Impact of surgical castration and housing environment on the immune function of fattening male pigs

Merlot, E., Thomas, F., Mounier, A.-M., Prunier, A.




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Presentation 3

Surgical castration in EU

- Surgical castration within 1 week of age: about 80% of male pigs ≈ 100 x 10^6/year in EU (*Fredriksen et al 2009*)
- Tendency in EU: suppression of surgical castration for animal welfare reasons
- Suppressing castration has other positive effects:
  - Improvement of growth and meat quality
  - Improvment of immune function?

Sex hormones and immunity

- In humans, many diseases have sex-specific differences in prevalence, age of onset or severity. For example:
  - autoimmune diseases prevalence > in women
  - athma prevalence > in boys than girls but < in men than women

- Involvement of sex steroids:
  - Androgens: anti-inflammatory and ↘ T lymphocyte functions
  - Estrogens: ↘ T lymphocyte functions, ↗ antibody production
  - Castration of sexually mature male rodents => thymic regeneration

- Few data about the effects of castration on porcine immune function :
  - Relatively to entire males, castrated males are more susceptible to parasitism (*Taenia solium*: Morales et al, 2002)
  - Relatively to females, castrated males are more susceptible to an inflammatory (LPS) challenge (Frank et al, 2005)

- Objectives: determine the long-term impact of surgical castration on immune function of fattening pigs

