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trafoon

Traditional Food Network to improve the transfer of knowledge for innovation

Tradition and innovation in bakery products

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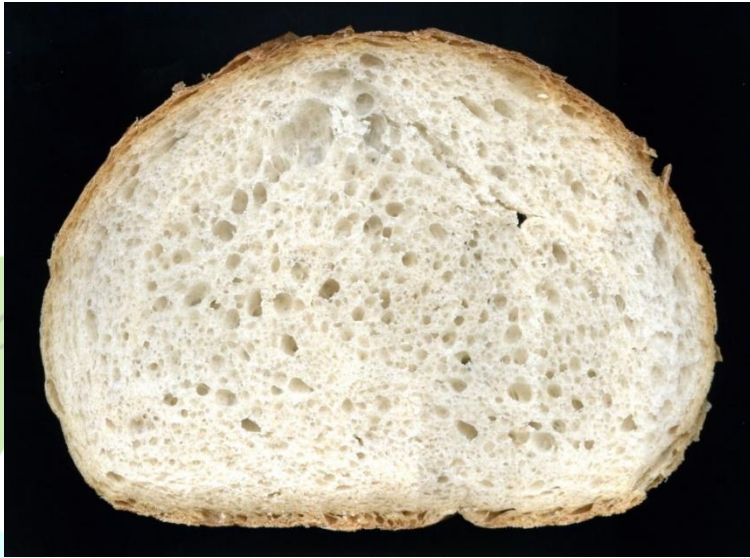
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The joint project between IAR&FR PAS and group of enterprises in the bakery products sector titled **“Innovative bakery products with health-promoting properties for Warmia-Masuria Province”** (POKL.08.02.01-28-010/13, EU, 2013-2015) dedicated to the transfer of knowledge from science to industry by finally development an innovative bakery products was proposed.



Leader of the project: company Agro-Coop Sp. z o.o. which unites 19 private enterprises – cooperatives from Warmia-Masuria and Podlaskie Provinces. The cooperatives run both manufacturing and trading, 132 shops and 14 bakeries operate as part of the company.



**Control 1:
wheat-rye bread
„Baltonowski”**



**Control 2:
spelt bread**





onion dry skin

**dry cherry
and cherry concentrate**



Quercetin as bioactive compound

Antioxidant properties

scavenging free radicals

chelating metals

inhibiting the oxidases activity

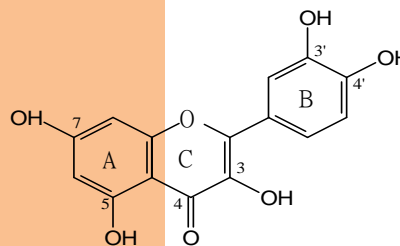
inhibiting lipid peroxidation

Biological activities:

- * anti-inflammatory
- * antiallergic
- * antihypertensive
- * antiviral
- * antimicrobial
- * inhibit platelet aggregation
- * anticancer

quercetin (Q)

3,3',4',5,7-pentahydroksyflawon



185 - 1917 mg Q/kg fw



45
times



odmiana \ związek		μmol/g w m					
		Q	Q3G	Q4'G	Q3,4'G	IR4'G	suma
Efekt	M	0,05 ± 0,00	0,02 ± 0,00	1,33 ± 0,03	0,83 ± 0,03	0,02 ± 0,00	2,24 ± 0,06
	S						
Fiesta	M						
	S						
	M						
		± 1,01	0,24 ± 0,00	31,14 ± 0,89	3,62 ± 0,05	0,22 ± 0,01	116,37 ± 1,85
		± 0,00	0,02 ± 0,00	1,45 ± 0,06	0,80 ± 0,03	0,03 ± 0,00	2,31 ± 0,09
		± 1,62	0,24 ± 0,02	26,80 ± 0,65	1,24 ± 0,01	0,19 ± 0,01	108,60 ± 2,45
		± 0,00	0,02 ± 0,00	1,75 ± 0,02	0,99 ± 0,02	0,01 ± 0,00	2,79 ± 0,04
		± 0,58	0,25 ± 0,00	48,00 ± 0,90	7,28 ± 0,01	0,22 ± 0,02	122,42 ± 0,35
Dawidowska	M	± 0,00	0,02 ± 0,00	1,11 ± 0,02	0,74 ± 0,01	0,01 ± 0,00	1,89 ± 0,03
	S						
haczewska	M						
	S						
otka 1786	M						
	S						
otka 1902	M						
	S	98,22 ± 1,34	0,42 ± 0,03	42,68 ± 0,37	3,63 ± 0,07	0,22 ± 0,01	145,17 ± 1,77

Dry skin

BŁOŃSKA – 122,4 μmol Q/g
SZALOTKA – 181,7 μmol Q/g

Flesh part

BŁOŃSKA – 2,8 μmol Q/g
SZALOTKA – 3,9 μmol Q/g

Bioavailability of quercetin from onion in humans

* The study was designed as two three days crossover experiment separated by seven days quercetin wash-out interval.

