

Can we extend yield gap analysis to livestock production?



A. van der Linden^{1,2,*}, G.W.J. van de Ven², S.J. Oosting¹, M.K. van Ittersum², I.J.M. de Boer¹

Objectives

- Apply the 'production ecological concepts' to livestock production
- Quantify the potential beef production for Charolais (*Bos taurus*) and Boran (*Bos indicus*) beef cattle in France and Ethiopia
- Set benchmarks for livestock production

Conclusions

- This research is the first to apply the production ecological concepts to livestock production
- Model results indicate that potential beef production of Charolais cattle is greater in a climate to which the breed is adapted (France) than in a sub-optimal climate (Ethiopia)
- Results provide scope to benchmark livestock production systems relative to potential production

Concepts

Potential beef production for animals is defined as the beef produced per cow (including offspring) per year, while growth limitations by feed and diseases are absent during the whole productive life (Fig. 1).

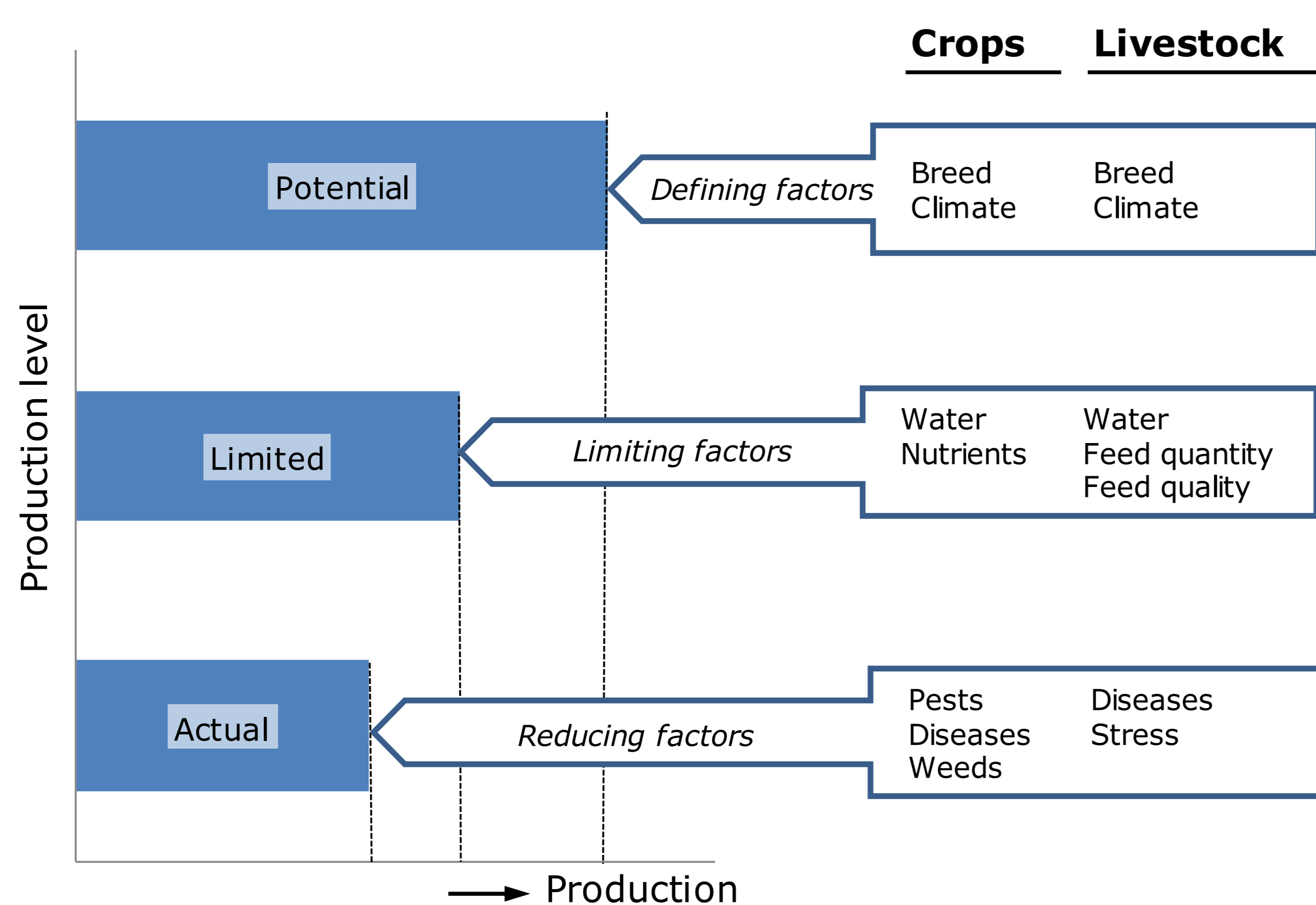


Figure 1. Potential, limited and actual production levels with their corresponding growth defining, limiting and reducing factors.