Material and methods

Poor: slatted floor, indoor

Enriched: housing on deep litter with outside run

ENT

Sham castrated

2 x 10 pigs

2 x 10 pigs

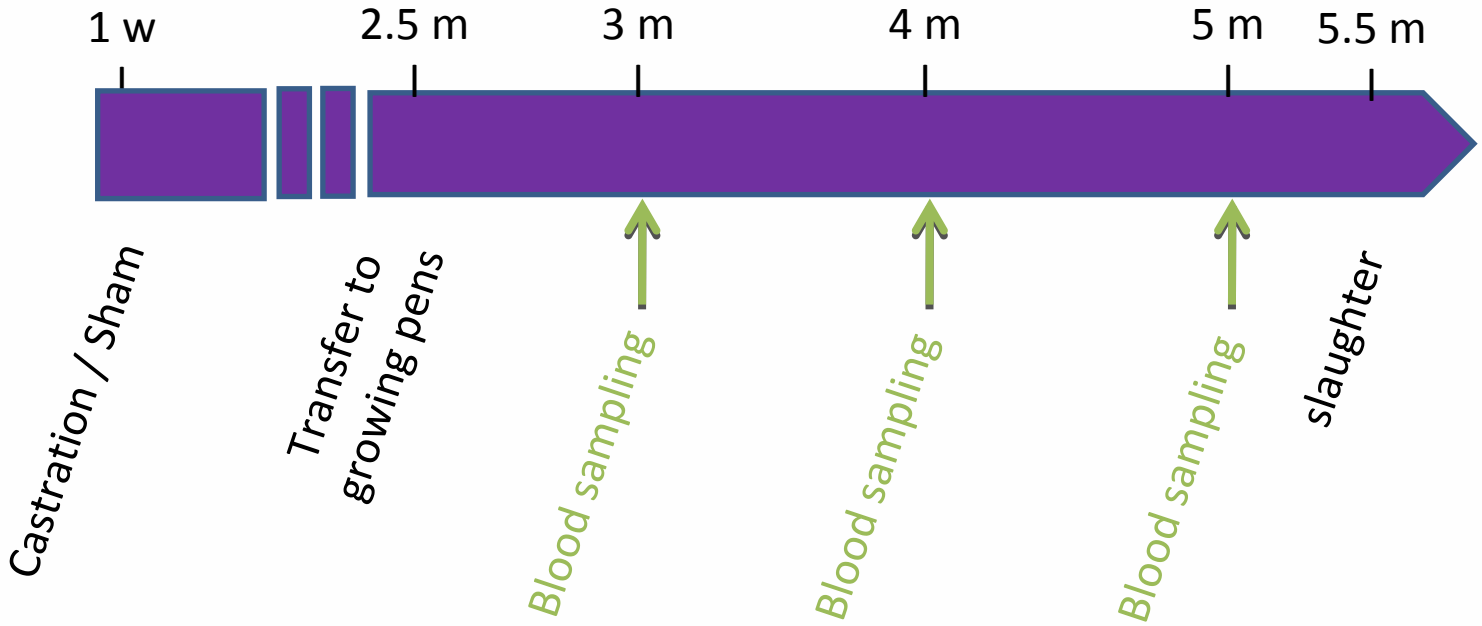
CAST

at 1 week of age

2 x 10 pigs

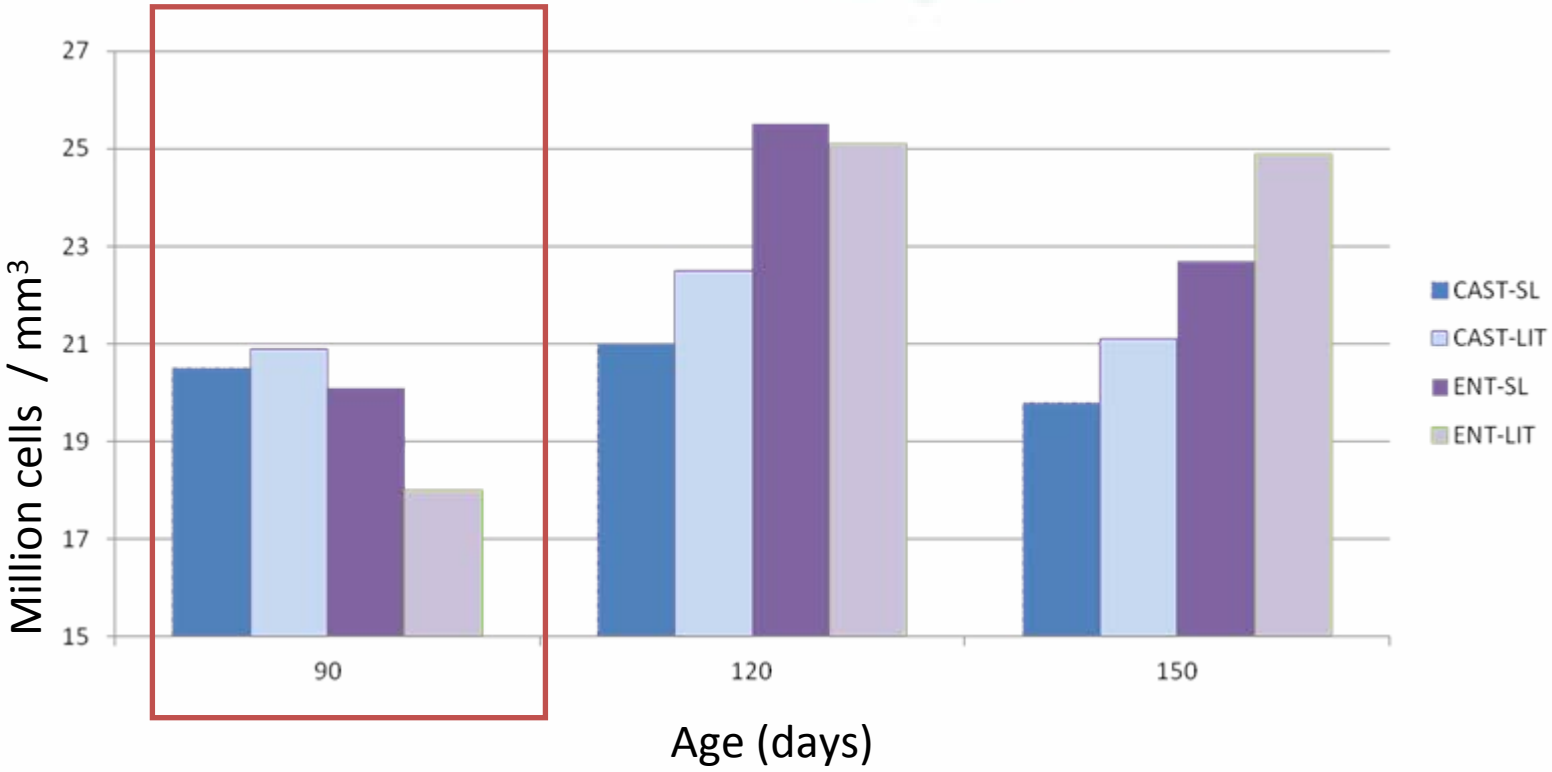
