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LOWINFOOD

Multi-actor design of low-waste food value chains through the demonstration of innovative solutions to reduce food loss and waste

GA No. 101000439

D3.4 IMPROVED BUSINESS MODEL FOR BREAD SUPPLY

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LOWINFOOD Consortium

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Summary

The supplier-retailer interface is a key hotspot of food waste in the bakery sector. This is partly due to the business model including a take-back agreement (TBA) that is applied between bakeries and retailers in some countries. The TBA infers a reversed logistics to the bread value chain, which is logic in terms of efficient source separated waste management, but it restricts the incentives and possibilities for retailers to take waste reducing actions. As a consequence, it results in over-stocking of bakery products in the supermarkets to ensure high product availability at all times, risking high levels of unsold products. The bread waste is generated at the supermarkets, but since it under the terms of the TBA is owned by the bakery, the supermarket has limited mandate and interest to take actions to reduce the waste. The objective of Task 3.1 (T3.1) is to demonstrate the efficiency of new business models for bread supply without the misplaced incentive structure imposed by the TBAs, in order to reduce bread waste at the supplier-retailer interface. This is done by comparing products supplied by bakeries to the Swedish and Finnish markets where different trade agreements are used. This is the fourth deliverable of Work Package 3 (WP3) in the LOWINFOOD project. The deliverable presents the innovation of T3.1 where a model of the current Swedish bread supply chain was created to which different scenarios of alternative bread management were applied. The features of the scenarios were based on the outputs of the stakeholder dialogues previously held in Sweden, Finland and Italy as part of T3.2 of the LOWINFOOD project. A simulation of the different scenarios is used to provide insights to the bread waste reduction potential in the Swedish bread supply chain with a specific focus on the supplier-retailer interface.

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Introduction to the deliverable

LOWINFOOD is a project committed to co-design, together with actors of the food chain, low waste value chains by supporting the demonstration of a portfolio of innovations in a set of value chains particularly concerned by food loss and waste (fruits & vegetables, bakery products and fish), as well as in at-home and out-of-home consumption. Each of these value chains corresponds to a single Work Package (WP) of the project.

The innovations are selected among promising solutions that have already been developed and tested by some partners of the consortium, with the aim to provide the necessary demonstration and upscale to allow market replication.

The LOWINFOOD consortium comprises 27 entities, located in 12 different countries, and ranging from universities and research institutes to start-ups, foundations, associations, and companies working in the food sector. During the 52 months of the project, the partners are committed to complete 30 tasks and to deliver 60 outputs (deliverables).

This deliverable, D3.4, is part of WP3 which is dedicated to reducing loss and waste in the bread value chain, with specific focus on bakeries and the supplier-retailer interface. D3.4 constitutes the output of task 3.1 (T3.1) where the objective is to demonstrate the efficiency of new business models for bread supply to reduce bread waste at the supplier-retailer interface. The work is based on previous outputs from T3.2 in WP3 where stakeholder dialogues were held in Sweden, Finland and Italy, during which a panel of bakeries discussed and approved a roadmap to reduce bread waste (the roadmaps produced in each country have been presented in the deliverable D3.2). Based on the findings in the stakeholder dialogues, the work of T3.1 included the mapping and modelling of current bread flows, and the search of new solutions that could contribute to reduced bread waste with a specific focus on the Swedish bread supply chain. This deliverable presents the output of this work, with specific attention to the evaluation of different solutions that emerged during the stakeholder dialogues based on their potential to contribute to reduced bread waste.

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1. Innovation background

This chapter provides a background to the content of the deliverable, including a description of the Swedish bakery sector, definitions, and a description of the relationship to previous work conducted within WP3.

