

LOWINFOOD

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

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D3.6 Strategic document bread waste

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Summary

The deliverable 3.6 “Strategic document bread waste” is related to Task 3.2 “Stakeholder dialogue to develop guidelines against food loss and waste in bakeries and their branches”, which is part of WP3. The objective of this Task was to investigate losses and waste in the bakery sector by means of a stakeholder dialogue, in parallel in three different countries: Italy, Sweden, and Finland. This deliverable is focused on the Italian bakery sector and aims to analyse and advise strategic action against food loss and waste, based on the evidence emerged during the stakeholder dialogue conducted there. The LOWINFOOD partners CNA and UNITUS conducted this task for the Italian case, by organising a stakeholder dialogue which involved 12 small-scale bakeries in Central Italy, with a series of meetings and participated discussion, resulting in the roadmap for bread waste reduction reported in deliverable D3.2, and called “*Roadmap – a hand against waste – una mano contro lo spreco*”. In parallel with the stakeholder dialogue, a baseline measurement of surplus bread was conducted in 2022 (baseline quantification) and 2023 (implementation phase). Based on the results of these activities (roadmap and surplus bread quantification), this deliverable aims to upscale their impact, by designing strategic actions to prevent and reduce bread waste in the Italian bakery sector, with a bottom-up approach from bakers’ point of view.

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 28 entities, located in 13 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).

In this context, the deliverable 3.6 “Strategic document bread waste” is developed as part of the activity of Task 3.2 “Stakeholder dialogue to develop guidelines against food lost and waste in bakeries and their branches” (WP3). This task has been conducted in parallel in Italy, Sweden, and Finland.

This deliverable focuses on the Italian case study tackled in this task. In Italy, two different quantification actions were conducted in 2022 and 2023 to measure the surplus bread in the Italian bakery sector. In addition, a series of stakeholder dialogues were conducted to develop strategic actions to firstly prevent surplus bread and then reuse and recycle it. The results are a first quantification of surplus bread in the small-scale bakery sector in the Italian context, and a roadmap containing actions to prevent and reduce surplus in a multi-actor approach.

1. The Italian bakery sector

The structure of the bakery sector in Italy differs from those of the other country-cases tackled in Task 3.2 of LOWINFOOD. The Italian bakery sector is made up of craft bakeries that are usually family business, with a maximum of 10 employees. These small-scale bakeries (in total, around 25,000 bakeries operating in the country) produce fresh bakery products to sell directly in their own stores, besides supplying retailers. They represent the core of this sector in Italy: 84.1% of the fresh bread produced in Italy comes from small-scale bakeries (Associazione Italiana Bakery Ingredients, 2022).

According to the Italian association of Bakery Ingredients (2022), almost half of the fresh bread (43.1%) consumed in Italy in 2021 was sold directly at bakery stores, 43.5% at retail stores, and the remaining part was supplied to HO.RE.CA (Hotel, Restaurant and Catering) (Associazione Italiana Bakery Ingredients, 2022).

At small-scale bakeries, bread is mainly handmade in own bakehouses. The process is manual, facilitated by machinery. The main ingredients of fresh breads are flour, water, salt, and yeast. To prepare special breads, such as for example "*rosetta*" or "*panini all'olio*", other different flours or other ingredient (oil, milk and so on) may be added to the dough.

The process is made during the night in order to have fresh bread and bakery products ready for human consumption in the early morning. Each bakery usually prepares its own bread dough overnight and leaves it to rest. After the leavening and rising stages, the dough is kneaded overnight and baked in an electric oven. Fresh bread is baked and ready to be sold at the bakery's shop (which is very often located in the same building) or delivered to retailers/supermarkets (Pietrangeli et al., 2023).

The Italian law states that bread can be qualified as "fresh" for 24 hours after the production process is concluded (Benozzo et al., 2011). This indication helps to distinguish fresh bread from preserved bread, which is sold packed in specific areas of the store, well differentiated from fresh bread. The fresh bread is prepared early each day, transported directly to grocery shops, supermarkets, and retail stores, and it needs to be sold on that same day. The bread remaining unsold in the evening is therefore considered a surplus as it can no longer be marketed as "fresh".

2. Results of the stakeholder dialogue in Italy

In the Task 3.2 of the LOWINFOOD project, the main objective was to develop a roadmap of actions to prevent the waste of bread at the bakery level by means of a stakeholder dialogue. The dialogue mostly focused on actions to reduce the quantity of surplus bread, and to ensure that surplus bread is properly handled. Another objective of this task was to assess the effects of such roadmap by monitoring the quantity of surplus bread in the status quo situation (baseline) and during the implementation of the roadmap.

