Are the consequences of coccidiosis affected by selection for improved performance?

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Background

- Chicken coccidiosis adversely impacts broiler performance
- Reduced growth rate caused by anorexia and reduced efficiency of feed utilization
    - reduced nutrient absorption
    - alterations in post-absorptive utilization
- *E. maxima* one of the most common *sp.* affecting the proximal intestine
- Malabsorptive type coccidiosis may affect Ca and P absorption and potentially impact bone mineralization
- Intensive selection for increased average daily gain and reduced FCR may affect bone mineralization

Aims and Hypothesis

- We aimed at comparing two genotypes differing in their growth rates (>25%) and FCR (>10%), infected with two levels of *E. maxima* during the grower phase
- We hypothesized
  - Birds of the slow growing genotype (S) will show higher degree of mineralization than birds of a fast growing genotype (F), irrespective of infection status
  - *E. maxima* will reduce bone mineralization in both genotypes and effects will be more pronounced at increased pathogen doses
  - Effects of *E. maxima* will be more pronounced in the Fast (F) growing genotype than the (S)

Material and Methods

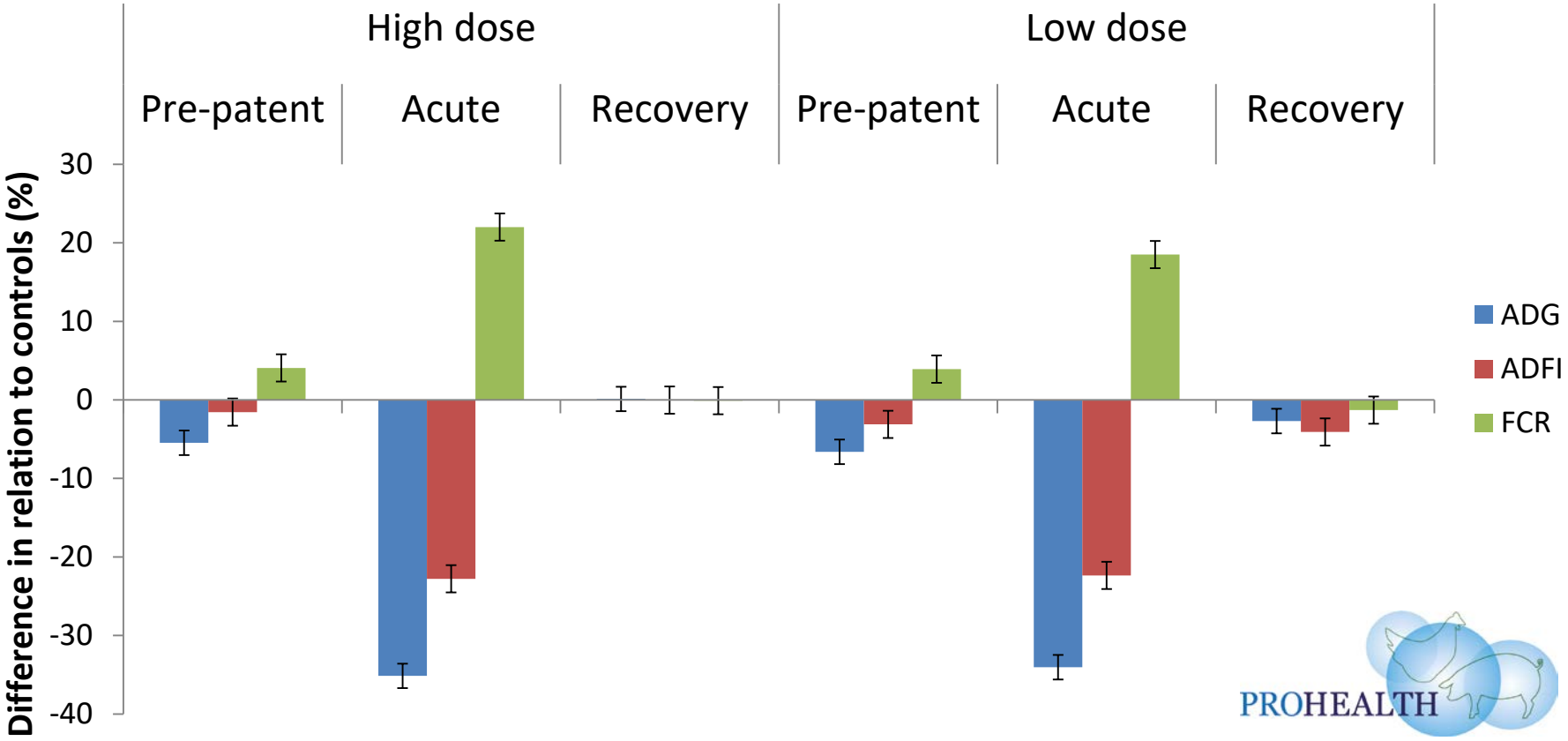
- 144d-old Ross 308 (F) chicks male chicks and 144 Ross Ranger (S) male chicks
- 2 phase dietary scheme according to Aviagen recommendations; starter (1-10) , grower (11-25)
- Oral inoculation with a single 0.5-mL oral dose of water (C), 2×10^3 (L), or 7.5×10^3 (H) of sporulated *E. maxima* oocysts at 13d of age

