

Association of SNPs of NPY, leptin and IGF-1 genes with residual feed intake under grazing condition in Angus cattle

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Feed efficiency in beef cattle



Beef cattle selection has been focused on higher BW

Consequences of selection for higher BW

- Higher production cost
- Increased environmental contamination
- Lower overall efficiency under restrictive grazing environment

Residual feed intake

$$\text{RFI} = \text{Actual DMI} - \text{Expected DMI}$$

- RFI → more efficient

+ RFI → less efficient

- Scarce data for RFI evaluation under grazing conditions
- Development of predictive genetic markers is an attractive way to genetically improve by this trait (*Moore et al., 2009*)
- NPY, leptin and IGF-1 have been proposed as candidate genes because of their physiological role (*Sherman et al., 2008*)



- Hypothesis

Animals with “favorable” allelic variants of NPY, leptin and IGF-1 genes present lower RFI than animals lacking such alleles under grazing conditions

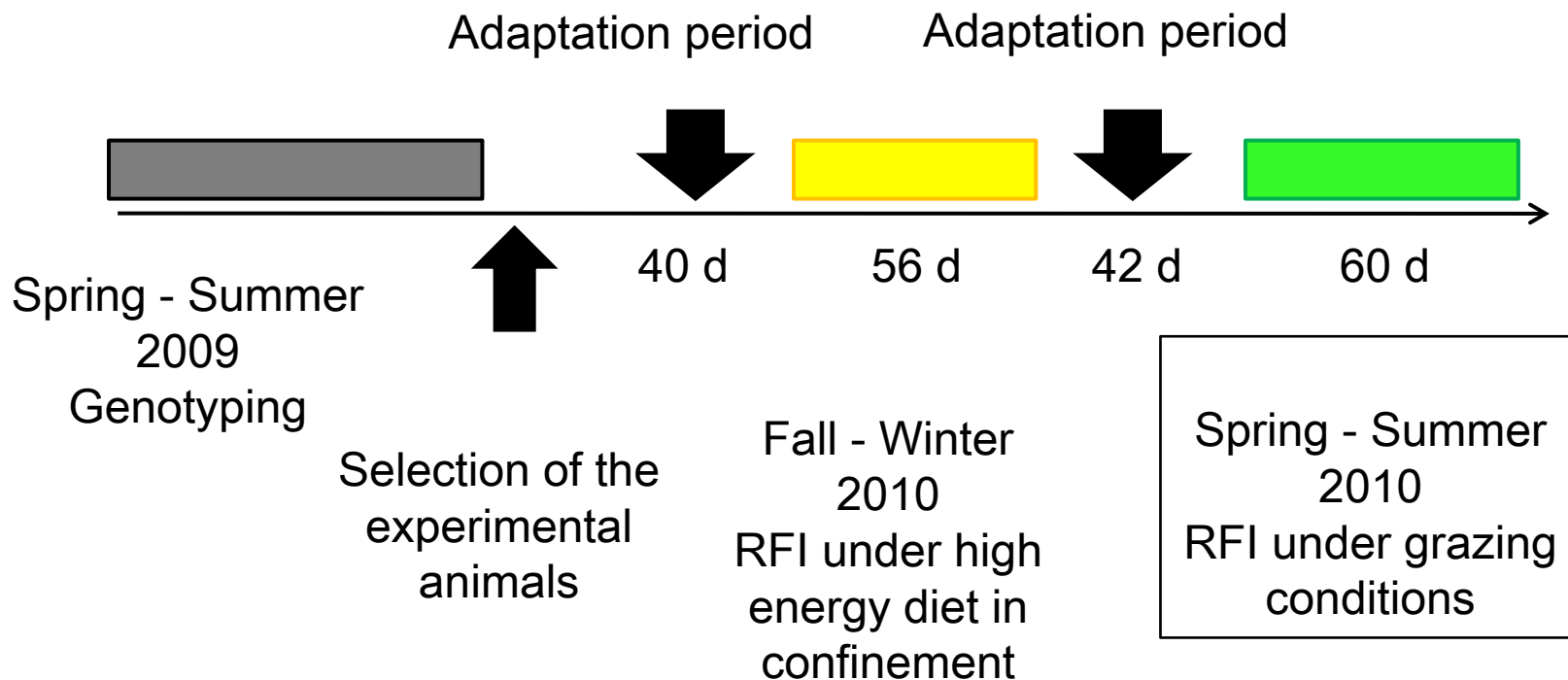
- Objective

Study association between allelic variants of NPY, leptin and IGF-1 and RFI under grazing conditions