In the Italian case, the activity was conducted in Central Italy with the support of CNA in recruiting the bakeries for the stakeholder dialogue. The region where the activity was conducted is Lazio, located in the centre of Italy. In particular, the stakeholder dialogue involved 12 small bakeries active in different areas of the province of Viterbo (IT141) which is characterized by several small towns and villages tucked away in a rural setting, as well as several medium-sized cities (Figure 1). The average sales price of common bread in the area (referred to 2022/2023) is 3.00€/kg. During the period of activity of the task, the bakery sector underwent a challenging situation as a consequence of the war in Ukraine, which caused a huge and sudden increase in the cost of inputs (especially flour and energy), particularly hitting this sector. However, even during this period, the average selling price of bread in the considered area remained lower with respect to the Italian average, which reached 5.00€/kg in 2023, in the Northern areas of Italy (Osservatorio prezzi MISE, 2023¹).



Figure 1 - The province of Viterbo

¹ <https://osservaprezzi.mise.gov.it/>

In Italy, no direct quantification of bread surplus, loss and waste was available before the activity conducted in Task 3.2 of LOWINFOOD. Therefore, the results of this assessment can represent a benchmark for other quantification studies, although the number of bakeries involved in the assessment is too low to be representative of the almost 25,000 businesses operating in Italy (Pietrangeli et al., 2023). During the first of the three meetings organized for the stakeholder dialogue conducted with the small-scale bakeries involved in the task in Italy (see D3.1 and D3.2 of LOWINFOOD for more details how the stakeholder dialogue was conducted), it emerged very clearly that the main issue concerning bread waste at bakeries is related to the surplus bread that remains unsold at the end of the day. Instead, other types of waste, for example the waste of wheat during the process of bread making, or the waste of dough, were negligible. The quantification conducted as part of this task was therefore focused on surplus bread, and organised in two phases. A first baseline assessment was conducted between the 1st of February to the 30th of June 2022. A second quantification was conducted the following year, in the same period (between the 1st of February to the 30th of June 2023), despite the dropout of 6 of the 12 bakeries initially involved. This drop-out was due to different reasons. One bakery closed its doors at the end of 2022, another one (with three branches) considered it too demanding to join an additional round of assessment, while the others were willing to continue the activity but were only able to collect few and partial data, which could not be considered in the results due to lack of robustness.

The methodology of measurement was the same for both assessments, and it is described in detail in Pietrangeli et al. (2023), which reports the results of the baseline assessment. Each bakery was given a diary, where the quantity of bread produced and the quantity remaining at the end of the day were reported on a daily basis, along with the selling price and final destination of the surplus product, for three main bread products that were identified during the stakeholder dialogue. The products considered in the direct measurement are common bread, focaccia bread, and typical Italian bread rolls (*rosette/sfilatini/panini all'olio*, meaning different types of bread rolls).

As a result of the quantification conducted in the year 2023, the surplus of common bread in total is equal to 6.89% of the production; the surplus of focaccia bread is 7.60%, while for bread rolls is 4.68%. From an economic point of view, the surplus bread of the three products together corresponds in total to a loss 32,253.69€ of sales value, across the five months of the quantification, which is equal to the 8.25% of the turnover recorded by the bakeries for the three products considered.

These results are higher if compared to the baseline quantification of surplus recorded in 2022 (5.88% for fresh bread, 3.99% for focaccia bread and 5.28% for bread rolls; Pietrangeli et al., 2023). This can be explained with the fact that the year 2022 was characterized by two different events that affected consumers life: the COVID 2019 restrictions, which were still ongoing during the months of quantification; and the beginning of the war in Ukraine, which caused a sudden increase of costs of raw materials and electric energy. For these reasons,

many bakeries reduced the quantity of bread produced to reduce the costs as much as possible; this likely resulted in a lower amount of surplus bread.

In parallel to the quantification activities, a series of 3 roundtables with 12 small craft scale bakeries together with the CNA of Viterbo and Civitavecchia and UNITUS researchers have been organized. The meetings took place in November 2021, March 2022, and May 2022. These meetings were organized in the form of structured discussions, with a facilitator who guided the participants into pre-defined topics. In these roundtables, a bottom-up approach was developed to discuss the causes that generate bread surplus and actions to firstly prevent, and then reuse bread surplus.