Material and Methods

- Pen ADG, ADFI and FCR were calculated over the pre-patent (d1-4), acute (d5-8) and recovery phase (d9-12) of infection and calculated as the percentage difference to their respective controls
- 1 bird/pen was weighed and dissected on d6 (acute) and d13 PI (recovery period) (n=8).
- Tibia and femur excised for determination:
  - Dry defatted bone weight (DDB; g/kg BW)
  - Ash content (g/kg BW)
  - Bone breaking strength of femur and tibia (BBS; N/kg BW)
  - Percentage bone ash (%)

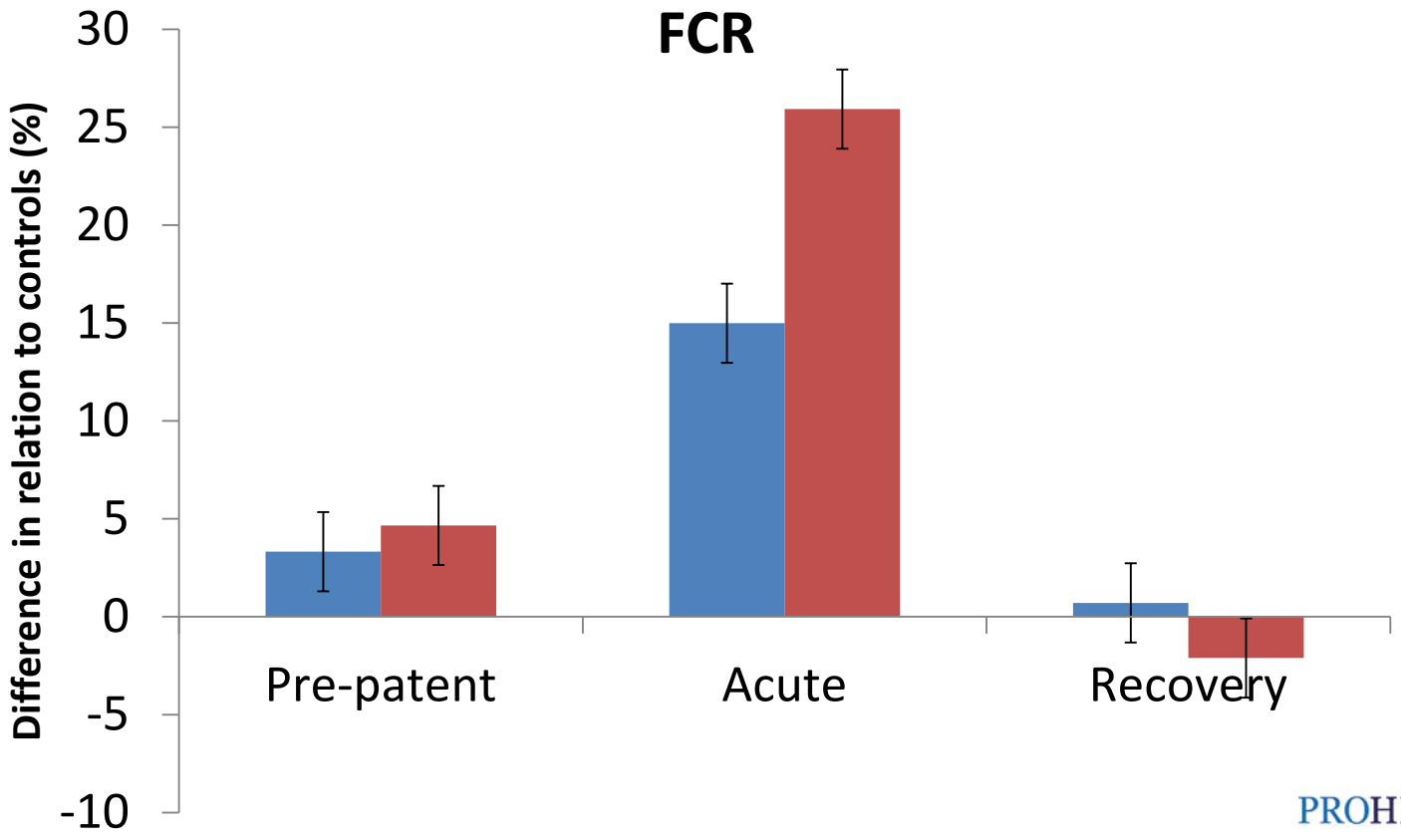
Results-Performance

- H and L birds showed reduced ADG and ADFI and increased FCR, effects being pronounced during the acute period of infection

