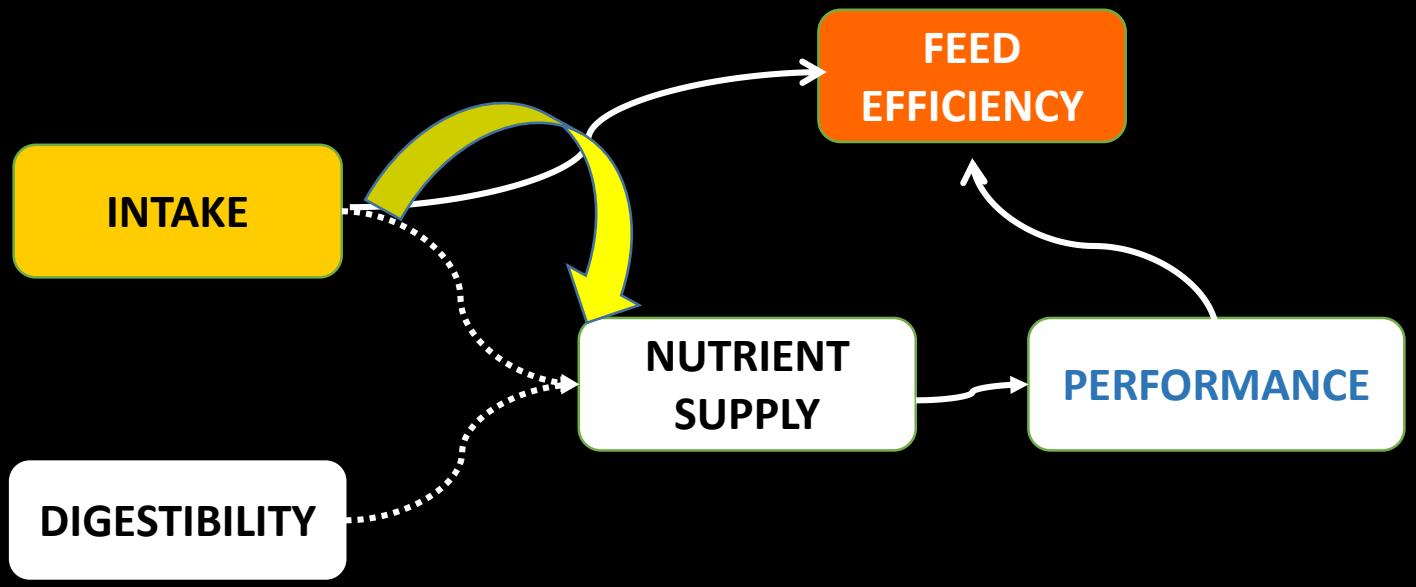
Major advances in electronic/computer technologies

and sensors deployed on cows, sheep and pygmy goats as illustrated by Mulvenna et al (2018)

…Need to identify routinely measurable KEY CRITERIA to detect individual variability for INTAKE & FEED EFFICIENCY

And a lot of knowledge published in the LITERATURE

Components of FEED EFFICIENCY at pasture ?



