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Received: 19.10.2022
Acceptance: 30.11.2022
Published: 16.12.2022
JEL codes: L81, D13, O12

Annals PAAAE • 2022 • Vol. XXIV • No. (4)
License: Creative Commons Attribution 3.0 Unported (CC BY 3.0)
DOI: 10.5604/01.3001.0016.1148

ELŻBIETA GORYŃSKA-GOLDMANN

Poznan University of Life Sciences, Poland

BREAD AND OTHER BAKERY AND CONFECTIONERY PRODUCTS WASTE IN SELECTED RETAIL STORES

Key words: food waste, bread and other bakery and confectionery products, retail, reasons, waste prevention

ABSTRACT. In order to fill the knowledge gap on the reduction of losses and waste of bread and other bakery and confectionery products (BBCP) in the selected retail level, studies have been conducted to estimate the scale of waste of this type of food at retailers, cause of occurrence of such losses have been determined, along with methods of limiting and preventing this phenomenon. Data about the scale of losses have been collected by monitoring diary from the sample of small shops ($N = 5$), bakeries with own shops ($N = 5$). Additionally, data from a retail network ($N = 29$ shops) taken from the cash register system. The qualitative data came from 9 individual in-depth reviews with trade experts. The analysis of the data shows that the total volume of losses in BBCP trade in small shops was around 2 kg/week (excluding goods returned for reprocessing). Based on the value BBCP's losses in the retail network accounted for 42% of the total losses. Moreover, they reach 20% of the bakery & confectionery department turnover. The BBCP returns from trade to reprocessing were recorded at 8-10% of the average daily order value. The 3 main categories of causes behind this phenomenon have been: related to the organisation of the bakery section at the retailer, the manner of displaying products and human errors. The ways of preventing losses and waste in the examined product category have also been named. The obtained results can be used for developing programs and strategies to limit trade losses in bakery & confectionery sections. The examined product category should be understood as the main goal of indexation programs and other steps aiming to limit food waste.

INTRODUCTION

It is indeed necessary to focus on bakery and other confectionery products, since, apart from fruit and vegetables, this product category is subject to waste most often. To improve customer satisfaction, retailers prioritise their availability on shelves and a high diversity over other sales aspects. This policy, however, leads to increased volumes of food waste and in turn to greater damage in the environment, consequently resulting in economic losses and social pressure due to discarding edible food. These volumes make it necessary to monitor goals aiming at reducing food losses and waste in trade and at implementing relevant measures. To do this, however, it is necessary to have knowledge of what food is subject to losses and why. In central Italy, at a single supermarket (5,300 m²) the equivalent of 469 bread servings is wasted daily [Cicatiello et al. 2016]. In Great Britain, WRAP experts [2018] estimated that the surplus of bread unsold at the end of the day, including freshly baked bread, is 67.5 tons, accounting for 1/3 of total food waste in retail. Globally, around 14% of the produced food is lost between harvest and retail, while an estimated 17% of the total global food production is wasted (including 2% in retail) [UN 2022]. Calling on Eurostat data, Åsa Stenmarck with co-authors, estimated that the food wholesale and retail sector bears responsibility for 5% of food waste in UE. The results of the PROM¹ project confirmed a low share of food losses in Poland's wholesale and retail sector (6.9%). Despite the fact that the food waste indicator in retail is considered relatively low when compared to other sectors, much attention is paid to limiting this phenomenon's scale at the discussed level. Several aspects lie underneath [Mena et al. 2011, Cicatiello et al. 2016, 2017, Brancoli et al. 2019, Goryńska-Goldmann et al. 2021a, 2021b]:

- retailers operate as a link connecting producers, processing plants and/or distributors with consumers;
- their practices and strategies have a major impact on food losses and waste generation at the initial and later stages of the food delivery chain stages;
- the established product quality standards lead to the rejection of some products, further leading to food losses in previous links, e.g.: in processing;
- the traders' marketing activity often precludes customers' sustainable purchasing behaviours; special offers and marketing gimmicks, such as two for one, or the second one for one cent, various discounts and similar promotional tools, including aroma-marketing, all work to encourage customers to buy more food than they actually need, leading to food waste at home;

¹ Project conducted in 2018-2021, financed by the National Research and Development Centre as a part of the GOSPOSTRATEG project [<https://projektprom.pl/>].

- many food products recalled from retail are still edible for humans; in many cases such products can be used for charity purposes, leading to reduced food waste;
- the reverse flow of BBCP, from retail to bakeries, where such products are destroyed, are paid for by bakeries, which means that retailers are not motivated to reduce such reverse flow; although losses are created at the retail level, they are recorded, processed and paid for at production level².