The Swedish bakery sector

In Sweden, bread is a staple commodity and each year the average Swedish citizen consumes around 50 kg of soft bread and around 3 kg of crisp bread (Swedish Board of Agriculture 2023). However, while a lot of bread is consumed, a large share of the bread produced also gets wasted along the supply chain. A previous study has shown that approximately 8.1 kg of soft bread (both sweet and savoury) per person and year is wasted across the bread value chain, adding up to national total of over 80 000 tonnes for this particular food category alone (Brancoli et al. 2019). As soft bread, due to its perishable nature, has a higher risk of being wasted compared to crisp bread, and is consumed in higher quantities, the focus in this deliverable will be directed to the soft bread category, and more particularly on savoury bread.

The majority of the soft bread production is carried out by large-scale industrial bakeries which sell their bread to consumers via retailers. The Swedish bread supply chain is dominated by a few large bakeries who supply retailers across the country with industrialised baked bread, sold in a pre-packaged format which means that the bread is put in plastic bags as part of the production line in the bakeries. Pre-packaged bread represents the most commonly consumed type of bread in Sweden, accounting for approximately 80% of the market for soft bread (Brödinstitutet n.d.). Notably, the market for this type of bread is heavily concentrated with the three largest bakeries together holding approximately 80% of the market share. Similarly, the retail market is also dominated by a few actors where the top three retail chains together account for almost 90% of the market share. Essentially, these six entities, consisting of bakeries and retailers (market shares illustrated in Figure 1), are the main actors controlling the bread market in Sweden. However, due to trading agreements between suppliers and retailers, power dynamics within the market are not evenly distributed among these companies.

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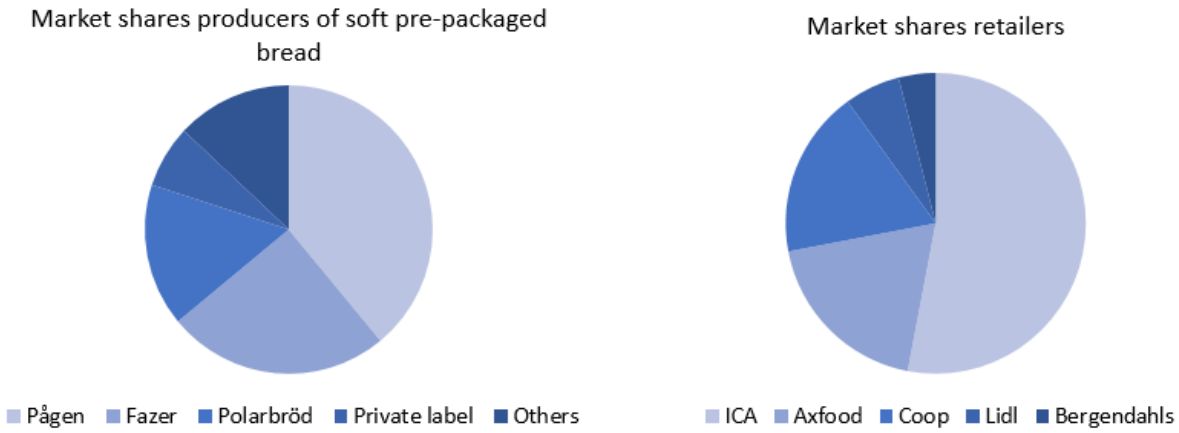

Figure 1. Market shares of producers of pre-packaged soft bread (left) and retailers (right) in Sweden (based on Brancoli 2021 and DLF & DELFI 2022).

The three market leading bakeries in Sweden, along with some smaller bakeries, work under a business model that involves a take-back agreement (TBA). This model assigns the suppliers, i.e., the bakeries, full managerial and economic responsibility of the bread, from forecasting and production up to management of surplus bread not sold at the retailers. In practice, this means that each bakery produces their bread based on their own forecasts and orders, then deliver this bread themselves to the retailers where they also place the bread on the supermarket shelves. To facilitate the logistics, some bakeries collaborate with a partner that manages the transportations and further management of the bread. Bread that is not sold at the retailers is removed from the shelves also by the bakeries or affiliated logistics companies. The produced bread typically has a shelf life of about six to ten days, but is removed approximately three to four days after being placed on the supermarket shelves if not sold in order to make room for more freshly produced bread. The removal of the older bread is, according to the bakeries themselves, a consequence of consumer demand for fresh bread and the bakeries wanting to provide as fresh bread as possible as a competitive strategy and to meet this demand.

