



Critical review of allocation rules – the case of Finnish rainbow trout

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Background: Interest in assessing and communicating the environmental impacts of food products

- There is interest among Finnish consumers → up 80 % are willing to know more about the environmental impacts of food;
- Product packages are preferred over other information channels
- Some Finnish companies communicate climate impacts of their products



Raisio 2011a



Saarioinen 2011



Hunajayhtymä 2011

- Finnish food companies have been more and more interested in assessing and communicating their environmental impacts
- International guidelines, such as, ISO 14040/14044, GHG-Protocol, PAS 2050 → Good, but not enough especially if results are communicated!
 - Do not push actors to achieve adequate amount of primary data i.e. data specifically from one's own product chain
 - Not comparable results between different guidelines
 - Not specific enough → for instance: allocation rules

Allocation rules

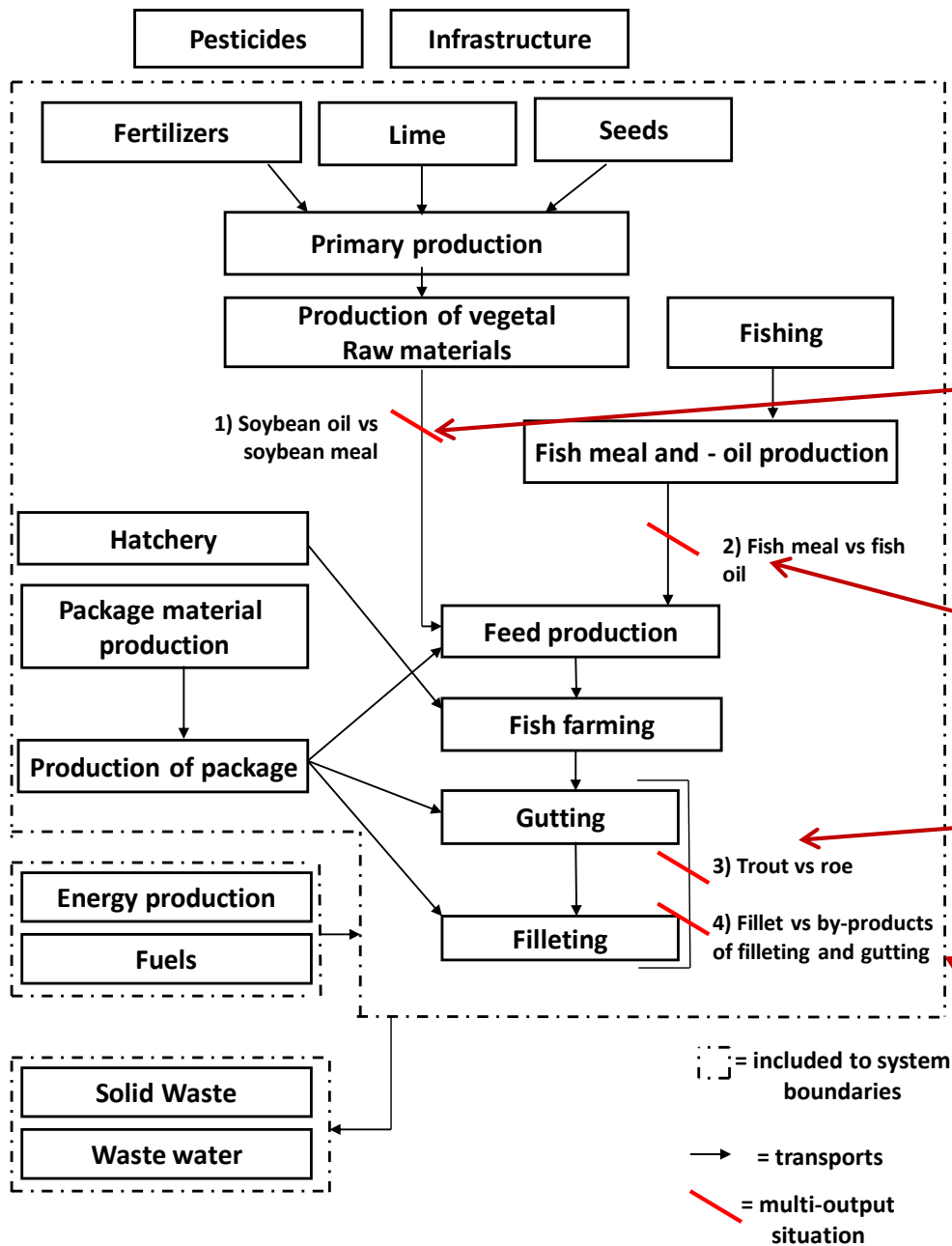
Background

- Allocation can substantially influence the results
- One of the most argued about methodological choices in LCA → raises continuous debate within the research community
- Allocation decisions are easily influenced by the perspectives and worldview of the analyst