Not enough analyses are carried out on the reduction of losses and waste of BBCP in retail. This paper contributes to the theory of retail operations by outlining problems and solutions allowing to reduce BBCP losses and waste in retail. The goal of the study was to: 1) attempt to estimate the scale of waste of bakery and other confectionery products in selected retailers; 2) identify, in a detailed manner, the potential causes behind them and 3) identify how to limit and prevent this phenomenon taking into account the selected product category.

MATERIAL AND METHODS OF RESEARCH

For purposes of this paper, the data depicting the phenomenon of losses and waste of BBCP were collected from selected retailers (operating in urban and rural areas), bakeries with their own shops and retail networks in 2020. The objects of the study were located in the Wielkopolska and Warmian-Masurian provinces. Following EU methodology, the study incorporates quantitative and qualitative approach³. The quantitative method used was used to estimate the scale of BBCP losses in retail stores, while qualitative methods identified their causes and ways to prevent them. Data on the magnitude of BBCP losses were collected from the monitoring diary at bakeries with their own stores (N = 5) and small rural stores (up to 50 m²) (N = 5). In the retail network (N = 29 own-stores), data was taken from the cash register system. The retail network running their own shops was engaged in collective purchasing, with the average size of a shop of 363 m² (from 154 to 884 m²). The common problem related to the food losses and waste is sensitivity these information for businesses. Since companies are unwilling to disclose such information, great efforts made during recruitment, to convince study participants that their information would remain anonymous and confidential. The data obtained from the retailers covered

² Shaping a contract and abusing negotiating leverage to determine the party responsible for loss management is a sensitive issue in the collaboration between bakeries and retailers. Bakeries and confectioneries collaborating with large retail networks are often forced to accept unsold products practically without any consequences.

³ Combining questionnaires with interviews results from assumptions developed under the annex to the Commission Delegated Decision (UE) 2019/1597 dated 03 May, 2019 [EC 2019].

information about the volume of BBCP returns to producers, storage losses shop losses, and the causes and ways of managing losses. Interviews with retail and processing experts were also conducted during the study. The selection of businesses for the study proved to be non-random. Individual, in-depth interviews were conducted, using a standard interview guidebook/questionnaire. The interviews were conducted with business owners or senior officers ($N = 9$). The content of the interviews covered following topics: the causes of BBCP losses, ways to reduce and prevent losses, and loss management practices. All collected data were transcribed and coded using QDA Miner software, LITE v2.0.8. The analysis of in-depth interviews followed the stages proposed by Robert Yin [2011, p. 178].

RESULTS

THE SCALE OF LOSSES AND WASTE OF BBCP IN SELECTED RETAIL STORES

To assess the total mass of losses, data were recorded in 5 small shops (up to 50 m²) located in rural areas, all belonging to one owner. Data were recorded throughout one year, weekly. Table 1 presents the food losses in total and with a distinguished category subject to examination. The annual BBCP losses were recorded at nearly 100 kg for a single, small shop, which translates to slightly over 8 kg monthly losses. That means a weekly average of 1.88 kg of BBCP losses for a single shop.

The data on the scale of losses of bread and other bakery and confectionery products were also obtained from a retail network with 29 own shops. In this case, the recording was carried out very in a very detailed manner, with specific types of products indicated. Based on the value BBCP's losses in the retail network accounted for 42% of the total losses. Moreover, in the bakery & confectionery department, reached 20% of the turnover value, putting the trade in these products in an unfavourable light in the perspective of estimates from other countries. These data were surprising, because a conclusion drawn from the in-depth interview with the department's head at the retail network was that once the losses exceed 4-5%, the operations department conducts talks, identifies the underlying causes (both with the suppliers and the staff of the own shops) and takes actions aiming to reduce the said losses.

