 Mogens.Vestergaard@agrsci.dk

Effects of chicory roots on finishing performance and CLA and fatty acid composition in longissimus muscle of Friesian steers

Mogens Vestergaard, H. Refsgaard Andersen, P. Lund*, T. Kristensen, L. Lydehøj Hansen and K. Sejrsen

Danish Institute of Agricultural Sciences, Tjele,

***Danish Technical University, Lyngby, Denmark**

Background

- The project reported here arises from a larger project investigating the effects of grazing system (set stocking vs. two-paddock rotation) for steers and the use of bioactive crops (especially chicory)

- Chicory is used because of the possible positive influence on animal health, i.e., parasite control, meat quality and sensory quality of meat from both steers and pigs (including CLA content, selenium and antioxidative status, drip loss and boar taint/androstenone levels)

- The overall objective of the entire project was to develop production methods/strategies that could improve the quality aspects of organic meat


Chicory

Objective

- Investigate the influence of a bioactive crop, chicory roots, on performance, carcass quality and fatty acid composition and CLA content of meat from finishing-fed steers

Material and Methods (I)

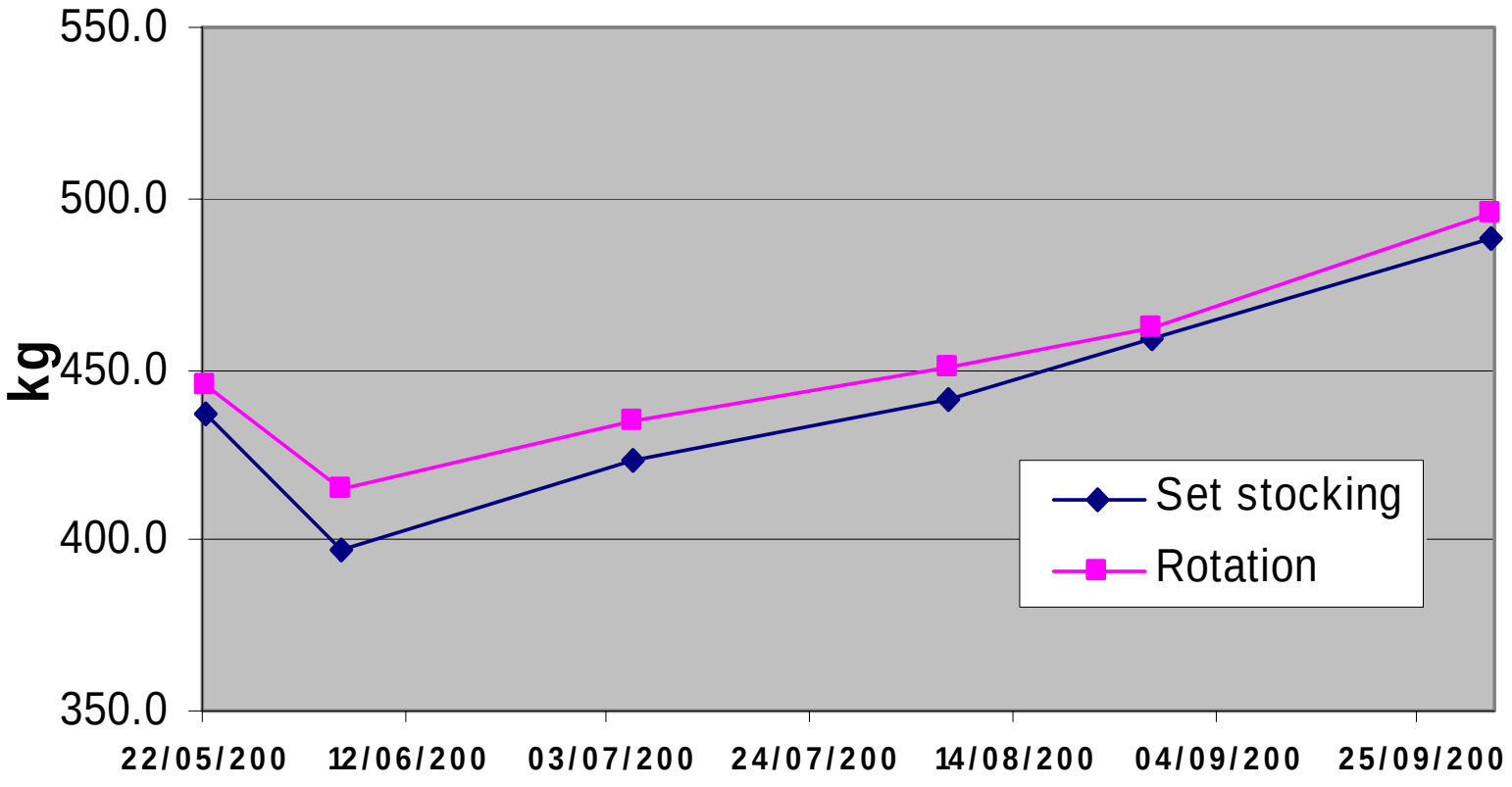
- 40 autumn-born Friesian bull calves
- Bull calves were castrated at 2 mo. of age
- Steer calves were grazing lowland non-fertilized pastures for two summers