2 x 10 pigs

Material and methods



Statistical analysis: analyses of variance with mixed models of SAS

Total white blood cell numbers



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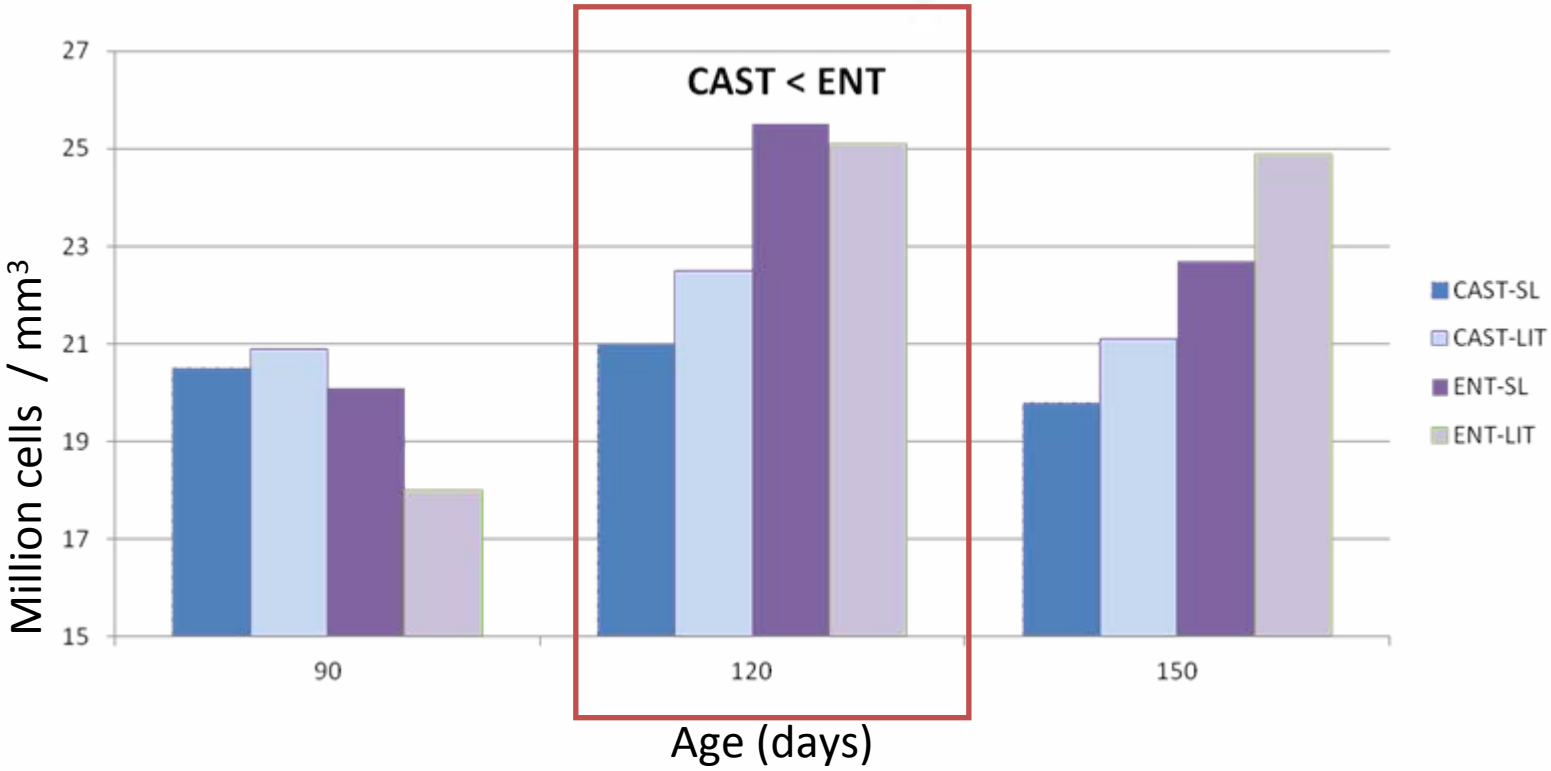