According to the opinion of the representatives of the examined retailers (applies to small, franchise shops and to shops operating as a part of the network), attempts are made to minimise the losses in the bakery and confectionery department. Although not yet a common practice, procedures are being developed to limit this phenomenon, which also includes legally sanctioned activities aiming to prevent food waste [Journal of Laws, 2019, Item, 1680]. These activities are the responsibility of the network retailer's

Table 1. Declared volume and value BBCP waste in small, rural shops (up to 50 m²)

Scope	Total for 5 examined shops		1 shop	
	BBCP food losses [kg]	total food losses [kg]	BBCP food losses [kg]	total food losses [kg]
Annual	488.8 (purchase value 2,503.0 PLN)	1,098.0 (purchase value 11,673.0 PLN)	97.6	219.6
Monthly (average)	40.7	91.5	8.13 (from 2.0 to 12.1)	18.3 (from 12.7 to 24.4)
Weekly (average)	9.4	21.1	1.9 (from 0.5 to 2.8)	4.2 (from 2.9 to 5.6)

Source: own study

operating department (identification of any losses in the network's shops), following the assumption that food waste is monitored by the department closest to the shops (given their direct contact with the supplier). These tasks are usually performed by the owner and/or head manager in smaller shops.

The comparison of the authors' own studies with the results obtained by other researchers shows that any proportion/percentages identified by these individuals are often lower. Still, the authors of some publications emphasize that the data they present might be biased due to the scope of products returned to producers, which are not included in the records of food waste in their shops. The results of studies from other countries show large disproportions in the distribution of BBCP waste. In the case of retail, estimates of losses are presented from various perspectives, such as: mass, the value of sales, the number of delivered loaves. Some authors including or not returns for reprocessing, this is not always clearly determined in the papers. Sometimes the values of losses are not stated precisely, in which case it is not known whether the authors present the data qualitative or quantitative context. The estimated BBCP losses in retail are as follows (Table 2):

- around 30% of the total mass of losses (within the examined category),
- 3-14% of the total mass of losses for this category,
- 0.4-9.4% of the value of sales within a category,
- but are also expressed as 30% of the delivered loaves.

The conducted studies (at the level of processing and trade) showed that returns from trade establishments to bakery and confectionery producers are at 8-10% of the average, daily value of orders. Report Feedback and the Rockefeller Foundation [FRF 2017] showed that the irregularities in the operation of the market, resulting from insufficient

Table 2. Comparison of data on losses and waste of bread and other bakery and confectionery products (BBCP)

Literature	Country/ subject of study	Estimates
Cicatiello et al. [2017]	Italy	30.6% of total waste mass, bread accounted for 70% of all recoveries, totalling more than 50 kg/day
Brancoli et al. [2017]	Sweden/ 1 smkt** 410 m ²	22.5 tons/year (including 30% share of bread and 12% share of pastry in total losses), 27% – total loss (mass), 3% – bread loss rate in store (total mass loss)
Eriksson et al. [2017]	Sweden/ 6 smkt	5-14% of mass supplied, bread returns vary in facilities, can be more than 50%
Lebersorger & Schneider [2014] by EHI [2011]*	Germany	6.5% – losses within the bake-off category, 1% – bread loss rate in store, 10.4% – returns to processing
Brancoli et al. [2019]	Sweden	6.7 tons/year (packaged and bake-off type, excluding crispy), 8.5% volumes of bread delivered within the bake-off category, 8.8% of the total mass delivered – returns to processing, structure of losses: - 39% returns to processing, - 7% – private label, - 24% – under the category bake-off, - 30% – production
Mena et al. [2011]*	Spain/ 1 shop	> 7% share in the structure of wasted food
Beretta et al. [2013]	Switzerland/ 1 smkt	3-7% (averaged 5.1%) the quantity of bread and pastry sold, total food waste rates at supermarkets are estimated as 5% by volume for bread

Table 2. Cont.

Literature	Country/ subject of study	Estimates
Stensgård & Hanssen [2016]	Norway	9.4% of sales value, fresh bread the category with the highest percentage of waste
Holweg et al. [2016]	Literature review	0.4-9.6% of sales value bread & pastry, in addition returned bread & pastry to supplier: - 7.5-15.1% of sales value
Lebersorger & Schneider [2014]	Austria/ 1 smkt	food loss rates (by value) 2.8% for bread and pastry, returned bread amounts to additional 9.7% of the sales of bread & pastry
Bilska et al. [2020]	Poland retail network	1.3% of total food products were unsold products, (bread and bakery products accounted for 1/5 of unsold food)
Cicatiello et al. [2017]	Italy/ 1 smkt	70.6 tons of food/year (worth about 170,000 €), mainly bread and fresh fruits and vegetables (averaged: 0.22 kg/day)
Cicatiello et al. [2016]	Italy/ 1 smkt 5,300 m ²	23.5 tons/year (70% bread), the largest fraction in total losses
Bilska et al. [2018]	Poland/ retail network	3.3 tons/2 weeks (including the share of baked goods at 9% – about 0.15 tons/1 week – more than 21 kg/day)
Ghosh & Eriksson [2019]	Sweden	30% of supplied bread loaves
Goryńska- Goldmann [2022] The current study	Poland	small store (up to 50 m ²): - averaged: 97.6 kg/year – 8.13 kg/month – 1.88 kg/day not including returns (with a value of purchase of around 2,503 PLN/year), retail network (N = 29 own-stores): - 42% of the value of total losses, - 20% of the turnover values the bakery & confectionery department

