Applying yield gap analysis to identify options for sustainable intensification in livestock production systems

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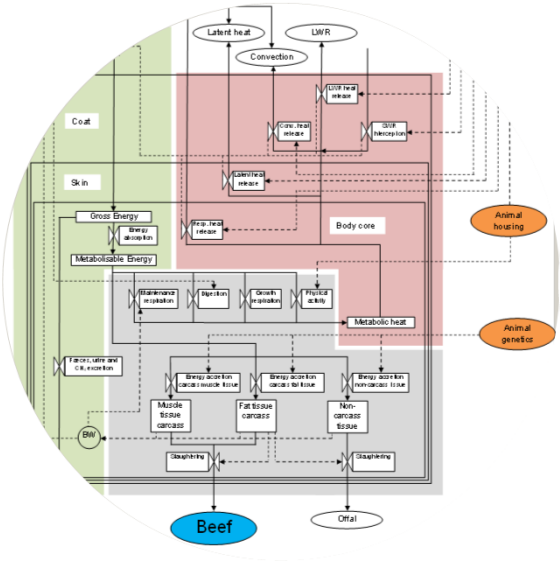

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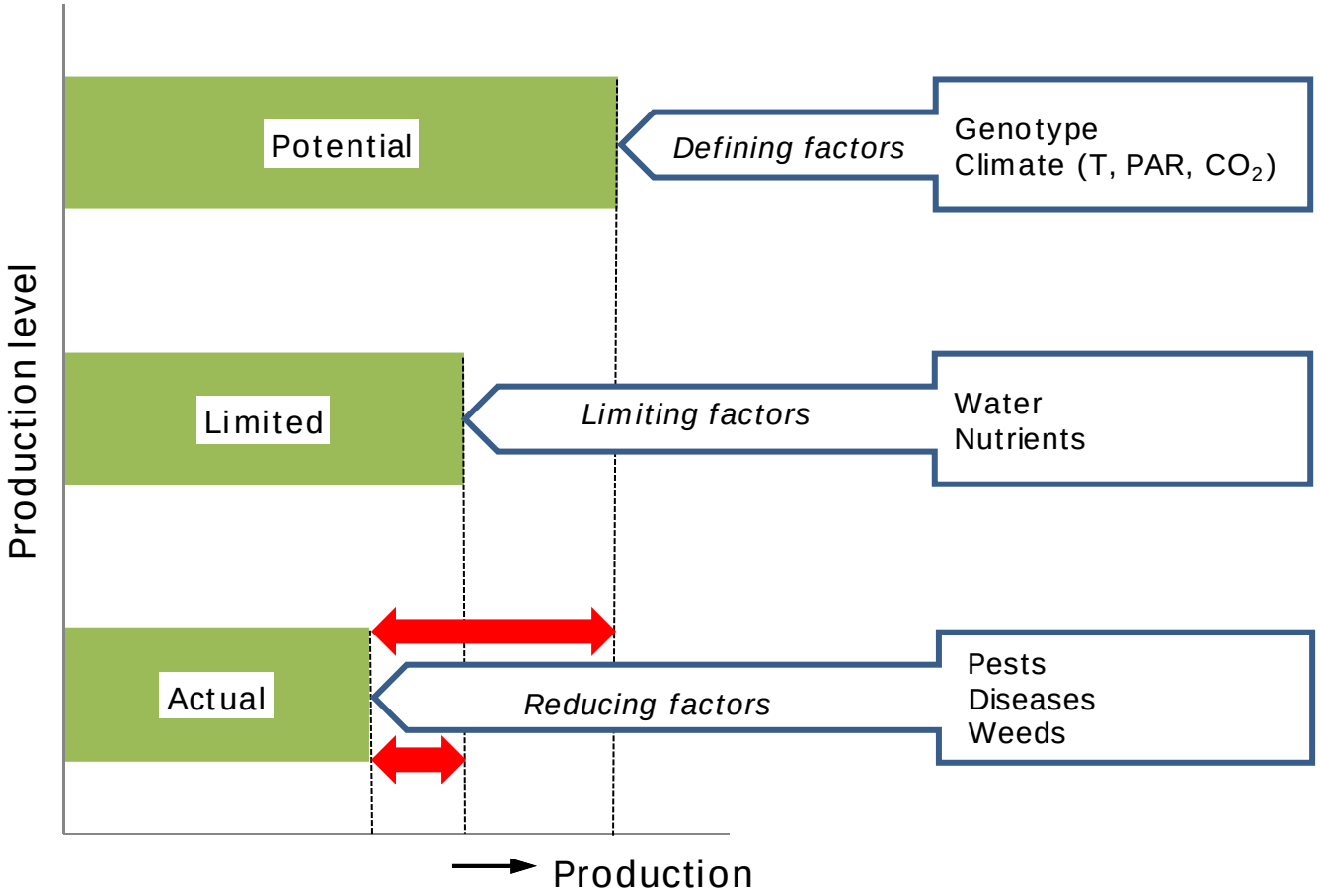
5th International Symposium for Farming Systems Design

Introduction

Concepts of (crop) production ecology



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Van Ittersum and Rabbinge, 1997

Aim

Apply concepts of production ecology to livestock to assess the scope for sustainable intensification of

