EAAP 2011 Session 53 No. 3 p 368

High energy & starch supplement post-weaning does not enhance marbling in beef cattle

Paul Greenwood

Jason Siddell, Malcolm McPhee,

Brad Walmsley and Dave Pethick

World class science, creating first class beef

Background

Literature suggests:

- Marbling phenotype is dependent on numbers of adipocytes in muscle by feedlot entry
- Intramuscular adipocyte gene expression up-regulated post-weaning (6-12 months)
- Nutritional intervention post-weaning to enhance number of pre-adipocytes may have long-term impacts on marbling
- High starch or ω-6 FA post-weaning/pre-feedlot will increase marbling cf. traditional forage-based systems
- Elite and low marbling genotypes may differ in responses to post-weaning/pre-feedlot nutritional treatments

Reviewed by Hocquette et al. (2010)

Objectives

1) Determine whether high energy/starch supplement during the immediate post-weaning period enhances marbling

2) Determine whether nutrition and genotype interact to affect intramuscular (IM) and subcutaneous (SC) fat development

3) Obtain data and samples for detailed modelling & biological studies of fat depot development

Experimental Design

3 x genotypes (total n = 165)

- High marbling & High subcutaneous fat
  - Angus with high EBVs (n =55)
- Low marbling & High subcutaneous fat
  - Hereford with breed average EBVs (n =55)
- High marbling & Lower subcutaneous fat
  - High marbling sire-line Wagyu x Angus cows with high EBVs (n =55)

Experimental Design

2 x post-weaning nutritional systems

(168 d, total n = 150)

Forage (pasture) only x 2 replicates (n = 75)

Forage (pasture) + high energy/starch supplement x 2 replicates (n = 75):
12.3MJME & 110g CP /kgDM, 1% LW/day

Pasture - N fertilised improved pasture
(cocksfoot, tall fescue, phalaris)