Research timeline

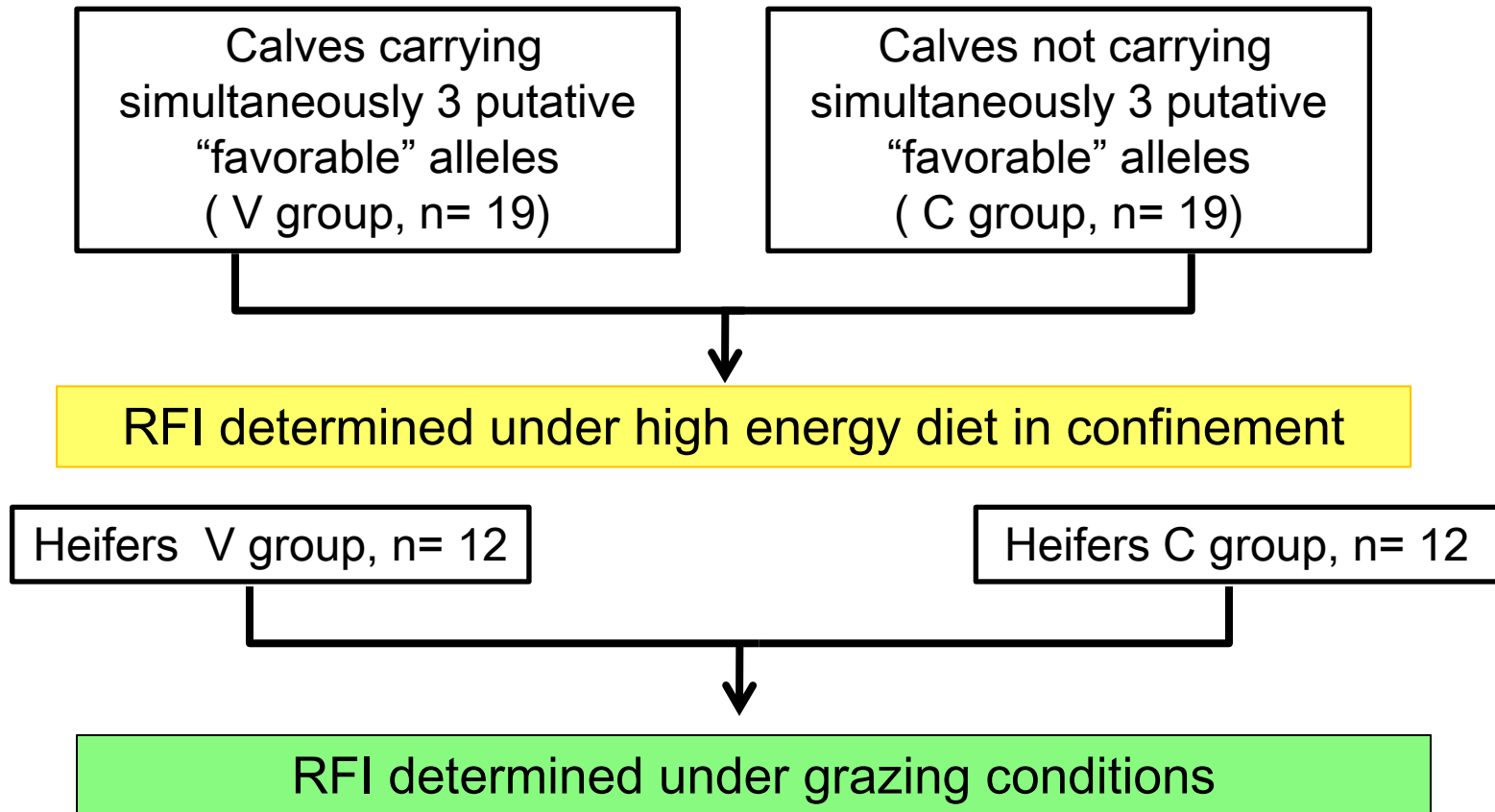


Uruguay (32° S, 58° W)



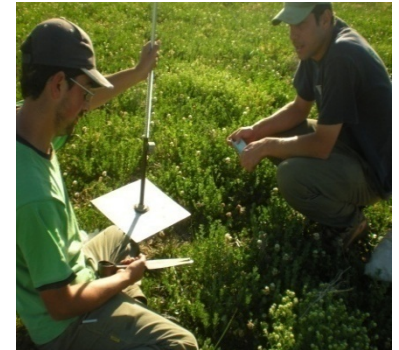
Experimental approach

- Genotyping by PCR-HRM 1700 pure Aberdeen Angus female calves
- NPY (A/G, intron 2), leptin (C/T, exon 2) and IGF-1(C/T, promoter region)