The topics of discussion with small craft bakeries reflected those agreed with the actors implementing the same task in Sweden and Finland (see deliverable D3.1 of LOWINFOOD). Topics covered included the causes of bread loss and waste in the bread value chain (from production to sale), how to quantify such losses, and the solutions available to bakeries and other stakeholders to reduce this issue. The meetings, in the form of brainstorming, allowed UNITUS and the CNA to identify the main causes that lead to the generation of surplus and also wastage of bakery products, with the aim to develop a possible pathway to solutions proposed directly by the participants. Having collected this information, the researchers then had the opportunity to evaluate the feasibility and effectiveness of the various proposed solutions and to create a strategy for their direct implementation. The result of this activity is the innovation *"Roadmap – a hand against waste – una mano contro lo spreco"* (see deliverable D3.2 of LOWINFOOD). This roadmap was therefore co-created with the bakeries and adopted by them from September 2022 onwards.

The roadmap included actions against bread surplus and waste generation that were mentioned and tackled during the discussions. It basically includes the actions raised by the bakers participating in the activity, grouped and listed to reflect the prioritization that emerged during the discussions. It includes different strategies developed for different relevant stakeholders in the value chain. Each action is aimed at tackling a specific problem related to bread surplus and promoting actions against food waste.

3. Structure of the roadmap against bread waste in Italy and potential for upscale

Figure 1 shows the “Roadmap – a hand against waste – una mano contro lo spreco”, the Italian roadmap that was elaborated as a result of the round tables with the bakeries. It is composed of the following five actions that correspond to five fingers of the hand:

1. Measure the daily surplus;
2. Encourage daily orders to plan sales;
3. Increase consumer awareness of the problem of waste by making "anti-waste" activities recognizable;
4. Encourage donations of the surplus for human consumption (through a collective organization) by the, use of apps, and / or donation to charities;
5. Suggest collective actions against food waste at municipal level (together with CNA).



Figure 1 – Roadmap – a hand against waste – una mano contro lo spreco

The rationale and structure of this roadmap is fully explained in the LOWINFOOD deliverable D3.2. Here, we just recap the content of the five actions foreseen in the roadmap.

Measure daily surplus

The first step of our approach involved a carefully assessment of the daily surplus production in the small-scale bakeries. During our initial stakeholder dialogue meeting, it was a common belief among bakery owners that their operations were efficient, with negligible or insignificant surplus and/or waste. One baker was even confident enough to claim that he could personalize each loaf with its intended customer's name; such was his certainty in the absence of waste. However, this perception changed dramatically when they began recording their daily outputs in a journal. This exercise of maintaining a daily diary brought to light the unexpectedly higher levels of surplus they were being produced, far exceeding the initial assumptions. Therefore, the foremost action we advocate is to encourage the adoption of diaries for recording and quantifying the surplus of baked goods. Following this approach, it was proven that this practice serves a dual purpose. Firstly, it acts as a repository of historical data, which is invaluable for predicting future sales more accurately. Secondly, by analysing this data, bakery owners can delve into the root causes of daily surpluses, at least for what concerns the bread they directly sell at the bakery store. They can explore various factors influencing this excess production, leading to more informed decision-making.

1. Encourage daily orders to plan sales

This action advocates the promotion of daily ordering systems by the customers of the bakeries to enhance the accuracy of their sales forecasts. Due to the inherent uncertainties in predicting next-day sales, the amount of unsold bakery items can vary significantly throughout the week and across months. Reducing the unpredictability of large, unexpected orders is a key challenge for bakeries. To address this, promoting daily orders is a strategic solution. This method allows bakeries to better anticipate sales, leading to more precise production planning. By implementing a system where customers place orders daily, bakeries can align their production more closely with actual demand. Finally, this strategy is crucial because bakery products are typically prepared the night before being sold, and it is difficult to adjust the daily production during the day. At the same time, bakeries reported that adopting planning strategies and orders to plan sales can be particularly easy and efficient when dealing with loyal consumers. This approach is not just about minimizing excess; it's about enhancing the overall efficiency and sustainability of bakery operations. This results in a significant reduction in surplus production, tackling one of the core issues reported concerning waste generation and inefficiency in bakeries.

