

*Analysis of the scale of losses and food waste
for an SME enterprise in the bread and bakery
industry in Lower Silesia – a case study*

CircE – European Regions toward Circular Economy

Project Partner Meeting



Date: 13.07.2022 Venue: Concordia Design Wrocław

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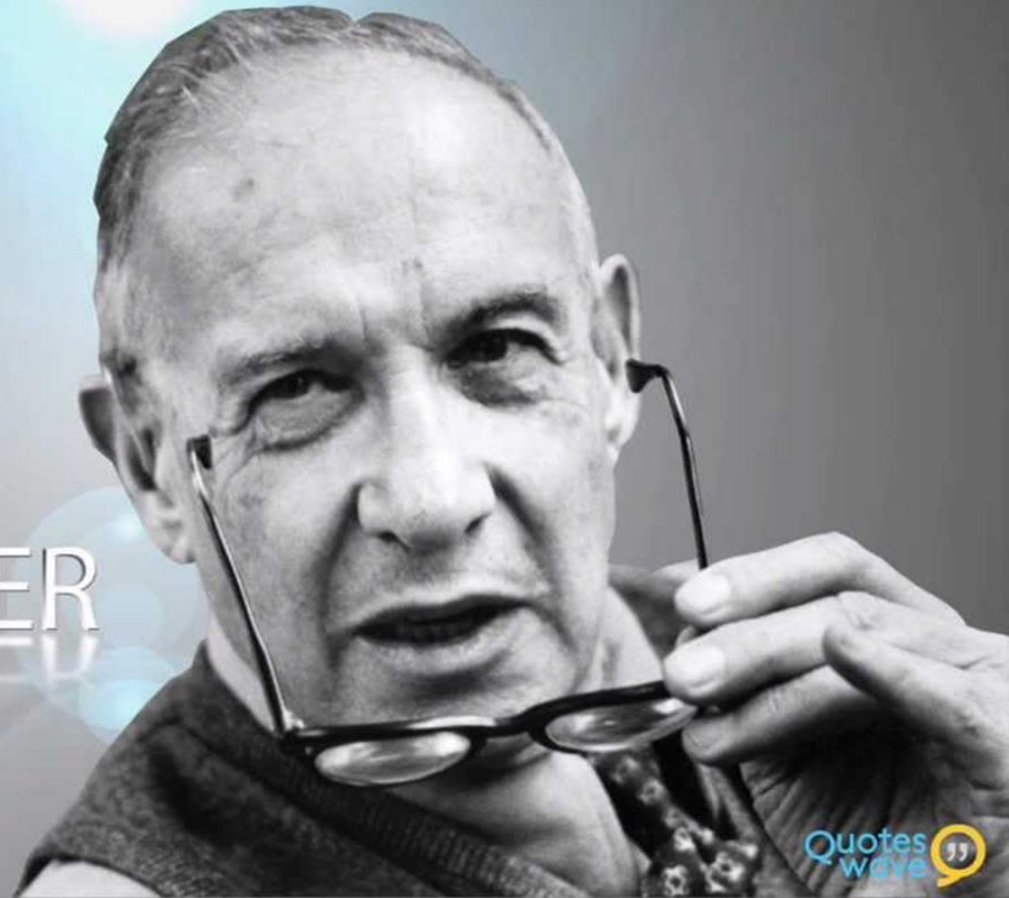
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 -  production and retail: bread and bakery losses: case study
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Key importance: measure

**"If you can't measure it,
you can't manage it".**

PETER DRUCKER




American Businessman
(1909-2005)



Quotes
wave

Goal and Scope

Project aim:

- analysis the scale of food waste generation in the bakery and confectionery industry in the Lower Silesian Voivodeship
- based on a selected SME enterprise (case study)
- taking into account:
 -  the impact of the COVID-19 pandemic
 -  review of implemented solutions
 -  recommendations for companies from the bread and bakery industry and for public institutions

Methodology

Case study (1 bakery and 40 related retail points):

- monitoring during 1 week:



losses during storage



losses during production



losses during transport



losses in retail

- amounts in numbers and mass of the complete assortment

Lower Silesia cereals-bread and bakery value chain

- previous studies (PROM project)