- There are several ways to make allocations, and thus different practices exist among LCA studies
- Vague basis, and thus damages the credibility of LCA
- Guidelines, such as PAS2050 and the GHG-protocol, aim at providing a more explicit basis for LCA studies
 - While such guidelines have been available for a while, only a few critical reviews have been published that estimate the success rate of LCA guidelines

The case of Finnish rainbow trout

Methods

- Attributional
- FU: one tonne of skinless rainbow trout fillet (cultivated)
- Studied impact classes were GWP and EP (aquatic eutrophication)
- Fish fillet, besides roe, is the only component for human consumption and the mass of the fillet is 52 % of the initial weight of the fish
- By-products of the process come from roe and from gutting and filleting: sold to feed processing plants and used further as feed for fur-farming animals
- Rainbow trout feed is a mixture of fish meal and oil (mainly sprat, eel and sandeel) and vegetable raw material, mainly soybean meal



Focus on the four main multiple-output situations:

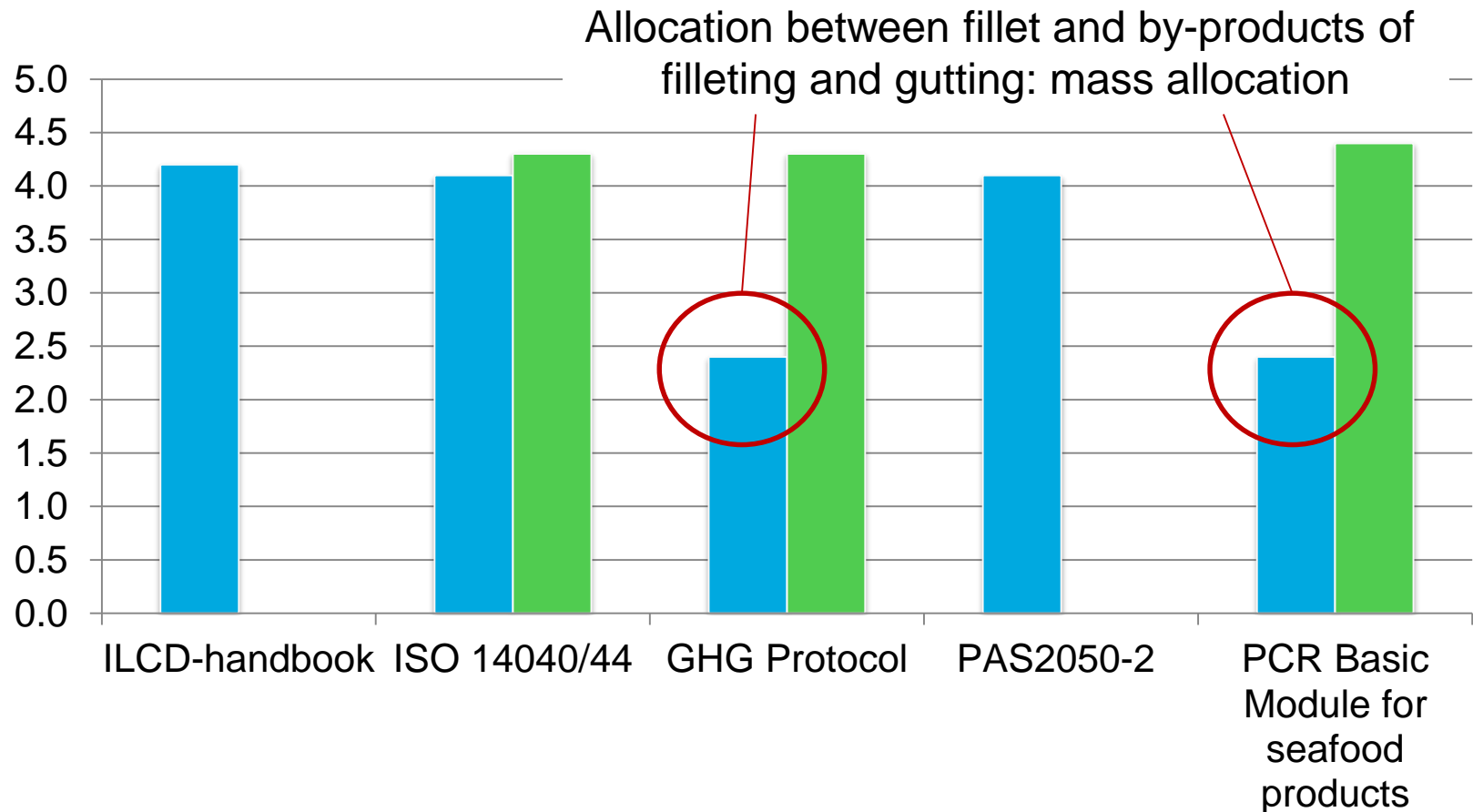
- 1) soybean meal and oil (soybean meal is a component of rainbow trout feed)
- 2) fish meal and oil (both components of rainbow trout feed; ratio is 1:3)
- 3) round fish (whole fish) and roe
- 4) fish fillet and by-products of gutting and filleting