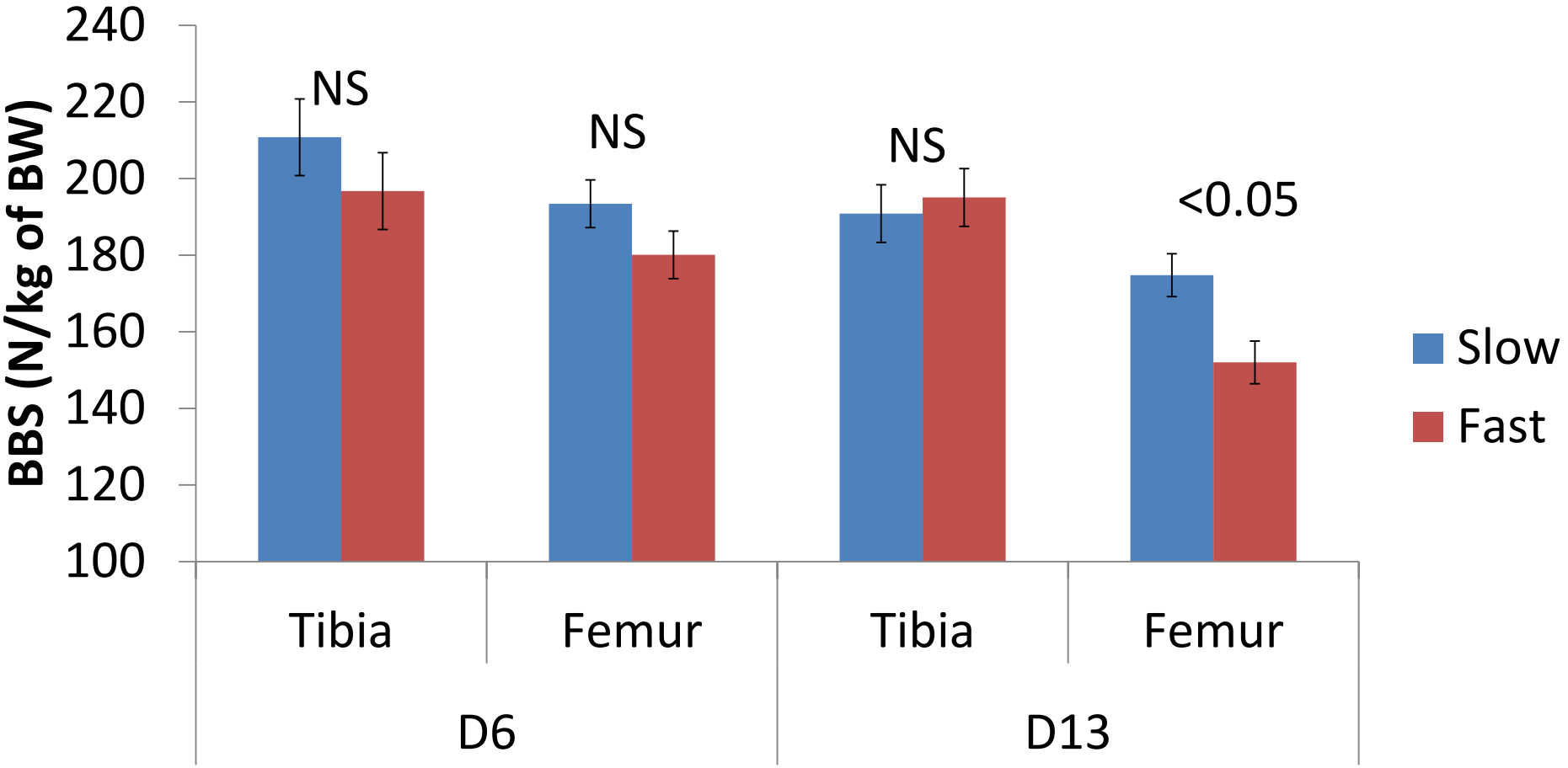


Results-Performance

- Effects of infection were more pronounced for FCR in S than F birds during the acute period of infection.