Low land organically-farmed pastures (wet marginal grasslands) at Fussingø

Material and Methods (II)

- 40 autumn-born Friesian bull calves
- Bull calves were castrated at 2 mo. of age
- Steer calves were grazing lowland non-fertilized pastures for two summers
- During the 2nd summer, growth rate (ADG) was 380 g/d

Live weight changes during 2nd summer depending on grazing system (Set stocking vs. Rotaion)



(Kristensen et al., in preparation)

Material and Methods (III)

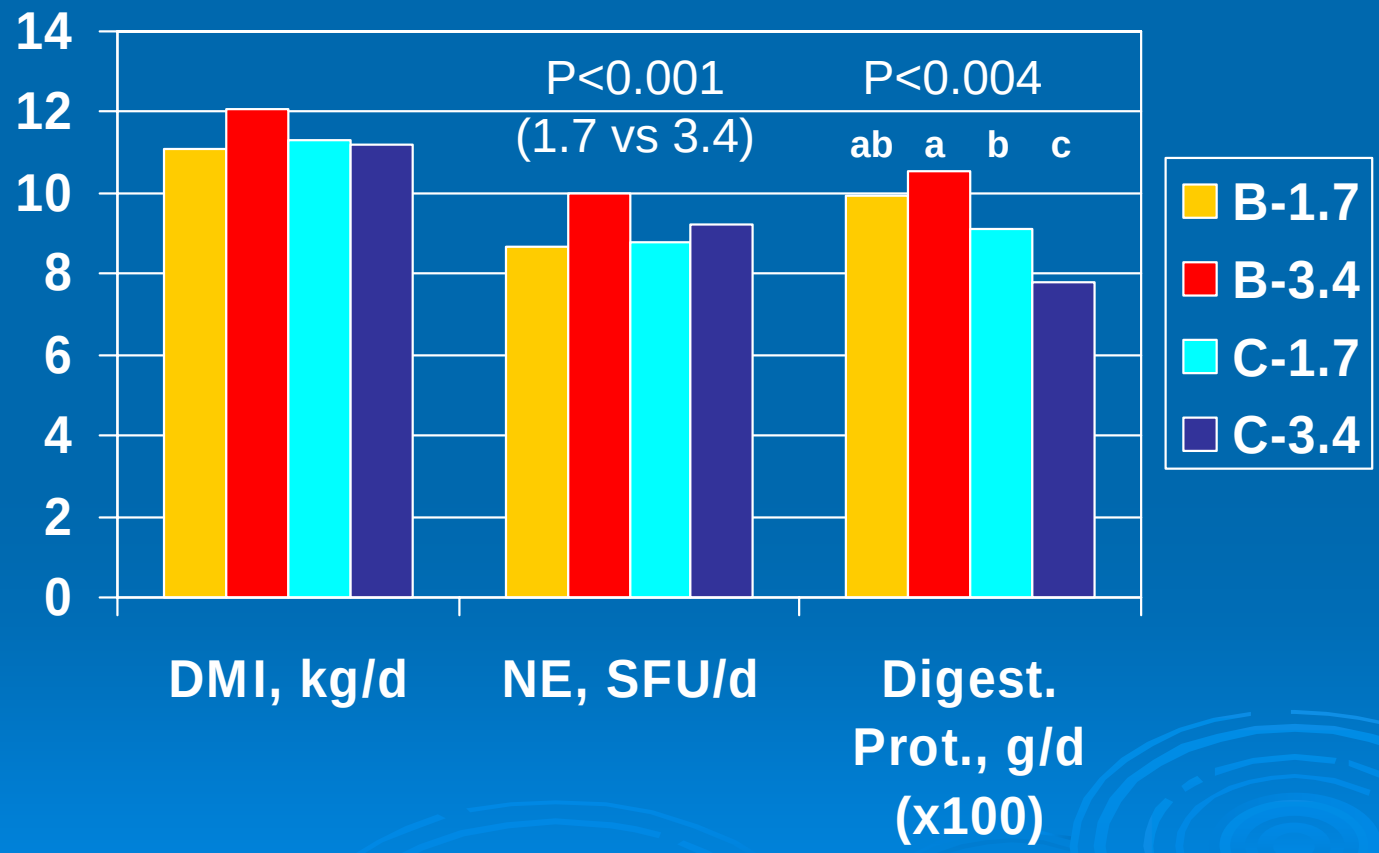
- In October, at two years of age (492 kg LW), steers were housed in tie stalls and finishing-fed for 10 weeks
- In total, 39 steers completed the finishing period
- LW every two weeks
- Daily individual feed intake recordings
- Carcass evaluation at slaughter
- Intramuscular fat in *M. longissimus*
- Fatty acid composition including CLA in *M. longissimus*