* No details about the quantity or value of losses

** smkt – supermarket

Source: own study

supervision and regulation, where larger retailers can enforce how market competition is shaped and transfer the risk and costs upstream were already noted. It was found that the concentration of power in the food industry allows larger retailers to dictate conditions and force the suppliers to waste food as a result of strict specifications and reject food in an unfair manner. This is yet another document that confirms that it is retailers who usually set trade standards and purchase contract stipulations and it is mostly suppliers who bear the costs of waste, tempting them to abuse the position. The supermarkets' power allows them to exert pressure on their suppliers and middlemen who bend to accommodate the ever changing needs and requirements. The value of variables such as the legislature, insufficient marketing, communication and distribution processes were previously noticed by Helén Williams and Fredrik Wikström [2011], among else.

THE CAUSES OF LOSSES AND WASTE OF BBCP IN RETAIL

A diagnosis of causes behind the losses and waste of food and a strategy for reducing this phenomenon are needed to limit food waste. To determine the causes of BBCP losses in retail, the authors examined the results of qualitative studies and the material obtained from interviews with senior management staff. Using the collected material, BBCP losses were divided into three categories:

- 1) losses related to the organisation of the bread department in a shops,
- 2) the manner of displaying products,
- 3) human errors.

A major cause behind BBCP waste is improper work organisation and lack of clear assignment of responsibility for the problem. According to the respondents, some shops do not monitor the waste of BBCP, which they consider to be the reason making it completely impossible to limit such waste. Products are wasted also because shops lack sufficient technical facilities and conduct their trade operations improperly, which includes incorrect defrosting of products in shops, storing bread for in-store baking against the principles of hygiene and producer's recommendations, and wrong marking of collective packaging.

With regard to the causes related to the manner of displaying products, the interviewed individuals emphasised that the waste of the examined product category is aggravated by poorly organised and placed racks. Emphasis was put on failing to maintain cleanliness and order in the shopping area and in the warehouse, resulting in the products becoming dirty or physically damaged and unfit for sale.

Human errors emphasised by the respondents may be related to the failure to maintain cleanliness in POS area and insufficient control of the time the products spend in the shop, leading to the presence of expired products (failure to follow FIFO). Speaking of shops which bake refrigerated dough, the respondents showed that the employees' complete lack of or insufficient knowledge of the instructions for in-store baking, along with incorrect storage and handling of the baking process would prove to be a problem.

According to the opinion of the respondents (both small, franchise shops and shops operating as a part of the network), attempts are made to minimise the losses in the bakery and confectionery department.

The results of a study for Poland, conducted as part of the PROM project, show that mechanical damage to the packaging, inadequate storage conditions or interruption of the cold chain in a retail sector are not significant determinants of BBCP waste. The most common cause of BBCP waste in the retail is the rapid loss of freshness of these products, exceeding the best-before date / minimum shelf life date (e.g.: packaged, toasted bread) [Elbe 2020]. Retailers face a trade-off between increasing shelf appeal (larger assortment, high inventory) and minimizing the environmental, social and financial impact of overstocking [Riesenegger, Hübner 2022]. Resolving this dilemma is particularly difficult in the case of BBCP. Results from Lena Riesenegger and Alexander Hübner [2022] indicate that up to one in four products in this category may remain unsold after store opening hours.

POSSIBILITIES OF TAKING ACTIONS TO LIMIT BBCP LOSSES AND WASTE IN RETAIL

The preferred ways of managing losses and waste in the examined shops consisted in:

- 1) making returns to suppliers,
- 2) offering discounted products to customers,
- 3) using them for social purposes and redistribution to the needy through public benefit organisations,
- 4) disposing of products (random events).

The monitoring of the quantity and causes of losses and waste of BBCP should be carried out during all unit-level operations in a shop. Businesses may take preventative and corrective measures to reduce the scale of this phenomenon. The identified activities are presented in relation to individual stages/operations of retailers (Table 3).