2. *Increase consumer awareness of the problem of waste by making "anti-waste" activities recognizable*

The third initiative focuses on elevating consumer awareness about food waste, particularly in relation to bread and bakery products. It was identified in roundtable discussions that customers' perceptions play a significant role in bakery waste, thus one of the major drivers of bread and bakery waste is linked to customers' habits. Customers often associate fully stocked shelves with quality, leading bakeries to overproduce, inevitably resulting in unsold items. To counter this, it's crucial to educate customers on the importance of reducing bread waste, helping them understand that a fully stocked shelf is not indicative of a bakery's quality. As part of this effort, a collaboration with CNA and other stakeholders is proposed to develop a recognizable window sticker. This will serve to distinguish and highlight bakeries that are actively participating in these anti-waste initiatives, thereby promoting consumer awareness and support for sustainable practices in the bakery industry. The glass patch also includes a QR code that refers to the web page of the LOWINFOOD project.

3. *Encourage donations of the surplus for human consumption (through a collective organization) by the reuse, use of apps and / or donation to charities.*

The fourth point of the action plan emphasizes the importance of donating surplus bakery products for human consumption, either directly or through collective efforts involving digital solutions such as? and charities. Charities play a key role in this action, helping redirect surplus bread to those in need and enhancing their positive impact on society. One of the barriers reported during the meeting was the initial regulatory obstacles (i.e., bureaucracy) to putting into practice this action. Helping the bakeries overcome this barrier is one of the main objectives of this action. At the same time, other solutions are available and have already been adopted by bakeries to make surplus bread and bakery products available for human consumption. Rehandling the surplus bread before the expiration date (in general, 2-3 days after its production) is one of the strategies to divert the surplus from becoming waste. On the other hand, producing breadcrumbs from surplus bread involves additional costs, making its selling price per kilogram higher than regular bread. Also, not all types of bread surplus can be used for the production of breadcrumbs (e.g., focaccia bread cannot be used). The initiative also suggests using apps like "Too Good to Go" to sell surplus products at a discounted rate towards the end of the day. Similarly, while selling surplus through apps is innovative and can generate additional turnover, bakeries encounter organizational difficulties such as in logistics in implementing this solution. The overarching goal of this action is to improve bakeries' capacity to manage and profit from unavoidable daily surplus rather than letting it go to waste.

4. Suggest collective actions against food waste at municipal level (together with CNA).

The fifth strategy aim to promote collective actions against food waste at the municipal level in collaboration with CNA. This includes promoting a network of bakeries to lobby for the full implementation of the Italian law against food waste (Law No. 166, Article 17, dated 19 August 2016) at municipal level. This law allows for a reduction in waste tax for food businesses that donate surplus to charities or use it as animal feed. Business associations like CNA play a crucial role in influencing local policymakers to support these initiatives. Additionally, this strategy involves engaging citizens through events and educational activities to raise awareness about food waste and to encourage behavioural changes that support waste reduction, especially in the context of bread waste in bakeries. This collaborative approach aims to enhance community awareness and drive impactful changes in food waste management at a local level.

While the roadmap was conceived and structured around the discussion conducted with a rather small groups of bakers, it shows the potential to represent a comprehensive approach to addressing food waste in the Italian bakery sector. The first action, measuring daily surplus, highlights the gap between perceived and actual waste levels, underscoring the importance of empirical data in waste management. The second action, encouraging daily orders, tackles the unpredictability of demand, aligning production more closely with actual sales and thereby reducing surplus. The third action aims to shift consumer perceptions, breaking the association between fully stocked shelves and bakery quality. This is crucial for reducing overproduction driven by customer expectations. The fourth action addresses surplus redistribution through donations and re-use, acknowledging the logistical and administrative challenges that bakeries face in this process. The fifth and final strategy advocates for collective actions at the municipal level, emphasizing the role of bakeries in influencing policy and raising public awareness about food waste.

The foreseen actions are in line with the current challenges of the Italian bakery sector and are specific to its structure, yet they share several points with the findings emerged in the other countries conducting the stakeholder dialogue in the bakery sector, in the context of Task 3.2. In this sense, the roadmap represents a holistic solution, and has been supported by CNA among the associated bakeries, by providing communication materials and signs to be showed at the bakeries' stores, to let the customers know that these companies were applying the roadmap against bread waste (Figures 2 and 3).



