71st EAAP Annual Meeting, Porto - Portugal
Session 22 “Can you have your cake and eat it too"
2nd December 2020, 13:45 – 17:30

Increasing duration of feed restriction:

Performance ranking and variability of beef cows’ response

De La Torre A, Mendes LB, Pires J, Sepchat B, Cassar-Malek I, Ortigues-Marty I, Blanc F.

Université Clermont Auvergne, INRAE, VetAgro Sup, UMR Herbivores, F-63122 Saint-Genès-Champanelle, France

Background of the study (1/2)

↗ Variability of environmental conditions

Direct (e.g. production, health) and indirect (resources) impacts on animals (Rojas-Downing et al., 2017)

↳ ruminants in pasture-based systems
(Delaby et al, 2018)

ROBUSTNESS is a complex trait of importance for livestock systems and genetic selection

Background of the study (2/2)

Robustness : Ability to cope with unpredictable perturbations

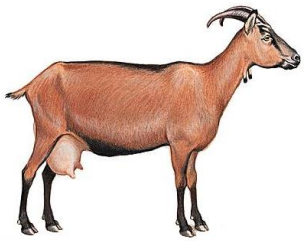
(Friggens et al., 2017)

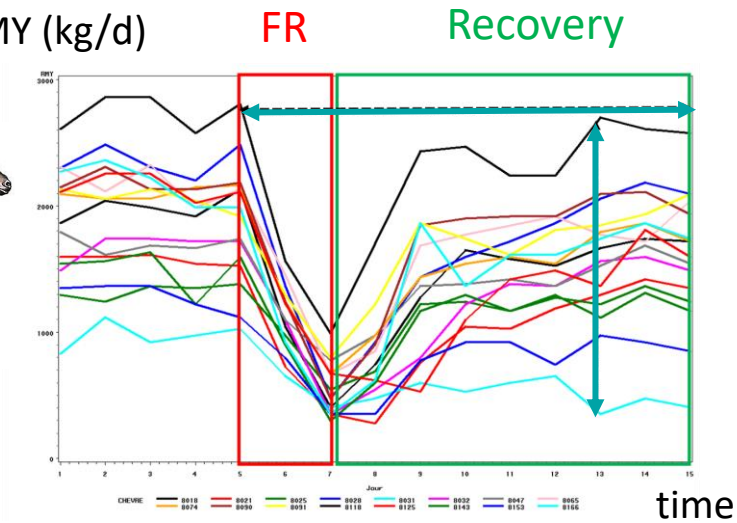
⇨ Complex concept with multiple elements including:

- rate of response to and recovery from perturbation
- trade-offs between functions

↳ Characterization & quantification are far from obvious

⇨ no standard procedures applicable





Friggens et al., 2016

⇨ Responses differ between individuals

⇨ how to rank individuals and on which indicators?

Objectives of the study

Short-term feed restriction (2 – 6 days)

marked changes

Bjerre-Harpoth, 2012,
Friggens et al, 2016,
Billa et al, 2019

To test the use of short-term FR to
i) assess inter-individual variability among suckling cows to face perturbations
ii) look for research proxies

Materials and methods (1/2)

