



# Public summary Wrap or Waste

Case 'Cheese packaging'



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Many food companies face dilemmas in their search for more sustainable packaging. Which packaging is more sustainable under which conditions? How to compare various types of packaging regarding sustainability? And how to include effects of packaging on shelf life and food loss risks?

Vergeer Holland (Vergeer) slices and packs cheese. The company is looking for a more sustainable alternative to their current “Klappack” packaging and is looking for opportunities to reduce the environmental impact of current and future packaging. This case was tackled within the Wrap or Waste PPP project by researchers from Wageningen University & Research (WUR), with funding from TKI Agri Food and Vergeer.

### Packaging dilemma: Cheese slices

The current packaging for cheese slices, “Klappack”, is composed of a multi-layer flexible packaging film that is sealed at both ends. It also has a length seal, that can be reclosed with a label. The film has an easy-peel layer, helping the consumer to open the packaging. The packaging combines a low packaging weight with a long shelf life of the cheese products (3-4 months), which translates into a relatively small CO<sub>2</sub> footprint. However, the film is not recyclable. In the short/medium term, Vergeer wants to find a suitable recyclable alternative, which offers an acceptable shelf life of the cheese and a reliable machinability.

## Approach and assumptions

### Selection of alternative packaging

After an extensive brainstorm and study of available literature and knowledge, a market scan was carried out for possible suitable materials. These films have been tested on lab scale to determine their material properties: such as oxygen permeability, sealability, processability on the packaging machines. From this scan, two promising alternative films were selected, both based on PE-EVOH-PE.

### Recyclability

The definition of recyclability of packaging is strongly related to the context in which the packaging is disposed of. According to the Netherlands Institute for Sustainable Packaging (KIDV), PE-EVOH-PE packaging is currently (2022) recyclable in the Dutch system, provided it can be confirmed that the EVOH layer does not impair the recycling of the PE film. According to the European association CEFLEX, PE/EVOH/PE films (and also PP/EVOH/PP, PE/EVOH/PP) are recyclable provided the EVOH weight does not exceed 5% of total weight.

### Production test + shelf life test

The two selected alternative packaging films have been used to produce Klappack packaging with cheese slices at Vergeer. After this production test, the shelf life of the cheese slices in the packaging with the various packaging films was determined and compared to the current film.

### Sustainability analysis – calculation tool

Sustainability of the packages of different films have been assessed with a calculation tool. The tool has calculated the greenhouse gas emissions related to the packaged products, including the effects of shelf life, food losses and waste. Besides, aspects such as the recyclability and circularity of the different packages are quantified.



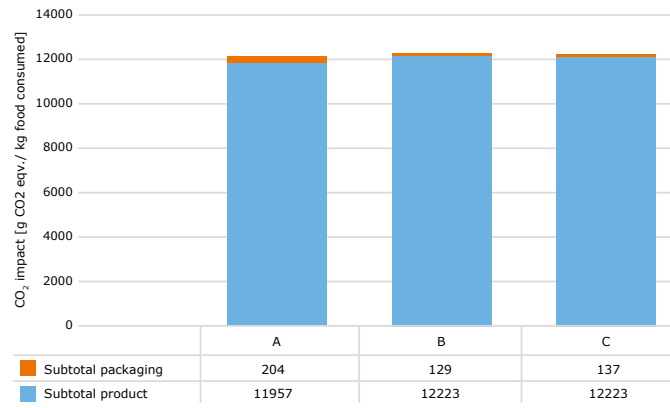
## Results

### Shelf life shortened with alternative packaging

The shelf life of the cheese in the packaging made with the two alternative films was found to be shortened from 120 days to about 30 days. The alternative films have, under the conditions in which the packaging is used, a higher permeability to carbon dioxide gas. This means that the protective atmosphere in the packaging disappears from the packaging sooner than in the reference. Due to the loss of protective atmosphere, mould has the opportunity to grow on the cheese surface. As a consequence of the reduced keepability, the food loss rate is estimated to increase from 1% at 120 days to roughly 3.2% at 30 days of shelf-life.