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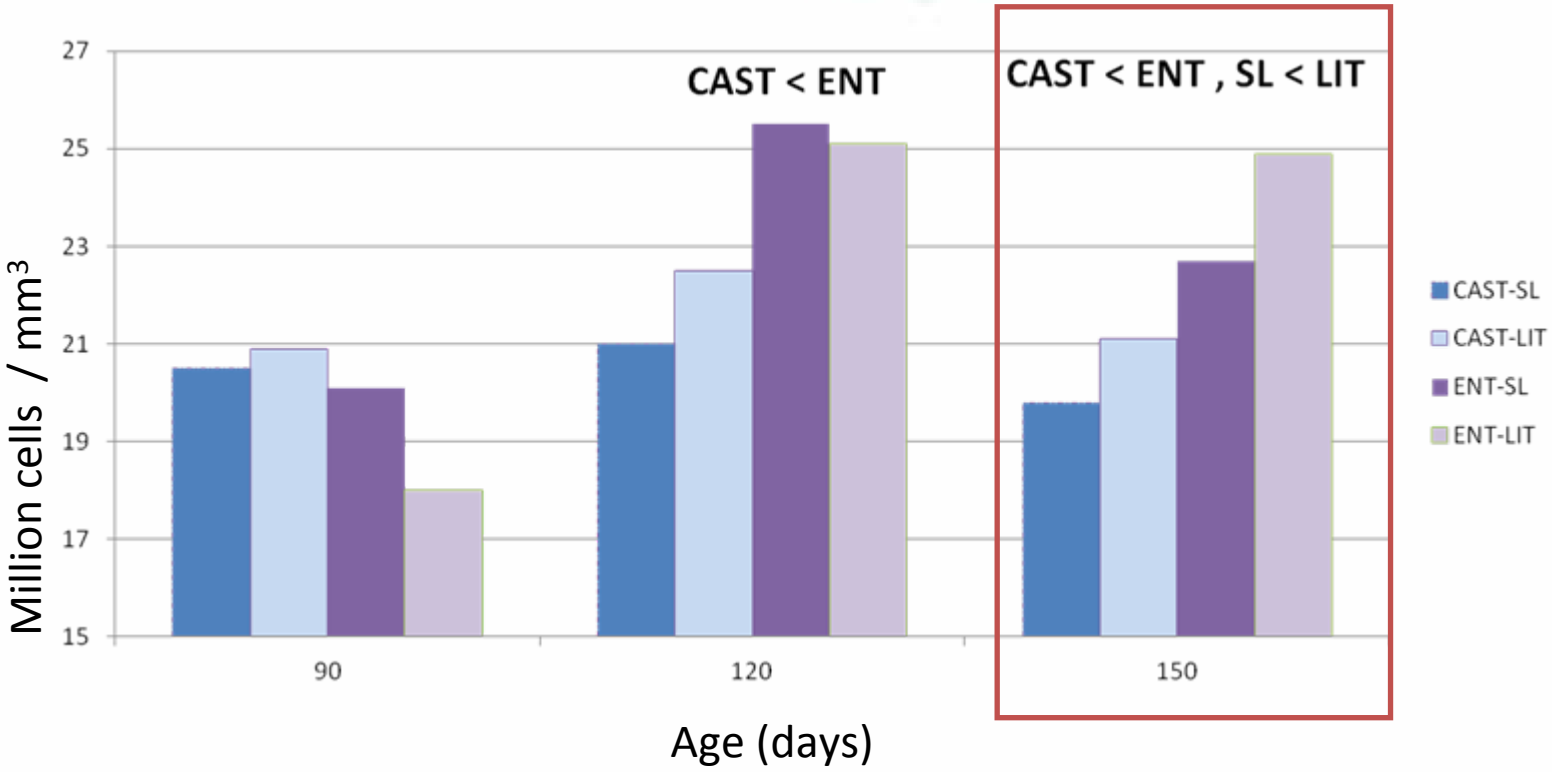
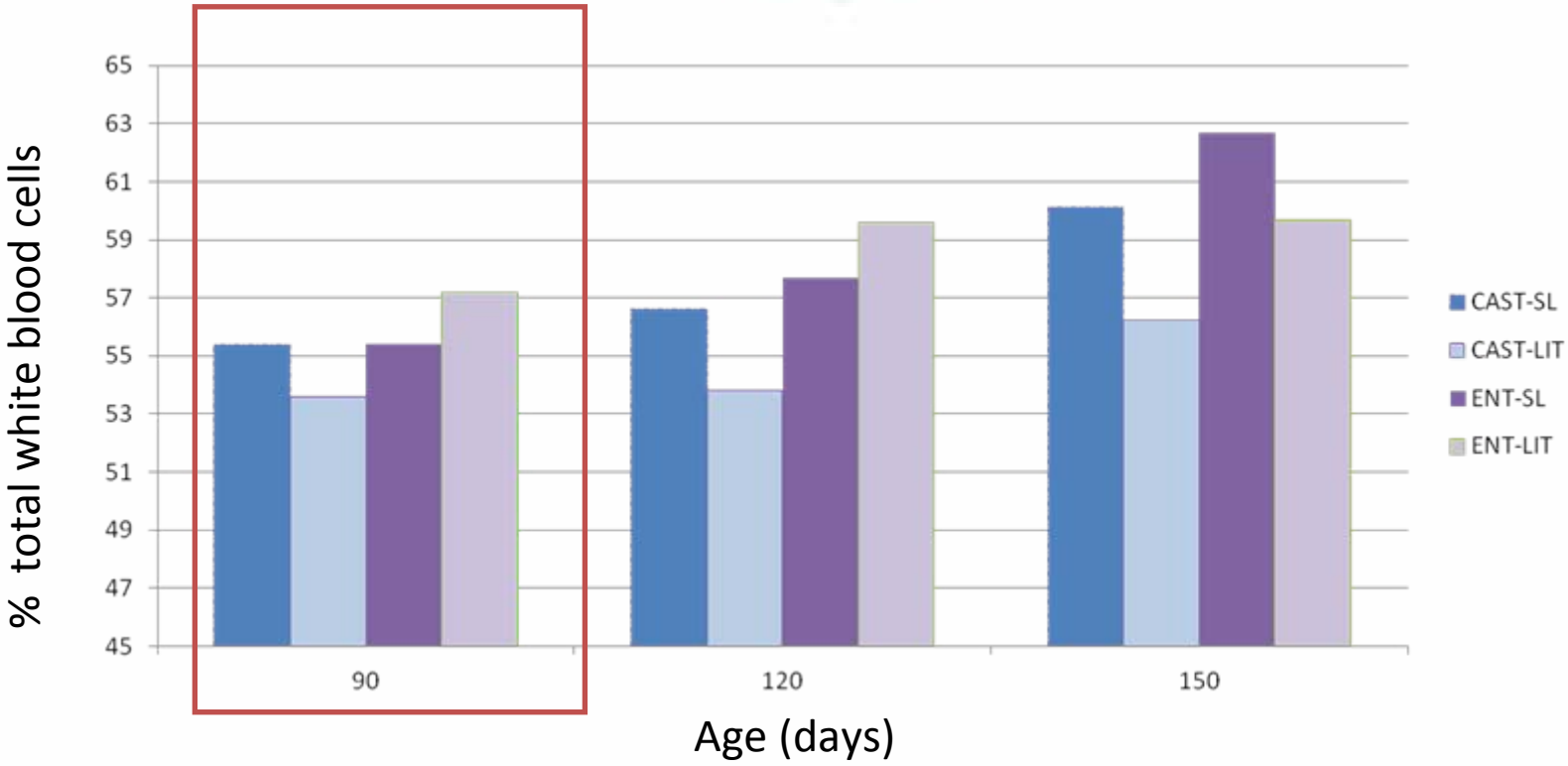