Methods

A model was developed for potential growth in beef cattle at herd level that simulates:

- Thermoregulation
- Feed digestion
- Energy requirements for
 - Fasting heat production
 - Feed digestion
 - Growth, pregnancy and milk production
 - Physical activity
- Energy partitioning between
 - carcass components
 - non-carcass



Charolais cattle



Boran cattle

Scenarios compared:

- Charolais cattle in France
- Boran cattle in Ethiopia
- Charolais cattle in Ethiopia

Results

The empty body weight of Charolais cattle in France is greater than in Ethiopia and more calves are produced (Fig. 2). Potential beef production of Charolais cattle is greater in France than in Ethiopia, and feed is used more efficiently for beef production (Table 1). Boran cattle have a greater potential beef production than Charolais cattle in Ethiopia.

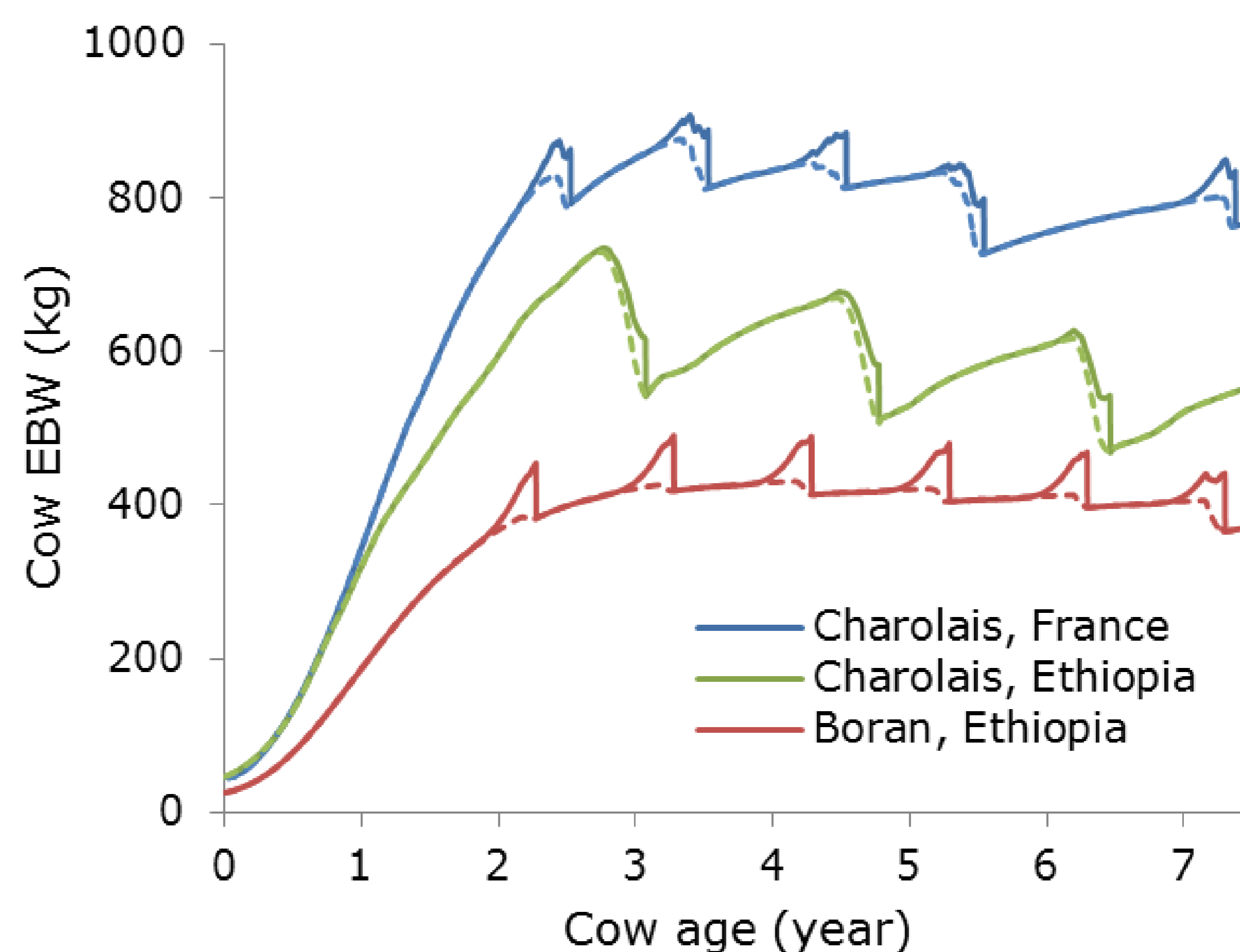


Figure 2. Empty body weights of Charolais cattle in France and Ethiopia, and Boran cattle in Ethiopia. Spikes represent calving events.

Table 1. Potential beef production, feed consumption and feed conversion ratio.

	Charolais France	Charolais Ethiopia	Boran Ethiopia
Potential beef production (kg meat per cow ¹ per year)	179.8	88.8	107.9
Feed consumption ² (kg feed per cow ¹ per year)	3480	2485	2287
Feed conversion ratio (kg feed per kg beef)	19.4	28.0	21.2

¹ Cow and offspring

² Feed quantity and quality is not limiting potential beef production

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