



# Chicken: from soy and insects to eggs and meat

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# DIL OVERVIEW: FACTS AND FIGURES



- Founded 1983
- Employees 200
- Locations Quakenbrück (GER),  
Brussels (BEL),  
Karlsruhe (GER),  
Berlin (GER),
- Legal status registered association



# DIL MEMBERS: OUR GREATEST REFERENCE



Dusan Ristic - Food Data Group, DIL

# POULTRYNSECT – PROJECT OVERVIEW



Organic Food Side Streams



Live *Hermetia Illucens* larvae



Slow growing local chicken breeds



Organic, high quality chicken meat

# POULTRYNSECT – PROJECT OVERVIEW



## Project objectives:

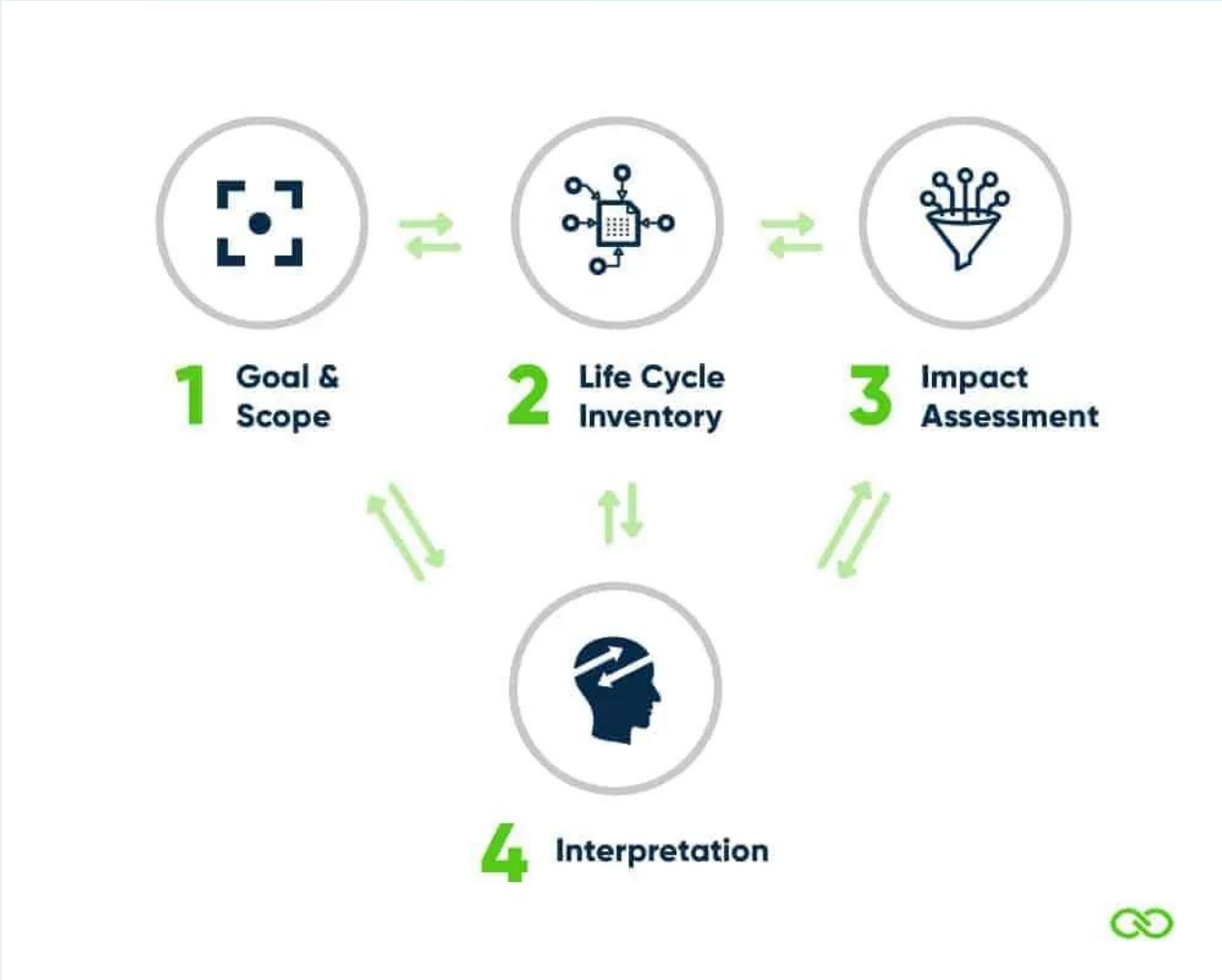
1. Optimization of *Hermetia Illucens* diet
2. Valorization of agronomic potential of the frass
3. Finding out the optimal level of *Hermetia Illucens* larvae in chicken diet
4. Larval influence on the bird welfare status
5. The impact of larvae bioactive compounds on chicken gut
6. Larval influence on poultry meat quality
7. The environmental impact of the chicken meat