Since the bakeries themselves are responsible for managing the surplus bread, the TBA business model allows for an efficient source separated waste management compared to other food waste generated at retailers of which the majority is directed towards incineration or anaerobic digestion. Currently, the surplus bread taken back from the retailers is primarily directed to ethanol production or diverted as animal feed, with a minor part also being donated and incinerated. However, since the bakeries bear full responsibility for the bread, the retailers have limited liability and therefore lack both ability and incentive to adopt any waste reducing action. The retailers' limited interest and possibilities to keep waste levels down along with a lack of collaboration between the actors consequently lead to overproduction and inefficient logistics which has been argued to be a significant drawback of the TBA business model (Eriksson et al. 2017; Brancoli et al. 2019; Ghosh & Eriksson 2019).

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To further distinguish between different stages of the supply chain and directed pathways of discarded bread, the term *bread loss* is used for waste occurring before bread enters the retail and consumption stage. *Bread surplus* refers to bread that is produced and delivered to retail but is, for any reason, not sold as intended to the consumer whereby it becomes *bread waste* if not directed to be reused as a food resource for human consumption. Hence, bread that is removed from supermarket shelves and directed towards e.g. anaerobic digestion, ethanol production, animal feed or incineration will be considered as bread waste whereas donated or price-reduced bread will be considered as redistributed surplus bread. Additionally, when referring to bread in this deliverable, the type of bread products intended include the pre-packaged savoury bread that is distributed by bakeries – either with or without a TBA – or by retailers themselves under their private labels.

Insights from previous work in T3.2

In previous work carried out under WP3 in the LOWINFOOD project, stakeholder dialogues have been conducted as part of T3.2 which provided insights into possible solutions that could lead to reduced bread waste at bakeries and retailers. The dialogues were held in Sweden, Finland and Italy, which provided with contrasting perspectives considering that the bread supply chain practices of the three countries differs. In Sweden these stakeholders included the top three market leading large-scale bakeries, retail chains and logistic partnering companies to both retailers and bakeries. All stakeholders provided suggestions to solutions they believed could lead to reduced bread waste, ranging from more incremental ones including, for instance adjusting the physical shelf space in supermarkets, to more comprehensive ones which primarily referred to reshaping the current business model to give retailers greater access to manage the bread in-store. In a previous deliverable, D3.2, all suggestions of waste reducing actions provided by stakeholders in Sweden, Finland and Italy are summarised and described in more detail.

The bread supply chain in the three countries involved in T3.1 and T3.2 of the LOWINFOOD project all have different characteristics to them. As described above, the Swedish bread market is concentrated to a few large actors that apply a rather unique business model. Being a neighbouring country to Sweden, Finland has a similar bread culture where the bakery sector constitutes one of the largest food industries in the country (Hyrylä 2021). Similar to Sweden, the Finnish bread market is made up by bakeries of different sizes, ranging from large-scale industrialised bakeries to small-scale family-owned ones (Hyrylä 2021). However, unlike Sweden, the TBA is not a commonly applied practice amongst bakeries in Finland (also recently forbidden in the updated Food Market Act for other than newly launched products). Both in Sweden and in Finland, a great share of the bread consumed is sold at retailers in a pre-packaged format. Instead, in Italy, the bakery sector is dominated by small-scale bakeries that sell their bread freshly baked and unpackaged, both via retailers and in their own shops. The different characteristics of the three bread markets means different prerequisites for making improvements to reduce bread waste. In this sense, learning opportunities can be made from

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each other, e.g., something that works well in Italy may be an area of improvement in Finland, and vice versa. However, in the previous conducted stakeholder dialogues some common learning opportunities were found to be applicable in all three countries. These included for instance the importance of collecting and making use of data on bread sales and production, the need for cooperation among actors, better coordination for managing surplus bread, and the responsibility of bakery supply chain actors to educate consumers.