### Cheese production contributes the most to the CO<sub>2</sub> impact

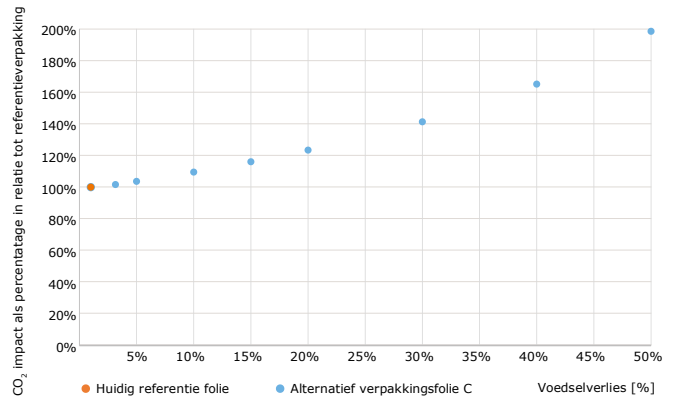
Figure 1 clearly shows that cheese production (blue column) is by far the largest contributor to the greenhouse gas emissions of the cheese slices-Klappack product packaging combination compared to the emissions related to the packaging materials, including the waste management of the food waste and the packaging waste. The CO<sub>2</sub> impact related to the alternative foils is estimated to be about 35-40% lower than the reference. The total calculated impact for the alternative foils is 2% higher compared to the reference, caused by the higher food loss and waste.



**Figure 1** CO<sub>2</sub> impact for the different product-packaging types for cheese slices (A=currently used packaging, B=alternative packaging with film from producer B, C=alternative packaging with film from producer C) [g CO<sub>2</sub> eq./kg consumed cheese]

### Effect of additional product losses on CO<sub>2</sub> impact

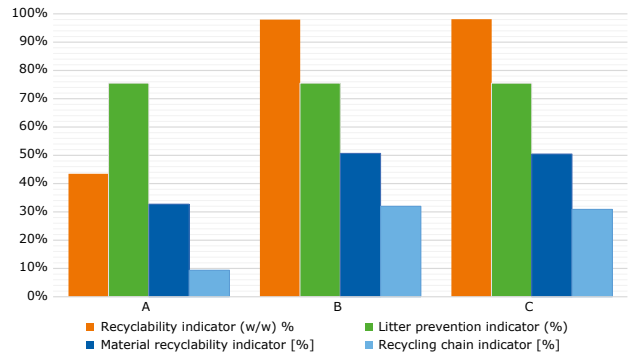
Figure 2 shows the sensitivity of the calculated CO<sub>2</sub> impact as a result of any additional product losses with the alternative packaging. It shows that if the actual percentage of losses is higher than the estimated 3.2%, then the CO<sub>2</sub> impact of the alternative packaging increases quite substantially and is significant higher than current packaging.



**Figure 2** Estimated CO<sub>2</sub>-impact as a result of varying food loss % with the alternative packaging, as a percentage related to the CO<sub>2</sub> impact of the current reference packaging-cheese combination.

### Alternative packaging scores positively on recyclability indicators

Figure 3 shows sustainability indicators other than CO<sub>2</sub> impact, such as the recyclability indicator (part of the packaging that can be recycled), the litter prevention indicator (to what extent the formation of litter is prevented), the recycling chain indicator (which part of the packaging is recycled) and the material circularity indicator (how circular is the packaging). The figure shows that the alternative films clearly score better on most indicators, as these films are recyclable. Only the litter prevention indicator scores comparable to the current reference packaging.



**Figure 3** Estimated CO<sub>2</sub>-impact as a result of varying food loss % with the alternative packaging, as a percentage related to the CO<sub>2</sub> impact of the current reference packaging-cheese combination.

## Conclusion

The results of this case show that it is possible to compare different packaging scenarios and to analyse various sustainability aspects on the basis of collected data and the calculation tool developed. The results of this analysis show a balanced picture in which the actual sustainability of the alternatives depends on the context in which the packaging is produced, used and processed.

From the perspective of greenhouse gas emissions, it is not immediately logical to opt for a more recyclable Klappack film. When such a switch is made, care must be taken that the logistics chain is properly adapted to the changed shelf life of the cheese, in order to prevent an increase in greenhouse gas emissions.

However, such a transition is highly desirable from a recyclability perspective and the alternative packaging films can be more easily recycled, although the recycling chains for these packaging materials can still be improved as there are still significant material losses in collection, sorting and recycling.

## More information about the project

In the Wrap or Waste public-private partnership project, various product, packaging and recycling experts from Wageningen University & Research and industrial partners join forces to find a new, more sustainable balance in packaging and packing. In this project, concrete business cases are used to compare current packaging and alternatives on sustainability indicators throughout the entire life cycle of the packaging, including effects related to recyclability and effects on shelf life and potential food losses.

The quantitative results from the project can be used by companies to make informed decisions about sustainable packaging choices. This will not only lead to the use of sustainable materials, but also contribute to more sustainable production chains; from (fresh) product to waste processing and recycling. More information can be found on the website [PPP Wrap or Waste](#).

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### In collaboration with

