Session 5 – Poster 20

Environmental impacts of introducing European grain legumes into broiler and laying hen feed in Brittany (France)

Daniel U. Baumgartner[1], **Laura de Baan**[1], **Thomas Nemecek**[1] and **Katell Crépon**[2]
[1]Agroscope Reckenholz-Tänikon Research Station ART, CH-8046 Zurich, Switzerland; www.art.admin.ch
[2]UNIP, F-75008 Paris, France
Contact: daniel.baumgartner@art.admin.ch

Aim: The goal of the study is to analyse the environmental impacts of producing chicken meat or eggs in Brittany (France) with European grain legumes as a replacement of soya bean meal using life cycle assessment (LCA) methodology.

Two main feed alternatives have been studied; they consist of:

SOY (standard feed formulas): **soy**a bean meal as main source of protein. Other feedstuffs are: Cereals, by-products and mineral feeds

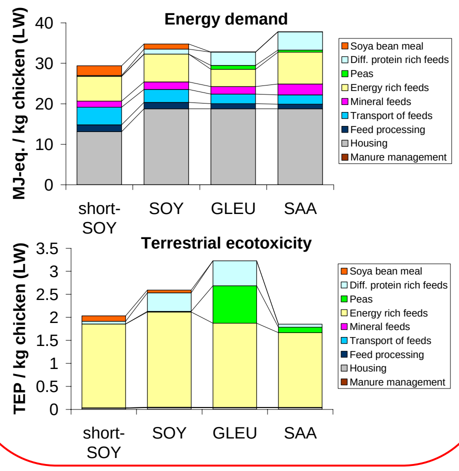
GLEU (**G**rain **L**egumes **EU**rope; alternative feed formulas): most of soya bean meal is replaced by European peas and faba beans

In addition two more feed alternatives were assessed for broiler chicken production only:

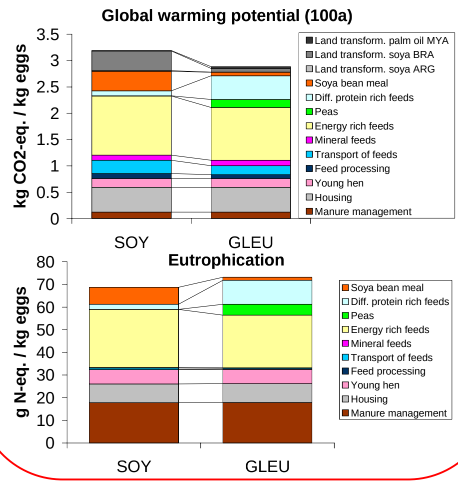
SAA: feed formulas on basis of GLEU, but with higher amounts of **s**ynthetic **a**mino **a**cids

short-SOY: standard feed based on **soy**a bean meal with a fattening length of 41 days (versus 60 days in the other alternatives)

Broiler chicken study



Laying hen study



Summary of environmental impacts:

Impact categories		Broiler chicken SOY	Broiler chicken short-SOY in % SOY	Broiler chicken GLEU in % SOY	Broiler chicken SAA in % SOY	Laying hen SOY	Laying hen GLEU in % SOY
Resource use-driven impacts	Energy demand [MJ-eq/ kg animal product]	3.48E+01	84%	94%	109%	3.11E+01	96%
	Global warming potential 100a [kg CO2-eq/ kg animal product]	3.12E+00	106%	90%	91%	3.19E+00	90%
	Ozone formation [g ethylene-eq/ kg animal product]	7.93E-01	97%	98%	97%	7.69E-01	95%
Nutrient-driven impacts	Eutrophication, combined potential N & P [g N-eq/ kg animal product]	5.38E+01	101%	105%	98%	6.87E+01	106%
	Acidifaction [g SO2-eq/ kg animal product]	5.60E+01	112%	98%	97%	7.92E+01	100%
Pollutant-driven impacts	Terrestrial ecotoxicity EDIP [points/ kg animal product]	2.59E+00	78%	125%	71%	2.38E+00	123%
	Aquatic ecotoxicity EDIP [points/ kg animal product]	2.03E+00	100%	89%	64%	4.64E+00	124%
	Human toxicity CML [points/ kg animal product]	1.04E+00	79%	100%	98%	8.49E-01	102%

Classification

very favourable	unfavourable
favourable	very unfavourable
similar	

Conclusions:

- There was **no overall advantage** in replacing soya bean meal with European grain legumes
- The **GLEU** alternative had a **smaller** environmental impact **than SOY** for the **resource use-driven impacts**. For the **nutrient-driven impacts** the results were **similar**, but the environmental impact of the **GLEU** alternative tended to be **higher** for the **pollutant-driven impact**
- The **short-SOY** production system for broiler chicken had the **least demand of** non-renewable **energy** per kg chicken (live weight) due to the higher output of the system. However, it was the system with the **highest impact on global warming** due to land transformation (cutting of rain forest) for cultivating soya beans in Brazil
- Using higher amounts of synthetic amino acids (**SAA**) resulted in a **higher energy demand** due to the use of feedstuffs with a more energy intensive production (i.e. synthetic amino acids, maize, gluten). For **terrestrial ecotoxicity** however, the environmental impact was **very favourable** compared with the standard SOY due to feedstuffs where pesticides had a lower impact
- The **environmental optimisation** of the studied systems **depends on different factors**: **choice** and **origin of feedstuffs**, and means of **transport**
- Further efforts have to be taken to **reduce** the **environmental impacts of** the **feedstuff production**

Acknowledgements:
This research was supported by the European Commission (grant no. FOOD-CT-2004-506223) and by the Swiss State Secretariat for Education and Research.

GLIP
Grain Legumes Integrated Project
FOOD - CT - 2004 - 506223

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra
Swiss Confederation

Federal Department of Economic Affairs DEA
Agroscope Reckenholz-Tänikon Research Station ART