**Additions and adaptations for the webpage of the model LiGAPS-Beef**

Webpage: <http://models.pps.wur.nl/ligaps-beef>

***General***

Name: LiGAPS-Beef (Livestock simulator for Generic analysis of Animal Production Systems –Beef cattle)

***Specifications***

Key outputs: Feed intake, average daily gain, feed efficiency, weight of edible beef, carcass weight, and the factors constraining growth (genotype, heat stress, cold stress, digestion capacity, energy deficiency, protein deficiency)

Time horizon: Life cycle of an individual animal or all animals in a herd unit. The length of the life cycle can be up to 11-12 years for cows in a herd unit.

***Examples***

Methodological papers

* A brief description and illustration of LiGAPS-Beef can be found at <http://dx.doi.org/10.1017/S1751731118001726> (Van der Linden *et al.*, 2018, Animal [published online]). This paper concludes that LiGAPS-Beef has scope to be used for the assessment and analysis of yield gaps in different beef production systems across the globe. The version of the model used in this paper is freely accessible at the library of Wageningen University & Research (<https://doi.org/10.18174/442973>).
* The results of a sensitivity analyses of LiGAPS-Beef are available at <http://dx.doi.org/10.1017/S1751731118001738> (Van der Linden *et al.*, 2018, Animal [published online]). In addition, this paper evaluates the performance of the thermoregulation sub-model and the feed intake and digestion sub-model.
* The performance of LiGAPS-Beef at the animal level has been evaluated with data from experiments in Australia, Uruguay, and the Netherlands [publication under review]. The results of this evaluation indicate that the accuracy of LiGAPS-Beef is acceptable, and that the model provides a good basis for simulating potential and feed-limited beef production. The defining and limiting factors for growth and production of beef cattle were simulated adequately, which provides scope to use the model for yield gap analysis.

Applications of LiGAPS-Beef

* LiGAPS-Beef has been combined with the grass growth model LINGRA (Light INterception and utilization- GRAss, available on the PPS model portal also) to simulate beef production of Charolais cattle in the Charolais area of France under climate change. The combination of LiGAPS-Beef and LINGRA allows to determine optimum stocking densities under feed-limited cattle production and water-limited grass production. Beef production per hectare was investigated under the current climate conditions, and under climate change scenarios with projections for smallest and largest climate change in the year 2050. This paper is available at <https://doi.org/10.1017/S2040470016000200> (Van der Linden *et al.*, 2016, Advances in Animal Biosciences 7 : 224-226). This research was presented at the LiveM 2016 conference in Potsdam, Germany, on the 15th of June, 2016. The conference presentation can be found at <http://ojs.macsur.eu/index.php/Reports/article/view/SP8-18> or <http://edepot.wur.nl/393445>.
* The combination of LiGAPS-Beef and the grass growth model LINGRA was used to assess and analyse yield gaps in 12 farm types with Charolais cattle in the Charolais area of France. The yield gaps of the whole feed-crop livestock systems were on average 85% of the potential production, and 47% of the resource-limited production. The main factors explaining the yield gaps were the diets, water-limitation in feed crops, and cattle management. Mitigating the yield gaps, however, may not be profitable from an economic perspective. This study is available at <https://doi.org/10.1016/j.agsy.2017.09.006> (Van der Linden *et al.*, 2018 Agricultural Systems 159 : 21-31). A presentation about (a preliminary version of) this paper is available at the website of the Wageningen Centre for Agroecology and Systems Analysis (<http://www.wacasa.wur.nl/sites/default/files/WaCASA%2020161214_AvdL.pdf>).