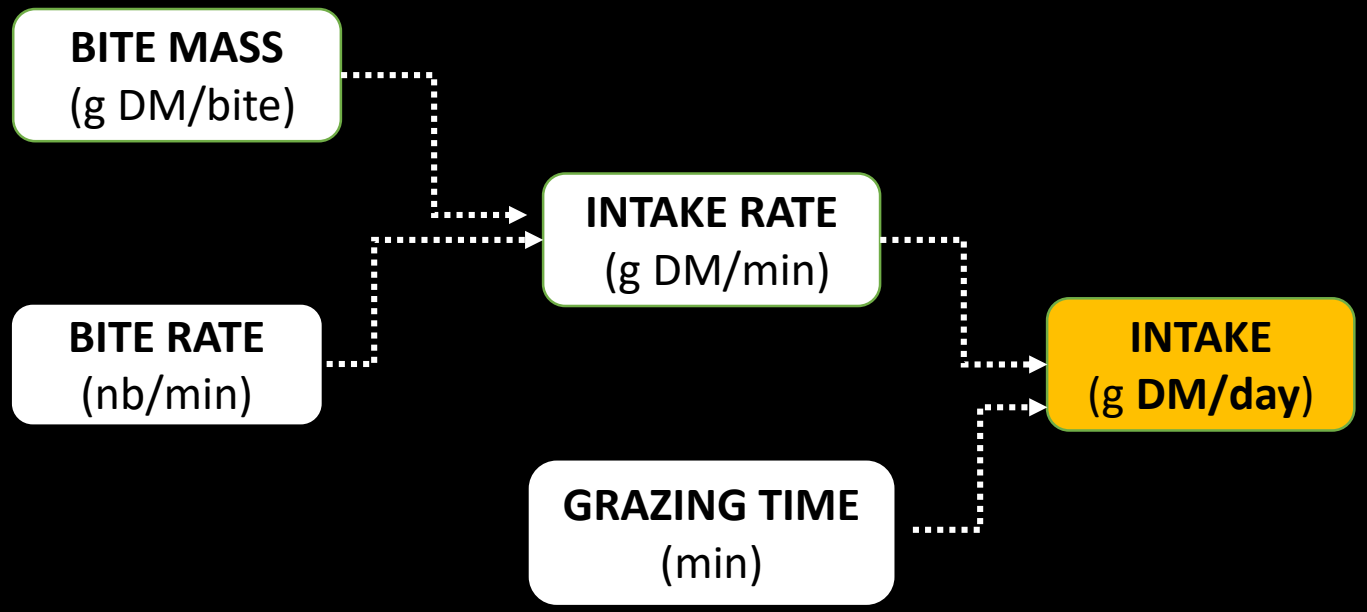
Boval, Edouard & Sauvant (2015)

INGESTIVE BEHAVIOUR COMPONENTS TO INTAKE ?

Since Allden & Whitaker, 1974….

SWARD HEIGHT

BULK DENSITY



We analyzed 90 references (142 experiments…483 treatments)… ***Our Meta-analysis Approach***

Papers from 1978 → 2018

Animal species

Cattle n=
- ❑ *dairy cows,*
- ❑ *heifers,*
- ❑ *steers*
- ❑ *calves*

Sheep n=

Goats n=

Experimental Design

At pasture (63%)

Micro-swards (37%)