% of blood lymphocytes



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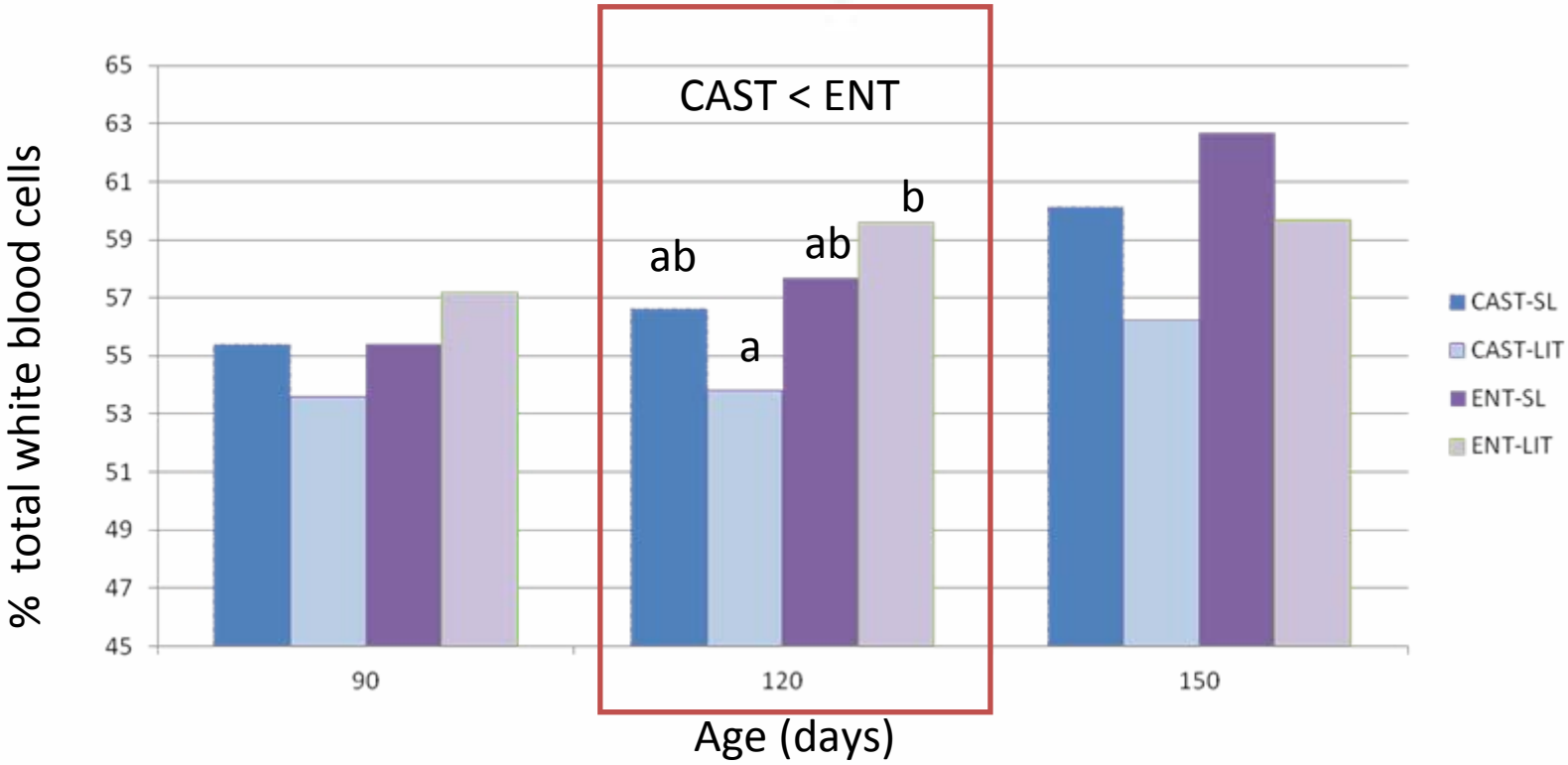