- Sensory analysis (Derek V. Byrne, KVL, Copenhagen)

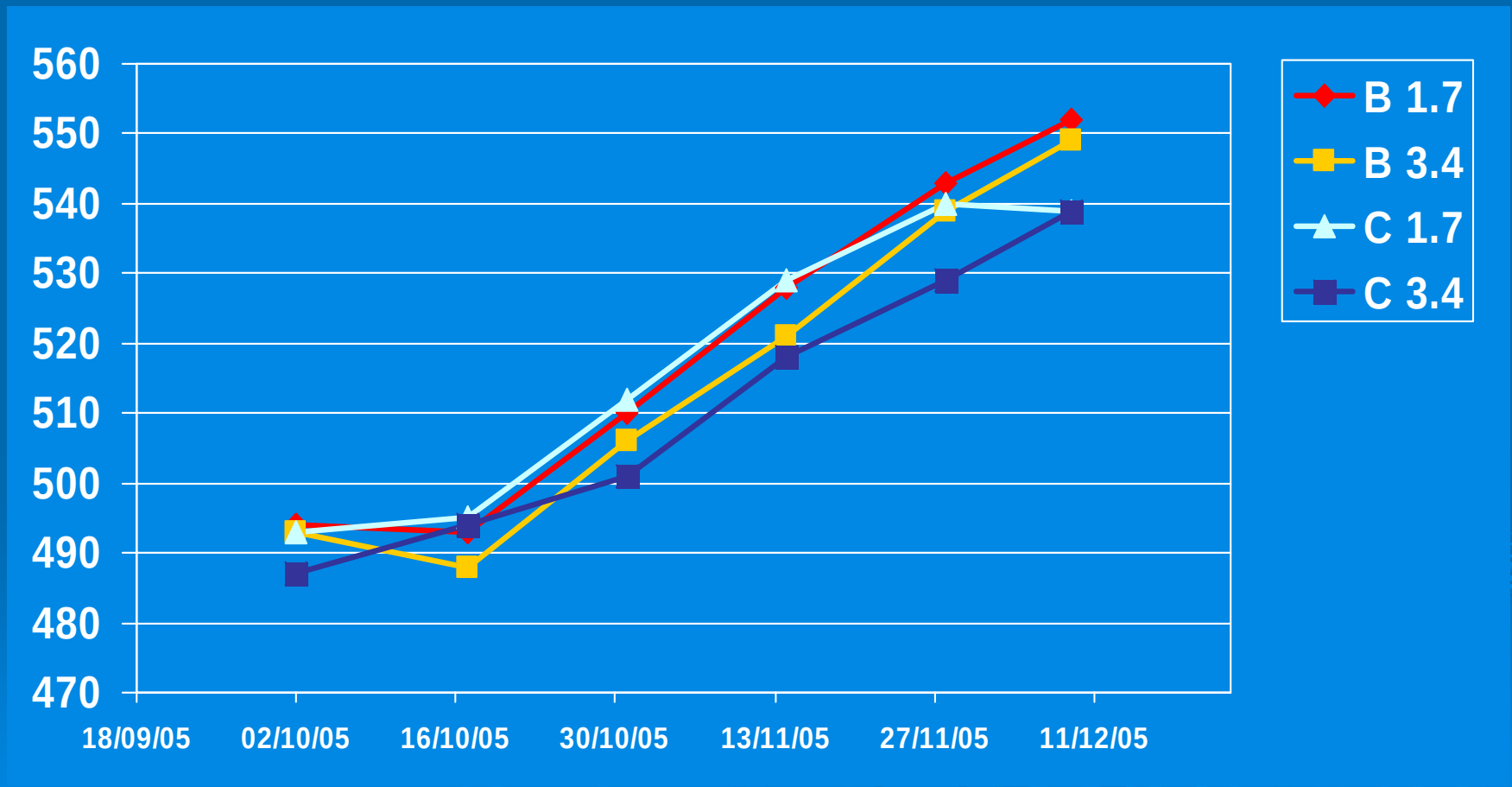
Material and Methods (IV)
Design of experiment