- previous own studies



waste sorting analyses: residua and biowaste



food wastage studies in kindergartens and hotels

- statistical data

Methodology

Analysis of the bread and bakery industry

- literature study
- analysis of best practices
- interviews



the owner of the analysed bakery



the production manager of the analysed bakery



5 shops selling products of the analysed bakery



6 other retail points



2 other bakeries



Food Bank Wrocław



REBREAD, Cracow



Lower Silesian Guild of Bakers and Confectioners, Wrocław






FoodSharing Wrocław



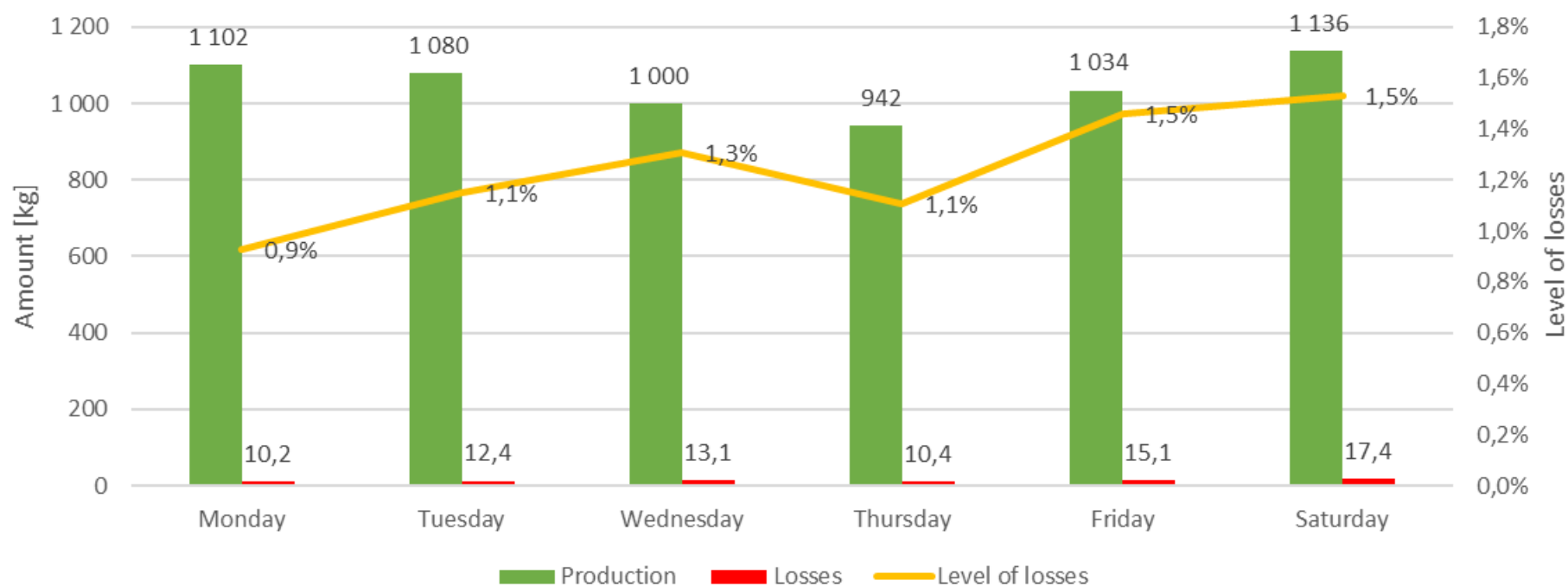
Results

Production and retail: bread and bakery losses in selected SME

Traditional, family-owned medium sized bakery

- Delivery to 40 points of sale
- Traditional baking: no additives
- Ovens are wood pellet fired
- Owner at retirement age:
no need for expansion/investment/anything new
- Assortment
 -  21 types of bread
 -  20 types of rolls
 -  24 types of pastry products
- Monitoring: 1 week, all related points of sale