Results-Genotype



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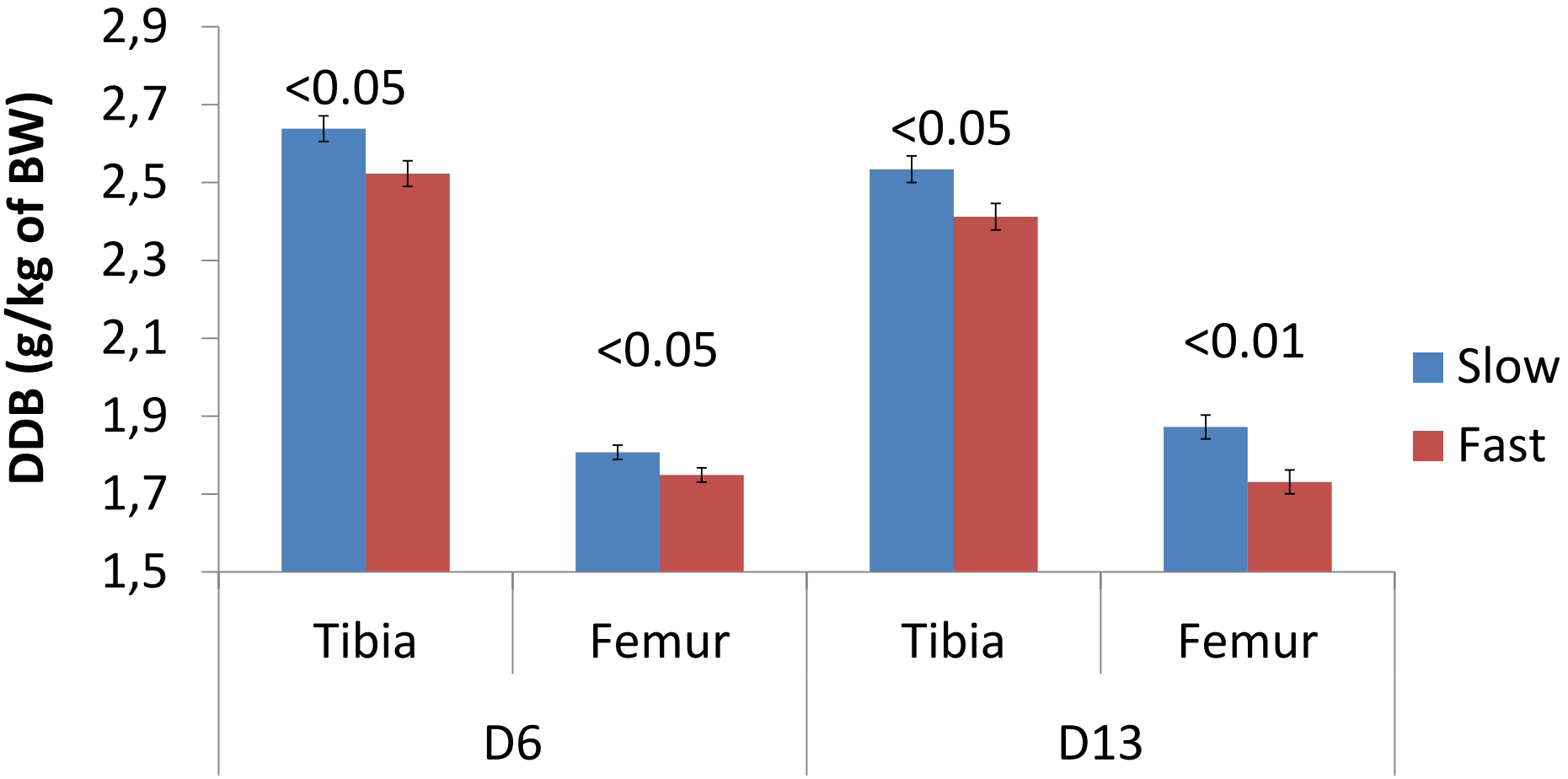