Focusing on the situation in Sweden, a prominent matter that emerged during the stakeholder dialogue was the divided opinion on the current business model which comprises the TBA system. The stakeholders' different views on the TBA business model was found to be a controversial topic with regards to how bread waste can be reduced. While some stakeholders (primarily retailers) presented the TBA as being a root cause of high bread waste quantities, others (primarily bakeries) described the current common practice with the TBA to be keeping waste levels down (discussed in more detail in D3.2). Based on the different opinions, suggested solutions to reduce bread waste could be divided to either take place within the current system, i.e., where the TBA is still in place, or to take place in an alternative system without the TBA in place. One of the major differences between the Swedish and the Finnish and Italian bread supply chains is the use of TBA. Since the TBA is commonly not applied in either Finland or Italy, insights from those bread supply chains are possible to derive for understanding and evaluating how a system without the TBA in place could perform in Sweden. Consequently, the Finnish and Italian bakery sectors were used as inspiration for creating a conceptual system without the TBA in place in a Swedish context. The further developed scenarios evaluated in this deliverable were therefore sub-divided under these two different systems.

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2. Scenario development

Considering the scale of actors operating in the bread supply chain in Sweden, implementing any of the interventions suggested in the stakeholder dialogues to test their efficiency would be a difficult task to achieve within the scope of the LOWINFOOD project. This was also acknowledged by the Swedish stakeholders who considered the suggested interventions to have a feasibility level of low to medium to implement in reality (see D3.2, submitted in October 2022). Consequently, the approach taken to evaluate the potential effects of the solutions was therefore to create a model of the current bread supply chain and then simulate the outcomes of the different suggested interventions as different conceptual scenarios. Based on the output from the stakeholder dialogues and the suggestions on potential interventions to reduce bread waste, one baseline and six alternative scenarios for bread management were developed; three within the system applying the TBA and three within a system where the TBA was removed. A description of each scenario is presented below and summarised in Table 1.

Baseline scenario

The baseline scenario infers the current system and practices applied within the Swedish bread supply chain. Mapping of bread flows was based on figures and information retrieved from industry stakeholders participating in the stakeholder dialogue, sustainability reports from bakeries, and previous studies. The quantities of produced and wasted bread creating the baseline scenario later constituted the base for the potential bread waste reduction assessed in the further scenarios.

Scenarios in a system with TBA

Shared data scenario

During the stakeholder dialogues conducted under T3.2, suppliers, especially, expressed the benefits of having sufficient data on how much bread is sold and at what time of day. In the baseline scenario, the ones supplying the bread have information about the quantities of how much bread is sold and how much is returned and wasted. However, Point-of-Sales (POS) data that inform when bread is sold are owned by the retailers. If suppliers had access to information on what time of the day the bread sales peak, they could optimise their deliveries to when the bread shelves need to be restocked. This, in turn, could prevent overstocking and instead contribute to a more even bread flow where the “old” bread gets sold before “new” bread gets placed in the shelves. In the shared data scenario, the baseline system, inferring the TBA, is applied with the improvement of retailers sharing their POS data to the suppliers.

Optimised shelves scenario

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In the current system, the physical space where bread is placed at the retailers comprises large, usually flat, wood or metal shelves. To not give customers the negative impression of empty or half-empty shelves, bread is often put in at excess amounts by the suppliers which leads to more bread waste being generated. Besides the physical prerequisites, the wide assortment of bread also contributes to the generation of waste since all varieties should be available (while abundance of each variety also should be maintained) to keep consumer satisfaction high. While still applying the TBA, by adjusting the physical shelf space to limit the assortment and by lowering volumes using mirrors, pictures and angled shelves, intentional overstocking could be reduced as consumers would get the impression of shelves being fuller than they actually are.