Table 3. Limiting the losses and waste of BBP at retailers in the aspect of waste risk

Stage	Risk	Causes	Consequences	Methods of prevention/correction
Goods acceptance	Goods that fail to satisfy quality criteria.	No control over accepted goods. No temperature control. Unspecified quality requirements for suppliers (e.g. shelf life). Lack of qualified, tested, regular suppliers, ineffective delivery control or no delivery control. Delays in placing goods in correct storage or display conditions. Improper goods handling. No stock and food losses monitoring. Excessive quantities of ordered product types.	Products failing to satisfy quality requirements – irregularities may be noticed when putting the products on display or by customers – resulting in complaints. <i>Storage losses</i>	1. Detailed control and evaluation of the suppliers of goods – qualification and selection of suppliers. 2. Each delivery controlled by trained, qualified employees; quality complaints filed with the supplier in case of irregularities. 3. Training for employees and building awareness. 4. Ensuring adequate infrastructural resources – racks, shelves, counters, refrigerated counters. 5. Maximal reduction of delivery unloading time – prompt placement in refrigerated counters and fridges. 6. Ensuring adequate equipment – transport carts. 7. Monitoring returns and adjusting the ordered volumes to the indicated demand – stock and sales analysis.
Goods storage – storage room	Improper conditions of storage of goods. Interrupted supply of utilities and equipment defects. Unqualified and untrained employees. Secondary impurities.	Unsupervised storage conditions (temperature, humidity), storage areas failing to satisfy sanitary and health requirements. Failure to follow FIFO. Improper sanitary condition of equipment, fridges and storage cabinets. Careless goods handling. Employees lacking personal hygiene. No pest control.	Reduced quality, damage or spoiling of goods. Reduced shelf life and use-by date. Complete damage of goods rendering them unfit for sales. Secondary contamination. <i>Storage losses</i>	1. Supervision over storage conditions – temperature and humidity control in the storage room, cooling system control. 2. Supervision over equipment – inspections, maintenance activities. 3. Power generators in place or establishing an alternative way of protecting the goods (applies to goods that must be refrigerated). 4. Protecting the storage room from pests – applying preventative measures (disinfection, pest and rodent control). 5. Observance of FIFO. 6. Training for employees and building awareness. 7. Supervision over the infrastructure and control/measuring equipment. 8. Medical examinations for employees. 9. Providing employees with facilities for washing and disinfecting hands, personal protective equipment, e.g. nitrile rubber gloves, hairnets.

Table 3. Cont.

Stage	Risk	Causes	Consequences	Methods of prevention/correction
Display – shopping area	<p>Improper conditions of displaying goods in the shopping area.</p> <p>Interrupted supply of utilities and equipment defects.</p> <p>Unqualified and untrained employees.</p> <p>Secondary impurities.</p>	<p>No supervision over display conditions or improper display (e.g. leading to deterioration of goods quality due to detrimental behaviour of customers). Display conditions failing to satisfy sanitary and health requirements.</p> <p>Failure to observe the “always forward” principle when displaying the goods.</p> <p>Improper sanitary condition of shelves, racks, counters and fridges when displaying the goods.</p> <p>Lack of proper equipment, gloves, materials for handling the products.</p> <p>Employees lacking personal hygiene.</p> <p>No pest control.</p>	<p>Reduced quality, damage or spoiling of goods. Reduced shelf life and use-by date. Complete damage of goods rendering them unfit for sales.</p> <p>Secondary contamination.</p> <p>Customer's resignation from purchasing the goods.</p> <p><i>Shop losses and customer complaints</i></p>	<ol style="list-style-type: none"> 1. Supervision over display conditions – temperature and humidity control in appliances and the shopping area, cooling system control. 2. Supervision over equipment – inspections, maintenance activities. 3. Power generators in place or establishing an alternative way of protecting the goods (applies to goods that must be refrigerated). 4. Protection from pests – applying preventative measures (disinfection, pest and rodent control). 5. Correct display. Observing the “always forward” principle. 6. Training for employees and building awareness. 7. Supervision over the infrastructure and control/measuring equipment. 8. Medical examinations for employees. 9. Providing employees with facilities for washing and disinfecting hands, personal protective equipment, e.g. nitrile rubber gloves, hairnets. 10. Providing customers with personal protective equipment. 11. Providing adequate packaging for products available to customers and adequate unit packaging used in shops. 12. Control of use-by dates and applying discounts before expiry. 13. Applying discounts for bread and other bakery and confectionery products 14. Promotional and information activities for customers on the possibility of repurposing old bread and other bakery and confectionery products, encouraging them to reduce the quantity of wasted food (e.g. in shops, social media). 15. Deep discounts for damaged goods. 16. Daily returns of the goods to the supplier for repurposing as fodder or biomass. 17. Redistribution of food for social needs as a way of using unsold, but otherwise uncompromised goods approaching expiry date.