Comparative study of LCA guidelines

- The chosen LCA guidelines for our comparative study were:
 - ISO 14040/44 (ISO 14040, 2006; ISO 14044, 2006)
 - ILCD-handbook (ILCD, 2010)
 - GHG-protocol (WRI/WBCSD, 2011)
 - PAS standard for seafood products (PAS 2050-2, 2012)
 - PCR Basic Module for seafood products (PCR, 2010)
- Only the given allocation rules of each guideline were applied
- Substitution was possible only between fillet and by-products of gutting and filleting where we assumed that the fillet replaces captured Baltic herring from the Baltic Sea which is also used for fur-farming animal feed
→ Fishing of Baltic herring has a “negative” eutrophication impact because fishing removes nutrients from the Baltic Sea
- Not possible to avoid allocation or do physical-causal allocation

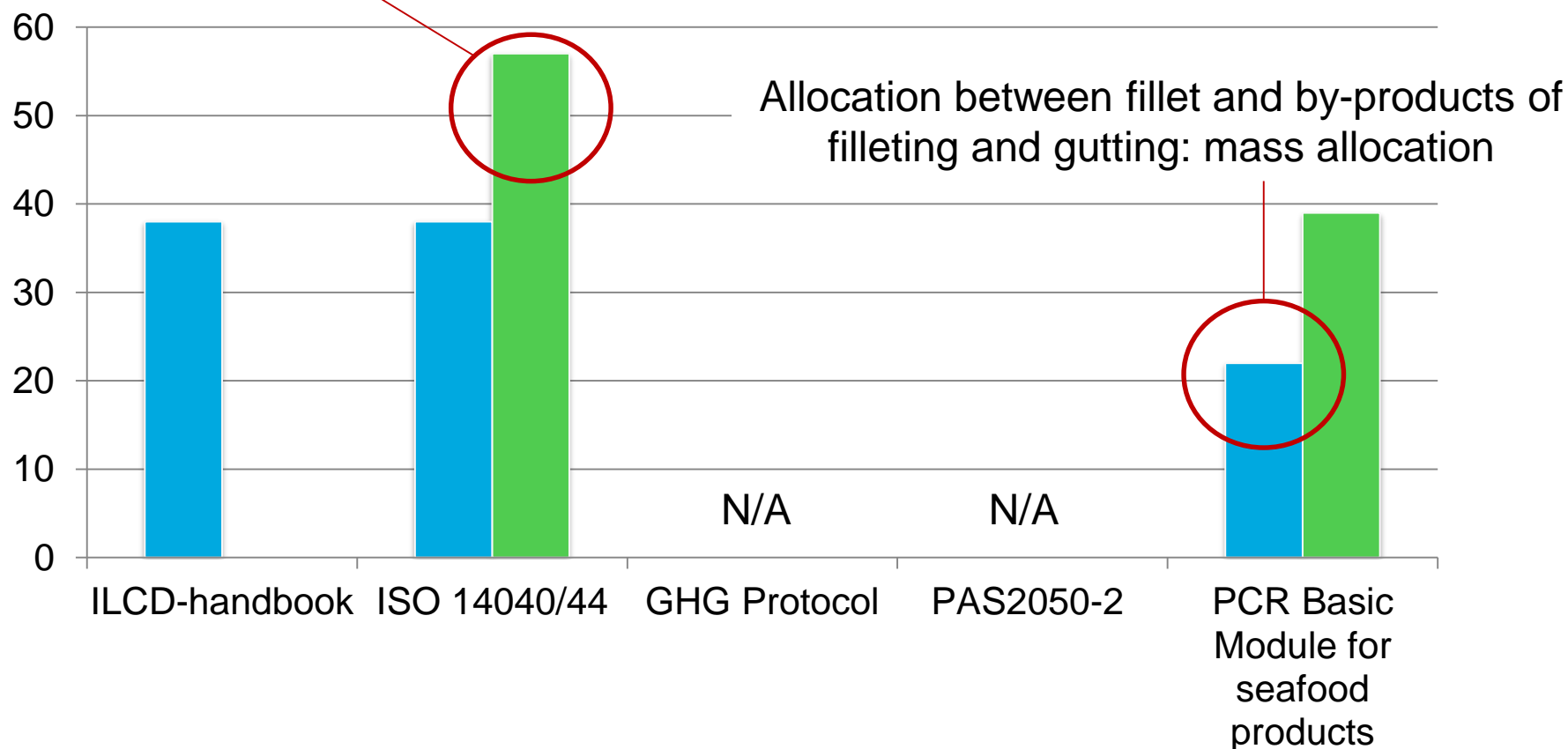
- ISO-standard:
 - 1) Substitution
 - 2) Both mass and economic allocation because the standard does not recommend one over the other
- ILCD-handbook:
 - 1) Substitution is not allowed in attributional LCA's
 - 2) Economic allocation
- GHG Protocol:
 - 1) When using substitution one has to know exactly what product is replaced and in our study it was not evident that Baltic herring was the appropriate substitute → we did not use substitution method
 - 2) Both mass and economic allocation were used because the Protocol does not clearly recommend one over the other
- PAS standard for seafood products:
 - 1) Substitution
 - 2) Mass allocation
- The PCR Basic Module for seafood products:
 - 1) Mass allocation
 - 2) Although, Supporting Annexes of PCRs state that low-value by-products should be regarded as waste and nothing should be allocated to the low-value product → we decided to present both results

GWP (kg CO₂-eq/kg fillet)



EP (kg PO₄³-eq/ t fillet)

Allocation between fillet and by-products of filleting and gutting: substitution



Main findings and conclusion

Main findings

- Quite difficult to interpret allocation rules even with substantial expertise
- The LCA guidelines aim at providing more explicit rules for different multiple-output situations, but according to our study the guidelines don't totally succeed in this task → can also be interpreted differently
 - Just one of the methodological choices!
- Application of the substitution method was challenging. The right replacement product was not self-evident
 - One has to be careful when using the substitution method
- The standard comparisons show that allocation has a marked effect on the final results of the LCA for rainbow trout fillet
 - When using only economic allocation, the environmental impact of a trout fillet can almost double compared with the situation where only mass allocation is used

Conclusion, suggestions

- To reduce the uncertainty of LCA studies we suggest that more work needs to be done to improve recommendations for multiple-output situations to harmonize the current LCA guidelines
 - Especially important when communicating the results
- One good partial solution, for now at least, is to:
 - 1) Provide arguments for the chosen allocation methods and
 - 2) To conduct a sensitivity analysis – always presenting the results of the sensitivity analysis when communicating the final results of the LCA studies

Questions?

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