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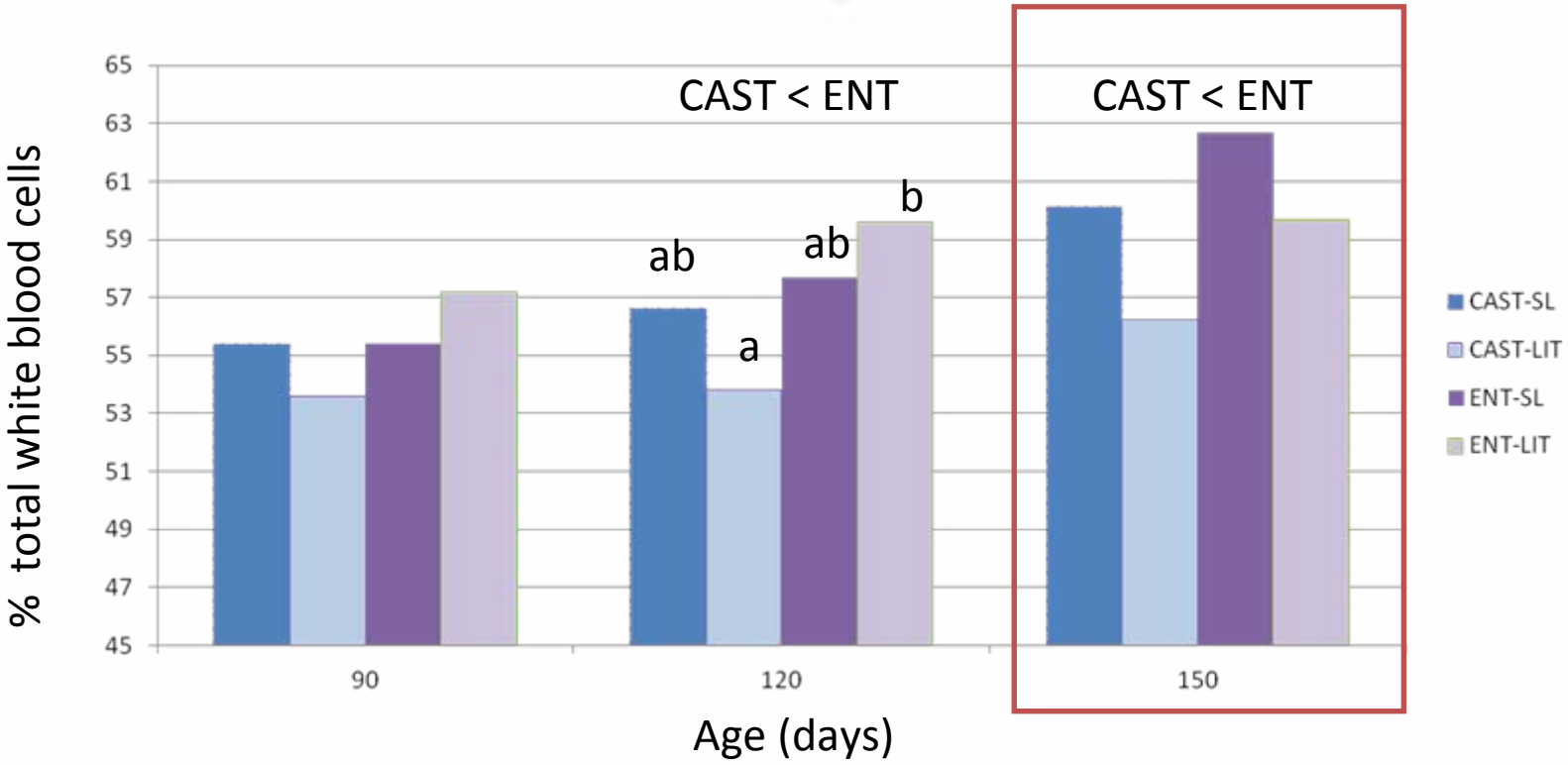
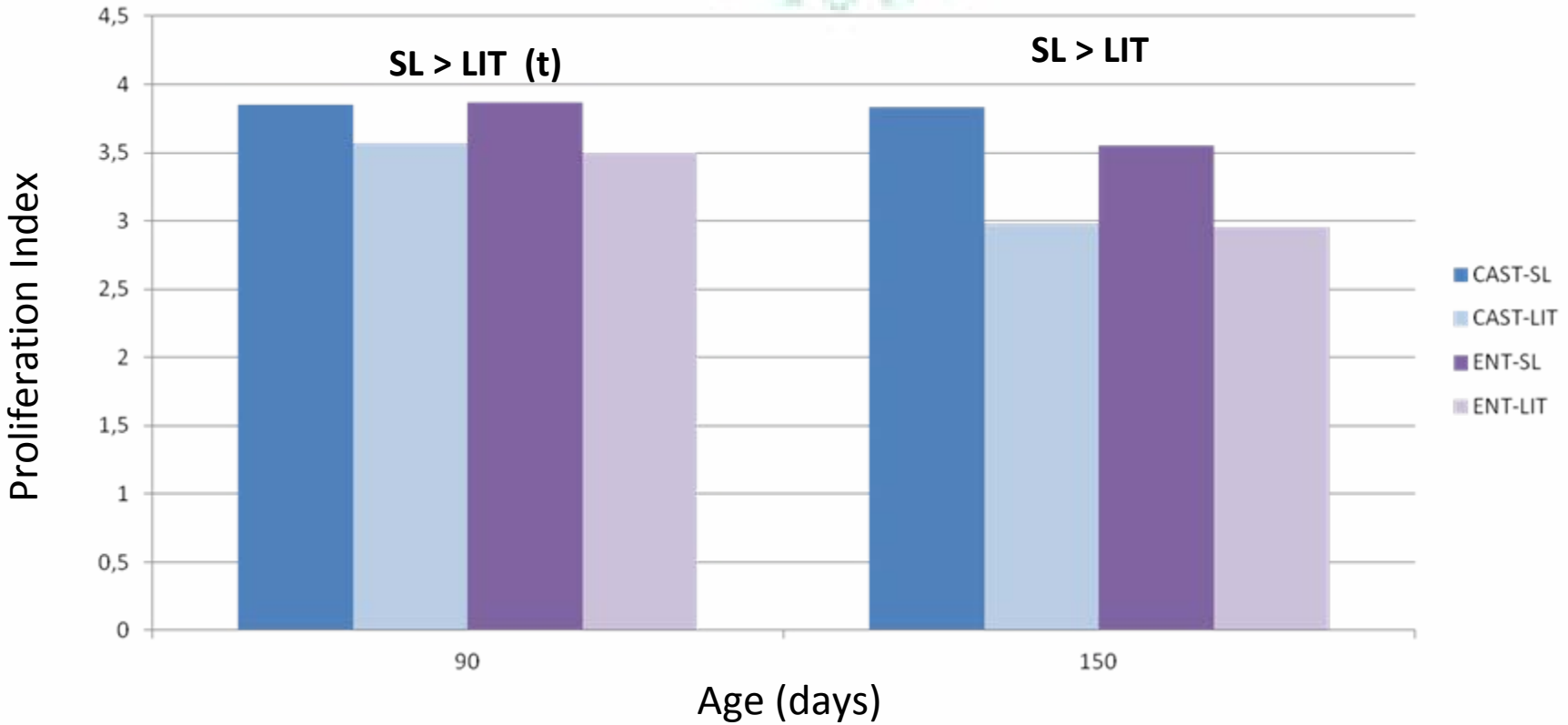


Sex effect in accordance with previous data (Odink et al, 1990)

Lymphocyte proliferation (ConA)



Slaughter data

- Body weight: 120kg
- Thymus weight

  CAST < ENT

  (0.266 ± 0.008 vs. 0.310 ± 0.009 g/live weight kg)
- Spleen weight

  SL < LIT

  (0.126 ± 0.003 vs. 138 ± 0.005 g/live weight kg)
- Lung health status and stomach ulcers

  no sex nor housing effect

Conclusion

- no interaction sex* housing

- Housing effect appears since M3, more pronounced at M5

  WBC (LIT > SL), lymphocyte proliferation (LIT < SL)

  ⇒ variable among studies

  ⇒ might be related to the microbial environment

- Sex effect appears at puberty (M4-5)

  WBC, lymphocyte %, thymus weight: CAST < ENT

  ⇒ supressive effect of castration?

  ⇒ Porcine specificity: boar testis produces both androgens and estrogens => explore the respective roles of androgens and estrogens

Thanks for your attention !