Experimental approach

- 60 d grazing trial continuous stocking
 - Initial BW: 294 kg
 - 4 paddocks/group (3 heifers/paddock, 1.2 ha)
 - BW registered every 14 days
 - DMI estimated by n-alkanes technique
-
- Temperate pasture (fescue 44%, white clover 29%, birdsfoot trefoil 27%)
 - Composition: 15% CP, 45% NDF, 25% ADF
 - 4300 kg DM/ha



RFI calculation and statistical analysis

RFI: residual from regressing actual DMI on expected DMI

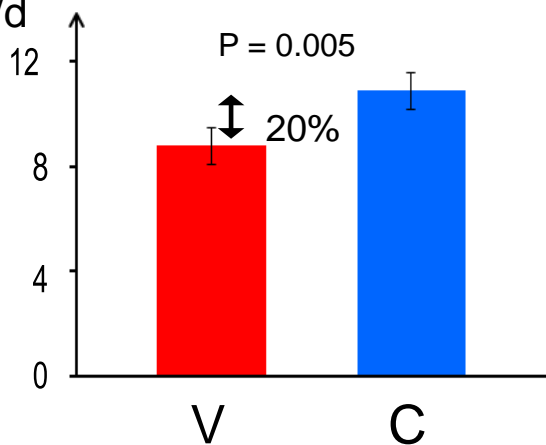
$$\text{Actual DMI} = \underbrace{\beta_0 + \beta_1(\text{mid-test BW}^{.75}) + \beta_2(\text{ADG})}_{\text{Expected DMI}} + \underbrace{\text{residual}}_{\text{RFI}}$$

Data were analyzed using PROC MIXED of SAS (SAS. Inst.)

The model included group (V or C) as fixed effect and paddock as a random effect

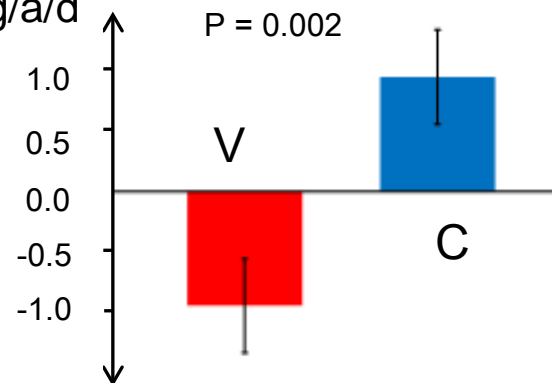
Results

DMI
kg/a/d

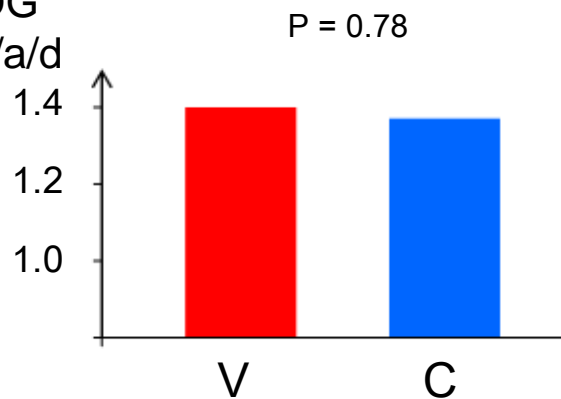


■ V group favorable alleles
■ C group non-favorable alleles

RFI
kg/a/d



ADG
kg/a/d



N = 12/group
Tukey test

Results

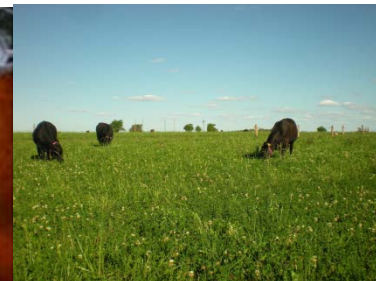
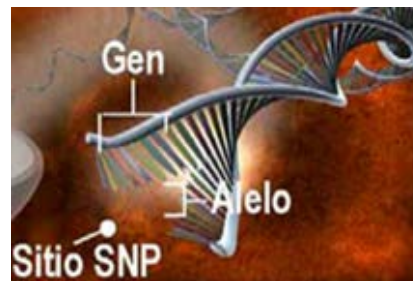
- The group of heifers with favorable allelic variants had lower RFI
- First evidence for an association between RFI and SNPs in NYP, leptin and IGF-1 under grazing conditions

Conclusions

- The presence of the three favorable alleles NPY, leptin and IGF-1 is associated with higher efficiency under non-restrictive grazing conditions
- These genetic markers could be used as a tool to better select efficient animals under non-restrictive grazing conditions

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Thanks for
your attention!