Animals and diet

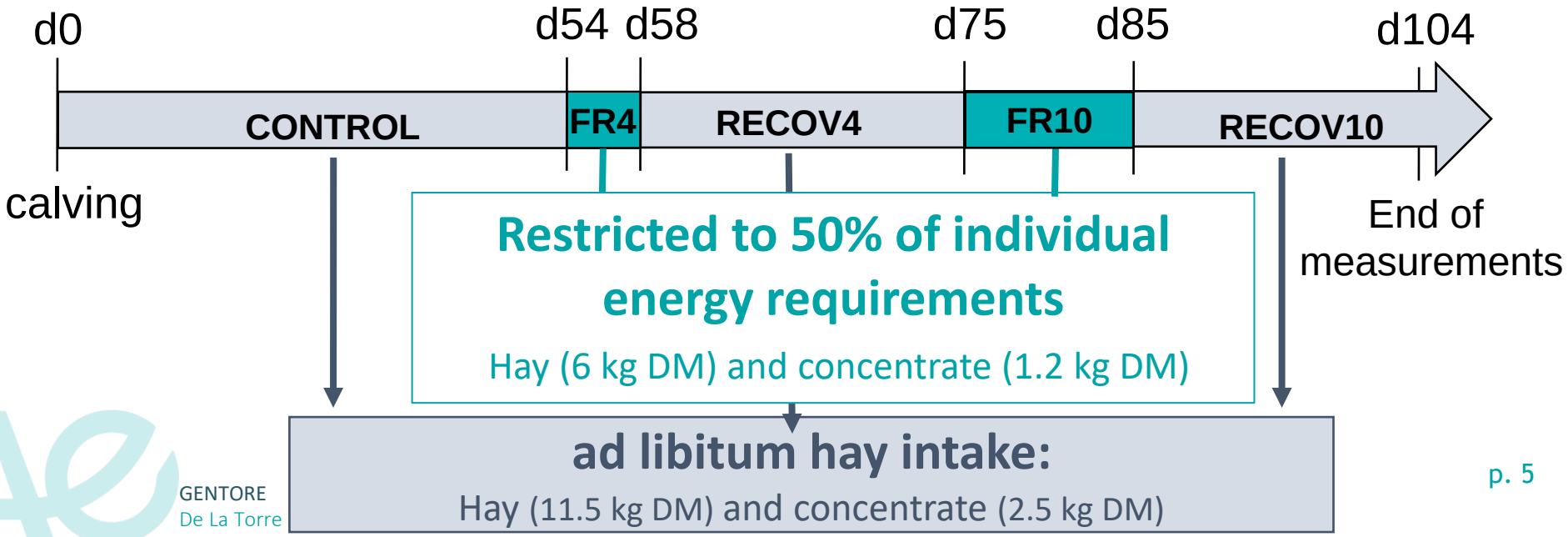
HerbiPole, INRAE Low Mountain Ruminant Farming Systems Facility

https://doi.org/10.15454/1.5572318050509348E12

13 primiparous charolais cows

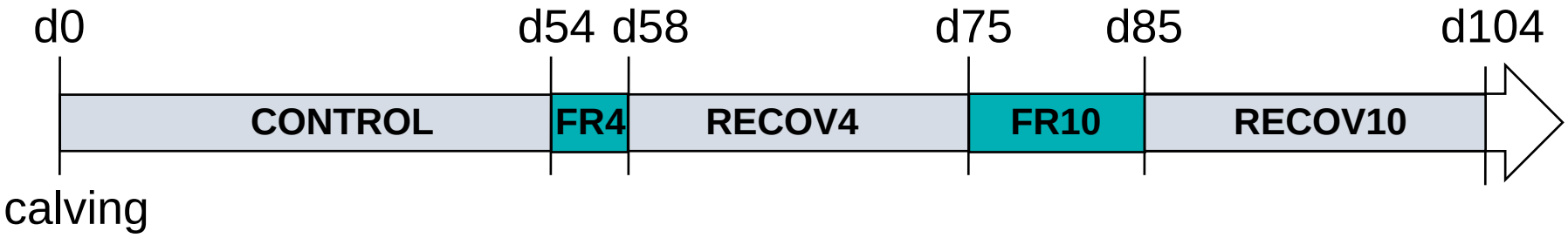
39 ± 2 months old

680 ± 42 kg at calving



Materials and methods (2/2)

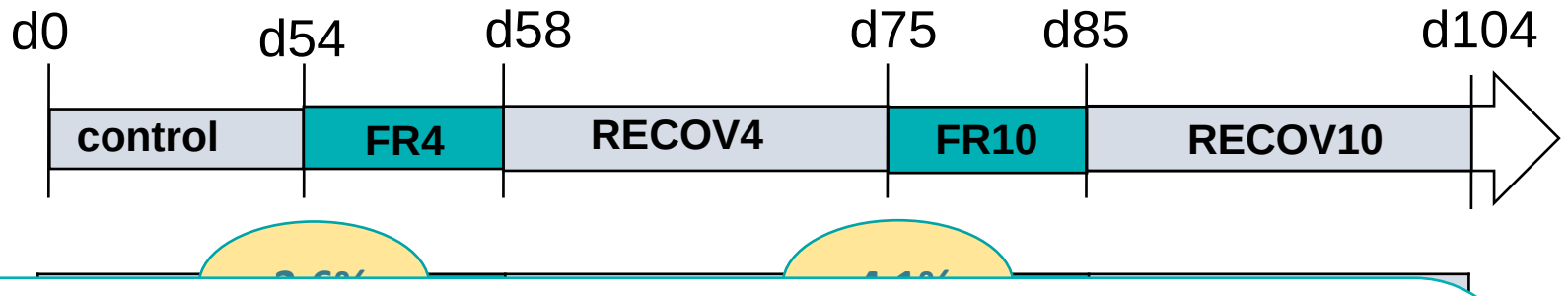
Measurements and sampling



	CONTROL	FR	RECOV
Intake (kg)	Individual daily feed offered and refused		
BW (kg)	once a week	2 – 3 times	at least 5 times
BCS (0 - 5) (Agabriel et al, 1986)	once a week		
MY (kg/d) (Le Neindre et al, 1973)	once a week	4 – 7 times	10 times
Metabolites (NEFA, ketone bodies, glucose, urea)	once a week	4 – 7 times	10 times