Meassurement Methods

Behaviour

Grass

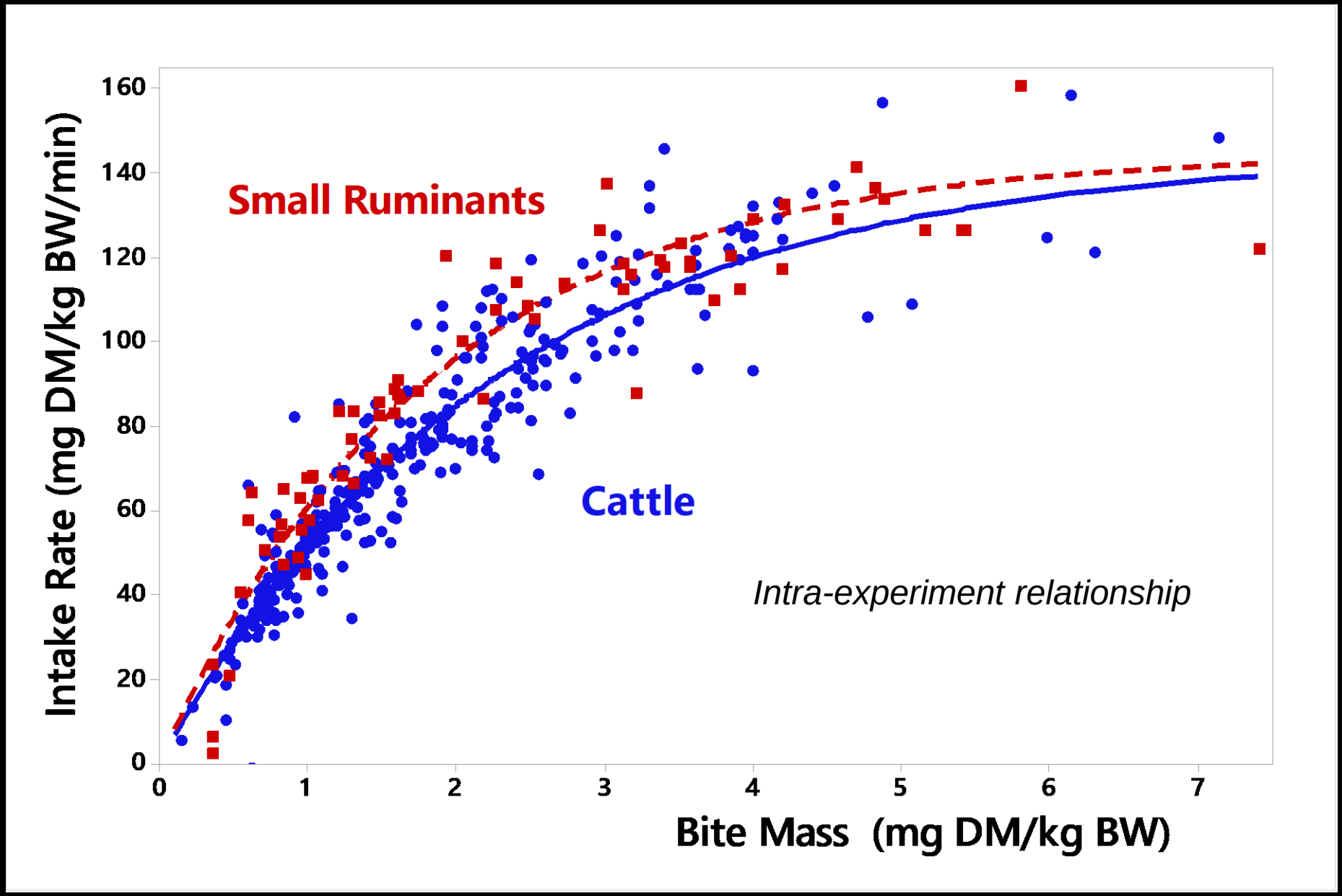
