

ENVIRONMENTAL IMPROVEMENT ACTIONS BY RETAILERS

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ABSTRACT

As retailers' decisions give environmental consequences both upstream and downstream the value chain, there is need of a tool for valuation of decisions and actions. This project has further developed and tested an actor based LCA methodology for retailers in case studies of egg and pork. Retailers improvement actions has been change in storage practice as well as transport practise e.g. home delivery. The result showed no environmental difference in longer storage, while there is a high environmental potential in offering home delivery. The actor based LCA methodology gives retailers better knowledge of their own environmental actions in the life cycle, as well as gives ideas for collaboration along the chain.

INTRODUCTION

Retailers have an important role in the life cycle of products. They are able to make decisions that influence the environmental impact throughout the life cycle. However, retailers come out as low in LCA studies. Conventional LCAs only account only for their contributions to environmental impacts, and not their role of improving the life cycle, which we study here.

METHOD

The study was based on the combination of the methodology life cycle assessment with an actor perspective. This combination was introduced by Berlin et al. (2008), Brunklaus et al (2010) and Baumann et al. (2011) In this study the concept is further developed and the approach is tested in case studies of egg and pork. These were selected to test food products with difference in shelf life as well as storage temperature. Dairy products have already been appointed for in case studies by Berlin et al. (2008).

For each case study several steps were taken; a) an LCA was performed and results presented for each actor b) identification of improvement decisions and actions for the retailer, c) calculation of the environmental consequences of selected actions in a lifecycle perspective was performed and d) a comparison of the result from the actions.

We now describe how step a) and b) were applied, for each of the two case studies.

Case study Egg

The LCA of egg included the whole lifecycle; agriculture, industry, wholesale, retailer, household, waste management, packaging and all transports along the chain. The functional unit was 1 kg of egg in the household. Data from the LCA of Swedish ecological egg by Carlsson et al (2009a) was used for agriculture, industry and packaging with some changes. We used Swedish electricity mix for fodder production. At the retailer the data source of Nilsson and Lindberg (2010) was used for study of the energy consumption and Eriksson and Strid (2011) for the waste figures (0,4%). The storage time at the wholesaler and retailer together was assumed to be 14 days. The energy usage at the household was found in Nilsson and Lindberg (2010) and the waste figure in WRAP (2008). For the transport data the Ecoinvent database together with NTM (2008) were used. The distance between the retailer and the household was assumed to 7.81 km (Orremo et al. 1999) and 59% of the consumers use the car. The shopping bag was assumed to have a weight of 4.2 kg.

The potential improvement actions of the retailers were identified in a brainstorming session with the researchers involved in this project together with Britta Florén and Magdalena Wallman at SIK (Swedish Institute for Food and Biotechnology) which utilized their understanding of life cycle thinking and LCA methodology, combined with their experience of the food chain. The actions identified were; 1. prolong the storage time at the retailer with 50% as the shelf life is assumed for eggs kept in room temperature and most often is the case in Sweden that eggs is kept in fridge temperature which prolongs the shelf life. 2. the retailer offer a home delivery service. The individual car transport was replaced by a small truck delivering food to several households, which we assume reduces the distance with 25%.

Case study Pork

The LCA of pork included the whole lifecycle from agriculture to waste management after the household. The functional unit was 1 kg of pork in the household. Literature and the Ecoinvent database were used as data sources. Data from the LCA of Swedish ecological pork meat by Carlsson et al. (2009b) was used for agriculture with exception of Swedish electricity mix for fodder production. Slaughterhouse data was found in LRF (2002). At the retailer the data source of Nilsson and Lindberg (2010) was used for study of the energy consumption and 1,3% of waste (Eriksson and Strid, 2011). The storage time was assumed to be 14 days. Data sources of transports and household was the same as the egg.

The potential improvement actions of the retailers were identified the same way as the egg study. The action identified was; decrease the waste of product at the retailer with 70% when the assumption of freezing of the meat for one month. Not sold fresh products which will be sold as frozen require a new package as well, which is made for freezing according to the regulatory.

RESULTS

The climate change depending of the lifecycle of today of egg and pork as well as the result of the suggested actions are presented in Figure 1 and 2. It is the action of a changed home delivery routine; the individual car transport was replaced by a small truck delivering food to several households, which gave the best result. A 12 % reduction of the climate change was achieved. By changing storage climate to chilling temperature including a reduction of wastage by 50% for the eggs gave a small improvement. The same came out for the pork with reduction of product waste including freezing and new packaging.