# SOY OR INSECTS? CHICKEN OR EGGS?



- Protein of animal origin – high environmental costs
- Can we use insects to minimize the use of resources?
- How can we get the most protein from chicken production?

# LCA STAGES

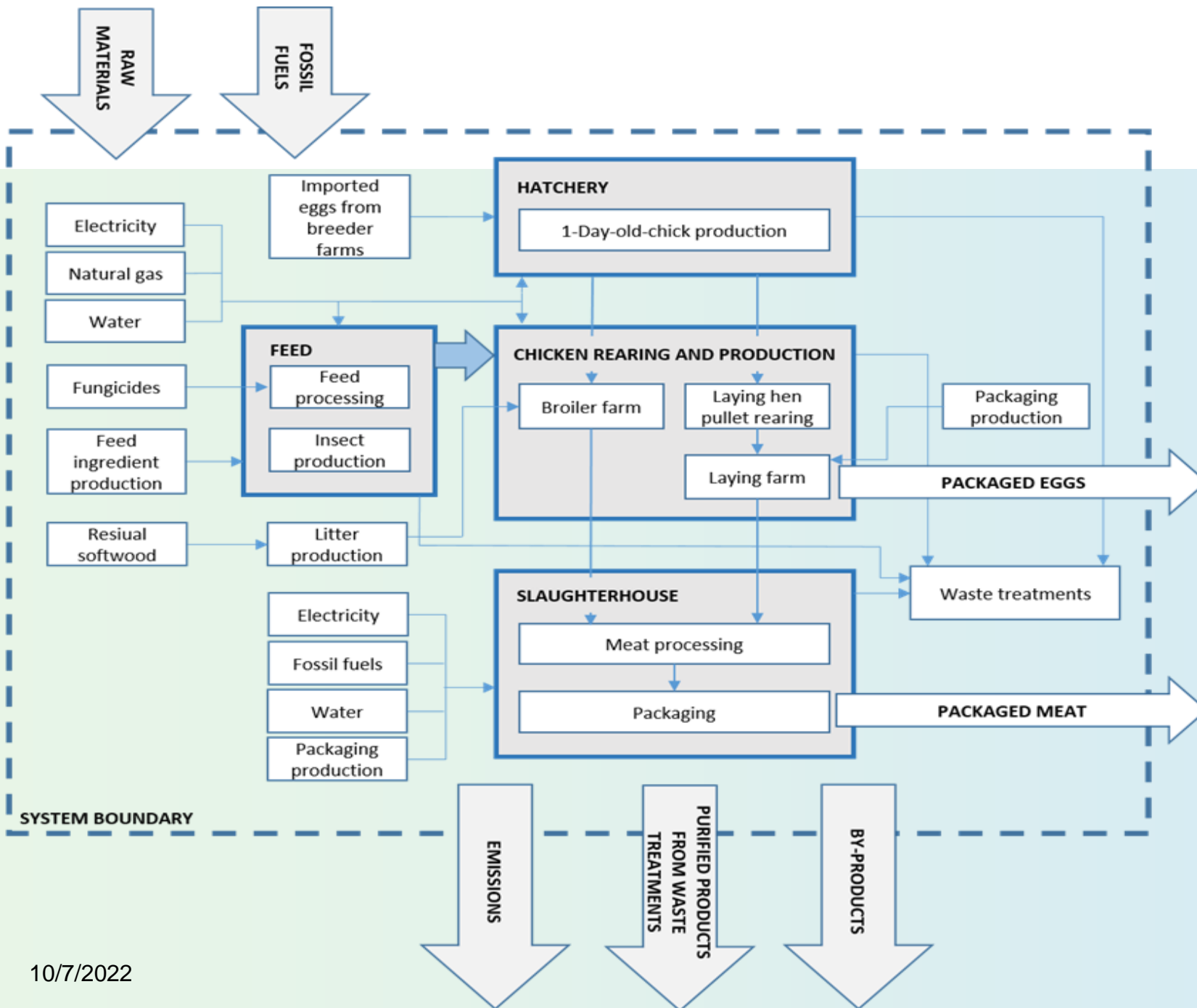


# GOAL AND SCOPE



- Environmental impact and efficiency of 2 types of chicken protein production
- Chicken were considered to be fed with and without 10% inclusion of insects into feed
- Insects were considered to be fed on 2 different diets
- 6 different scenarios were considered, 3 for each protein production system
- It was hypothesized that environmental footprint of protein production can be lowered by inclusion of insects into the commercial feed





- The data were collected from the literature, mostly:
  1. Dekker et al. (2011) (Netherlands) for laying hen production and
  2. González-García et al. (2014) (Portugal) for broiler production)
- Calculations were done in SimaPro 8.5.2.0 (PRé Consultants, Netherlands)
- Background data were taken from the ecoinvent 3 (ecoinvent, Switzerland) and Agri-footprint (Agri-footprint, Netherlands) database.
- The LCA was developed using a modular and attributional approach

# INVENTORY ANALYSIS



- Methodology - IMPACT 2002+
- Adapted to the DIN EN ISO 14044:2006
- Two functional units:
  1. Protein conversion ratio, FU1 – amount of chicken protein that can be produced with 20t of feed protein.
  2. Functional unit, FU2 – estimation of production of 1 kg of chicken protein.