Food donation scenario

The final scenario of improvements made to the system with the TBA still in place comprises the donation of surplus bread generated at the retailers. The majority of all surplus bread generated in the current system becomes waste (per applied definition) since it is managed in ways where it is not consumed as food. By increasing the share of surplus bread that is donated, the bread would move further up the food waste hierarchy which could contribute to increased sustainability, both within the bread supply chain and in society when creating social value for the donation recipients (Sundin et al. 2023). The food donation scenario therefore infers the suppliers redirecting the bread removed from the shelves (which usually has about four to five days left of its shelf life) to local donation centres.

Scenarios in a system without TBA

Retail ownership scenario

A main limitation to foster a reduction of bread waste at the suppler-retailer interface identified in both the stakeholder dialogues and in previous studies (Eriksson et al. 2017; Brancoli et al. 2019) is the current limited incentive and possibilities for retailers to take waste reducing actions. Transferring the ownership of the bread to the retailers would therefore give the retailers both incentive and possibility to reduce bread waste. In this scenario, the pathways for bread waste generated were not adjusted, instead, the scenario refers to how bread waste can be prevented through a shift in ownership. In the assessment of the scenario, consideration was taken to the waste rate of the bread retailers currently have ownership of, i.e., the bread sold under private labels.

Co-logistics scenario

As previously concluded, long-distance (from bakery to local hub) and short-distance (from local hub to retail) transportation of bread together infers an area of improvement in the Swedish bread supply chain, since these transports account for considerable environmental impact from

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the transport stage (Weber et al. 2023). Instead of each bakery managing their own transports of bread, the co-logistics scenario infers a collaborative solution where all bakeries would transport their bread together, facilitating a multi-actor strategy for bread waste treatment. With respect to lower emissions from transports, this scenario would be most beneficial from an environmental point of view, however, also having a potential effect on the bread waste since bakeries would not have to produce and transport more bread for the sake of filling the trucks to make the most use of the transports.

Reduced price scenario

When applying a system without the TBA in place, the retailers would have ownership of the bread in the way they currently have with the private label bread. This shift of ownership would enable the retailers to manage all bread similar to how they currently manage their private label bread, inferring the possibility to reduce the price of older (surplus) bread which in the current system is taken back by the suppliers and becomes waste. Consequently, the reduced price scenario considered the assessed quantity of reduced bread waste to instead be directed as redistributed surplus bread by being sold at a reduced price in the supermarkets.

Table 1. Scenarios on bread waste reduction in Sweden.

Scenario	System	Changes on current practice
Baseline	Current practices including TBA	No change, business as usual (BAU)
Shared data	TBA still in place	Increased sharing of sales and point-of-sales data between suppliers and retailers
Optimised shelves	TBA still in place	Optimisation of shelving management in-store by reducing assortments/volumes, using mirrors and angled shelves
Food donation	TBA still in place	De-centralised donations of the surplus bread removed from shelves
Retail ownership	TBA removed	Transferred ownership of the bread from bakeries to retailers to allow for alternative prevention measures, no change in waste management pathways
Co-logistics	TBA removed	Alternative transportation model inferring co-transport for bread suppliers
Reduced price	TBA removed	Reducing prices on surplus bread and sell at retail

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3. Results from the scenario simulations

The mapping of the baseline scenario revealed that about 211 000 tonnes of soft bread (that is to be sold under the TBA) are produced in Sweden every year. Of this bread, approximately 32 500 tonnes (15.4%) get wasted at the production and retail stages, out of which 19 700 tonnes (61%) are generated at the retail level and 12 800 tonnes (39%) at the bakeries. The simulation of the scenarios with the TBA still in place, i.e. the *Shared data*, *Optimised shelves* and *Food donation* scenarios, revealed a potential reduction of bread waste of about 10 500, 2 400 and 600 tonnes for each scenario respectively. The simulation of the scenarios where the TBA was removed, i.e., *Retail ownership*, *Co-logistic* and *Price reduction*, revealed a corresponding potential reduction of bread waste of approximately 10 100, 800 and 6 300 tonnes respectively. The potential levels of bread waste for each of the scenarios are presented in Table 2 and illustrated in Figure 2 where waste at the bakery level comprises e.g. loss of ingredients, over-baked bread, and excess parts of bread, and where waste at the retail level mainly comprises unsold bread that is taken back by the bakeries or disposed of by the retailers depending on the scenario.