- Livestock systems
- Crop – livestock systems

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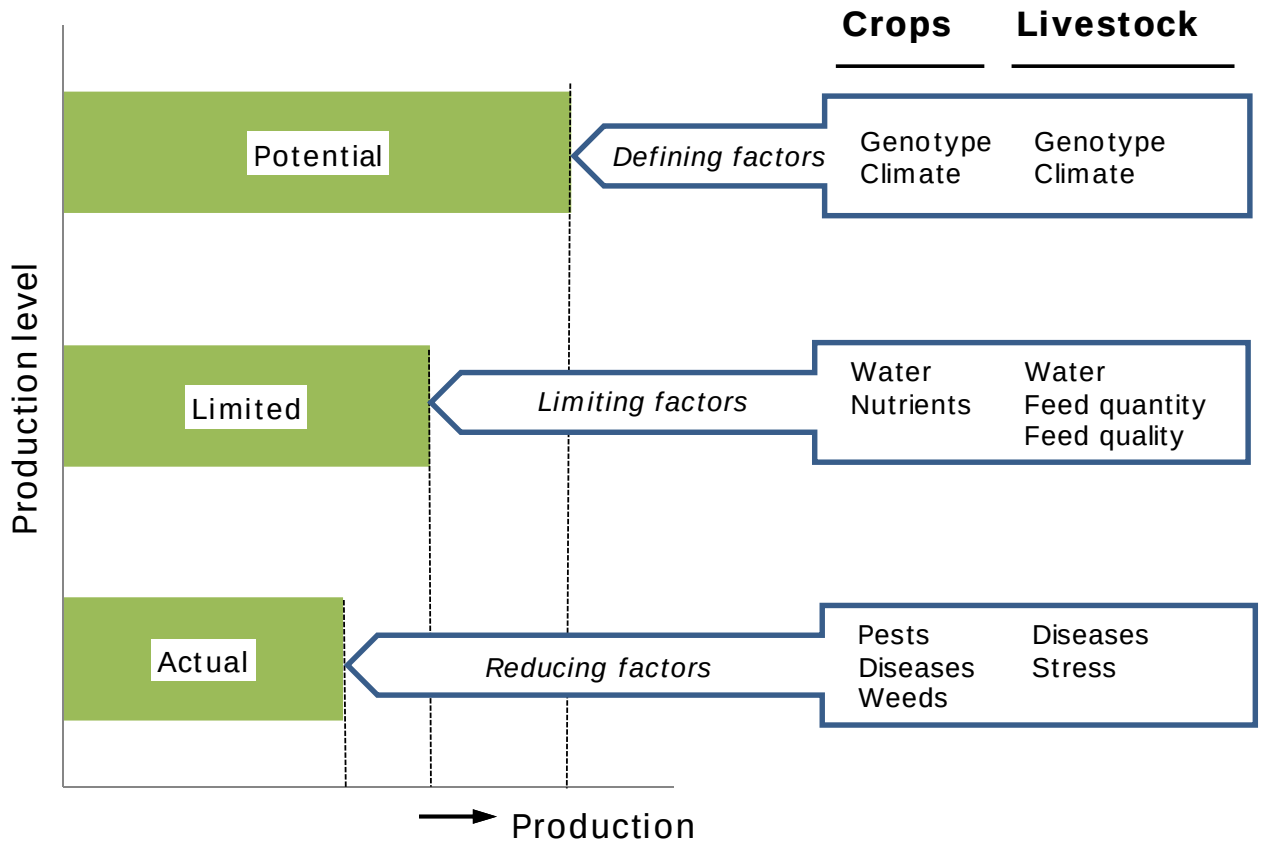
Methods