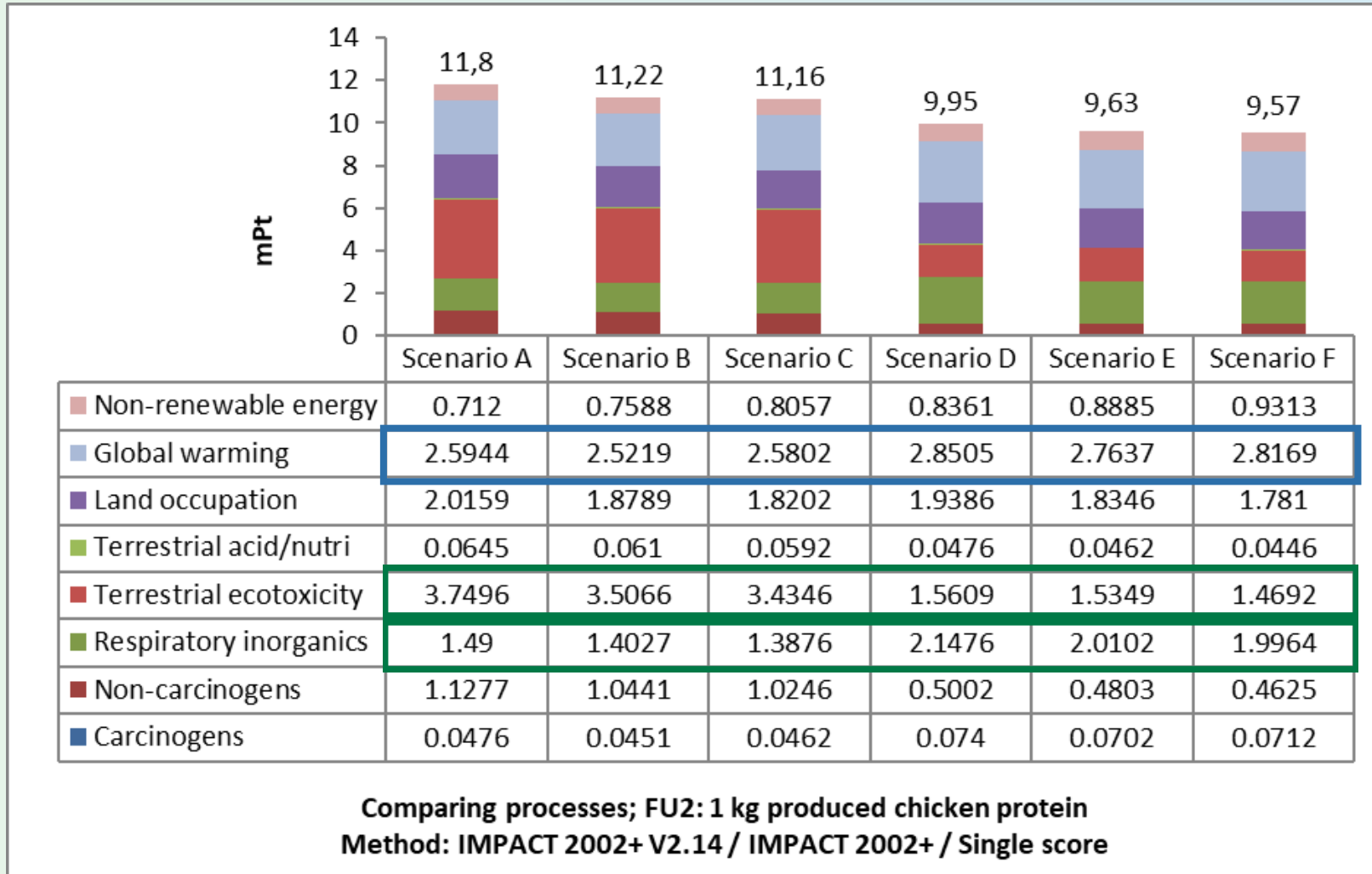
# PROTEIN PRODUCED



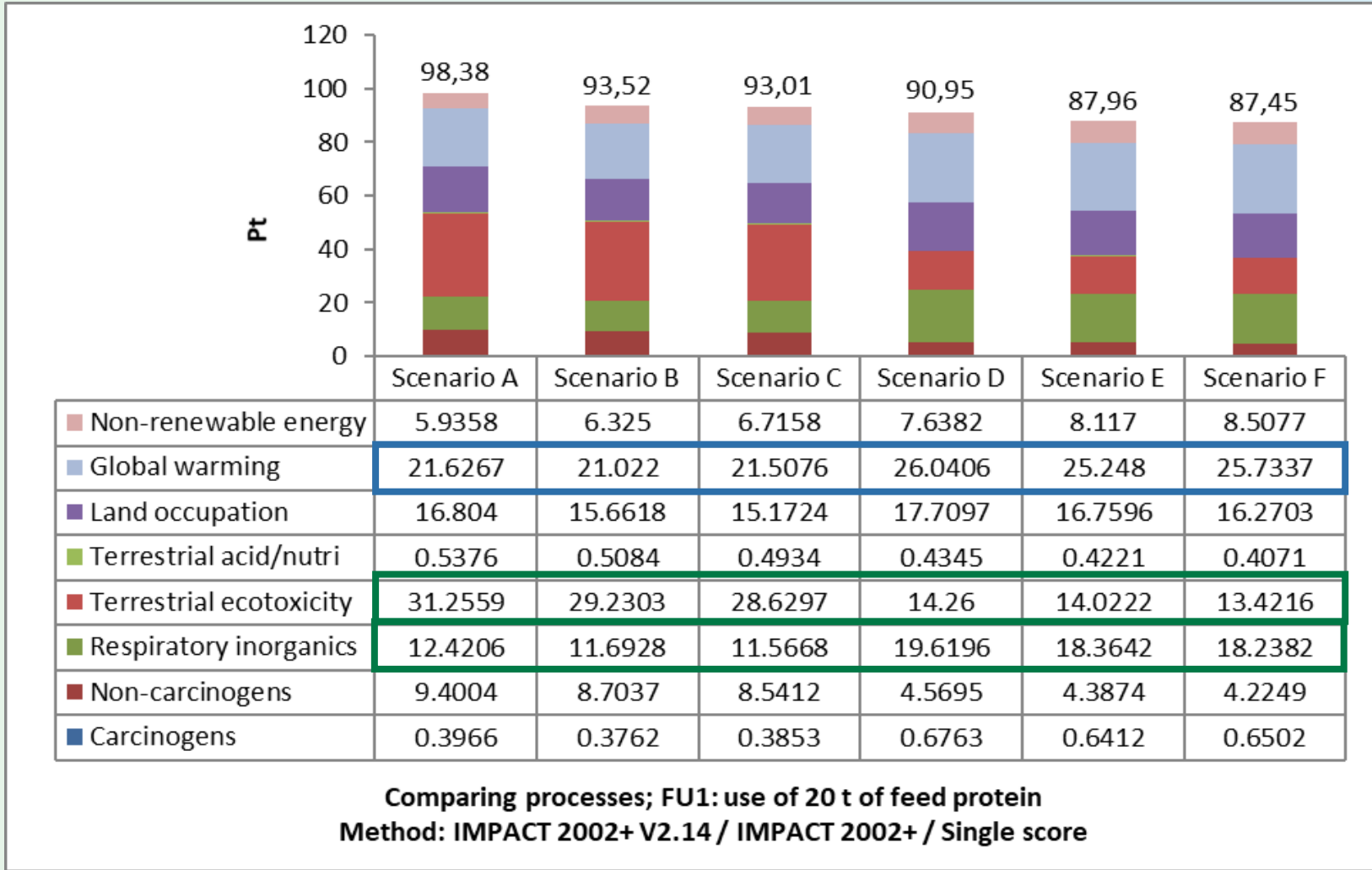
Scenarios		Commercial feed protein (t)	BSFL protein, fed with Gainesville diet (t)	BSFL protein, fed with fruit and vegetable waste (t)	Protein produced (kg)
A	Egg production	20			8,335.75
B	Egg production	18	2		
C	Egg production	18		2	
D	Broiler production	20			9,135.456
E	Broiler production	18	2		
F	Broiler production	18		2	

Protein conversion efficiency: 2.4 for laying hens and 2.24 for broilers.

# LCA RESULTS



# LCA RESULTS



# PROTEIN DIGESTIBILITY



- Egg and chicken meat protein are of different quality
- Digestible Indispensable Amino Acid Score (DIAAS), determined by amino acid sequence and digestibility, is recommended as a measure of protein quality
- DIAAS of egg protein is 116.4 and of chicken meat protein 108.2
- Protein conversion efficiency was corrected accordingly: to 2.06 in laying hen production and to 2.07 in broiler chicken production.

# CONCLUSIONS



- Broiler production has slightly higher protein efficiency than egg production
- Laying hen production achieved higher single score results than broiler production
- Higher quality of egg protein compensates for the difference in protein conversion efficiency
- The production of feed has by far the largest share of the environmental impact of the entire production
- Decrease of environmental impact due to introduction of larvae:

Decrease in environmental impact achieved by introduction of HI larvae into the diet of:	Larvae fed on Gainesville diet	Larvae fed on fruit and vegetable waste
Laying hens	5%	5.50%
Broilers	3.30%	3.80%



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**Thank you for your  
attention!**

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