Results (1/3)

« **Static responses** » to FR



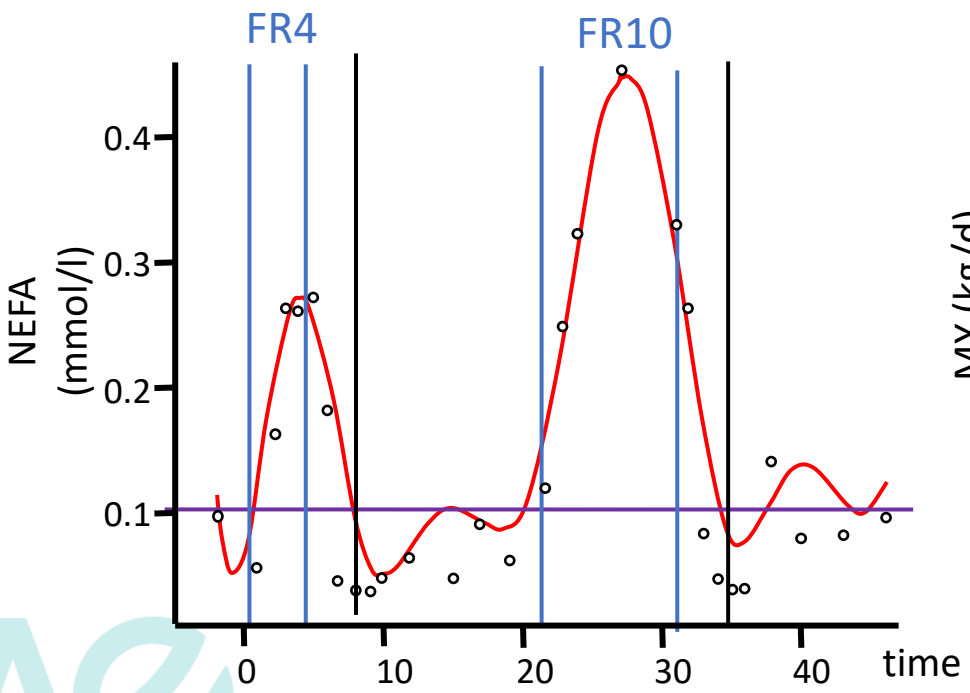
Short-term FR induces productive and metabolic changes in beef cows

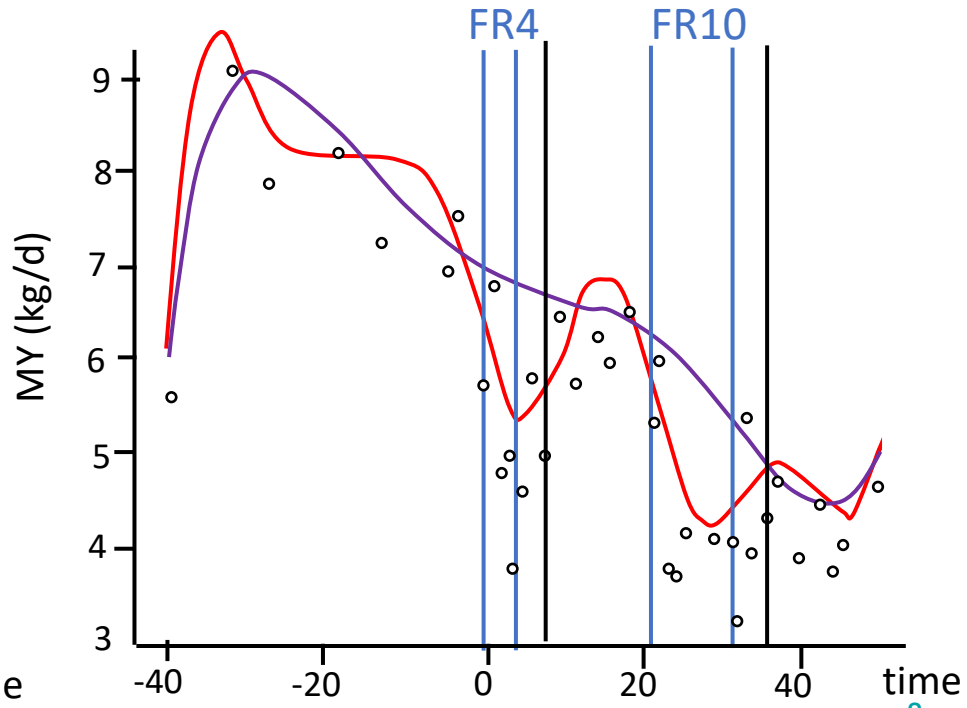
Milk yield and plasma NEFA concentrations showed the most largest quantitative and significant changes