- Steers were allocated to 4 treatment groups based on sire (n=3), block (n=5) and previous grazing system (n=2):
  - B-1.7: 1.7 kg DM of barley
  - B-3.4: 3.4 kg DM of barley
  - C-1.7: 1.7 kg DM of chicory roots
  - C-3.4: 3.4 kg DM of chicory roots
- Treatments were arranged in a 2 x 2 factorial design with two types (B vs. C) and two levels (1.7 vs. 3.4) of concentrates
- Beside the fixed concentrate allowances, steers had free access to medium quality clover grass silage

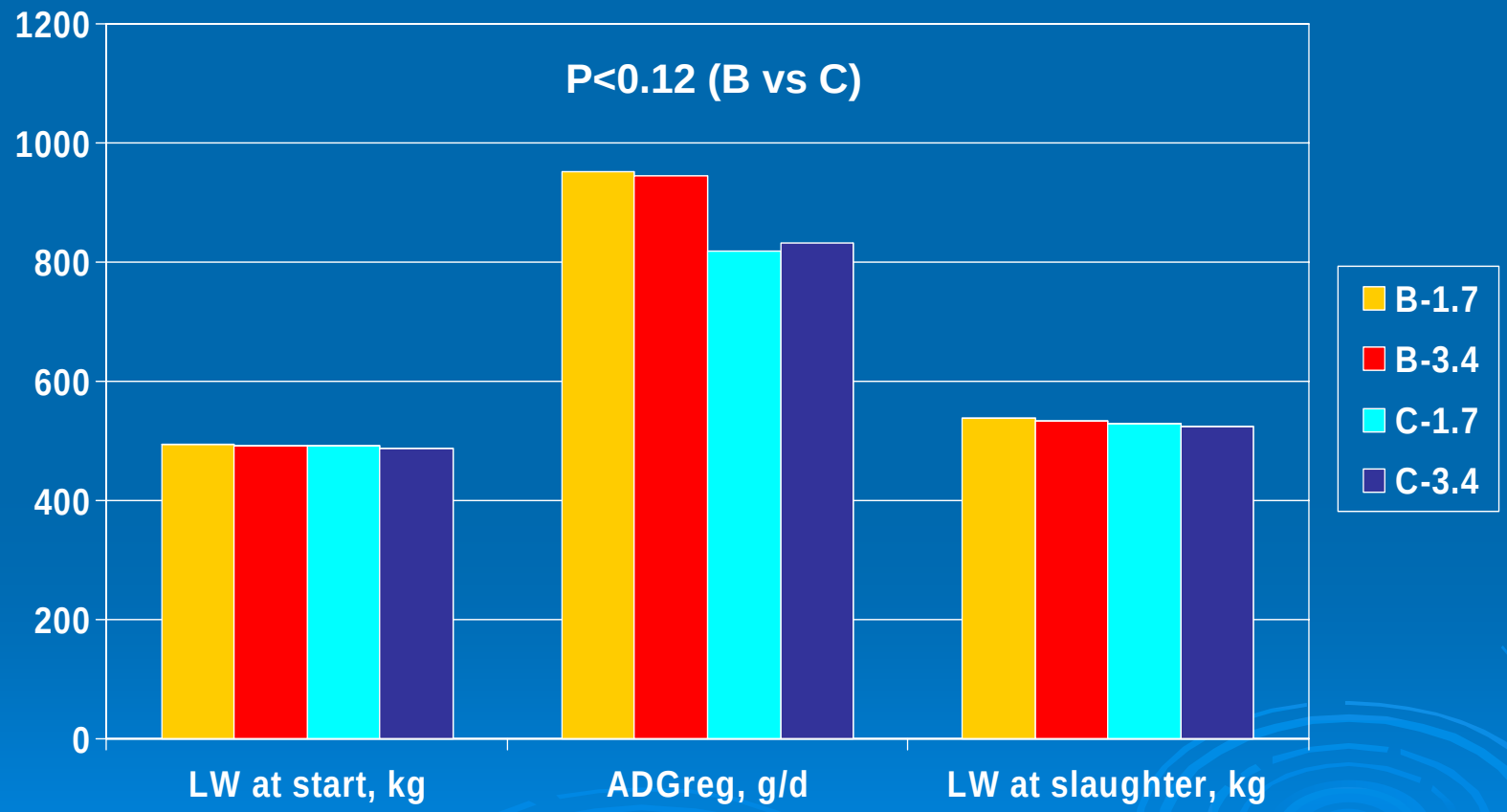
Feed intake of steers during finishing



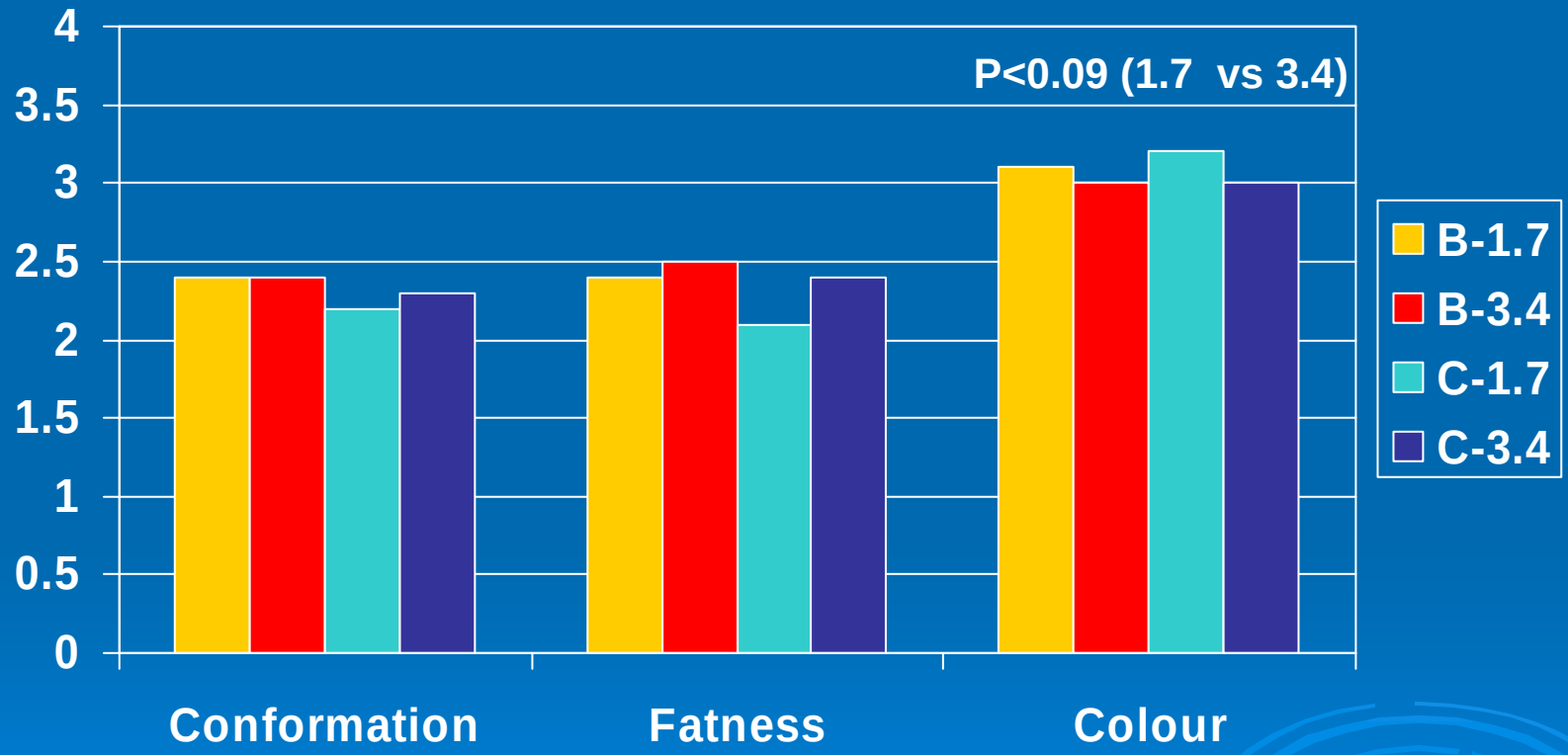
Growth curves for the four treatment groups during finishing feeding