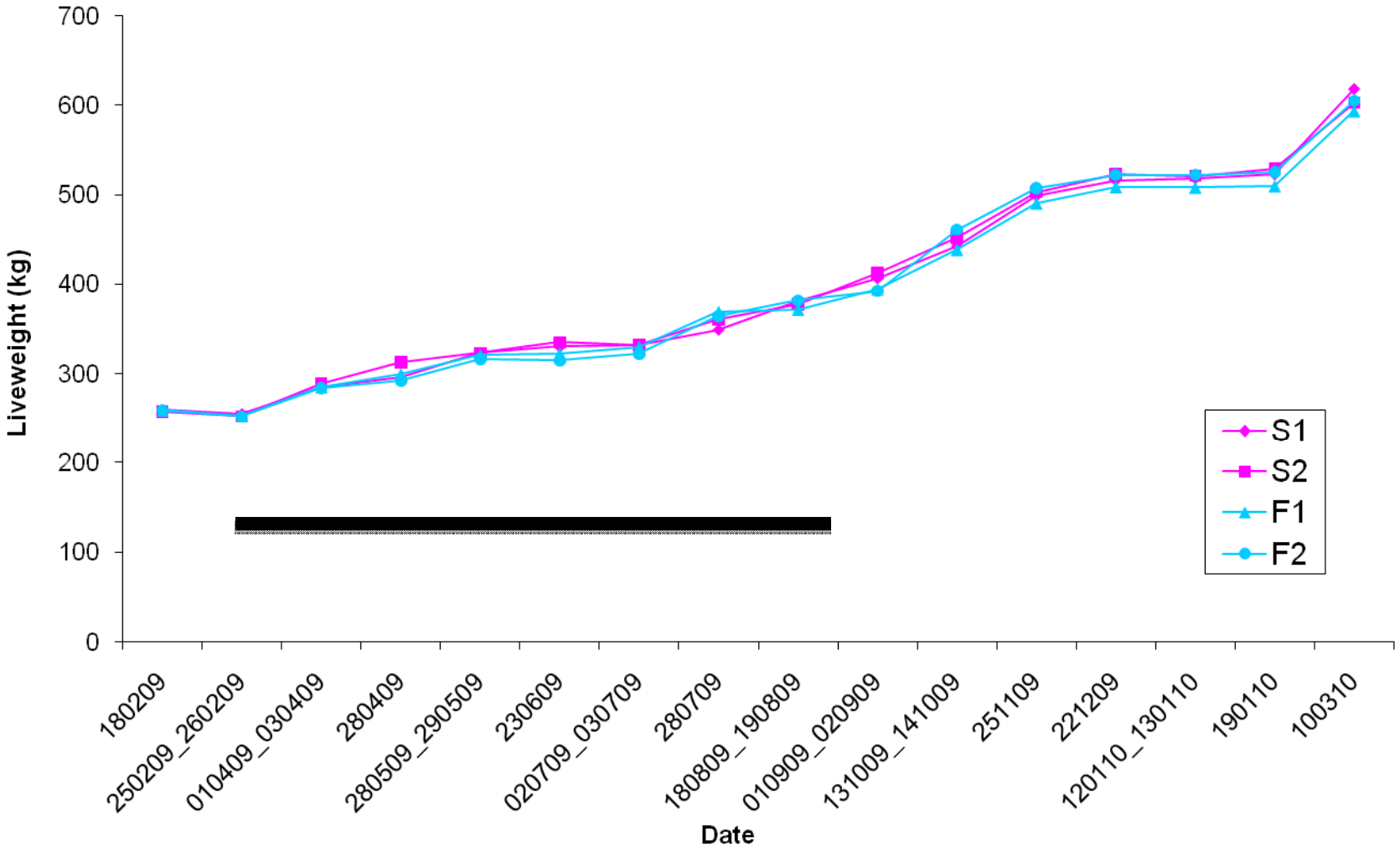
- tetraploid ryegrass

- grazing oats

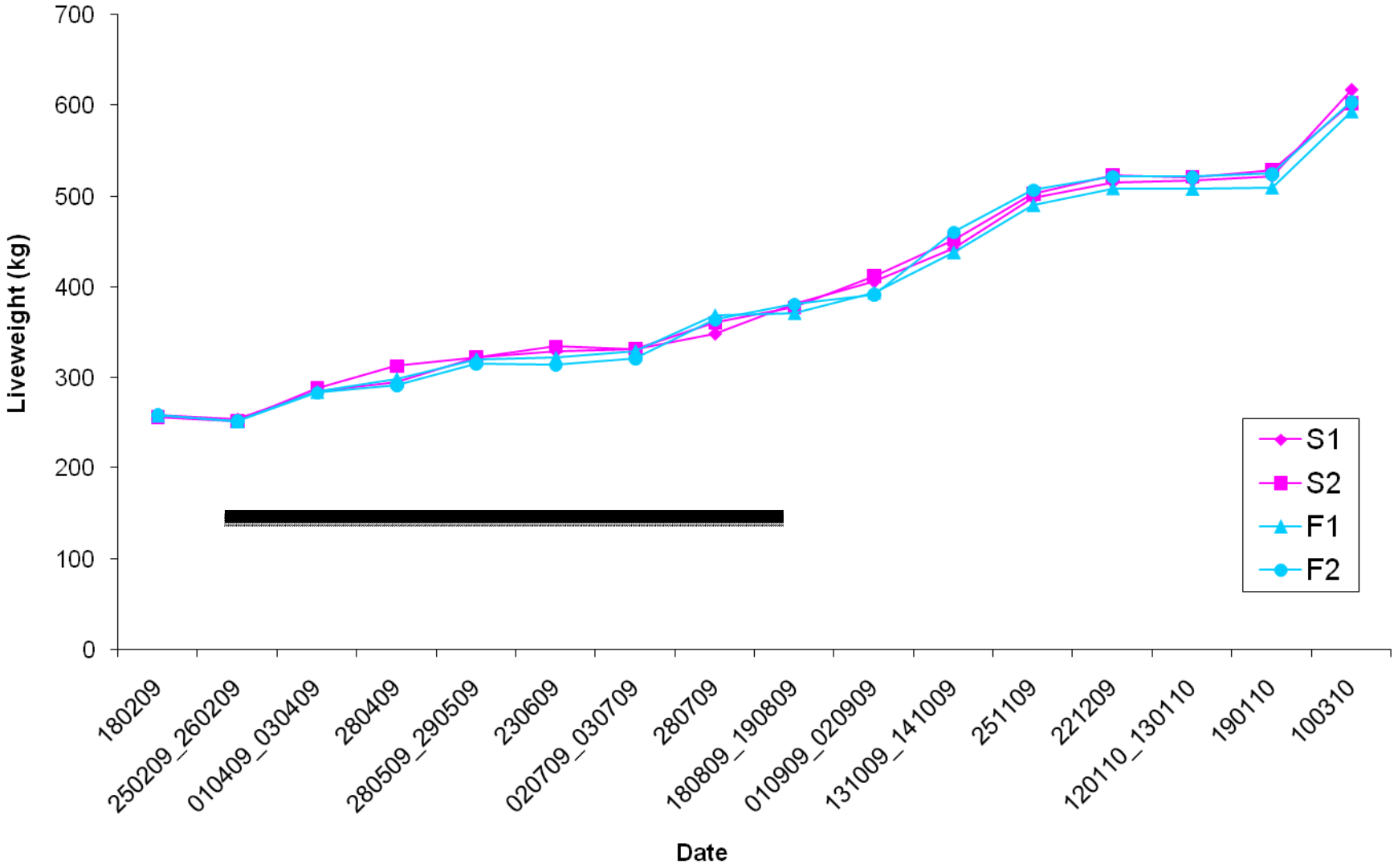
Aim: ***MATCH GROWTH RATES*** of replicates