Case study: losses in production 23.-28.05.2022

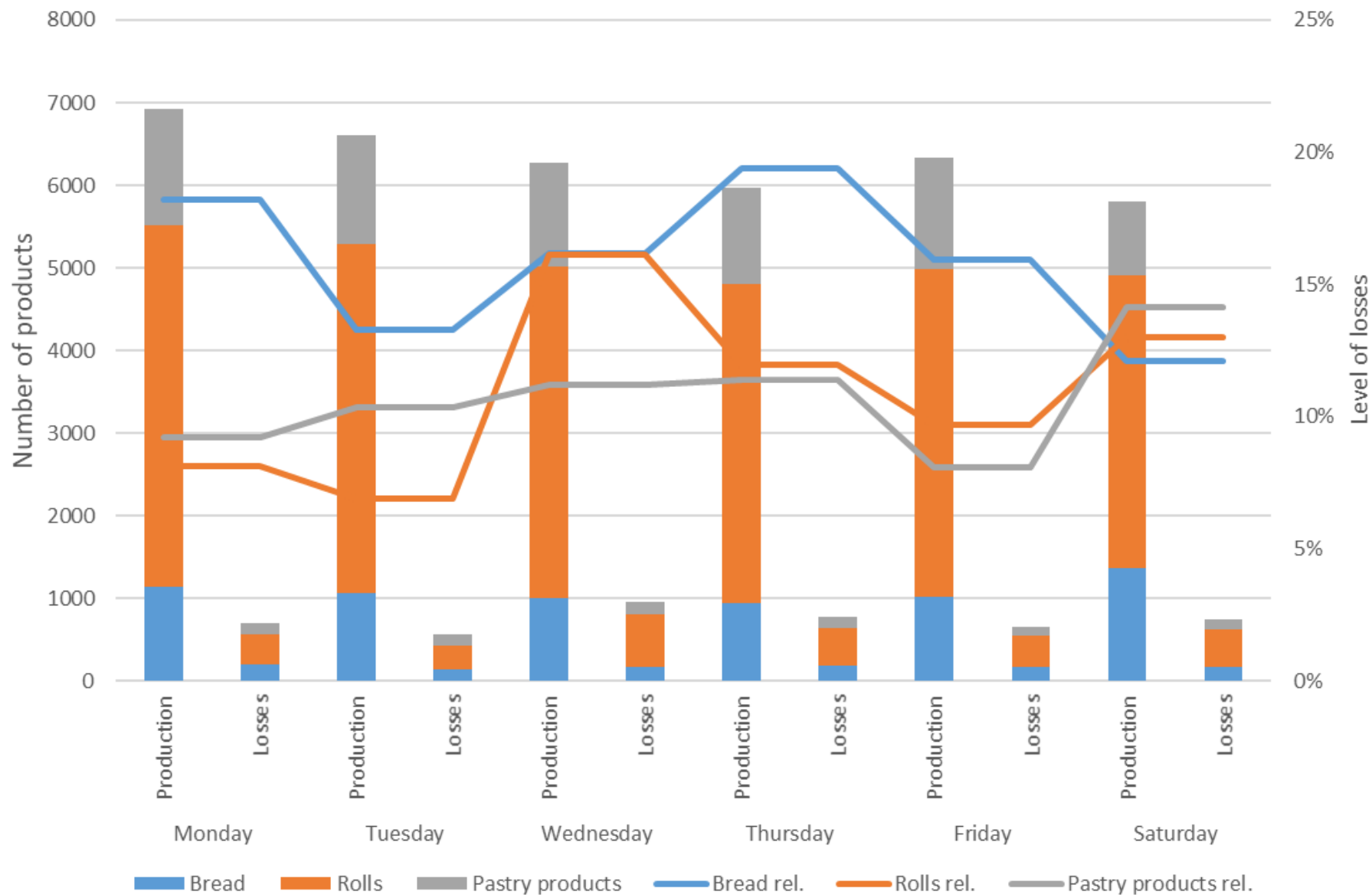


Weekly total: 78,6 kg or 1,25% of the total production

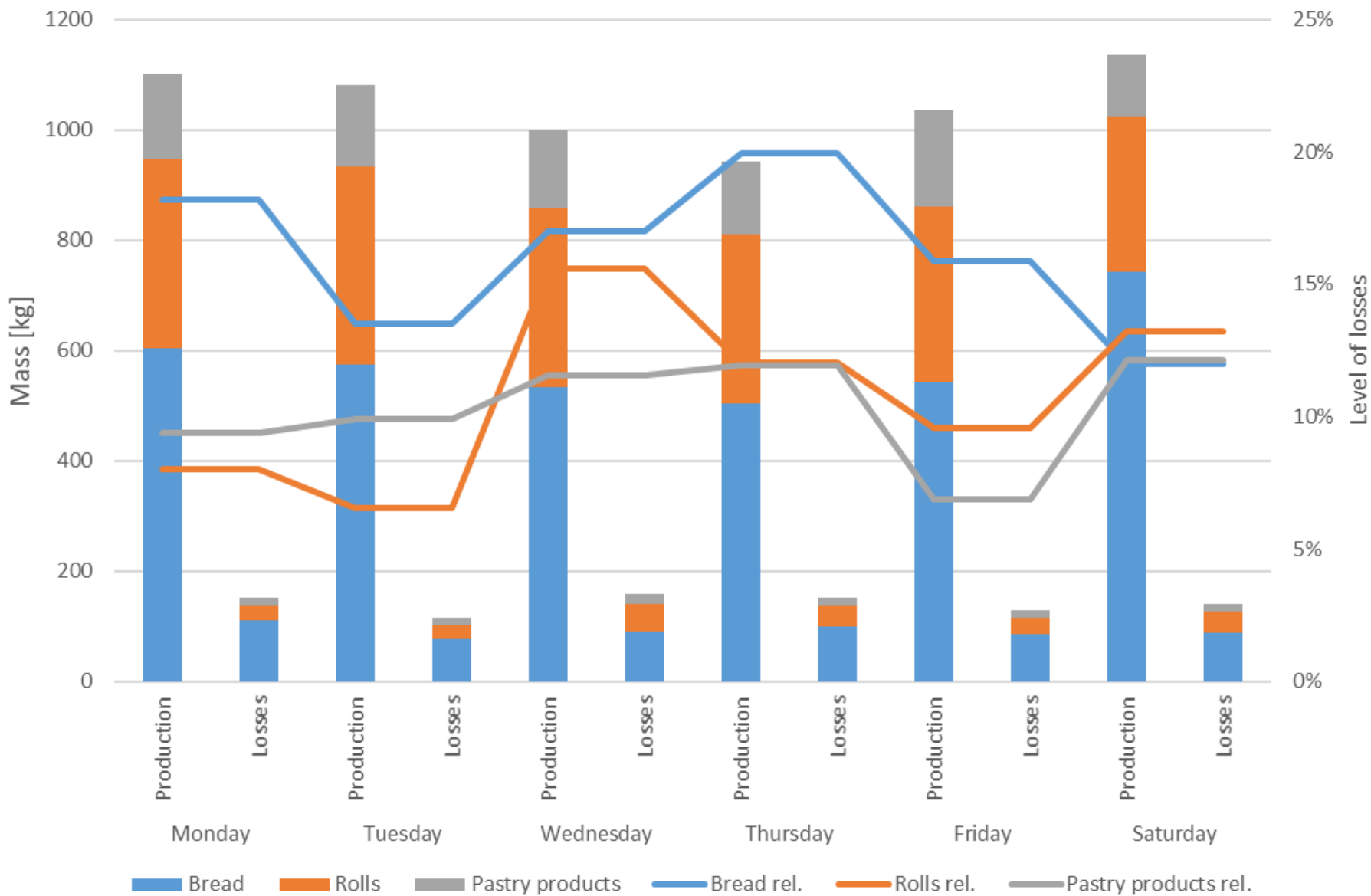
Losses in storage: negligible

Losses during transport: negligible

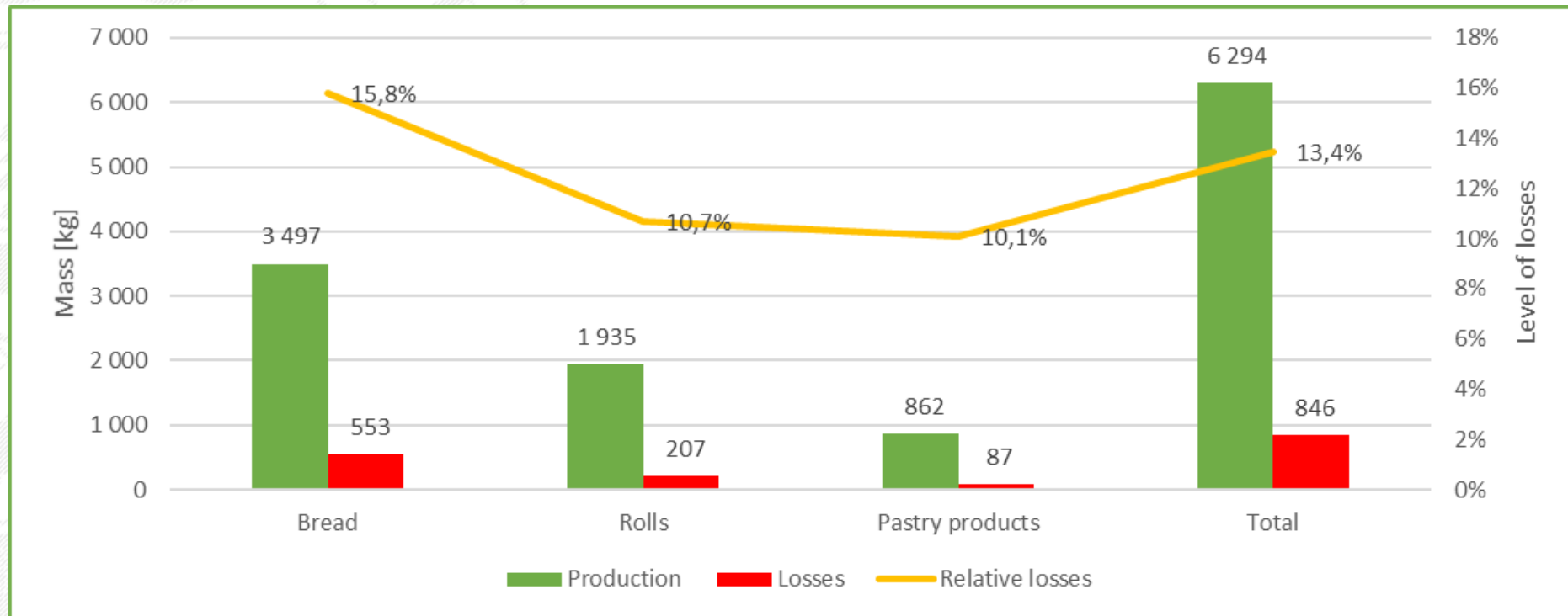
Case study: Bread and Bakery production and retail losses (unsold products) 23.-28.05.2022