Extending concepts of production ecology to livestock



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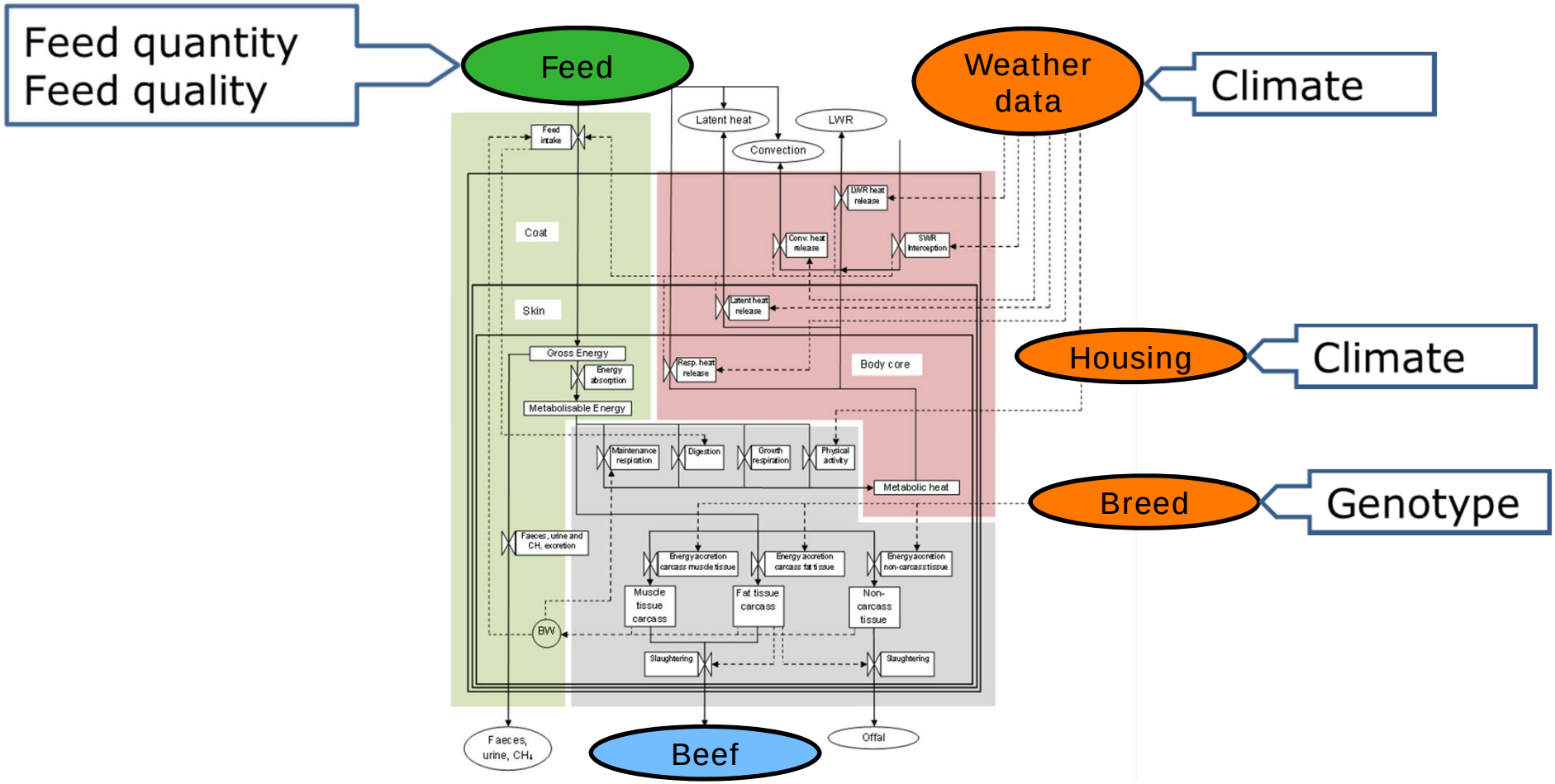
Van de Ven *et al.*, 2003; Agric. Syst. 76 : 507-525
Van der Linden *et al.*, 2015; Agric. Syst. 139 : 100-109

Methods

Modelling potential and limited livestock production

Methods

Modelling potential and limited beef production



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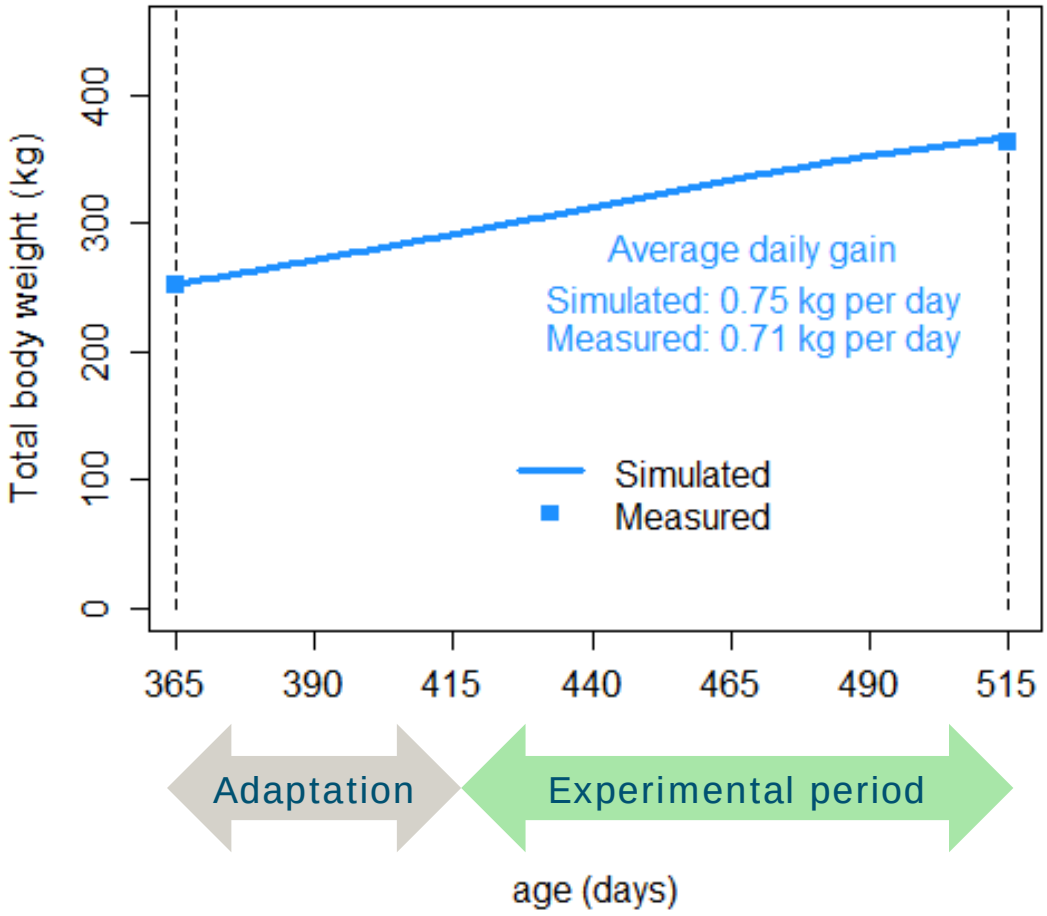
Results