Table 2. Estimated bread waste for each scenario.

Scenario	Bread waste quantity (tonnes/year)			Waste rate (%)	
	Total	Retail	Bakery	Retail	Bakery
Baseline	**32 500**	19 700	12 800	9.2	6.2
Shared data	**22 000**	13 900	8 100	6.5	3.8
Optimised shelves	**30 100**	17 300	12 800	8.1	6.2
Food donation	**31 900**	19 100	12 800	8.9	6.2
Retail ownership	**22 400**	9 600	12 800	4.5	6.2
Co-logistic	**31 700**	19 700	12 000	9.2	5.6
Reduced price	**26 200**	13 400	12 800	6.2	6.2

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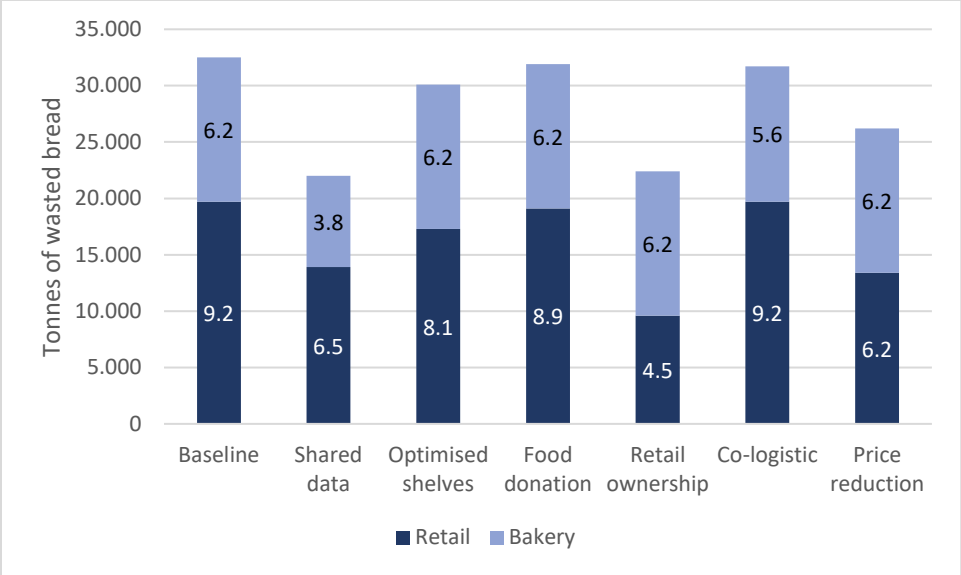

Figure 2. Bread waste quantities at bakery and retail levels from each scenario. Figures inside the bars indicating percentages of wasted bread for each level based on total amount of produced bread.

The scenario found to have the greatest overall waste reduction potential was the *Shared data* scenario where a reduction potential was found both at the production side in the bakeries and at the retail side in the supermarkets. The main reason behind this reduction is that the scenario infers a better bread flow throughout the system where it would promote the bakeries to fill the shelves when they need to be restacked which would prevent overstocking and, consequently, overproduction. All other scenarios were found to have a waste reduction potential only at one of the two stages; either at the bakeries or at the retailers. However, when considering each supply stage separately, the single greatest potential impact was found in the *Retail ownership* scenario where the waste rate at the retail level went from 9.2% down to 4.5%. Similarly, the greatest waste reduction potential for the bakery stage was found in the *Shared data* scenario. Worth to mention is also that only two of the assessed scenarios contributed to a reduction at the bakery stage which primarily is a result of the other actions taking place at the retail stage and that they do not infer a (direct) impact on the production stage. There are however other potential actions for bakeries to take (as presented in D3.2), but these were not assessed in this deliverable.