Case study: Bread and Bakery production and retail losses (unsold products) 23.-28.05.2022



Case study: Bread and Bakery production and retail losses (unsold products) 23.-28.05.2022, weekly total



In short:

- retail losses 846 kg or 13,4% of the total production
- yearly total: 44 t (+ 4 t in production)
- financial loss: 100 000 Euro (472 th złoty)
- per sales point: 3,5 kg/d; 21 kg/wk; 1,1 t/yr

Bread and Bakery value chain: **production**

2020	Sales Poland		
	[kg/inh.month]	[kg/inh.yr]	[th. t/yr]
Bread+Rolls	2,75	33,0	1 263
Other bakery products	0,99	11,9	455
Total	3,74	44,9	1 717

2020	Sales Lower Silesia		
	[kg/inh.month]	[kg/inh.yr]	[th. t/yr]
Bread+Rolls	2,34	28,1	81
Other bakery products	0,96	11,5	33
Total	3,3	39,6	115

- Strong decline (bread p.p.: 2000: 79 kg/yr; 2020: 33 kg/yr)
- Elderly eat more
- In 2020 increase of flour sales (+19%; Covid)

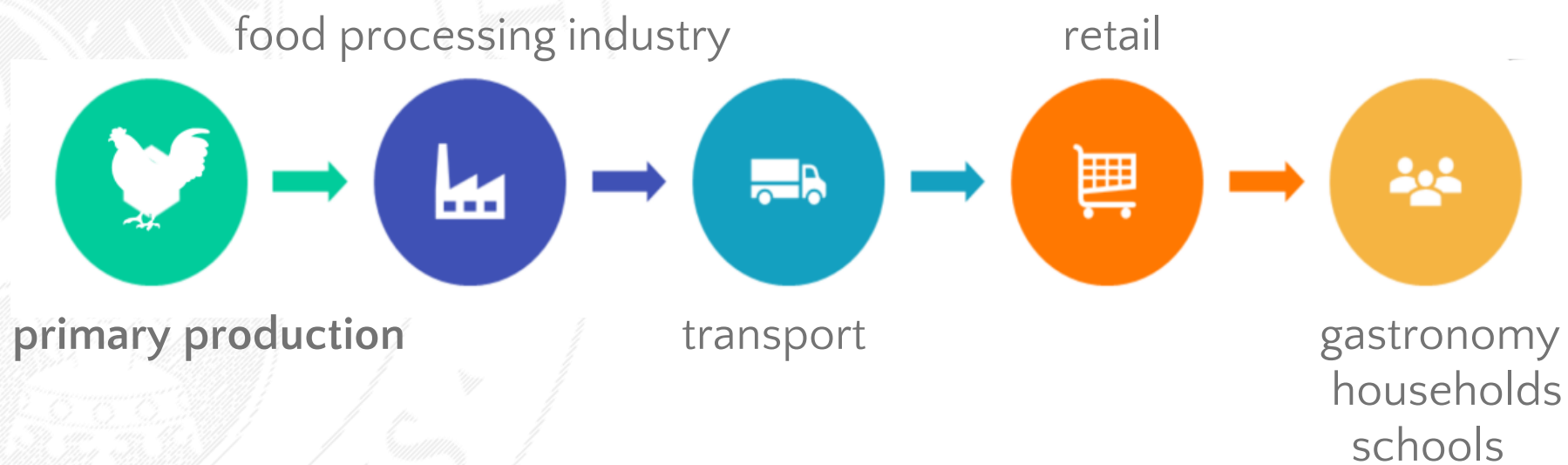
Retail: Bread and Bakery losses (unsold products)

2020	Losses Poland		
	[kg/inh.month]	[kg/inh.yr]	[th. t/yr]
Bread+Rolls	0,38	4,6	177
Other bakery products	0,10	1,2	46
Total	0,48	5,8	222

2020	Losses Lower Silesia		
	[kg/inh.month]	[kg/inh.yr]	[th. t/yr]
Bread+Rolls	0,33	3,9	11,4
Other bakery products	0,10	1,2	3,4
Total	0,42	5,1	14,7

- Bread and Rolls: 14,0% of losses in retail
- Other bakery products: 10,1% of losses in retail