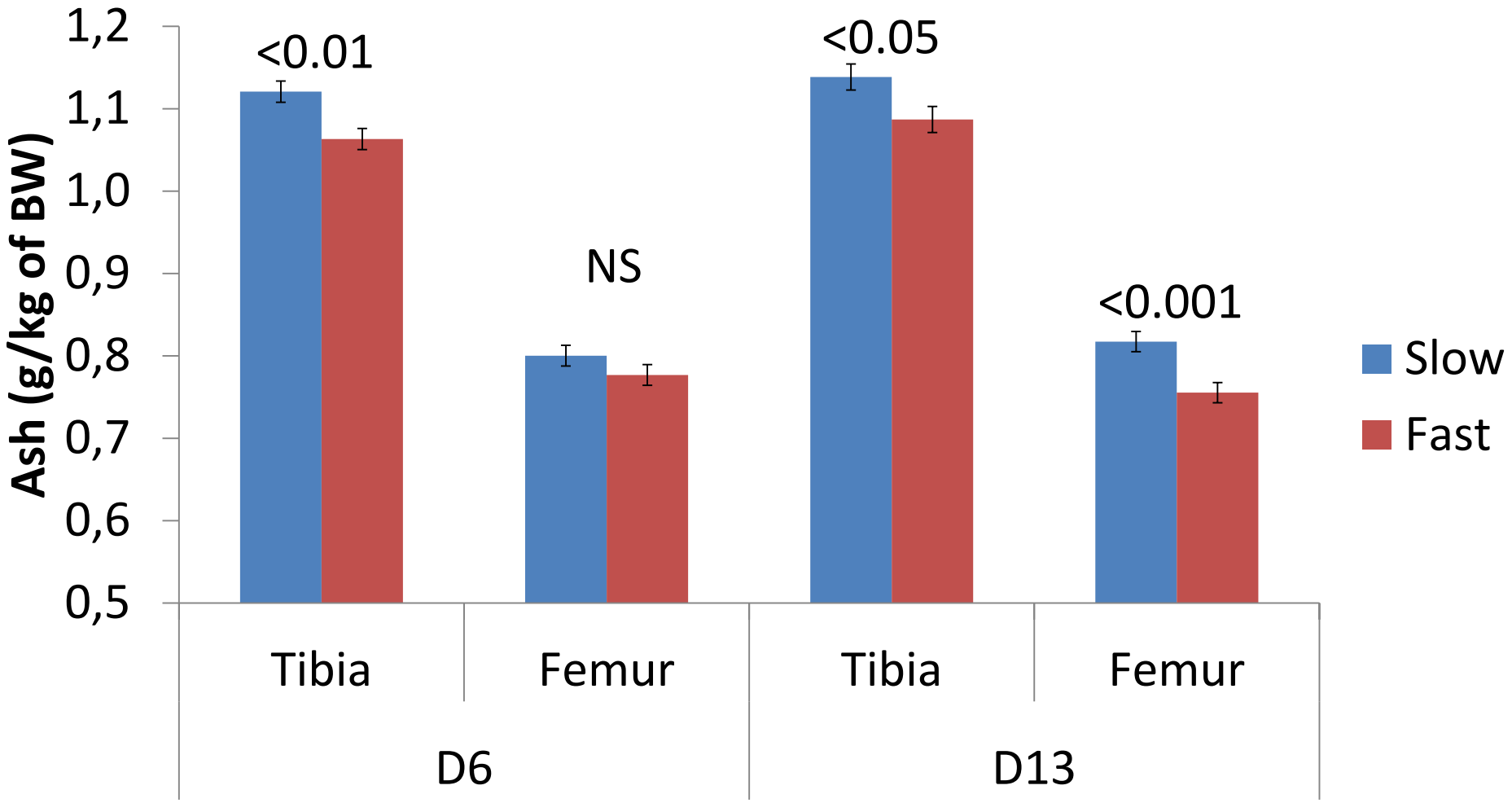
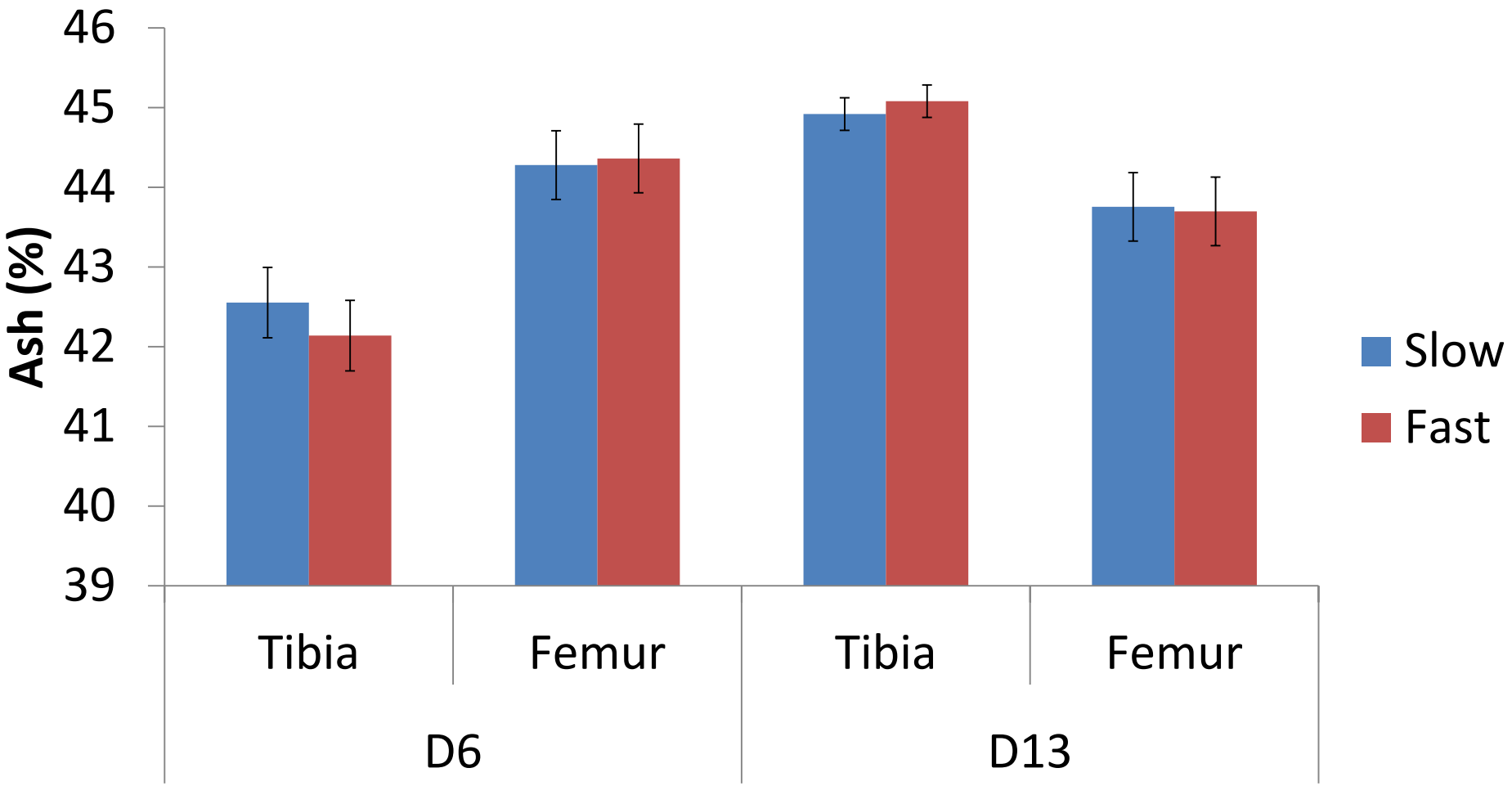