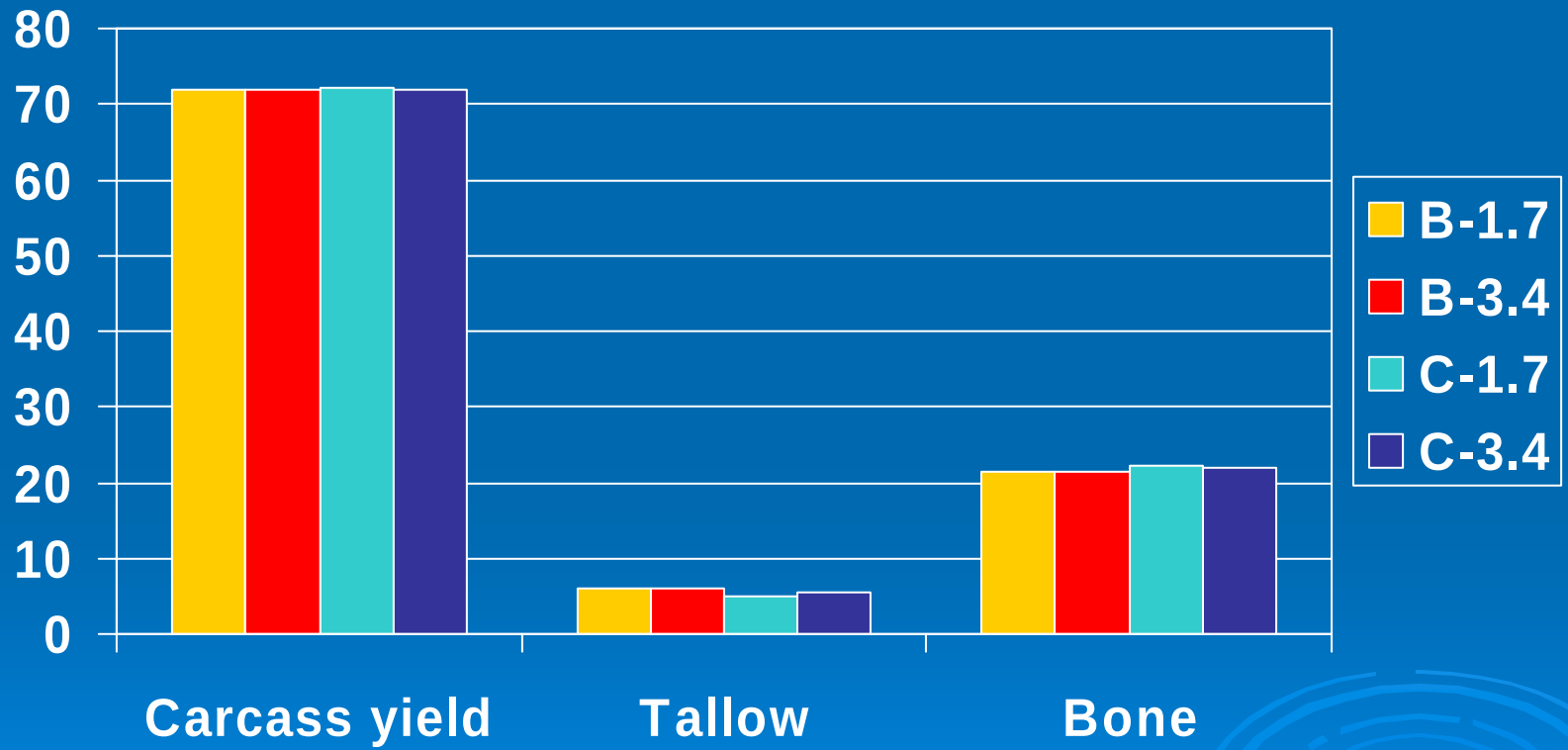
LW at start and at slaughter and ADG during finishing