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4. Comparing the business models of bread supply

The specific focus of the innovation applied in T3.1 was related to the current business agreement applied between suppliers and retailers in the Swedish bread supply chain and aimed to evaluate the effects that an alternative business model without the TBA in place could have on the generation of bread waste at the supplier-retailer interface. With regards to this aim, six scenarios of alternative bread management pathways in the Swedish supply chain were developed; three which inferred improvements made within the current system applying the TBA, and three which inferred improvements made in a system where the TBA is removed. All assessed conceptual scenarios indicated a potential reduction in waste volumes compared to the baseline scenario. The most beneficial scenario in terms of potential waste reduction was the *Shared data* scenario, which indicated a potential reduction corresponding to approximately 10 500 tonnes of bread per year. However, the degree of waste reduction potential for each scenario was based on estimations and assumptions, mainly provided by industry stakeholders, which means that their potential beyond the theoretical modelling applied in this deliverable remains uncertain. Nonetheless, since all scenarios were based on suggestions provided by industry stakeholders who have a lot of knowledge in the field, it can be assumed that applying any of the interventions in reality would at least to some degree lead to reduced bread waste. The magnitude of waste reduction may however vary between interventions and this deliverable has indeed provided with valuable insights to the potential relation between them.

In this deliverable, scenarios and their assumed bread waste reduction potential are presented with individual implications. However, considering that they target different steps in the bread value chain and do not constitute either-or alternatives, there is also a possibility to make combined implementations of the scenarios. If therefore implementing more than one of the proposed solutions, bread waste could plausibly be reduced further than what the scenarios suggest individually. Additionally, this deliverable has presented six scenarios based on interventions suggested by industry stakeholders in the Swedish bread supply chain. In the previous work of WP3, especially in the roadmap developed to provide guidance on how to reduce bread waste, other interventions deriving from the Finnish and Italian stakeholder dialogues are also available. Of those interventions, several could be applicable also in a Swedish context, for instance educating consumers and creating a zero-waste culture within and throughout organisations.

The *Baseline scenario* presented in this deliverable reflects the current situation of bread supply. Due to rising costs of bread production, this system becomes less and less sustainable every day, as highlighted in the Italian stakeholder dialogue. Changes are therefore required to make bread value chains more sustainable, to which the work carried out in WP3 can provide valuable insight. The assessment of the *Shared data* scenario presents as a solution likely to contribute to less bread waste, and based on the conclusion from the stakeholder dialogues it could be useful both

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in a Swedish, Finnish and Italian context. Additionally, the *Shared data* scenario has the potential to be combined with other scenarios such as the *Food donation* scenario, which also have the potential to be applied in each of the different countries. However, as recognised by both Italian and Swedish stakeholders, a food donation scenario is dependent on an organisational structure that allows for its potential to be realised. Effectively donating surplus bread requires local institutions that can support the redistribution to those in need, which in turn is dependent on efficient logistics that transfer the bread from supermarkets or bakeries to charities. However, as identified by Finnish stakeholders, donating bread can also become a limited possibility if too much bread is donated, which is yet another aspect to consider in the potentials of the food donation scenario.