- Western Australia
- ¾ Brahman × ¼ Shorthorn
- Pasture, *ad libitum*



Experimental data: Petty and Poppi, 2012

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Results

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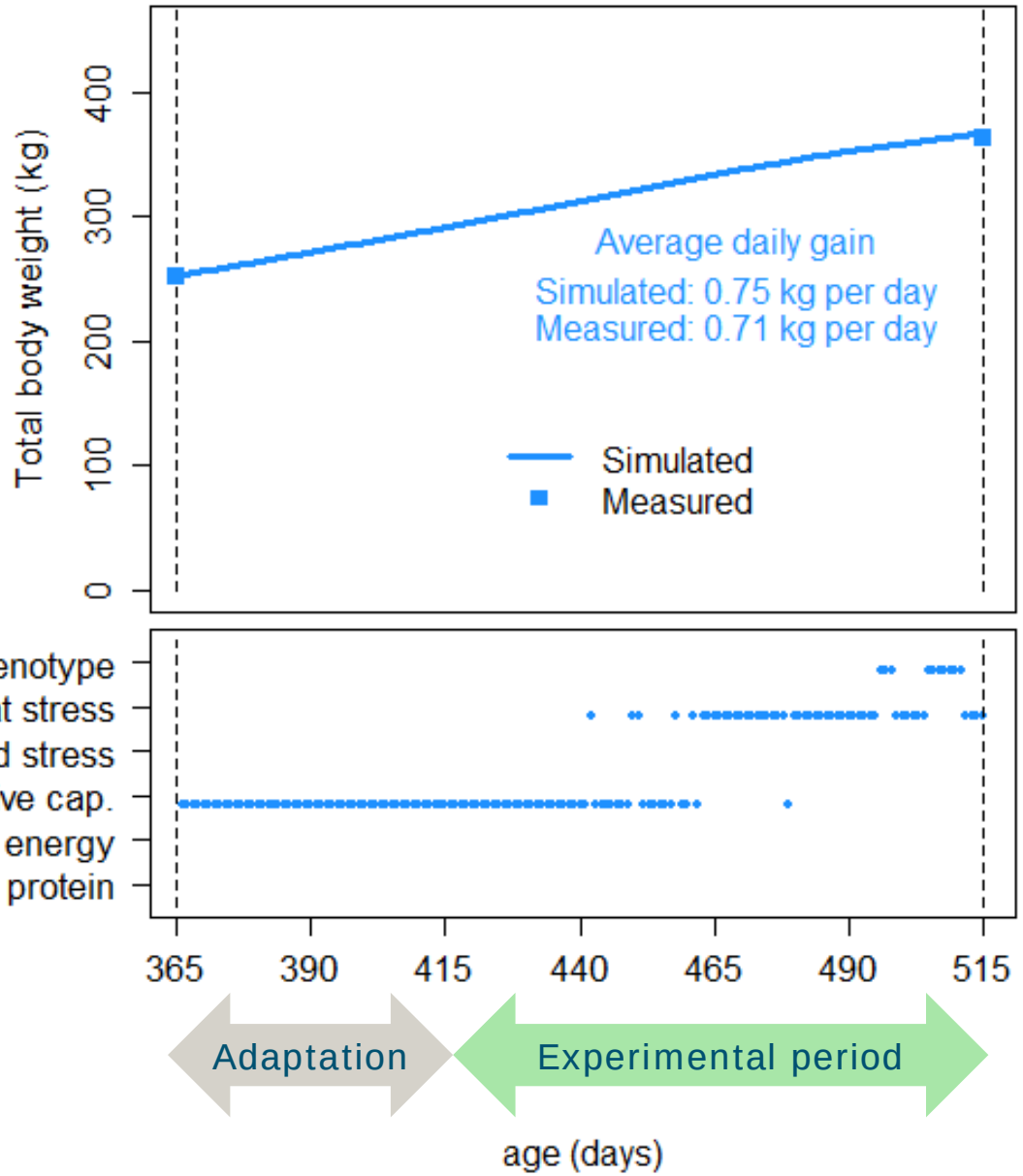