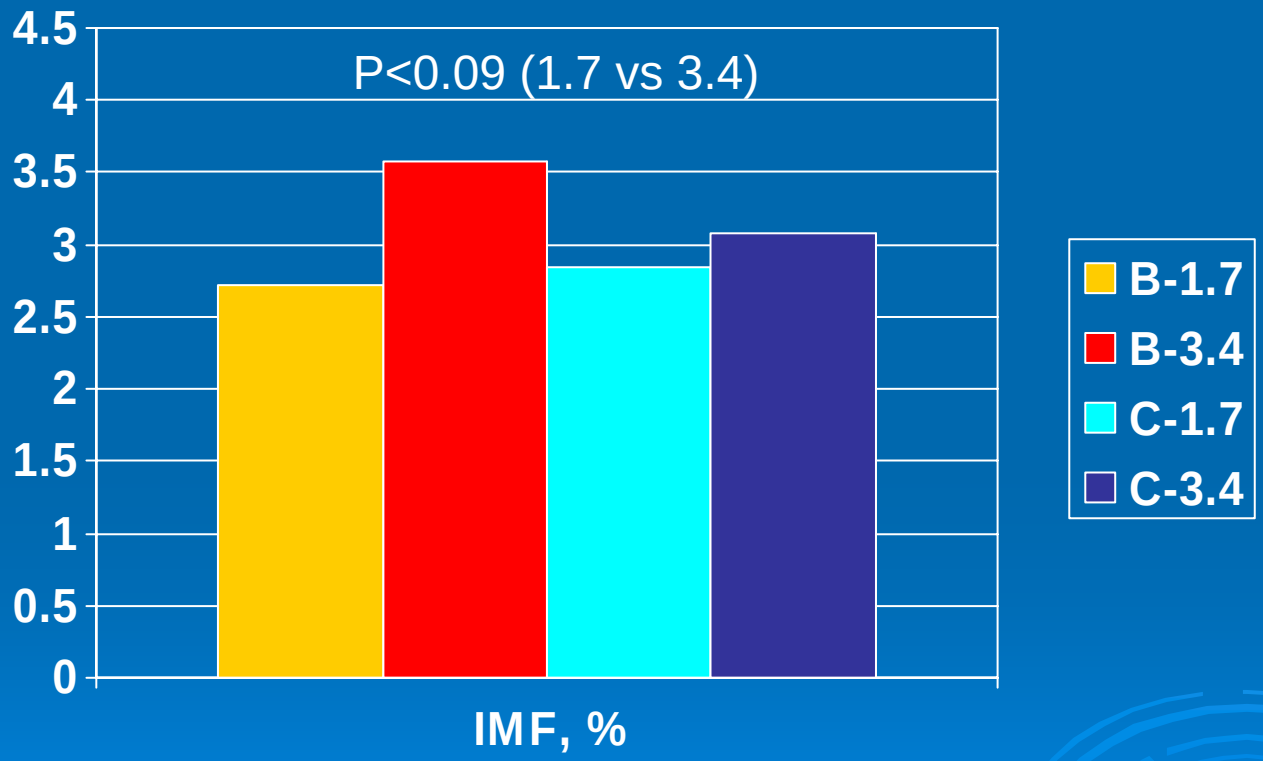
EUROP Conformation and Fatness and Lean/fat colour of steers