Results (2/3)

NEFA and MY dynamic responses to FR

- Each cows is its own control
  - New variables that account for individual differences
    - NEFA and MY returned to their initial levels within **3 ± 1 d**, independently of FR duration





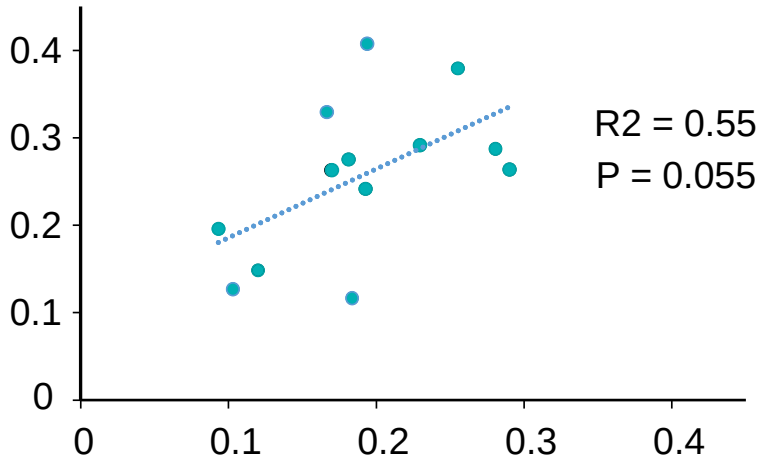
GENTORE

De La Torre et al., 71st EAAP, session 22

Results (3/3)

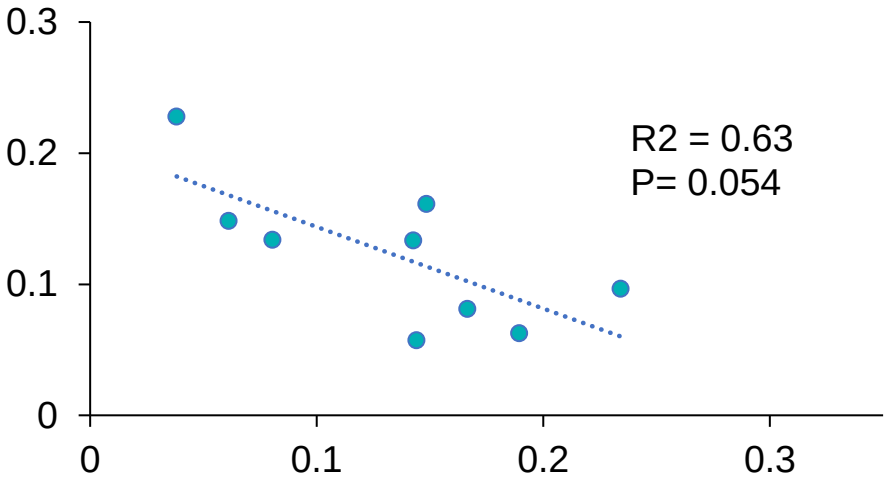
Analyses of NEFA and MY **dynamic responses** to FR