Source: own study [Wróblewski 2015, PTTZ 2022]

CONCLUSIONS

The conducted study allowed to show the scale of BBCP waste at retailers. Less than 2 kg of weekly losses (excluding returns for reprocessing) were identified in smaller, rural shops (up to 50 m²). The retail network with 29 own shops (average area over 360 m²) recorded losses at 42% of the value of total losses, with 20% of the turnover values of bakery and confectionery department, putting the trade in these products in an unfavourable light in the perspective of estimates from other countries. These products should still be understood to be the main goal of indexation programs and other steps aiming to limit food waste.

The results of the quantitative study allowed us to identify potential risks in shops, and thus causes and consequences of BBCP losses and waste, along with methods of preventing them and recommendations of specific intervention activities.

The results of this study are important for designing preventative actions by creating a venue for future monitoring of shop losses and food waste, a more sustainable management of resources in retail, support for political actions and educational intervention projects. In the future, when studying shop losses and BBCP waste at retailers, a decision should be made whether to include or disregard the volumes of losses generated due to returns of such products from retailers to their producers and suppliers. It is necessary to continue efforts to develop tools for reliable and effective combating of food waste. There is a need to build deeper relations and seek common ground for joint initiatives aiming to minimise waste between food retailers and suppliers, organisations engaged in the redistribution of food for social purposes, public administration and commune self-governments.

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MARNOWANIE PIECZYWA I POZOSTAŁYCH WYROBÓW PIEKARSKO-CUKIERNICZYCH W WYBRANYCH PLACÓWKACH HANDLU DETALICZNEGO

Słowa kluczowe: marnowanie żywności, pieczywo i pozostałe wyroby piekarsko-cukiernicze, handel, przyczyny, zapobieganie marnowaniu

ABSTRAKT

W celu wypełnienia luki w wiedzy z zakresu redukcji strat oraz marnotrawstwa pieczywa i pozostałych wyrobów piekarsko-cukierniczych (BBCP) na poziomie handlu detalicznego przeprowadzono badania, mające na celu oszacowanie skali marnotrawstwa tej żywności w wybranych placówkach handlowych. Określono także przyczyny ich występowania oraz sposoby ograniczania i zapobiegania temu zjawisku. Dane o skali strat z małych sklepów ($N = 5$) i od właścicieli piekarni z własnymi sklepami ($N = 5$) zebrano stosując dziennik pomiaru, a z sieci handlowej ($N = 29$ sklepów własnych) pobrano je z systemu kasowego. Danych jakościowych dostarczyło 9 indywidualnych wywiadów pogłębionych z ekspertami z handlu. Z analizy danych wynika, że łączna skala strat w handlu BBCP w małych sklepach osiągnęła wartość około 2 kg/tydzień (nie włączając zwrotów do przetwórstwa). W ujęciu wartościowym straty BBCP w sieci handlowej stanowiły 42% wartości całkowitych strat. Natomiast w odniesieniu do wartości obrotu w ramach działu pieczywo/cukiernia wyniosły 20%. Zwroty BBCP z handlu do przetwórstwa osiągały do 8-10% średniej dziennej wartości zamówienia. Zidentyfikowano 3 główne kategorie przyczyn tego zjawiska, tj.: związane z organizacją działu pieczywa w jednostce handlowej, sposobem ekspozycji produktów i błędami ludzkimi. Wskazano także sposoby zapobiegania stratom i marnowaniu badanej kategorii produktów. Uzyskane wyniki mogą być wykorzystane do opracowania programów i strategii ograniczających straty w handlu na dziale pieczywo/cukiernia. Badaną kategorię produktową należy uznawać za główny cel programów waloryzacji i innych środków mających na celu ograniczenie marnotrawienia żywności.

AUTHOR

ELŻBIETA GORYŃSKA-GOLDMANN, PHD

ORCID: 0000-0002-0884-4772

Poznań University of Life Sciences, Poland

Department of Economics and Economics Policy in Agribusiness

28 Wojska Polskiego St., 60-637 Poznań, Poland

e-mail: gorynska-goldmann@up.poznan.pl

Proposed citation of the article:

Goryńska-Goldmann Elżbieta. 2022. Bread and other bakery and confectionery products waste in selected retail stores. *Annals PAAAE XXIV* (4): 65-79.