Food losses in the Polish cereals value chain

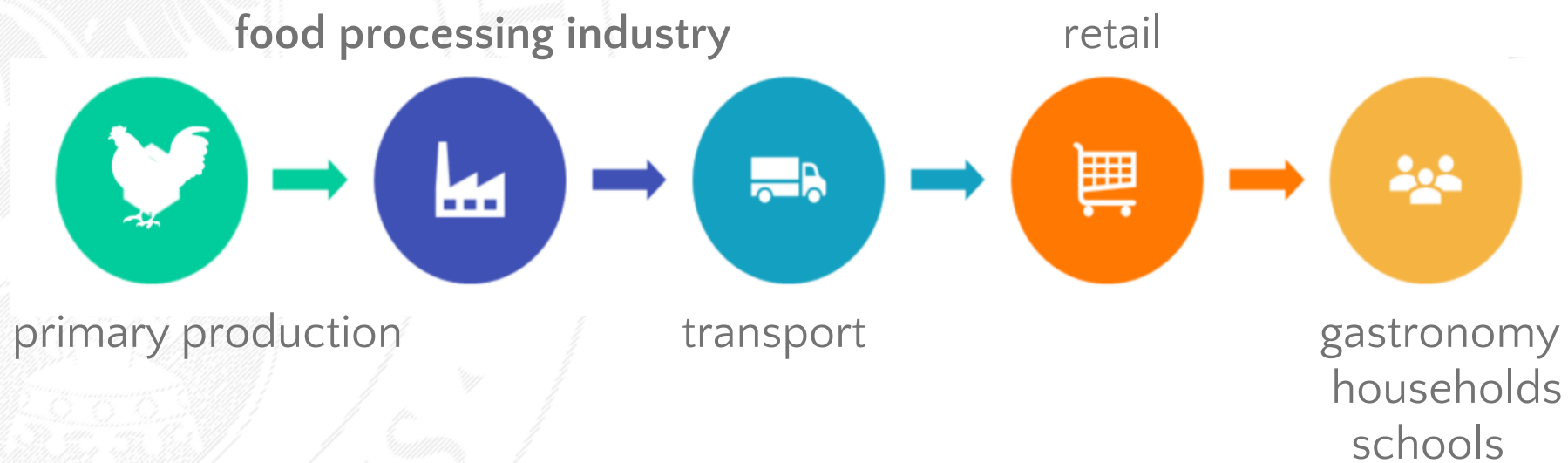


Food losses in agriculture – consumption cereals

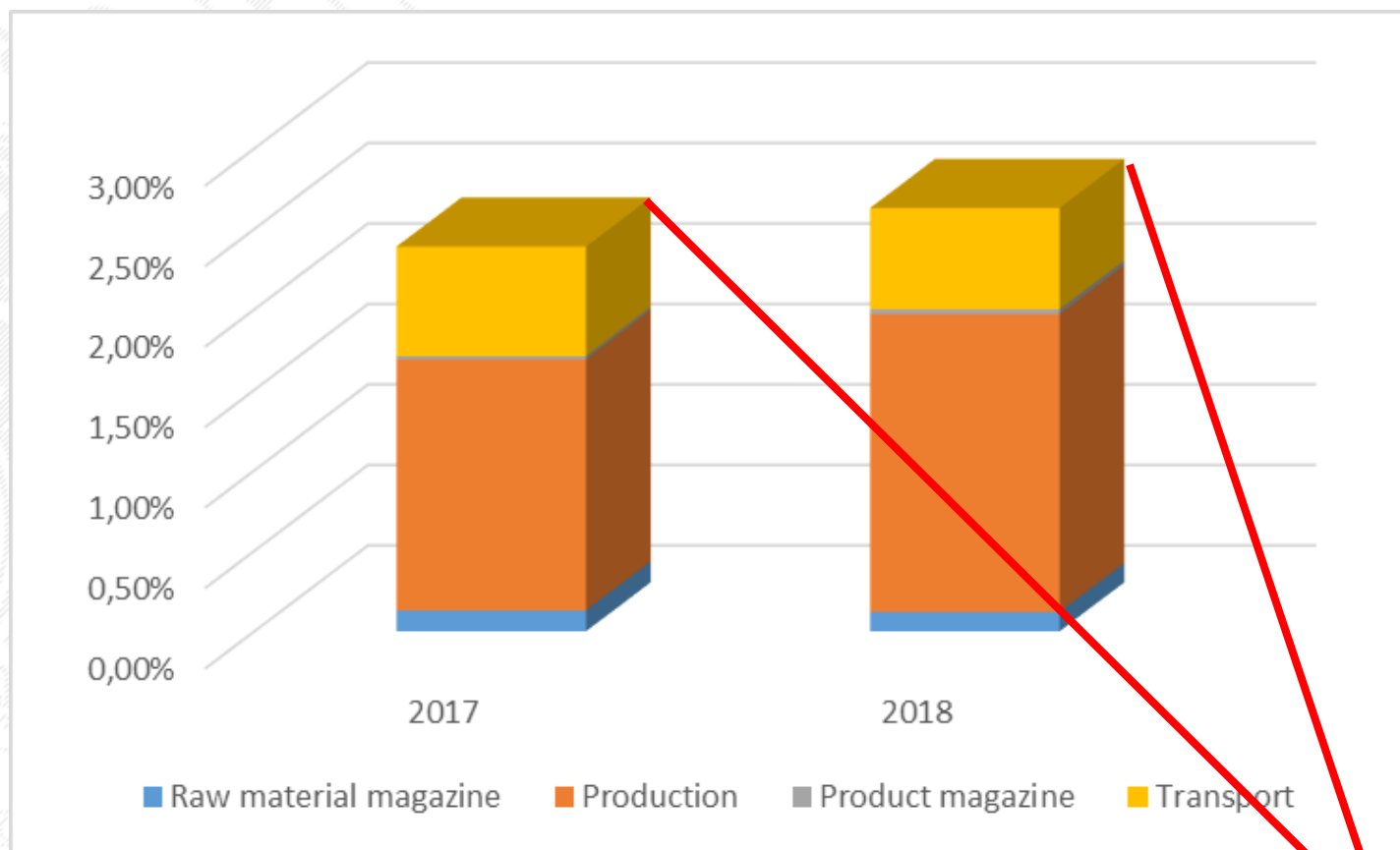
- 1,7% average losses in 2017–2018 (at farms, including transport & storage)
- 29% of the overall losses in primary production
- 217 thous. t/yr

	Poland		Lower Silesia	
	[t/yr]	[kg/inh.yr]	[t/yr]	[kg/inh.yr]
Consumption cereals	217 000	5,7	19 000	6,6

Food losses in the Polish cereals value chain





Food losses in bread and bakery production



- 307 thous. t in 2017; 263 thous. t in 2018
- 8,1 kg/inh in 2017; 6,9 kg/inh in 2018