Genotype

Climate

Feed quality & quantity

Experimental data: Petty and Poppi, 2012

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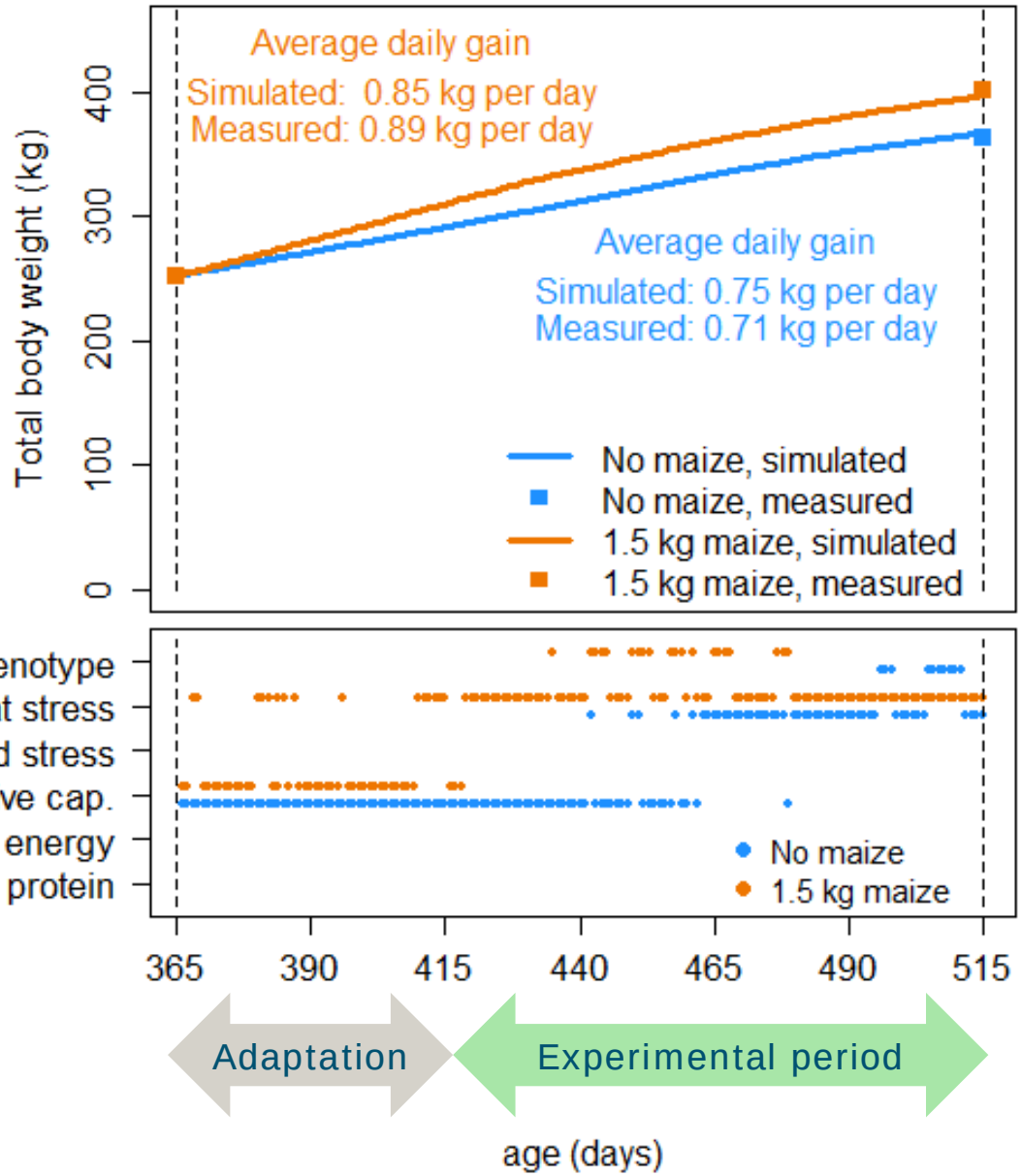
Results

- Western Australia
- ¾ Brahman × ¼ Shorthorn
- Pasture, *ad libitum* + 1.5 kg maize