82
85
56
58
90

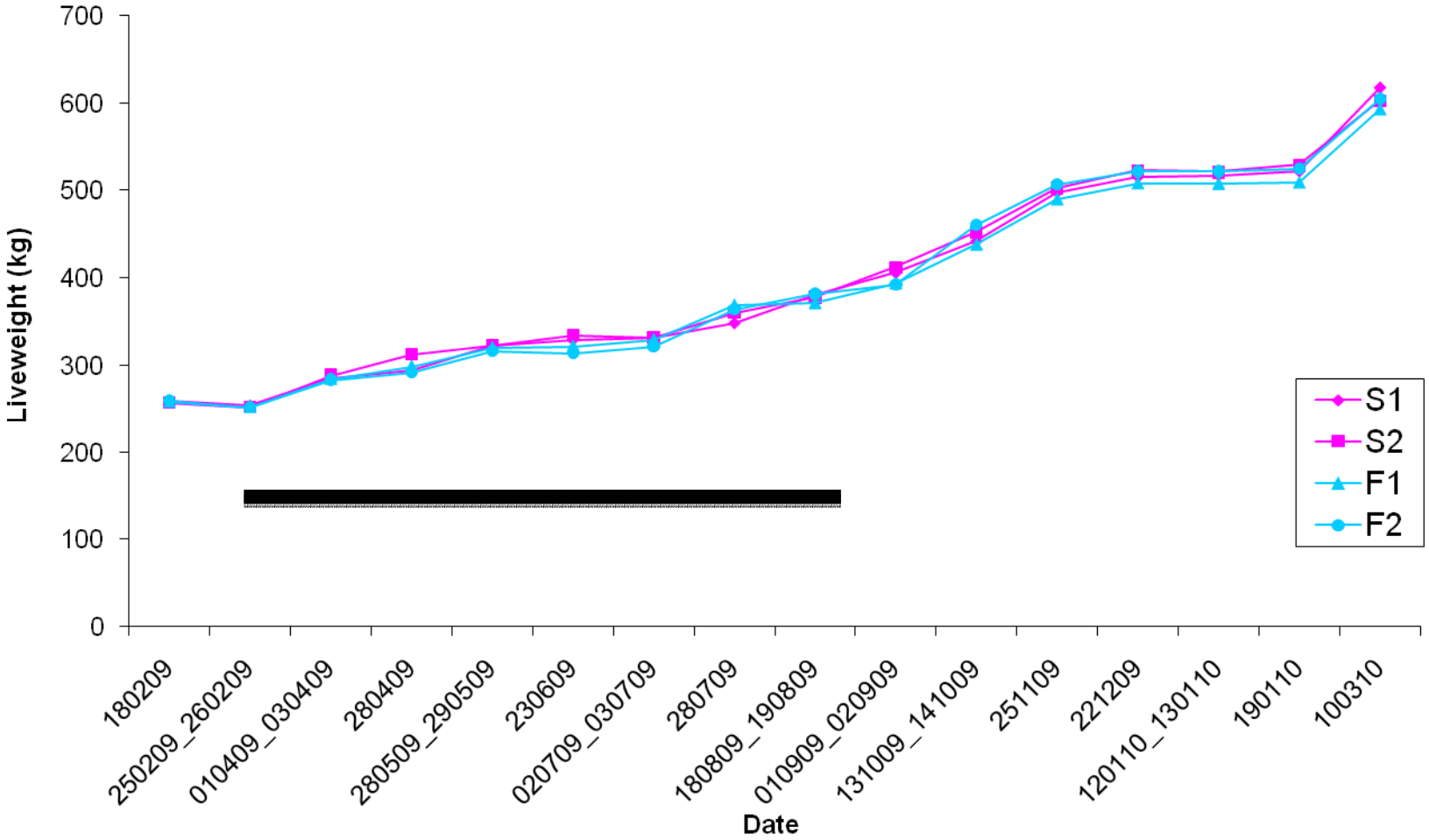
Liveweight - Angus



Liveweight - Hereford



Liveweight – Wagyu x Angus



Experimental Design

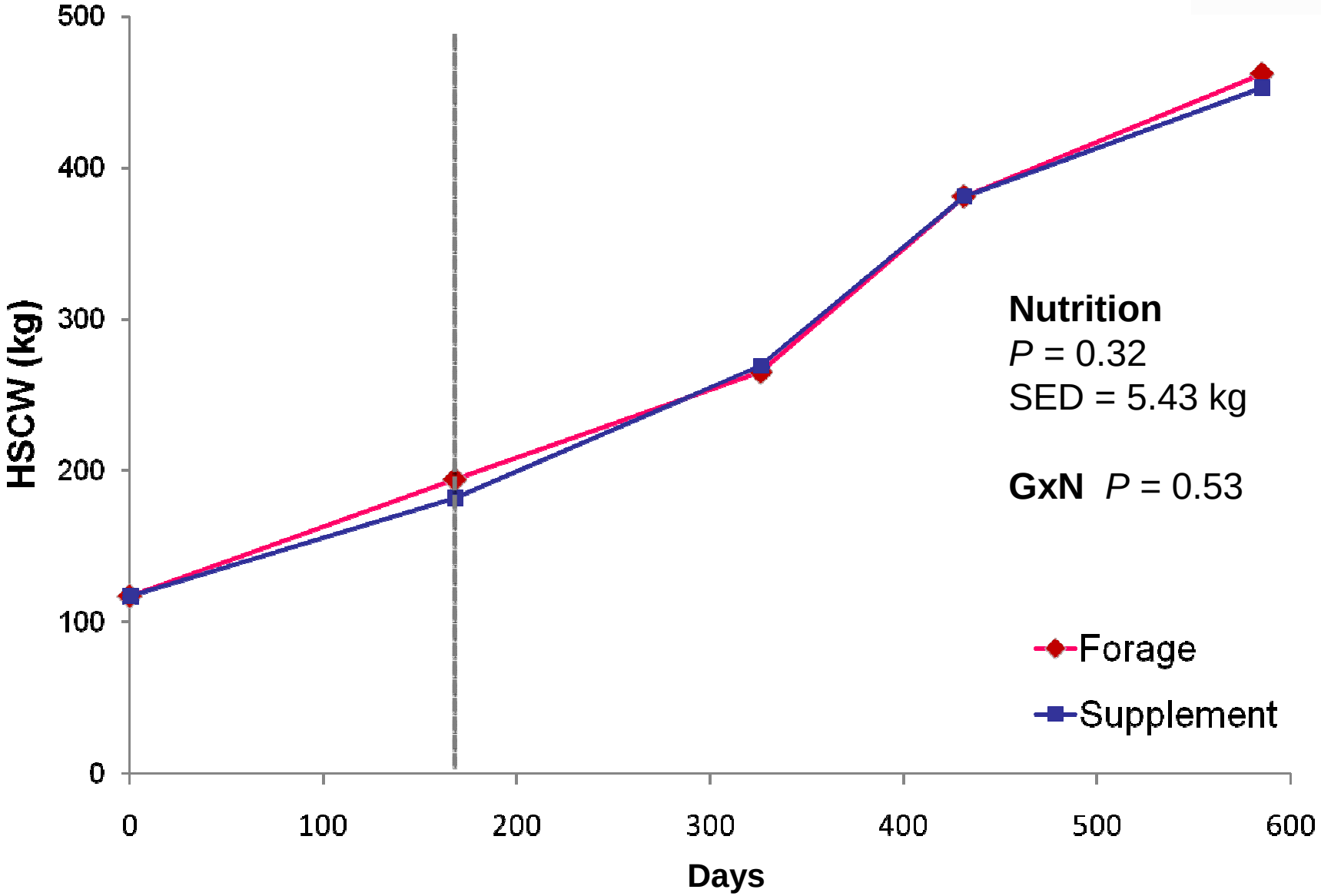
- 5 x slaughter times (total n = 165)
  - Weaning (Baseline) ~ 6 mo (n =15)
  - End of nutritional treatments ~ 12 mo (n = 30)
  - End of backgrounding ~ 18 mo (n = 30)
  - Short feedlotting ~ 21 mo (n = 30)
  - Long feedlotting ~ 26 mo (n = 60)