Figure 2 – Window decal at a bakery, communicating the participation of the bakery to the LOWINFOOD project, and the commitment to implement the roadmap “una mano contro lo spreco”



Figure 3 – Communication materials produced to support the awareness of consumers and stakeholders about the participation of the bakeries to the LOWINFOOD project

The “Roadmap – a hand against waste – una mano contro lo spreco” underscores the need for improvement of collaborative efforts among various stakeholders, including bakeries, consumers, charities, and local governments. Such collaborations can amplify the impact of individual actions and foster a more sustainable food system. Qualitative observations of the bakeries during the roadmap implementation suggest that one of the prominent effects was the improved framing and communication of waste-reduction practices they had already been using. Although an actual reduction of bread waste could not be proved (see deliverable D1.6 for more details), the implementation of the roadmap strengthened the relation with customer and enhanced bakeries’ reputation. We also observed that this activity strengthened the commitment of the CNA bakery association to take collective action against waste in the bakery sector. This was reflected in efforts to scale up the roadmap and raise awareness among small bakeries about waste-related issues. These efforts, that are described in Section 4, have continued well beyond the duration of the task and even beyond the official lifetime of the project.

Indeed, further activity was conducted by CNA and UNITUS to discuss with stakeholders the extent to which the roadmap developed as part of Task 3.2 of LOWINFOOD can be relevant for the Italian bakery sector as a whole, and the conditions for this to be possible. Indeed, aligning the interests and capabilities of different stakeholders towards the common goal of waste reduction is key to allow the upscale of the roadmap, and a successful implementation of actions against food waste requires not only the commitment of individual bakeries but also supportive institutions, consumer education, and effective collaboration among all the stakeholders involved.

4. A strategy to reduce bread loss and waste in the Italian bakery sector

The roadmap for reducing bread loss and waste in Italy, particularly actions n.4 and n.5, places significant emphasis on the role of local stakeholders, including institutions, business associations such as the CNA, and consumers. This integrated approach recognizes that achieving substantial and sustainable results in waste reduction requires a systemic effort to involve various actors at the local and national level. Local institutions are vital in this effort. Their involvement can range from policymaking to the provision of logistical support for waste reduction initiatives. For example, following Law n.166/2016 (the Italian law for food waste reduction, analysed in Giordano et al., 2020), municipalities have the power to incentivize bakeries’ prevention and redistribution activities through fiscal measures. For example, municipalities can decrease the waste tax due by businesses in the food sector which commit to donate surplus food to charities (the tax is currently calculated by applying a flat rate set by each municipality to the floor area of the business facilities in squared meters). Moreover, they can decide to charge the waste tax base on the actual quantity of waste produced, instead of calculating the waste tax based on the size of stores and

business, as it happens now in most municipalities. Such policies not only encourage responsible waste management but also strengthen community bonds by supporting those in need. The CNA is the largest associations of bakers in Italy and it represents the interest of the small-scale businesses; therefore, it can play a pivotal role in reporting the needs and ideas of the affiliated bakeries. By acting as a bridge between bakeries and other stakeholders, including policymakers and researchers, the CNA can facilitate more effective and tailored strategies for surplus management.

As part of the activity of Task 3.2, UNITUS researchers and the staff of CNA Association of Viterbo and Civitavecchia conducted some discussion and meetings with national representatives of the CNA, including the national level representatives of the agri-food sector, the bakery sector and the environmental function of the CNA. These talks were very useful to understand the commitment that such a big association can make to push the sustainability transition in small-scale businesses.

The main role that the CNA can play in pushing for the upscale of the roadmap concerns the dissemination of the roadmap, and the best practices already applied at many bakeries, across the network of associated bakeries. This would also avoid the so-called “green hushing”, meaning that companies who actually develop actions for sustainability in their daily practices may fail to properly communicate them, thus losing the potential benefit they can get from a broader communication. Based on the results from Task 3.2 of LOWINFOOD, Italian bakeries seem to waste much less bread with respect to the other two countries participating in the task? or other countries in the EU? (citation), as a combined effect of a small amount of surplus, and the existence of several alternative destinations for surplus bread, which very seldom ends up in the waste bin (Pietrangeli et al., 2023). In this sense, the CNA can develop and make available to the associated bakeries tools for reporting best practices, as well as the communicative power that small-scale businesses may not have themselves. This would greatly enhance the overall impact of any action against food waste developed by Italian bakeries.