Genotype

Climate

Feed quality & quantity

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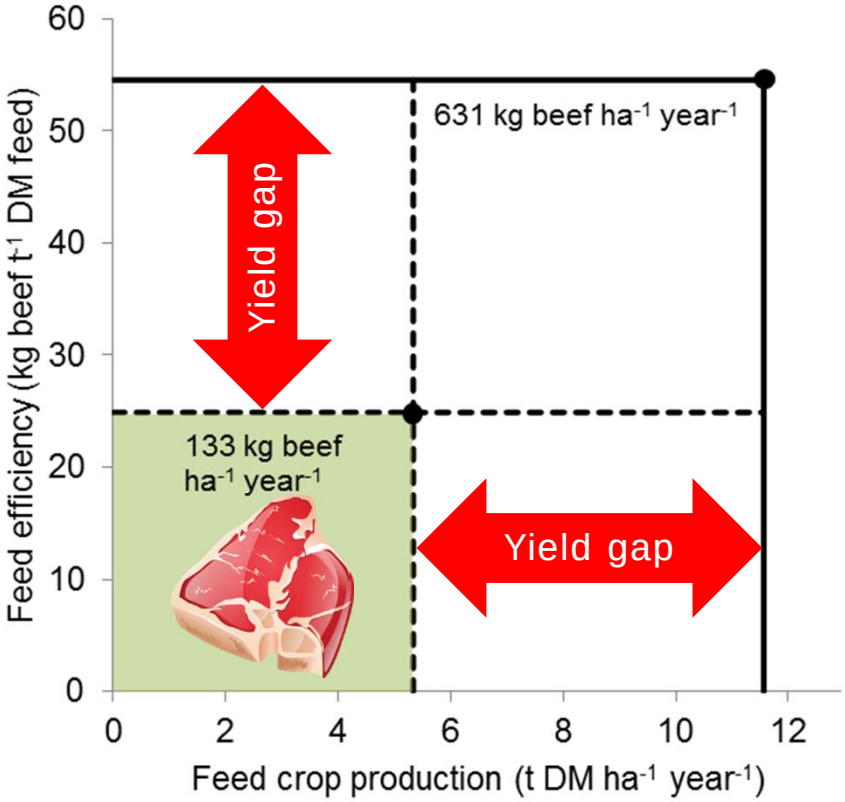
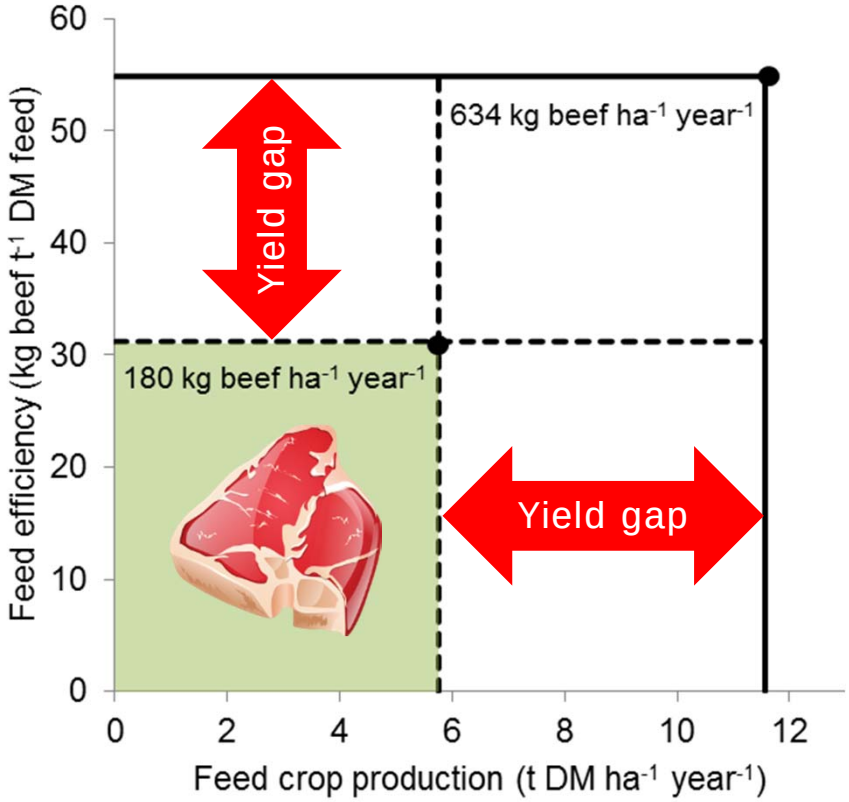
Results

Crop-livestock systems

5% concentrates, 95% grass-based



18% concentrates, 82% grass-based



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Van der Linden *et al.*, 2015
Data: Reseaux d'Elevage Charolais, 2012

Discussion

- Production ecology is based on bio-physical processes

  … but societal and economic factors also form constraints

- Application to other livestock species / types

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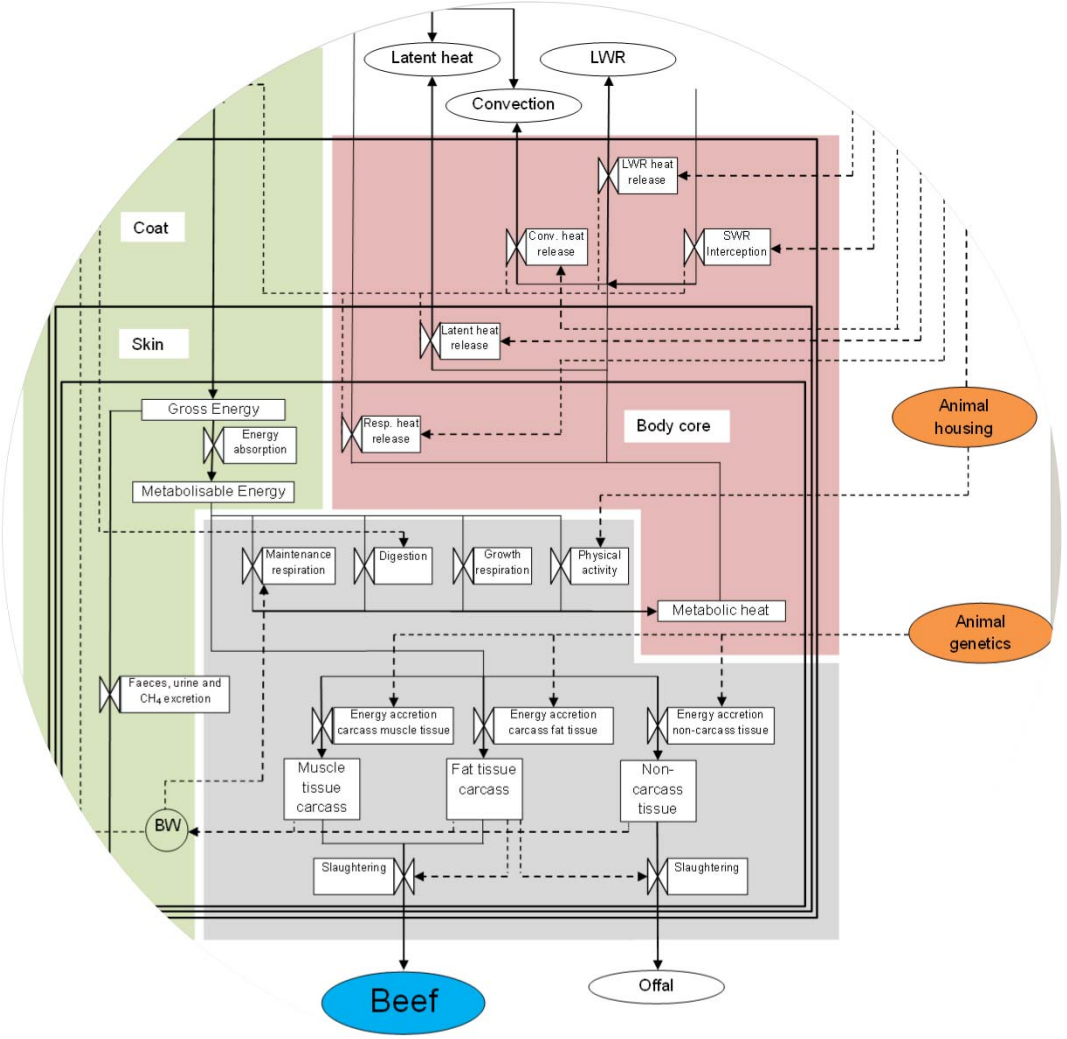
Conclusions