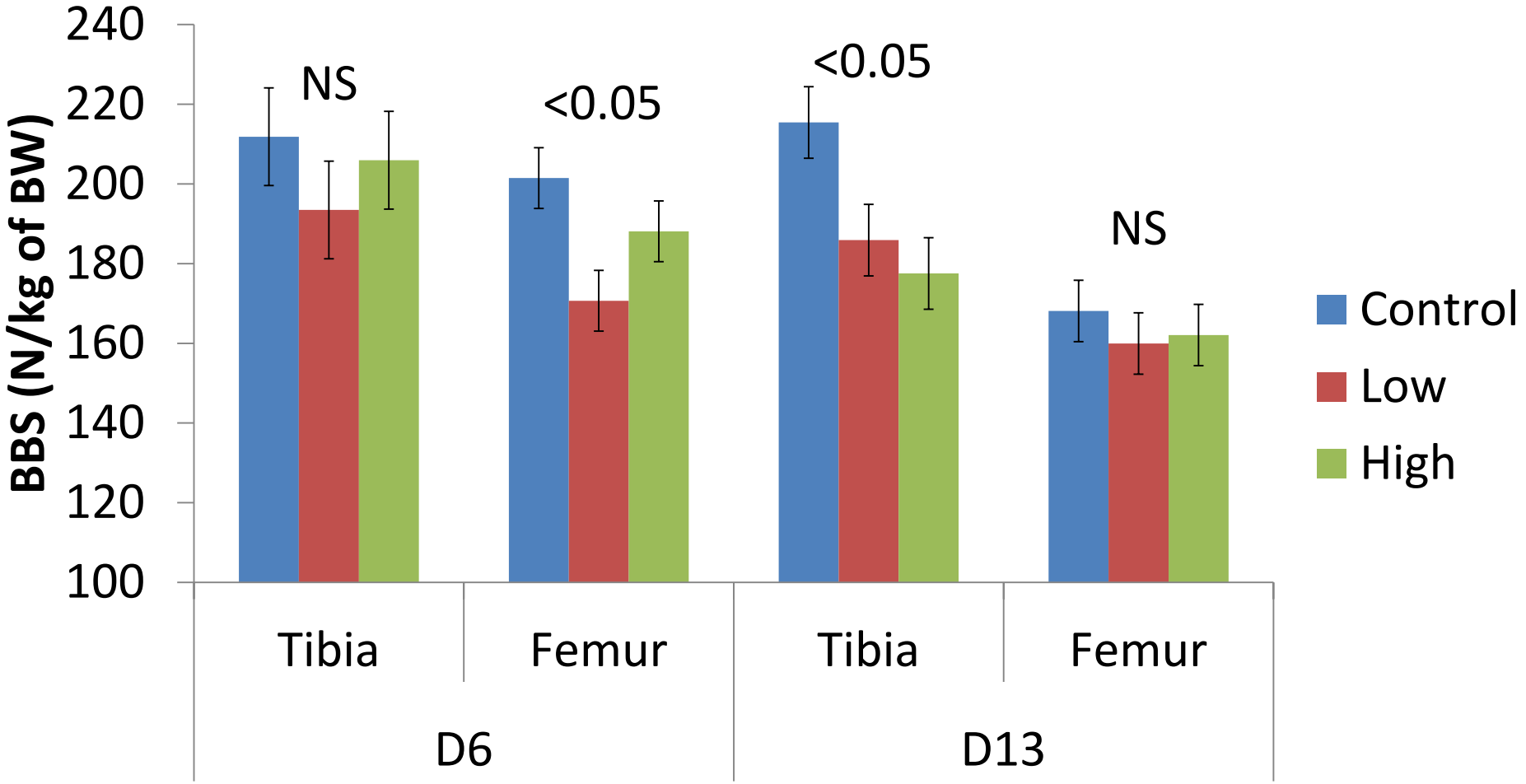
Results-Genotype



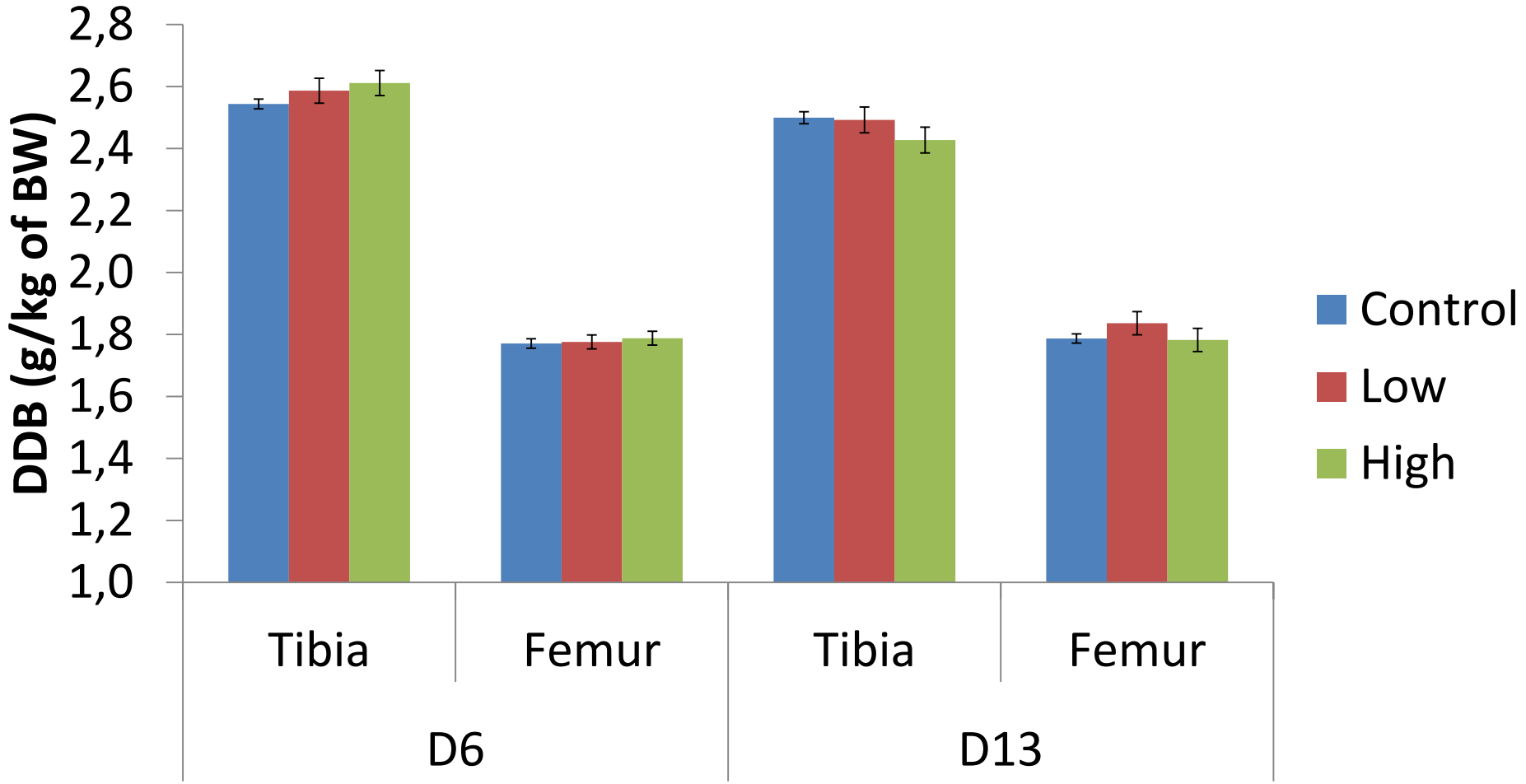
Results-Genotype



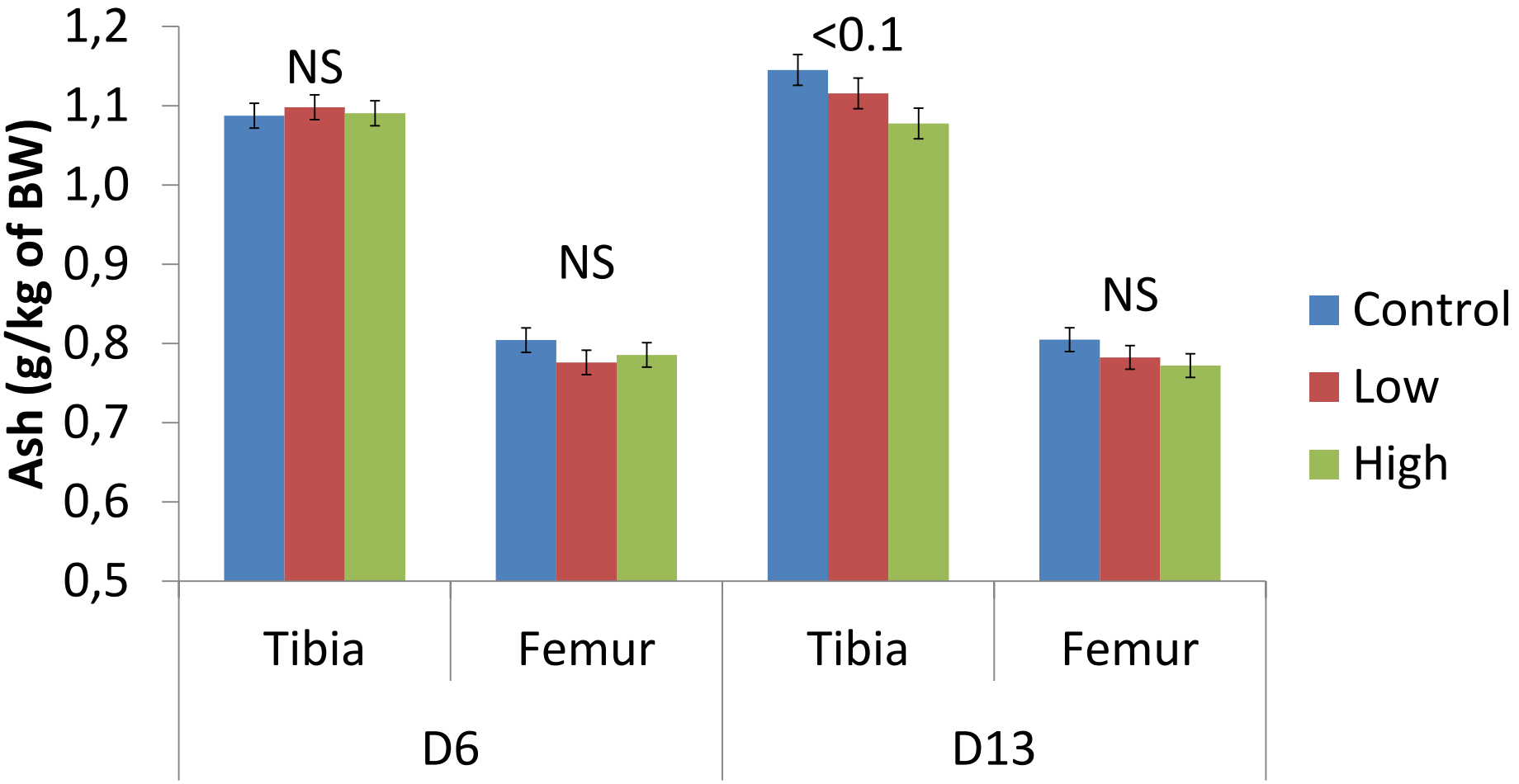
Results-Dose



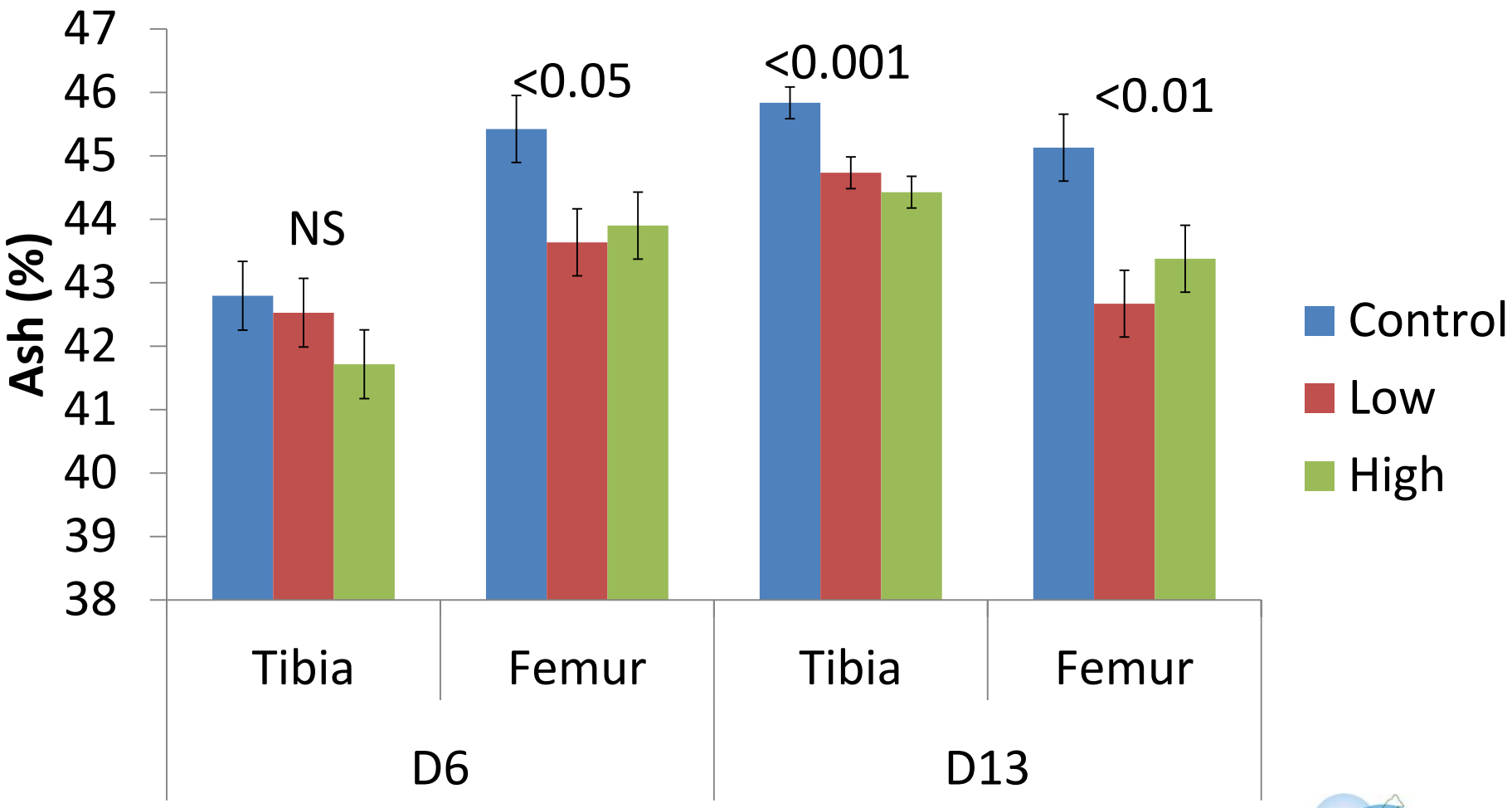
Results-Dose



Results-Dose



Results-Dose



Discussion

- ADG and ADFI were reduced to the same extent in birds of the two genotypes
- Birds of the S genotype overall showed higher degree of bone mineralization both at the level of tibia and femur
- Infection with *E.maxima* reduced aspects of bone mineralization both at the level of tibia and femur with effects persisting to the end of the recovery period
- Effects were in general dose independent due to the high pathogenicity of the strain used
- The impact of infection was similar between the two genotypes

Further research

- Expand on different pathogen species which may elicit different pathological responses to the host affecting different portions of the intestine
- Diet offered to genotypes was adequate in nutrients. It would be interesting to investigate responses when offering diets marginally deficient in nutrients involved in bone mineralization

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Thank you

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