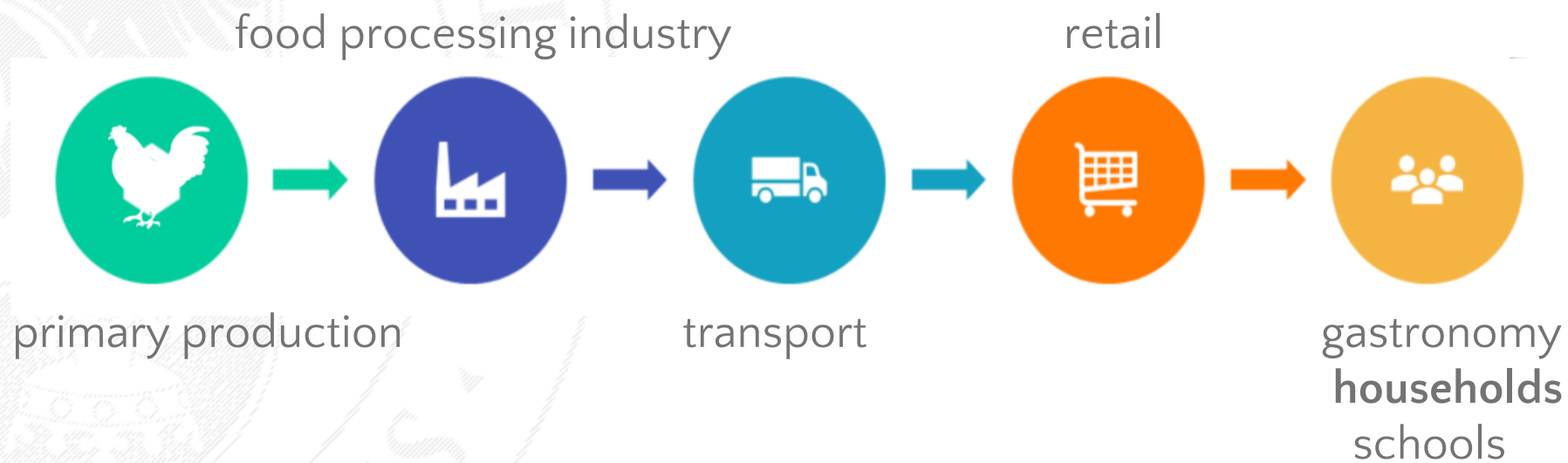
This implies a production of 12,8 and 10,0 mio. t

Food losses in bread and bakery production

- Considered level of losses in production: 2,5% (case study: 1,3%, excl. storage and transport)
- Actual production level:
 -  bread and rolls: 1,47 mio t/yr
 -  other bakery products: 0,37 mio t/yr

	Poland		Lower Silesia	
	[t/yr]	[kg/inh.yr]	[t/yr]	[kg/inh.yr]
Production losses	44 425	1,2	3 365	1,2

Food losses in the Polish cereals value chain



Bread and bakery wastage in households

Residual waste composition

City of Wrocław (641.000 inhabitants)	share of housing [%]	kitchen waste [%]	avoidable kitchen waste [%]	bread and bakery [%]	total share bread and bakery in residual waste [%]
One family housing	22%	28,1%	33,7%	29,5%	2,8%
Multi family housing	38%	30,4%	28,7%	34,7%	3,0%
Centre	40%	23,1%	22,9%	29,5%	1,6%
City total	100%				2,4%

City of Opole (128.000 inhabitants)	share of housing [%]	kitchen waste [%]	avoidable kitchen waste [%]	bread and bakery [%]	total share bread and bakery in residual waste [%]
One family housing	19,5%	8,9%	50,9%	20,6%	0,9%
Semi-blocks	19,5%	21,1%	50,4%	24,6%	2,6%
Blocks	61,1%	17,2%	50,2%	27,5%	2,4%
City total	100%	16,3%	50,4%	25,4%	2,1%

Bread and bakery wastage in households

Biowaste composition

Żary-Żagań, 4 towns, 4 village communes (96.000 inhabitants)		kitchen waste [%]	avoidable kitchen waste [%]	bread and bakery [%]	total share bread and bakery in biowaste [%]
One family town		44,1%	10,9%	33,1%	1,6%
Multi family town		57,6%	15,5%	21,4%	1,9%
Village		57,8%	15,7%	19,7%	1,8%

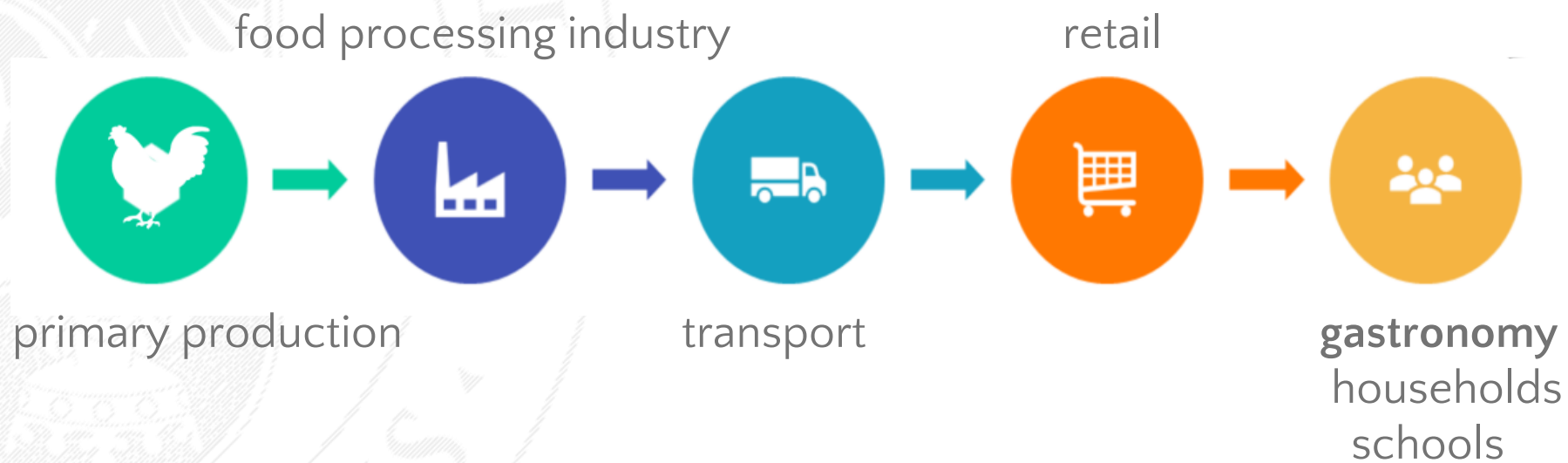
City of Opole (128.000 inhabitants)	share of housing [%]	kitchen waste [%]	avoidable kitchen waste [%]	bread and bakery [%]	total share bread and bakery in biowaste [%]
One family housing	19,5%	18,6%	34,0%	9,5%	0,6%
Semi-blocks	19,5%	44,4%	25,3%	14,2%	1,6%
Blocks	61,1%	40,1%	42,5%	9,4%	1,6%
City total	100%	36,6%	37,5%	10,2%	1,4%