Start expt av. ~ 220 kg – End expt av. ~ 745 kg LW

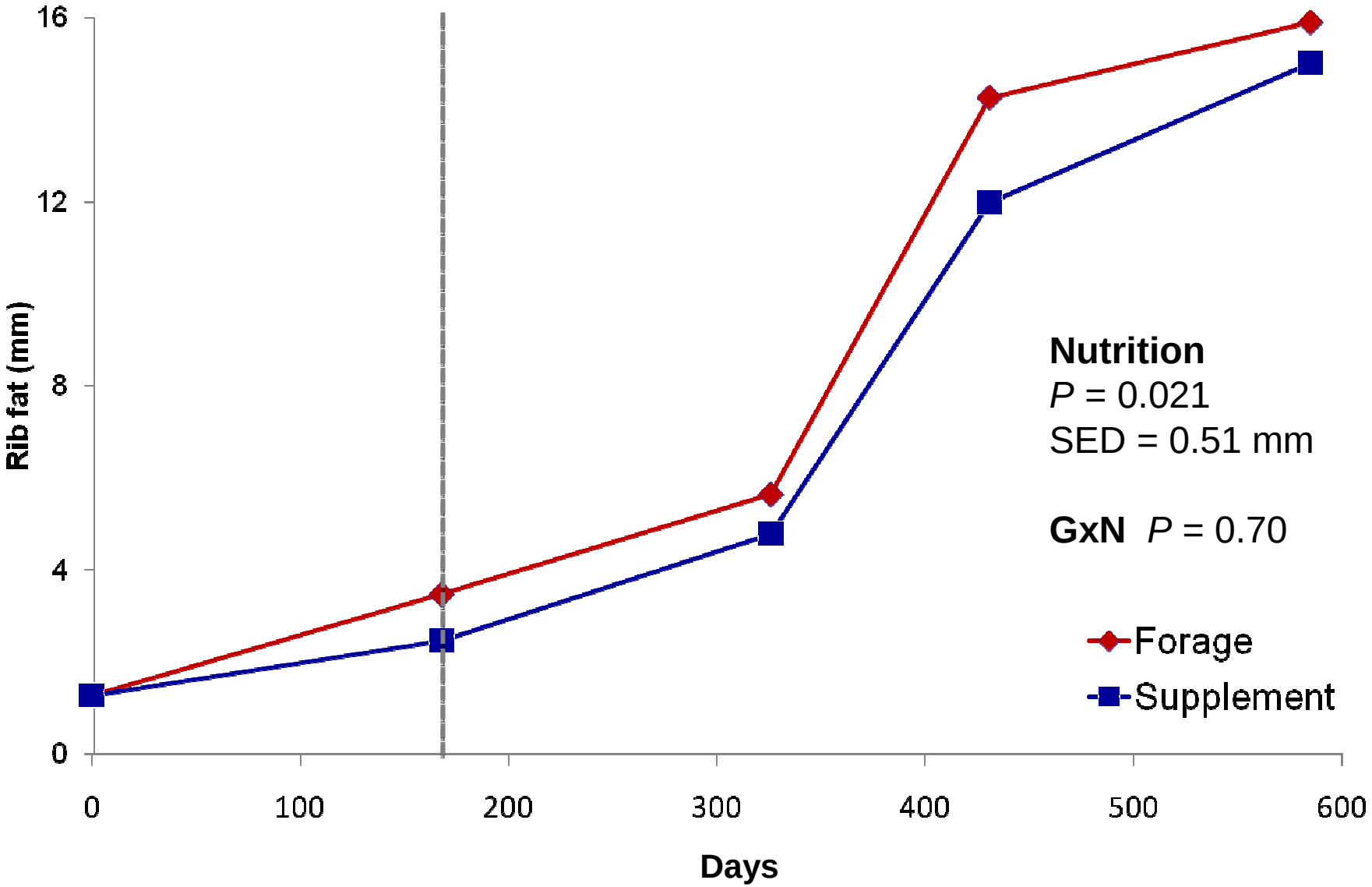
Measurements & samples

- Liveweight & ultrasound scans
- **COMMERCIAL CHILLER ASSESSMENT**
- Weight & samples of fat depots (subcutaneous, intermuscular, intramuscular, internal) & muscles: predictive models + genomics
- Objective meat quality - 5 cuts
- Taste panel assessments of meat quality (MSA models) - 9 cuts

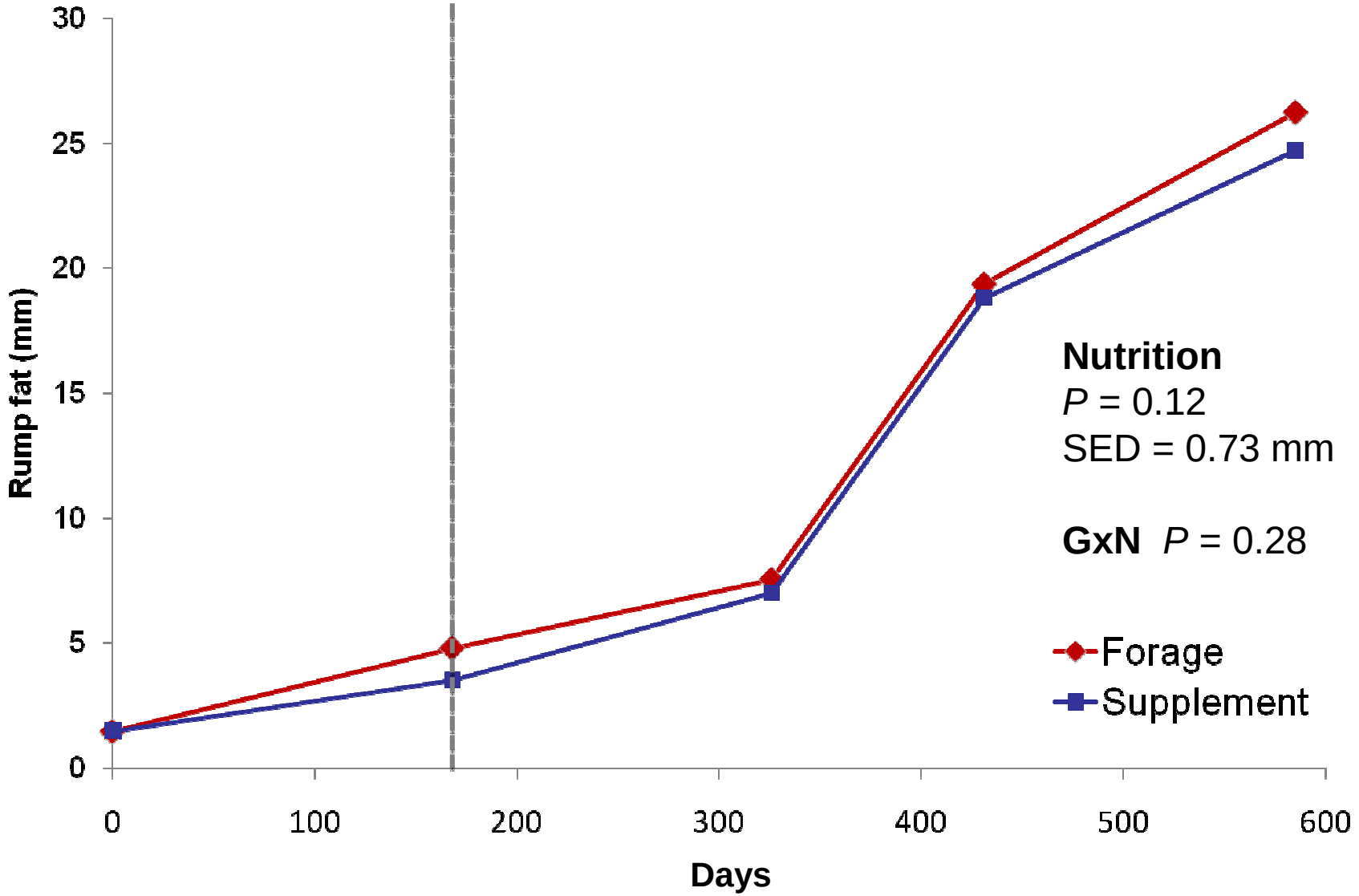
Carcass weight (kg)