Application of PE to livestock systems allows to identify constraints for production and to quantify yield gaps

Yield gap analysis allows insight in how to increase livestock production

Thank you for your attention!



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www.yieldgap.org

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Van der Linden *et al.*, 2015, Agric. Syst. 139 : 100-109


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References (I)

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References (II)

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- Van der Linden, A., Oosting, S.J., van de Ven, G.W.J., de Boer, I.J.M., van Ittersum, M.K., 2015. A framework for quantitative analysis of livestock systems using theoretical concepts of production ecology, Agricultural Systems 139 : 100-109.
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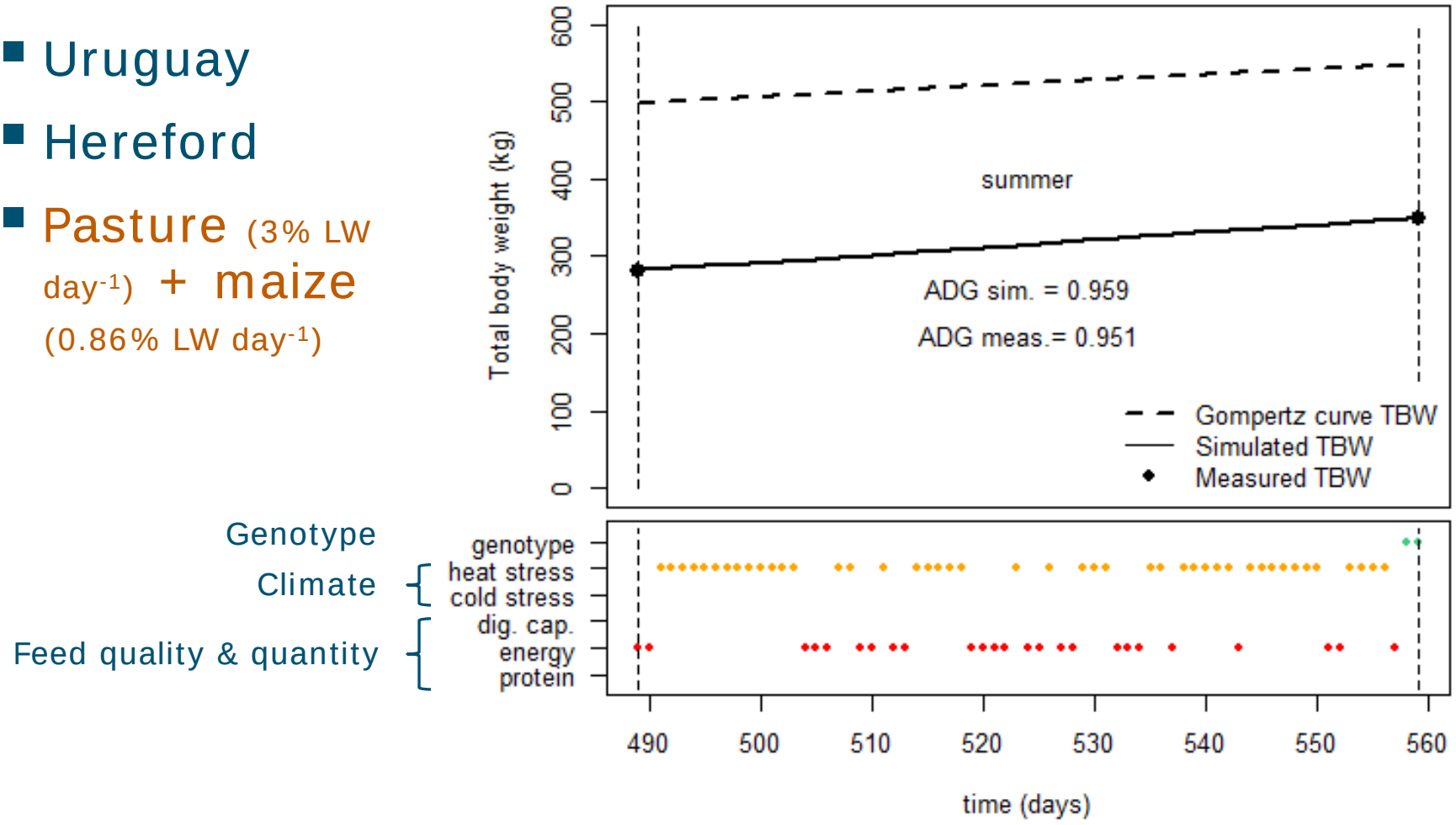
- Van Ittersum, M.K., Rabbinge, R., 1997. Concepts in production ecology for analysis and quantification of agricultural input-output combinations, Field Crop Research 52 : 197-208.