Fecal indices, Alkanes…

Climate Environments

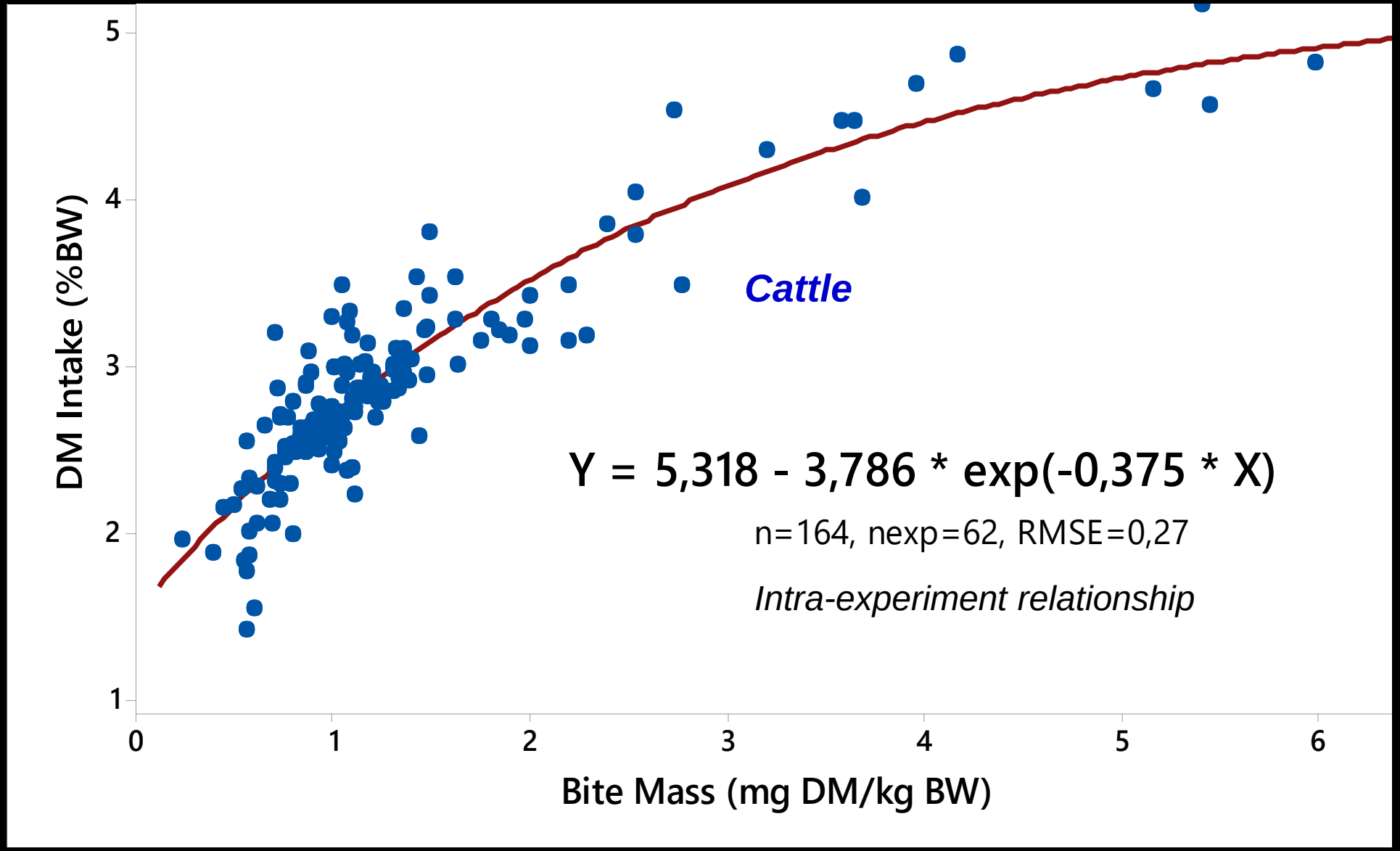
Tropical (45%)