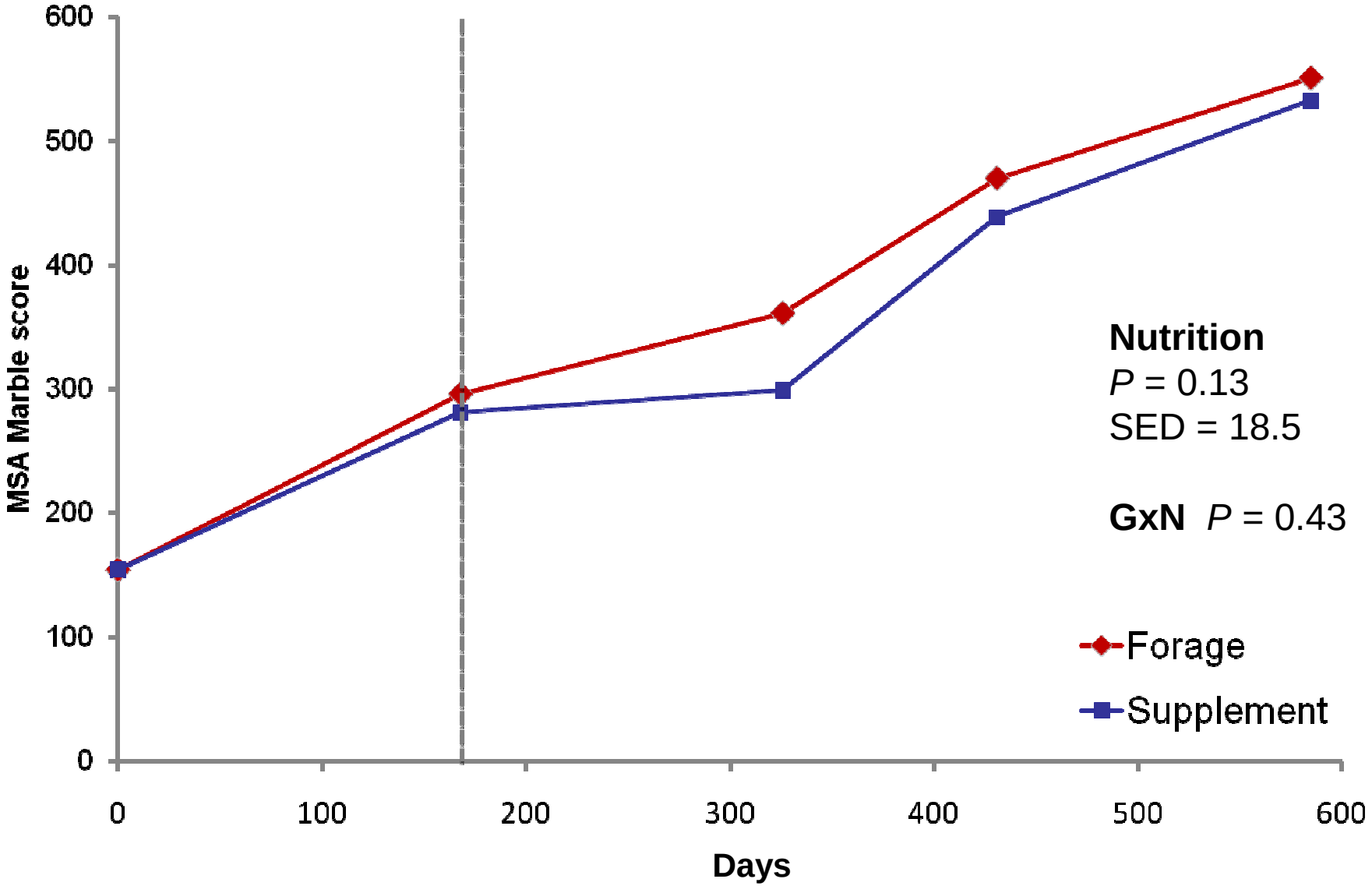
Rib fat (mm)


16
12
8
4
0
Rib fat (mm)
0
100
200
300
400
500
600
Days
Nutrition
P = 0.021
SED = 0.51 mm
GxN P = 0.70
Forage
Supplement