Results

Model illustration at animal level

- Uruguay
- Hereford
- Pasture (3% LW day^{-1}) + maize (0.86% LW day^{-1})



Experimental data: Beretta *et al.*, 2012

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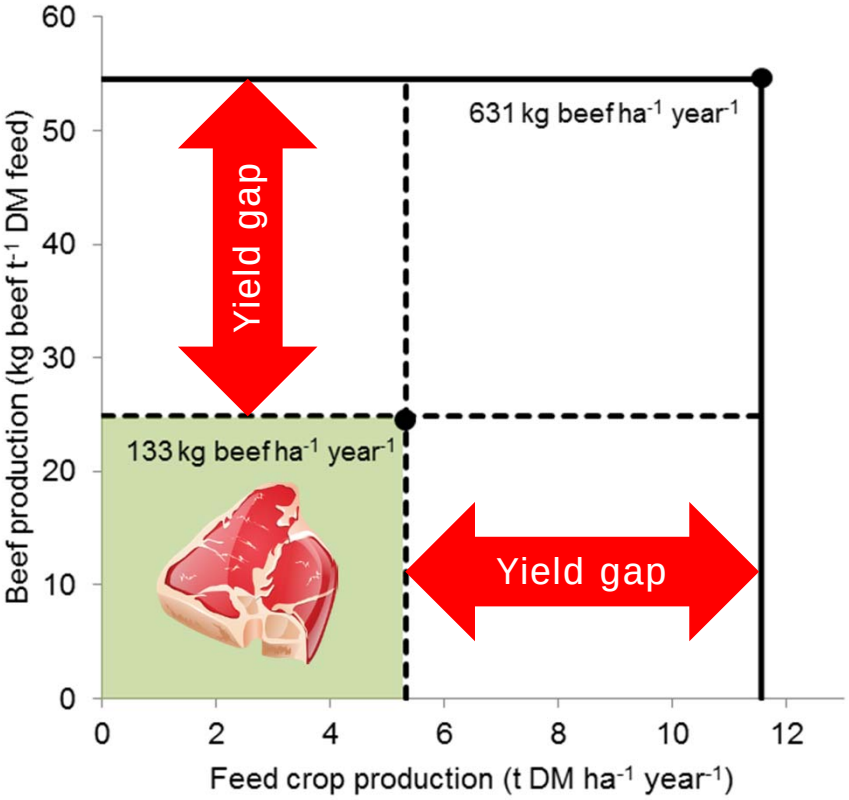

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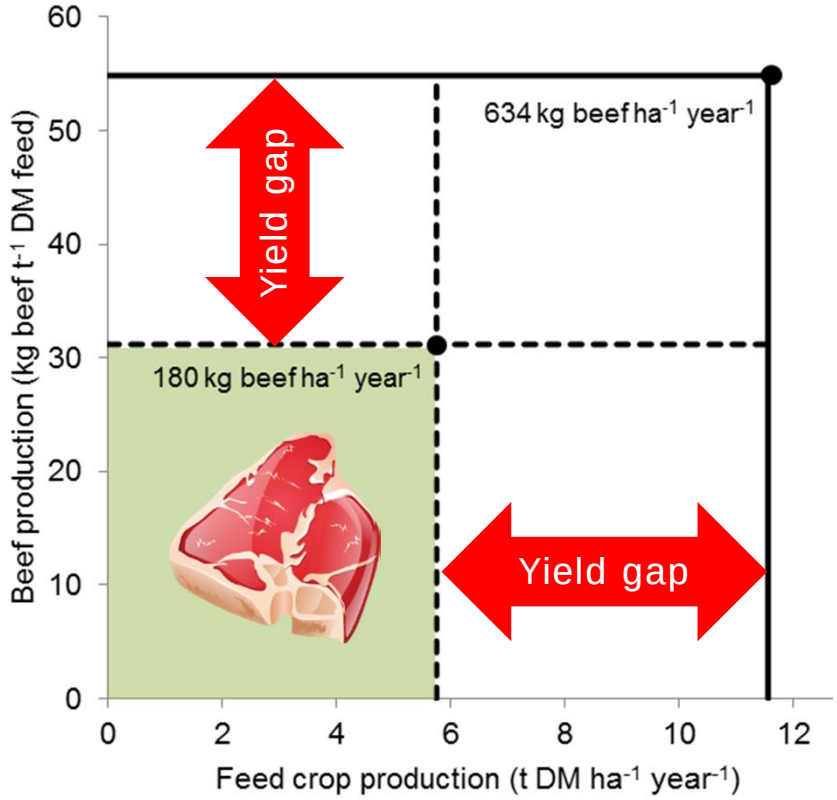

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Van der Linden *et al.*, 2015

age (days)