Temperate (55%)

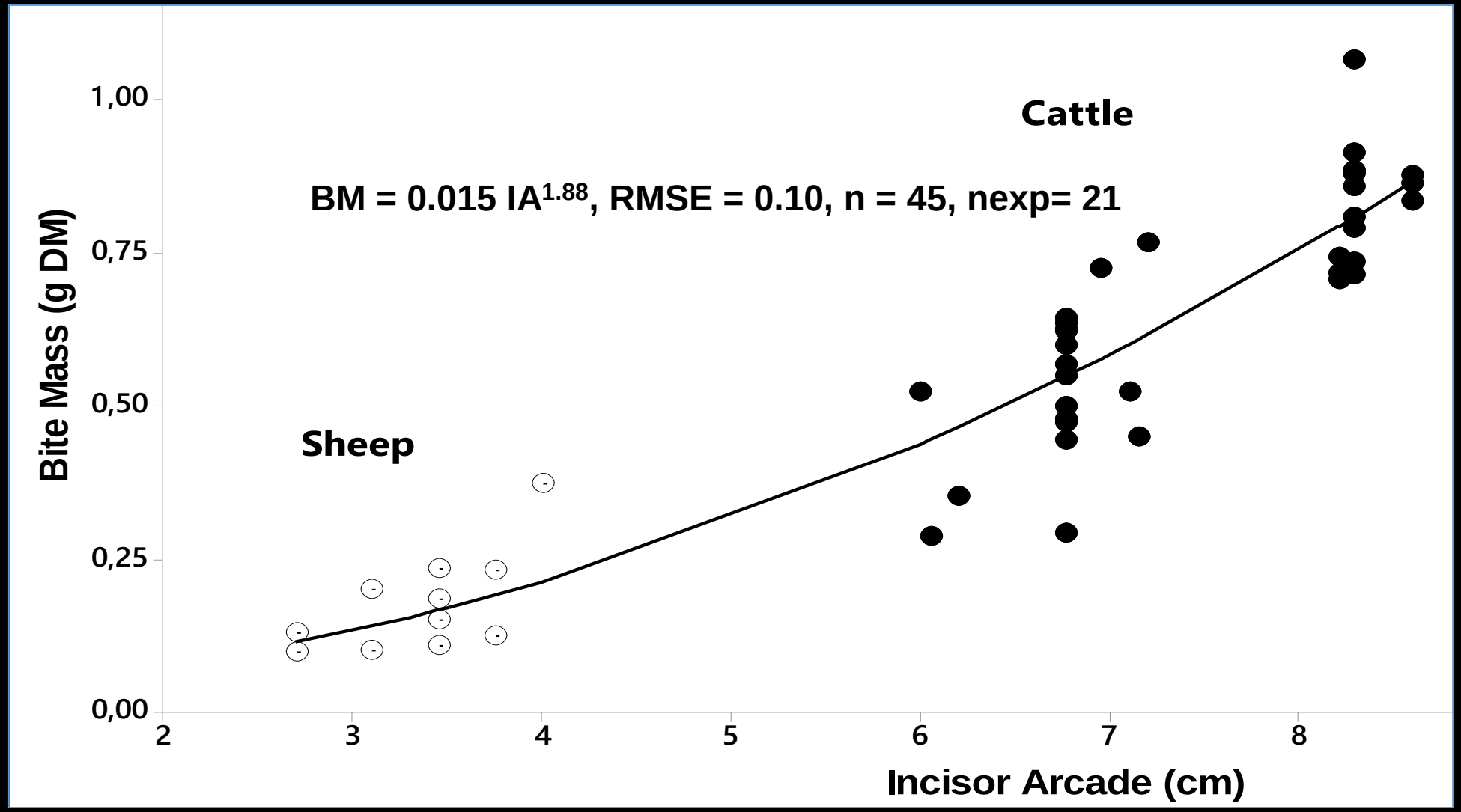
▶Bite Mass is indeed a Key criteria for appraising INTAKE RATE