Bread and Bakery wastage in municipal waste

Poland 2020	Collected [t/yr]	Bread content [%]	Bread wastage [t/yr]	Bread wastage [kg/inh.yr]
Biodegradable waste	1 610 035	1,6%	25 761	0,7
Residual waste	8 142 334	2,3%	187 274	4,9
Total			213 034	5,6

Lower Silesia 2020	Collected [t/yr]	Bread content [%]	Bread wastage [t/yr]	Bread wastage [kg/inh.yr]
Biodegradable waste	123 280	1,6%	1 972	0,7
Residual waste	766 743	2,3%	17 635	6,1
Total			19 608	6,8

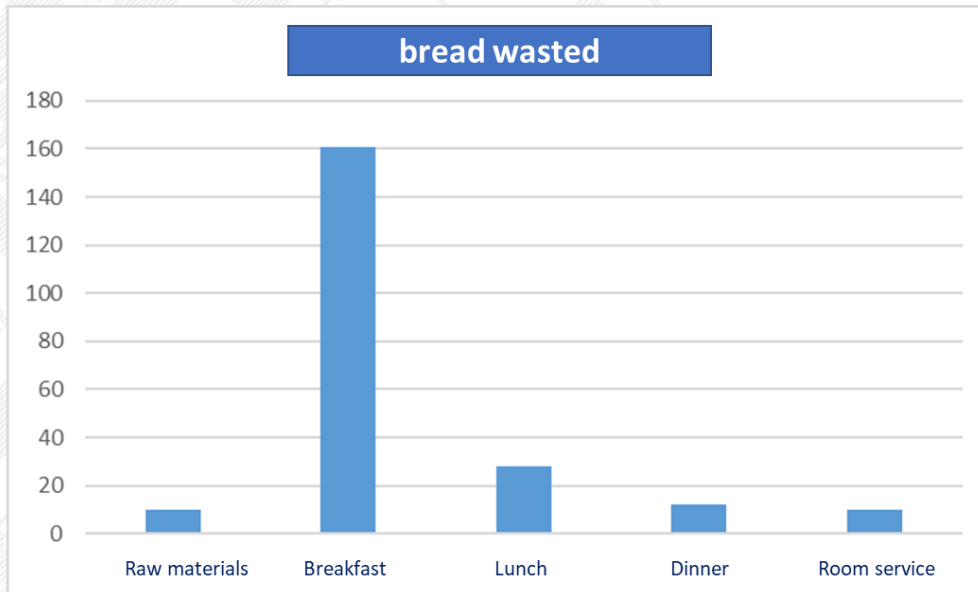
Food losses in the Polish cereals value chain



Bread and bakery wastage in gastronomy

250-room hotel – how much bread is wasted

1 roll=0,06 kg;
10cm



22 days of measurement – how much wasted:

221 kg

On average/day=10 kg

Forecast – 1 month

310 kg

Forecast – 1 year

3 650 kg

22 days

221 kg



3 683 pieces



368 m

1 month

310 kg



5 166 pieces



500 m

1 year

3 650 kg



60 833 pieces

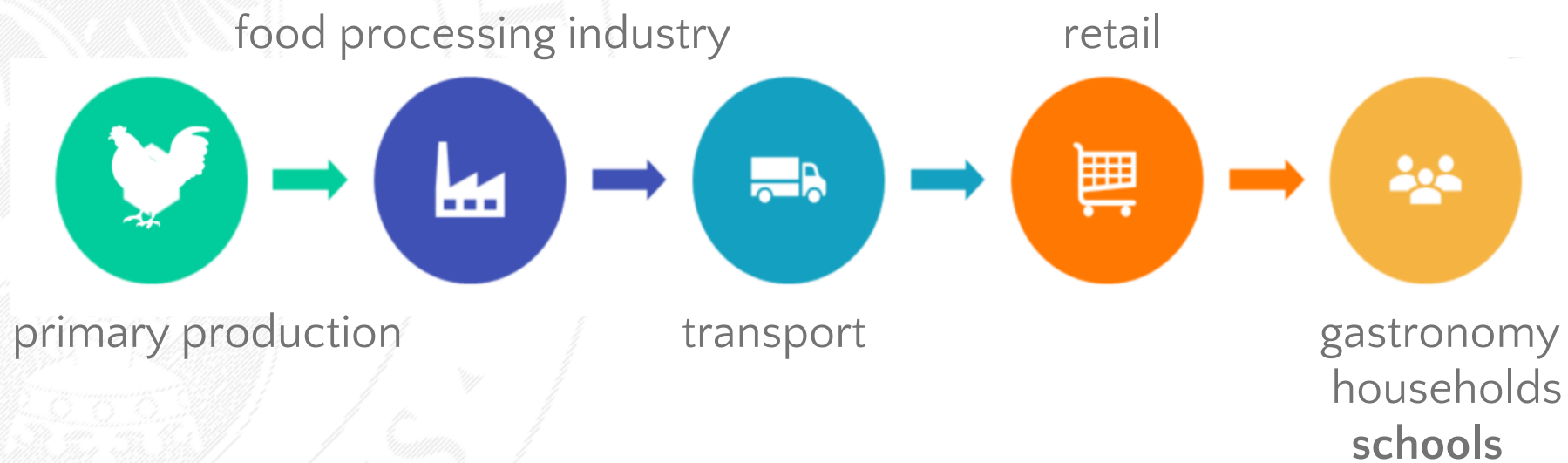


6 km

Bread and bakery wastage in gastronomy

- Poland 2020: 775 300 beds (hotels and other)
- 70% all year (seasonal beds counted as 25%): 600 000 beds
- 14,6 kg/bed.yr
- 8 773 t/yr
- 0,23 kg/inh.yr (for Poland and Lower Silesia)

Food losses in the Polish cereals value chain



Bread and bakery wastage in schools:

Kindergarten – 500 kg of wasted bread per year

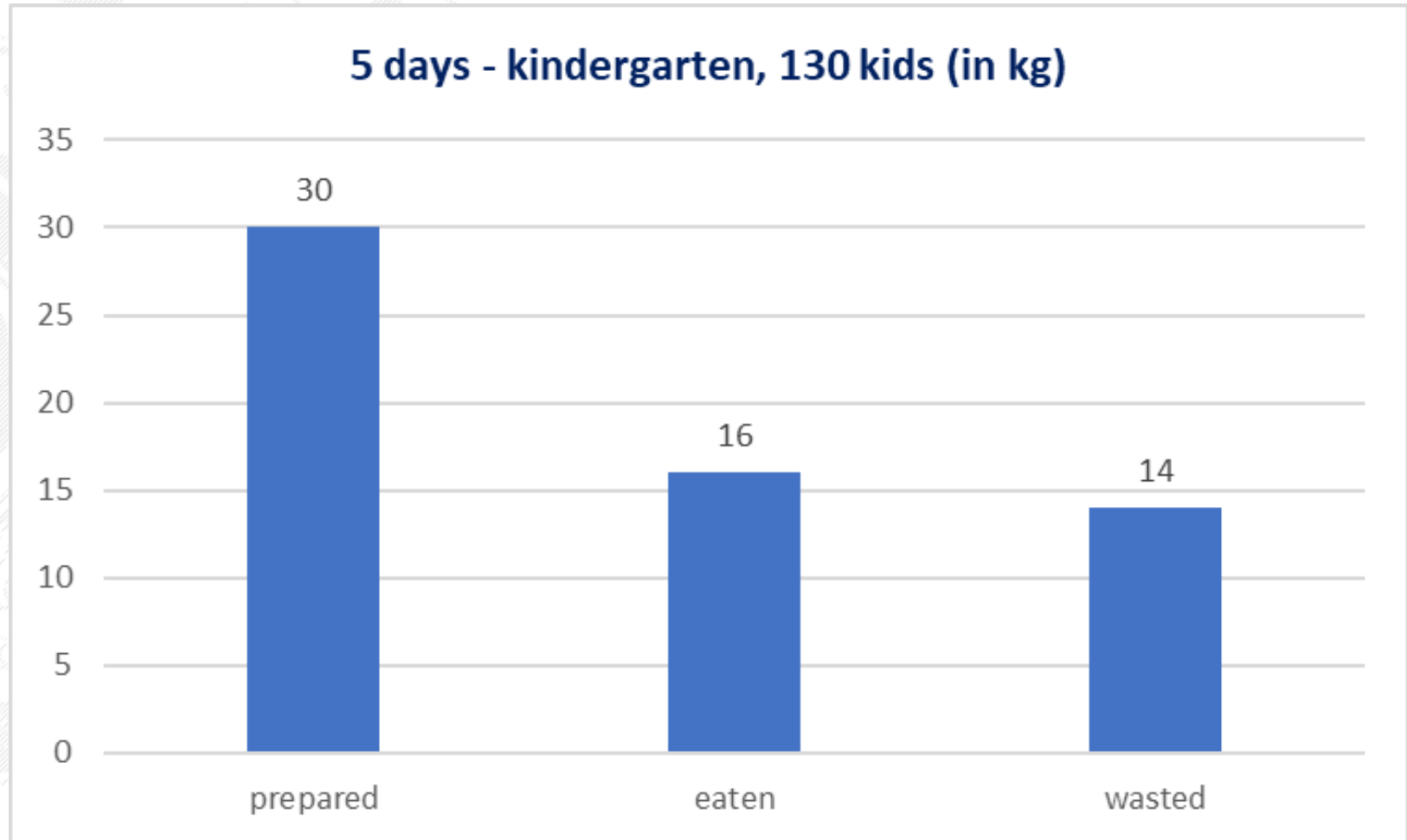


Illustration – kindergarten



Bread and Bakery wastage in Kindergardens

2020	wasted bread [kg/pupil.wk]	Time in kindergarden [wk/yr]	Children in kindergardens	wasted bread [t/yr]	wasted bread [kg/yr]
Poland	0,108	43	1 424 536	6 597	0,17
Lower Silesia	0,108	43	104 264	483	0,17

Bread and Bakery wastage, overview

2020	Poland		Lower Silesia	
	[t/yr]	[kg/yr]	[t/yr]	[kg/yr]
primary production ¹	217 210	5,68	19 086	6,58
food processing industry+transport	44 425	1,16	3 365	1,16
retail	222 366	5,81	14 745	5,09
gastronomy	8 773	0,23	665	0,23
schools	6 597	0,17	483	0,17
households ²	213 034	5,57	19 608	6,76
Total	712 405	18,6	57 951	20,0

1. amount of lost consumption cereals
2. not considering home composting and pet animal feed






Bread and bakery: Branch related problems

- High amounts of losses, up to 15%
- Take-Back-Agreements for unsold products
- Lack of Voluntary Agreements on food waste reduction
- Prices of gas, coal, petrol, electricity, salaries, flour are rising strongly
- COVID-19: quarantine of employees, decrease in sales less significant
- Ongoing strong decrease in bread consumption (58% in 20 years)
- Low level of bread redistribution (high administrative burden)
- Low level upcycling of returned bread

Recommendations: legal and policy

- Ban on Take-Back-Agreements
- Support for Voluntary Agreements on food waste reduction
- Make redistribution of bread simpler
- Support for initiatives for upcycling of unsold bread
- Initiating and supporting food waste measurements
- Initiating and supporting benchmarking of bread wastage in retail
- Awareness campaigns: bakeries, consumers, shops

Recommendations: Bread and bakery industry

- Operation and management in retail: reduce wastage by:
 -  adjusting the assortment to the time of the day/client
 -  flagship products: available to closing time, others not
 -  awareness raising amongst clients: not everything all the time
 -  reduce delivery to shops to decrease returns
 -  lower prices at the end of the day
- Upcycling of unsold bread: make new food (and other) products
- Voluntary Agreement in the value chain: reduction of food waste / end of Take-Back-Agreements

Recommendations: Further research

- Measurement is key: initiation and support for food waste measurement in the whole value chain: horizontal and vertical
- Repetition of the analysis every year: more bakeries, more shops
- Inclusion of through branche organisations on an earlier stage
- Similar analysis in other food industries (fruit & vegetables, dairy, meat)

Thank you for your attention!

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