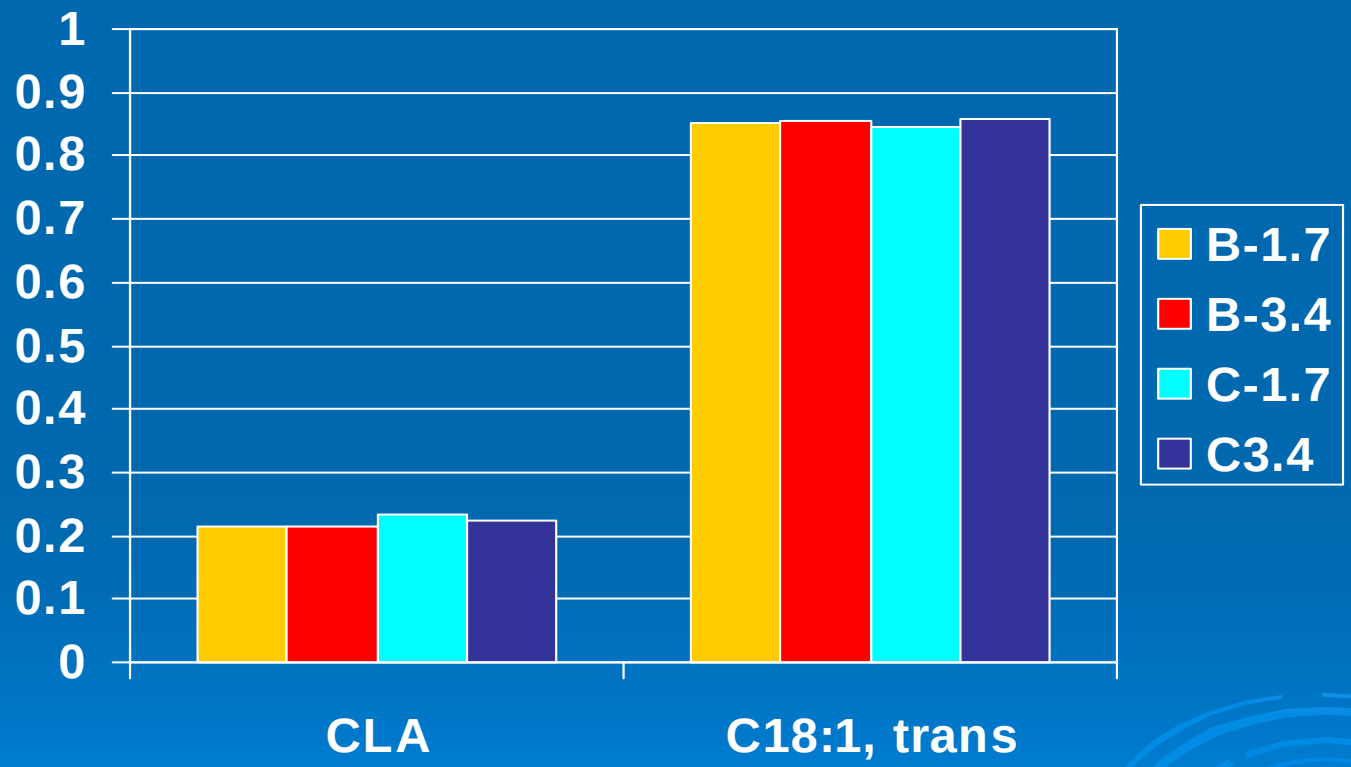
Carcass yield, tallow and bone in carcass estimated by KKC-2 (n=34)



Intramuscular fat (IMF) in *M. longissimus* of steers



CLA, *cis-9, trans-11* and vaccenic acid (C18:1, *trans-11*) in *M. longissimus*



Intramuscular fat and fatty acid composition in *M. Longissimus*

- The high concentrate level increased IMF ($P<0.09$)
- Neither treatment affected the content of *cis*-9, *trans*-11 CLA (0.22 mg/100 mg of FA), vaccenic acid (C18:1, *trans*-11) or linoleic acid (C18:2*n*-6)
- Longissimus muscle of C- compared with B-steers had 10% less C18:0 ($P<0.01$) and 7 to 17% more C16:1, C18:1 and C18:3 ($P<0.03$)

Conclusions (chicory vs. barley)

- The results showed that steers finishing-fed with 15 to 30% of the net energy intake coming from chicory roots compared with barley had:
  - slightly lower gain
  - similar carcass quality
  - more unsaturated fat in the meat, but
  - similar CLA content in the meat

Acknowledgements

- The technical skills of research technicians (The FUSSINGØ crew) are greatly acknowledged. Body condition scoring was performed by Orla Nielsen. Financial support was received from DACROFF (FØJO II) under the project PROSBIO/PROSQUAL