▶Bite Mass is indeed a Key criteria for appraising INTAKE

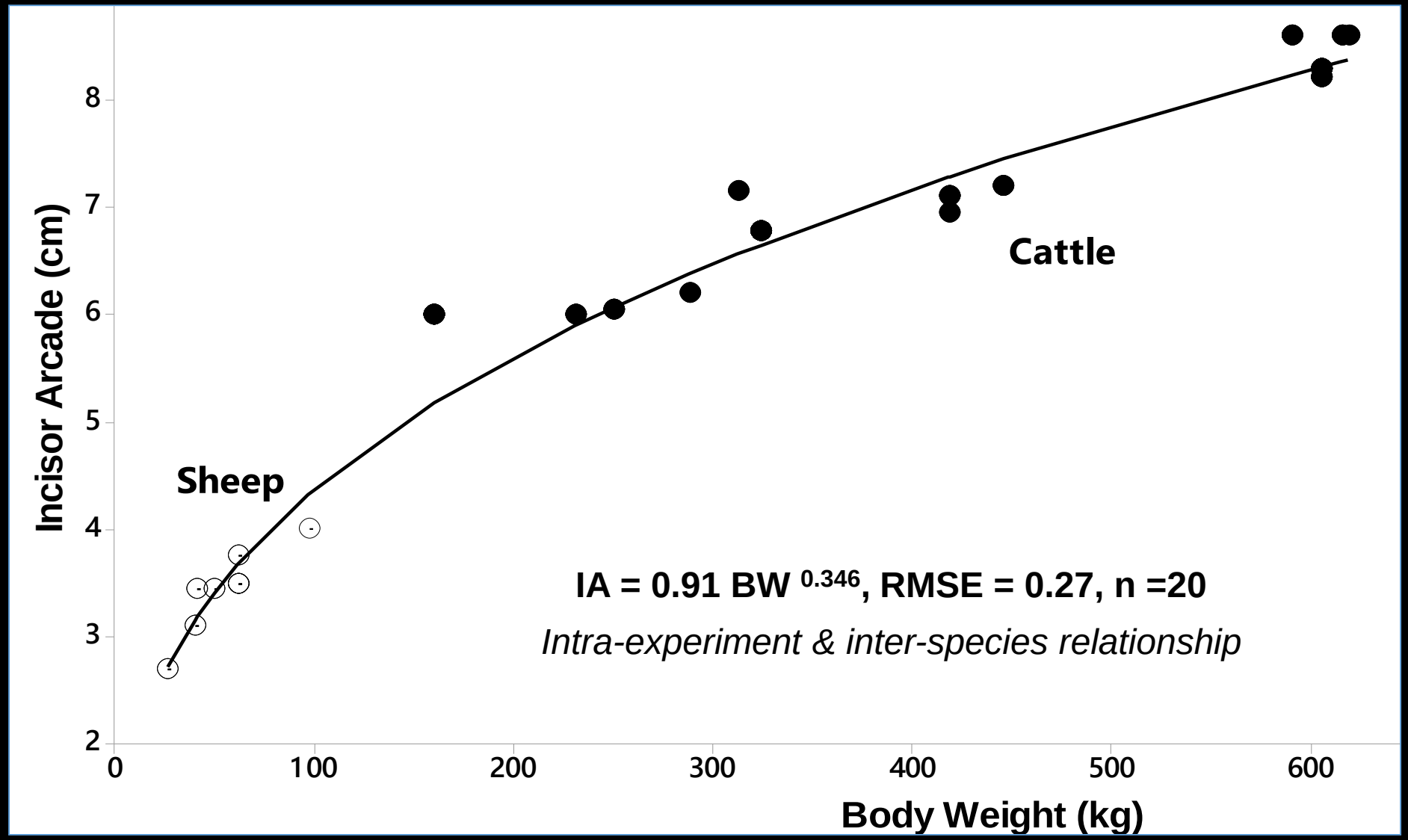


▶Bite Mass is well related to Incisor Arcade *(Intra-experiment relationship)*

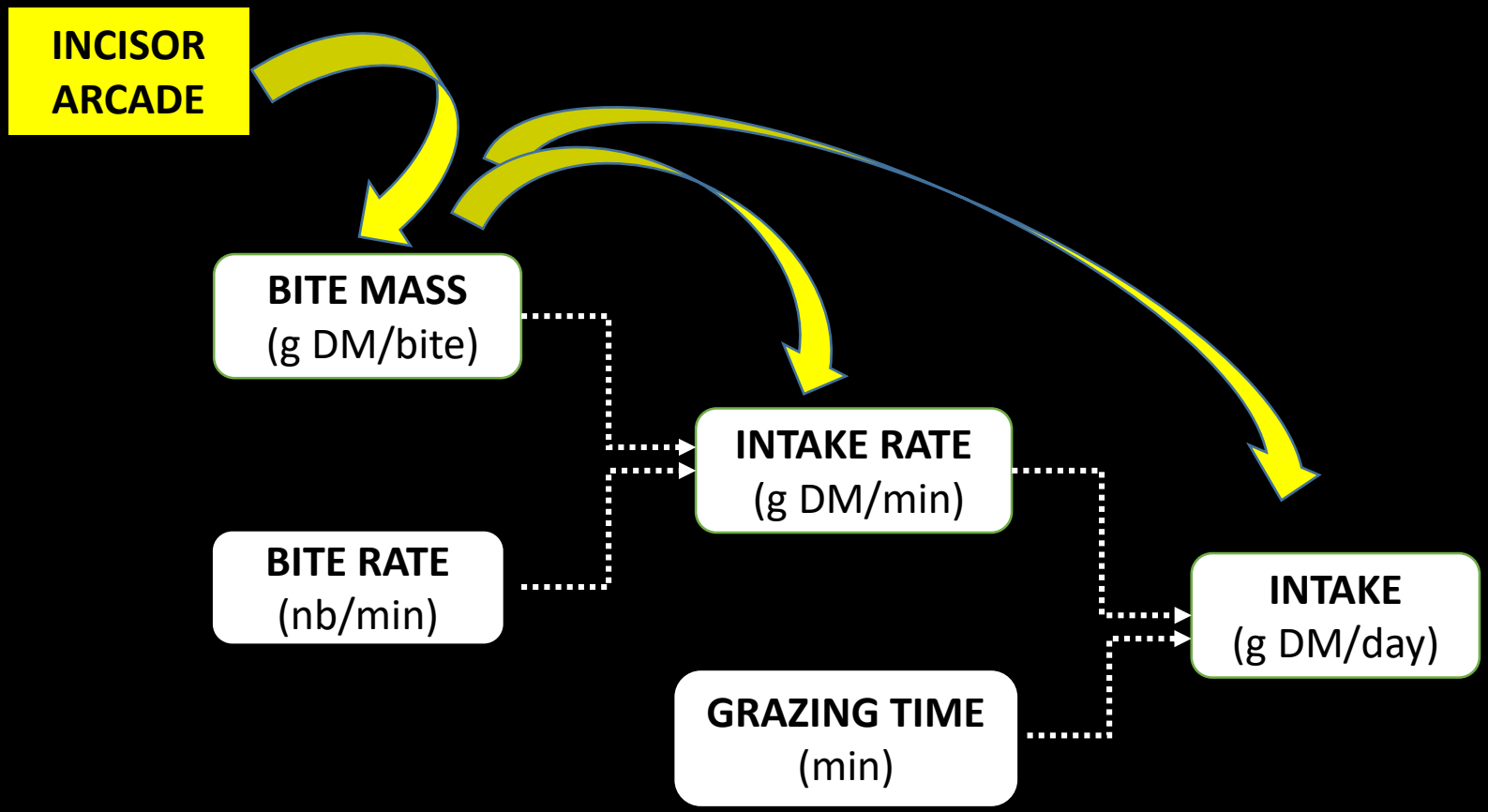


As Gordon and Illius (1996) had already shown

▶Incisor arcade is related to Body weight as well