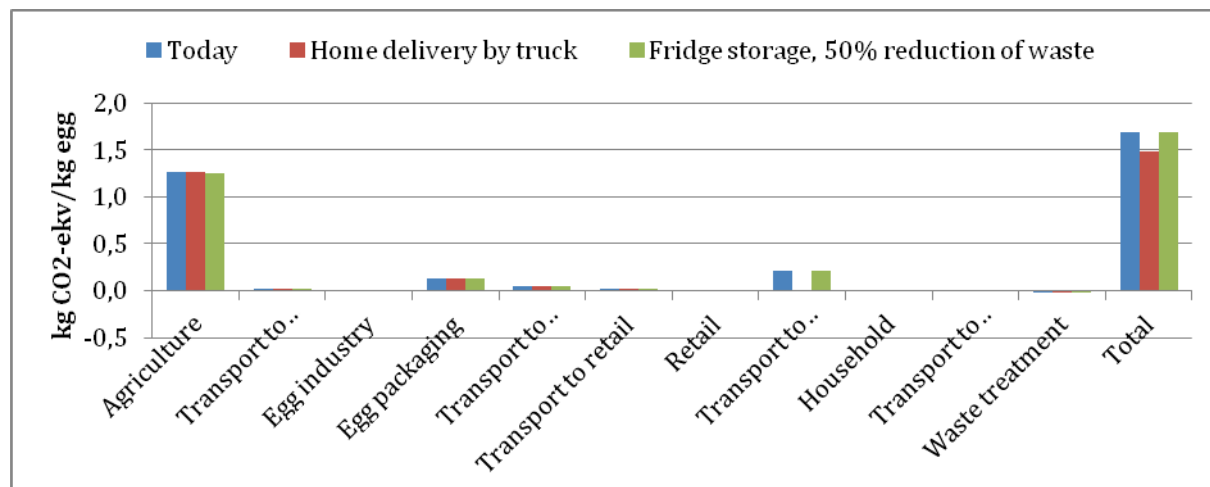


Figure 1. The climate change depending on today's lifecycle of egg and the improvement actions at the retailer.

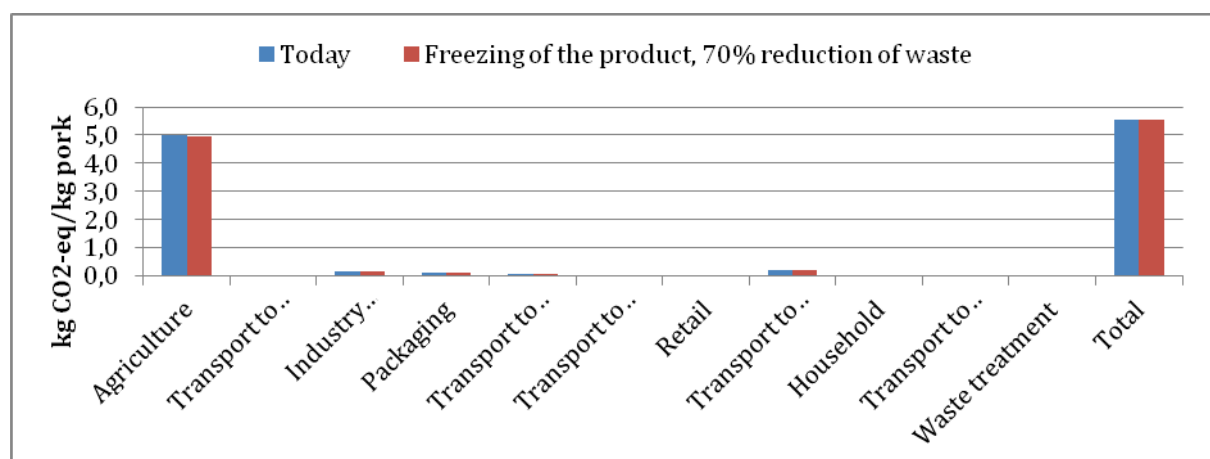


Figure 2. The climate change depending on today's lifecycle of pork and the improvement actions at the retailer.

DISCUSSION

In an ordinary LCA, retailer often came out as an actor with low contributor to the environmental impact. As can be seen in Figure 1 and 2 this is also the case of this study. But this low contribution is not in correlation with the power of the actions the retailer is able to make decisions on. We found that if the retailer offers a home delivery system with a small truck the impact of this action is in fact higher than the environmental impact of the retailer itself.

To reduce food waste is very important from an environmental aspect as well as others. Nevertheless in this study it did not come out as an improvement of the climate effect. The energy required to change to chilling temperature and freezing respectively as well as the extra package, consumed the same amount of environmental impact which was gained of the reduced food waste. These two examples also shows that it is not easy for an actor to know in



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advance which actions gives the best result and also shows the importance to have a life cycle perspective of the actions when making decisions.

So far these studies include two of three levels of the actor analysis: LCA level, actor's possibility and influence level (Brunklauß 2011, Raab and Brunklauß 2012). Further studies will be made on others actors possibilities and influence, e.g. farmers and consumers. Based on the actor analysis tool, retailers will be able to derive green strategies for own activities and collaboration activities regarding storing, transport, and purchasing.

CONCLUSIONS

To conclude by combining LCA with an actor perspective the focus shifts from the analysis of technical devices to the analysis of actions and actors in the whole life cycle. More specific, the retailers will be able to get knowledge of which decisions and actions gives best environmental impact in a life cycle perspective, as well as ideas for collaboration along the chain.

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