

## A simple vegetation criterion (NDF content) may account for diet choices of cattle between forages varying in maturity stage and physical accessibility

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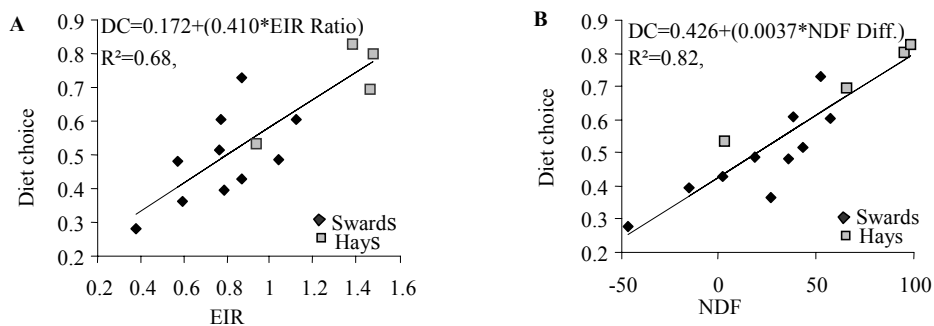
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**Introduction** The management of extensively grazed pastures requires an understanding and prediction of the diet choices of herbivores grazing on vegetation that is qualitatively (maturity stage) and quantitatively (biomass, sward height) heterogeneous. The Optimal Foraging Theory (OFT, Stephens & Krebs, 1986), bases its predictions on the relative energy intake rate (EIR) of forages. However, as EIRs are difficult to assess at pasture and are subject to wide intra- and inter-individual variations, another vegetation criterion was sought (accessibility, quality), by-passing the animal's influence, to predict cattle diet choices quantitatively.

**Materials and methods** The results of two grazing and two complementary indoor experiments (Ginane *et al.*, 2002; Ginane *et al.*, 2003) were pooled. Eighteen-month old heifers were able to choose, throughout the day for approximately 7 days, between two forages (standing swards or hays), varying in relative maturity stage (vegetative vs. reproductive) and physical accessibility (sward height). Forages were characterized by their protein and fibrous chemical composition, their digestibility (measured *in vitro*), and their intake rates (measured *in situ* on the animals used in the choice experiments). These measurements yielded EIR values.

**Results** Diet choices were significantly and positively linked to forage EIR ratio (EIR of the vegetative forage/EIR of the reproductive forage, Figure 1A), consistent with OFT. Among the different criteria tested the difference in NDF content between forages (reproductive-vegetative) was the one most closely related to diet choices (Figure 1B). The close relation between diet choices and the neutral detergent fibre (NDF) criterion may arise because the NDF content is linked to (i) forage prehensibility, as it takes into account sward resistance to defoliation and mastication (Sauvant *et al.*, 1996), (ii) forage ingestibility, as it partly expresses forage fill effect in the rumen (Mertens, 1994), and (iii) forage digestibility, which varies inversely with NDF content.



**Figure 1** Linear regressions equations of observed diet choices (DC) with (A) EIR ratio of forages (vegetative/reproductive) and (B) difference in NDF content of forages (reproductive-vegetative)

**Conclusions** This study indicates that forage NDF content, a common and easy-to-measure criterion, may be useful for predicting cattle diet choices in heterogeneous pastures.

### References

- Ginane, C., R. Baumont, J. Lassalas & M. Petit (2002). Feeding behaviour and intake of heifers fed on hays of various quality, offered alone or in a choice situation. *Animal Research*, 51, 177-188.
- Ginane, C., M. Petit & P. D'Hour (2003). How do grazing heifers choose between maturing reproductive and tall or short vegetative swards? *Applied Animal Behaviour Science*, 83, 15-27.
- Mertens, D.R. (1994). Regulation of forage intake. In: G.C. Fahey Jr (eds.) Forage quality, evaluation and utilisation. American Society of Agronomy, Madison, Wisconsin, 450-493.
- Sauvant, D., R. Baumont & P.Faverdin (1996). Development of a mechanistic model of intake and chewing activities of sheep. *Journal of Animal Science*, 74, 2785-2802.
- Stephens, D.W. & J.R. Krebs (1986). Foraging theory. Princeton University Press, Princeton, NJ, USA.