Another point that can be promoted in terms of communication at the national level is that small-scale bakeries seem to benefit from a greater flexibility in adjusting the production to the demand of consumers; this is mainly because these businesses are very close to consumers, meaning that bread producers are in most cases also the sellers, and they have therefore a direct overview of the changes in consumer demand. In this sense, it is important to remark that the quantification of surplus bread conducted in Italy as part of task 3.2 only covers the quantity of bread that is produced and directly sold by the bakeries; we have no information about the bread that is sold through other channels (mostly restaurants, local supermarkets and grocery stores etc.). Moreover, this assessment only focuses on small-scale bakeries, that do not supply large retailers; while this is a limitation, it can be estimated that the surplus would definitely be higher for bakeries that have take-back agreements in force, in the relation with large retailers. Take-back agreements in the bakery sectors refer to situations where the retail store is only required to pay to the bakery for the quantity of

bread it actually sells, and not for the quantity of bread ordered, with surpluses becoming a problem of the producers (Eriksson et al., 2017). Extended responsibility of the bakeries is common in this case, meaning that the bread producer takes responsibility for its products all the way through to sale in the supermarket. In this situation, it is very common that a high surplus is recorded, because retailers have no incentive to adjust the orders to the actual sales they expect (Brancoli et al., 2019). While this case was not tackled in Task 3.2 of LOWINFOOD, other evidence suggests that the removal of take-back agreements, considered within Task 3.1, shall be considered as a priority action in these situations (see, for example, deliverable D3.4 of LOWINFOOD).

Consumers, on the other hand, are key to driving demand for more sustainable practices. Educating consumers about the implications of food waste and the importance of supporting anti-waste initiatives can lead to a significant shift in purchasing behaviours. As an example, signs can be put on empty shelves in the evening to communicate to the customers that that type of bread is no longer available due to the commitment of the bakery not to produce in excess; moreover, window decals can be distributed to all bakeries committed to implement the actions of the roadmap, or, in a broader approach, actions against bread waste in general. Again, the role of the CNA can be crucial to support these actions, for example by providing the associated bakeries with standardised logos and communication materials. Another action that is considered crucial to push consumers towards more sustainable and efficient behaviours, which can support the efforts of bakeries to reduce waste, concerns the action n.2 of the roadmap, that is to encourage consumers to order bread and bakery products in advance. To allow a proper upscaling of this action, tools and apps to book bread in advance can be developed at the national level, and made available to bakeries and consumers, in order to facilitate their interaction. Moreover, also for action n.4, collective actions can be more successful in terms of outreach and building awareness of consumers. The app Too-Good-To-Go, which was mentioned during the stakeholder dialogue as a useful idea to sell, at a reduced price, the bread and bakery products remaining at the store in the evening, is used by some bakeries but does not prove to be very well-suited for this kind of products. Nonetheless, a similar approach – selling at a reduced price the surplus products remaining at the end of the day – can be implemented by offering products at the store at a reduced price in the evening. This would also reinforce the relation of the bakeries with their customers and, at the same time, provide the people in need with an alternative option to buy a basic product for their diet.

Among the possible actions that can be implemented at national level to reduce bread waste, the possibility to reuse surplus bread as feed for animals shall also be mentioned. This is a potentially good option especially in rural areas, but it is subject to several restrictions from the legislation, which could partially be overcome if the issue is tackled at the national level.

One point that emerged very clearly from our talks with national-level representatives of the CNA is that any action against food loss and waste must always consider an economic rationale. As emerged in the results of Task 3.2 in Italy, even if the surplus bread is reused

and reallocated to other purposes, very seldom this is reflected in the gain of additional profit. This is important, with respect to the current situation, as many small-scale bakeries are struggling to keep the profitability of their activity. In this sense, a strategy against bread waste at small-scale bakeries can be framed in a wider effort to improve the added value of the artisanal bread they produce, and to transfer this added value to customers. Implementing actions against bread waste can be part of this process, as giving more value to the product means to take care it is not spoiled, thus improving the economic profitability of these businesses, which represent a strategic asset for the territory.

Apart from these considerations, the upscaling of the roadmap at national level could also benefit from further discussion to identify additional solutions that have not been mentioned in the stakeholder dialogues. For this reason, an additional point to design a national strategy against bread waste would be to continue the discussion on bread waste reduction at a higher level.

To conclude, the success of a strategy against bread waste hinges on the collaborative efforts of bakeries, local stakeholders, local institutions, associations like the CNA, consumers, as well as national institutions. Each group has a unique and complementary role to play, creating a synergistic approach to tackling bread waste. This collective action can lead to more effective and sustainable solutions, aligning with broader environmental and social goals.

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