Amplitude of increase in NEFA (mmol/L) over FR10



Amplitude of increase in NEFA (mmol/L) over FR4

Relative rate of milk loss (kg/d) over FR10

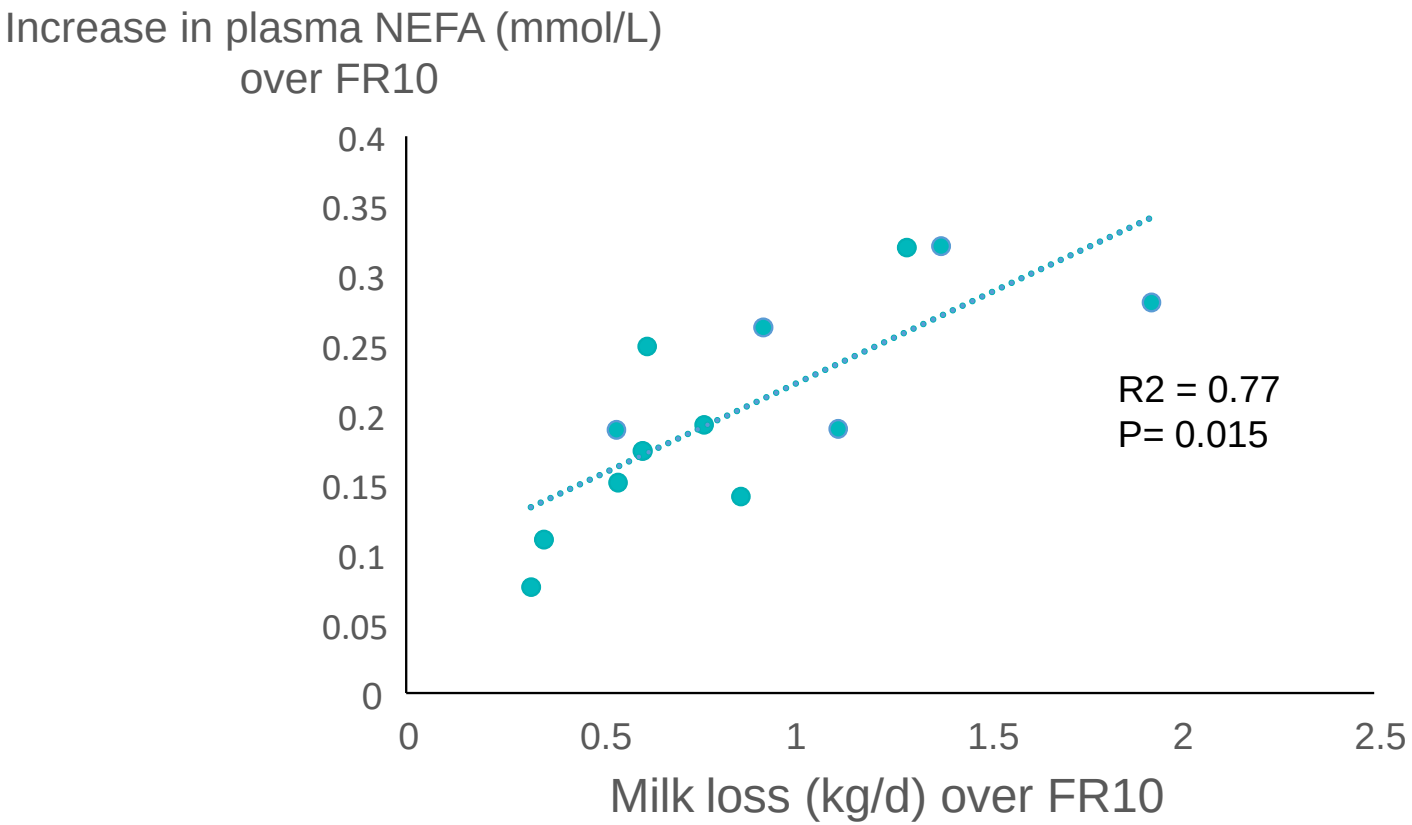


Relative rate of milk loss (kg/d) over FR4

FR duration did not change the ranking of animals

⇨ High responder cows in FR4 remained high responders in FR10

Results (3/3)



Links between the dynamics of responses were observed

⇨ Highlight of trade-offs between functions

Conclusions

⇨ **Short-term feed restriction is a relevant experimental model in beef cows to characterize and quantify responses**

⇨ **FDA is a relevant method to highlight dynamic responses and to take into account inter-individual variability**

- ⇨ Select animal within the herd
- ⇨ Target animal for selective management

⇨ **Further research is waranted to test variables derived from FDA as proxies of animal robustness**

- ⇨ to improve future breeding strategies

Acknowlegments

Study funded by Gentore H2020 project

Staff of the INRAE facility (HerbiPole)
B. Sepchat, M. Barbet, S. Gatignol

Staff of Herbivore Joint Research Unit
I. Constant

Thank you for your attention