As previously established during the stakeholder dialogues, successfully implementing changes within the bread supply chains in both Sweden, Finland and Italy would require joint efforts from different industry actors. However, what also was discovered during the stakeholder dialogues, especially in Sweden, was that different actors have different opinions in several of the suggested intervention areas on how much, and even if, the solutions would contribute to reduction in bread waste volumes. This was for instance the case for the *Retail ownership* scenario. The assessment of the retail ownership scenario revealed that bread waste in the Swedish bread supply chain could be reduced by approximately 10 100 tonnes per year. However, as the ownership of the bread differs between Sweden and Finland and Italy, the *Baseline scenario* assessed in this deliverable, constituting the current practice in Sweden, can be compared to e.g. the Italian situation where the ownership of the bread lies at the retailers. In Italy, bread in supermarkets still gets wasted to a great extent despite the retailers having full ownership of it. This suggests that a shift in ownership may infer a risk of backfiring if the retailers would e.g. lack the interest or possibilities to actually minimise the waste of bread. Hence, shifting the ownership of bread to the retailers should only be considered a solution in situations where the retailers have the right prerequisites to manage the bread, which according to retail stakeholders in Sweden is the probable case there since all retail chains present to actively work for preventing food waste.

Furthermore, what should be noted is also potential trade-offs that could arise with applying those solutions suggested in this deliverable. One example can be found in the *Co-logistics* scenario where the idea is that bread suppliers would join forces in the bread delivery stage. In Sweden today, there are mainly two actors delivering the bread to the supermarkets. If limiting the delivering parties down to one, it is plausible that some job opportunities will get lost which presents a dilemma between social impact and the potential savings in environmental impact. Another trade-off that bakery stakeholders in Italy identified during the dialogue is that if selling surplus bread for a reduced price, as suggested in the *Reduced price* scenario, a great risk emerges inferring that bakeries would sell less bread for full price, resulting in them making less profit in their businesses. Again, this trade-off also constitutes a constrain between, on the one hand

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environmental benefits through less bread waste being generated, and on the other hand bakeries making less money for them to live off.

To summarise, the interventions presented as scenarios in this deliverable are not the only solutions that could contribute to reduced bread waste in Sweden, there are other solutions presented in both the Swedish, Finnish and Italian stakeholder dialogues that could be implemented for this purpose. Additionally, their potential to be implemented also reaches beyond the Swedish context as highlighted in the stakeholder dialogues. Therefore, any potential intervention aiming at reducing bread waste should with preference be regarded as more context-specific rather than country-specific which would make the findings in this deliverable relevant for bread supply chains also outside of Sweden. However, before taking action, it is also important to address potential trade-offs that could be accompanied with the solutions, and evaluate their overall impact beyond the sole aspect of reducing bread waste.

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5. Conclusions

Bread constitutes a staple commodity in many cultures, not the least in European countries. However, the perishable nature of bread also makes it a food category with high waste rates compared to other food categories. In Sweden alone, more than 80 000 tonnes of bread are wasted every year, of which 35% is generated at the supplier retailer interface (Brancoli et al. 2019). In previous work within the LOWINFOOD project, reasons behind bread waste occurring in bakeries and at the supplier-retailer interface in Sweden, Finland and Italy have been identified, as well as solutions to how bread waste could be reduced. In this deliverable, the insights from the previous work have been applied in an evaluation of potential contribution of suggested interventions to reduce bread waste.

The results from T3.1 presented in this deliverable have provided an indication of the potential benefits of six interventions on bread waste reduction within a Swedish context as a case study. However, the interventions are not limited to be implemented in Sweden as similar solutions could be relevant also for other countries such as Finland and Italy. As previously concluded during the stakeholder dialogues in T3.2, to achieve a reduction in bread waste quantities, cooperation and coordination between industry stakeholders is of great importance. A next step towards achieving a reduction of bread waste in the bread supply chain in Sweden, as well as in other countries, would therefore be for the industry stakeholders to sit down together and realise their own solutions into actuality. An essential part in doing so would be by starting with deriving a common understanding of the trade agreements and which features should be removed or fostered in order to achieve a reduction of bread waste at the supplier-retailer interface. To this purpose, the evidence from the work presented in this deliverable can provide a good foundation to which actions should be prioritised for gaining the most potential benefits and achieve a more sustainable bread supply chain where inspiration could be taken from other countries.

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