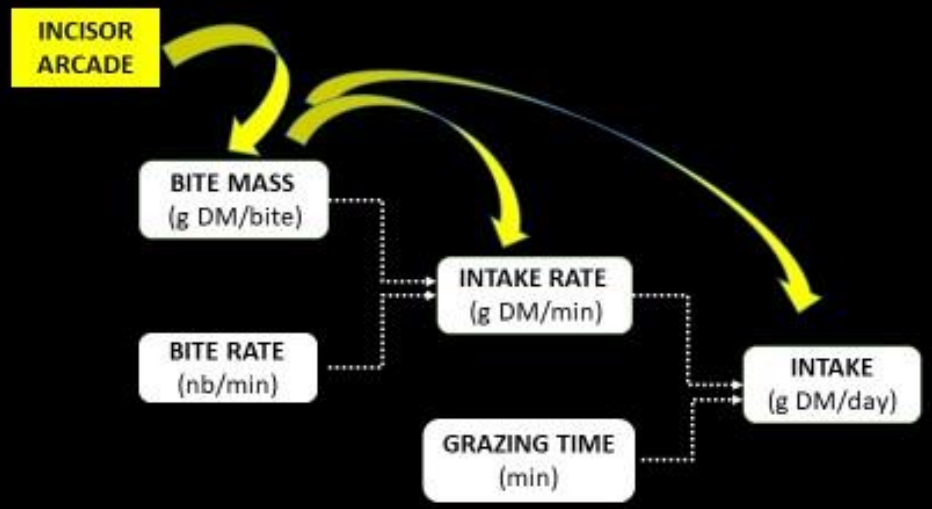
INGESTIVE BEHAVIOUR COMPONENTS TO INTAKE ?



According to Illius et al, 1995

'Incisor arcade influence survival capacity of sheep in harsh winter conditions'

INGESTIVE BEHAVIOUR COMPONENTS TO INTAKE ?



Incisor arcade influence survival capacity of sheep in harsh winter conditions (Ilius et al, 1995)