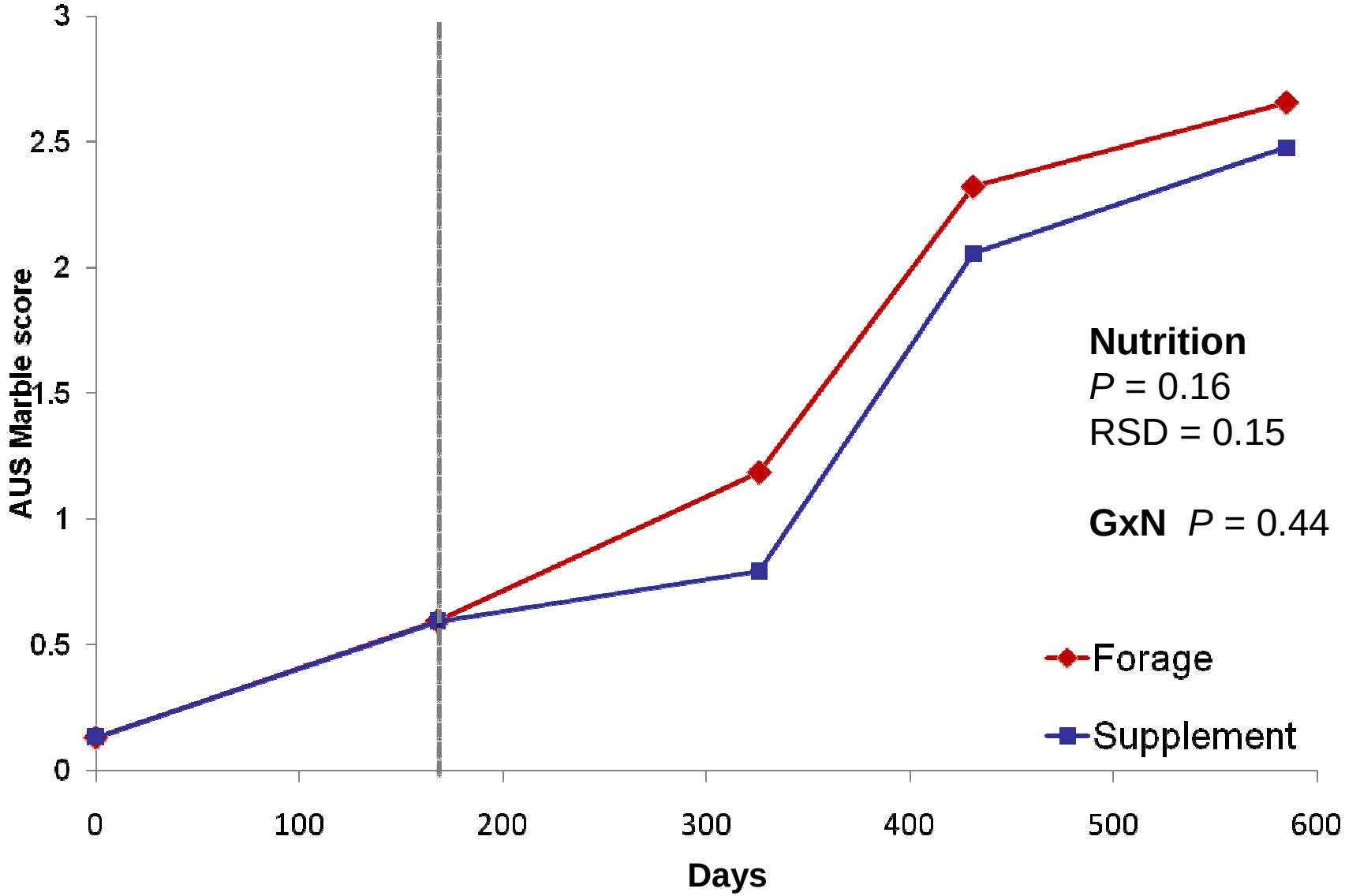
Rump (P8) fat (mm)



MSA Marble score



AUS Marble score



Conclusions

- Post-weaning supplementation did not enhance commercial assessments of marbling, and tended to suppress subcutaneous fatness
- No interactions between Genotype and Nutrition
- Resource for post-weaning modelling & developmental studies on fat depots & their distribution