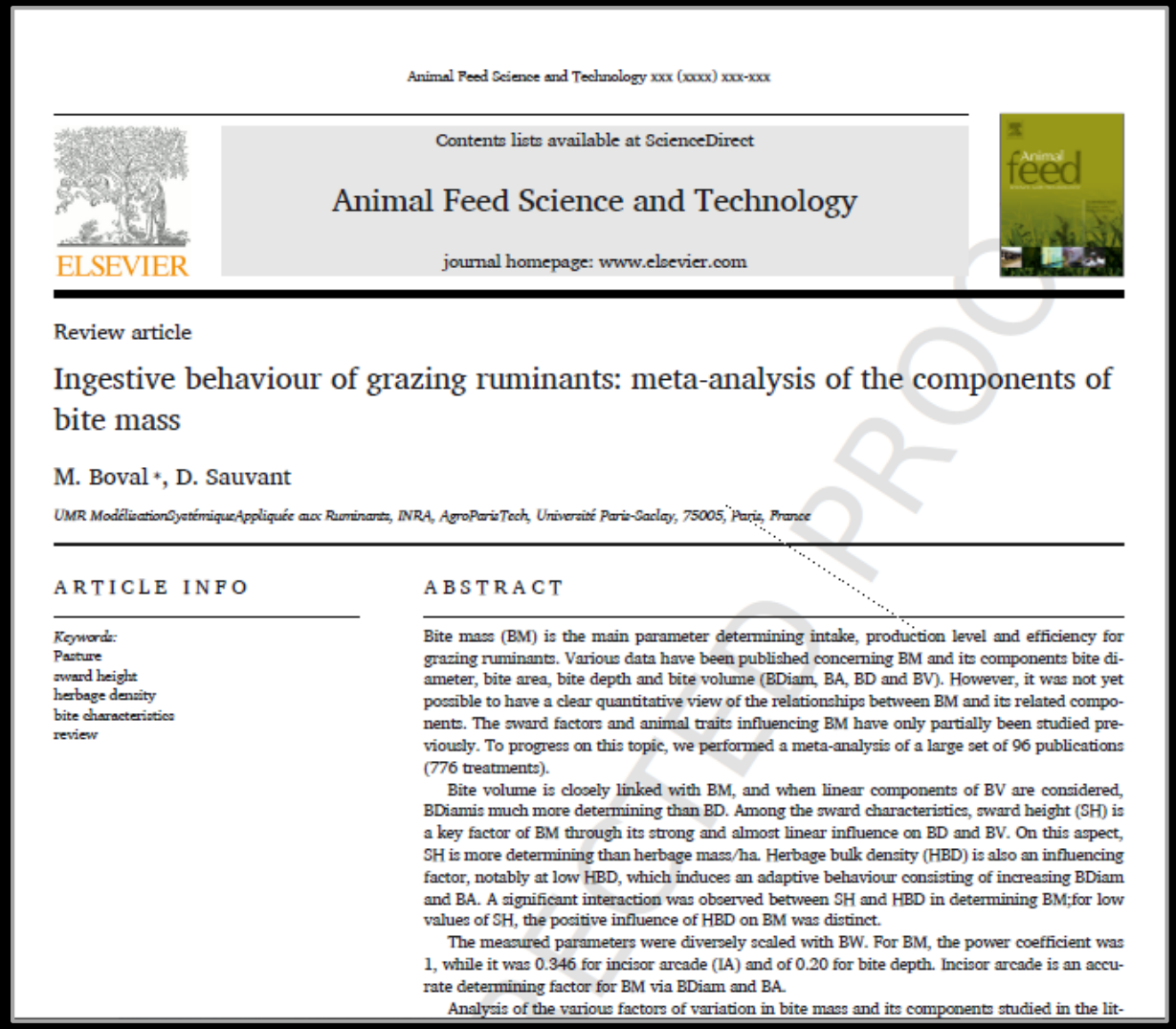
☛**Bite mass is a KEY CRITERIA to better appraise Intake, to detect individual variability for FEED EFFICIENCY,**
While Grazing time is not…

☛ **Incisor arcade may be easily measured, to estimate bite mass…,**

➞**We are investigating some possible combinations, considering chewing movements for example...**

➞ **We have highlighted other valuable results and general laws from the literature analysis**

- **Boval and Sauvant 2019a**
  In Animal Feed Science and Technology
- **Boval and Sauvant 2019b,**
  Preprint of Biorxiv, submitted to ANIMAL



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Review article

Ingestive behaviour of grazing ruminants: meta-analysis of the components of bite mass

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ABSTRACT

Bite mass (BM) is the main parameter determining intake, production level and efficiency for grazing ruminants. Various data have been published concerning BM and its components bite diameter, bite area, bite depth and bite volume (BDiam, BA, BD and BV). However, it was not yet possible to have a clear quantitative view of the relationships between BM and its related components. The sward factors and animal traits influencing BM have only partially been studied previously. To progress on this topic, we performed a meta-analysis of a large set of 96 publications (776 treatments).

Bite volume is closely linked with BM, and when linear components of BV are considered, BDiamis much more determining than BD. Among the sward characteristics, sward height (SH) is a key factor of BM through its strong and almost linear influence on BD and BV. On this aspect, SH is more determining than herbage mass/ha. Herbage bulk density (HBD) is also an influencing factor, notably at low HBD, which induces an adaptive behaviour consisting of increasing BDiam and BA. A significant interaction was observed between SH and HBD in determining BM;for low values of SH, the positive influence of HBD on BM was distinct.

The measured parameters were diversely scaled with BW. For BM, the power coefficient was 1, while it was 0.346 for incisor arcade (IA) and of 0.20 for bite depth. Incisor arcade is an accurate determining factor for BM via BDiam and BA.

Analysis of the various factors of variation in bite mass and its components studied in the lit-


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