* Before and after specified intervals of sample administration blood was collected.

group A

9 person: 6 female, 3 male



group B

the body mass of volunteers:
54 – 78 kg

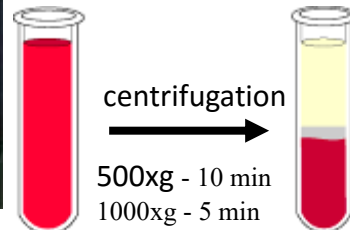
the mass of onion
flesh: 46 - 72 g,
200ml of water

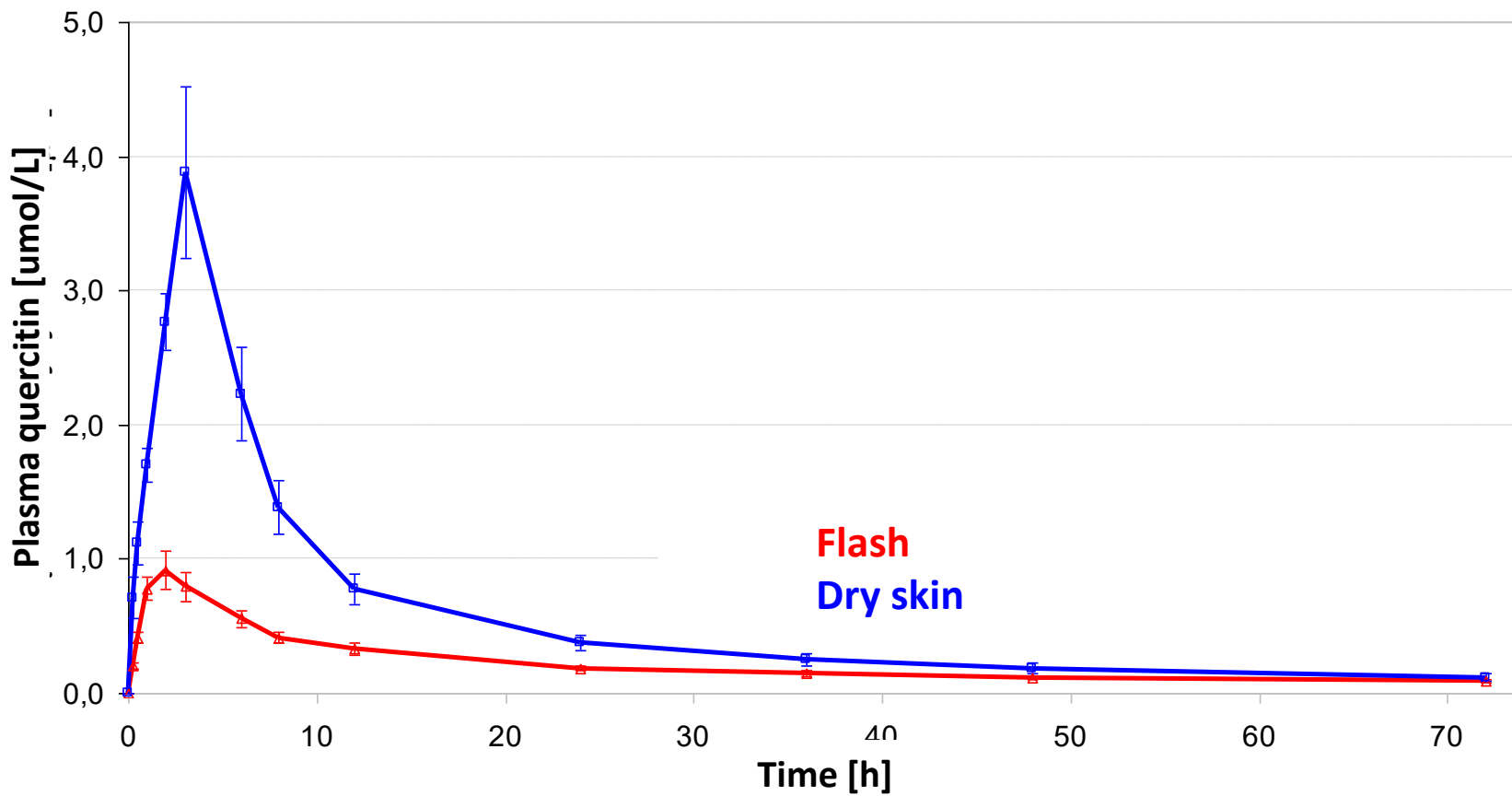


the mass of onion dry skin:
2.03 – 3.17 g, 200ml of water

1.4 mg Q/kg of body mass

* The concentration of quercetin and its derivatives in plasma was determined by HPLC.





Wiczowski et. al, *J.Nutr.* 2008, 138(5), 885-889.

The nutritional value of cherries (100g):

calories - 47 kcal

carbohydrates - 10.9 g

protein - 0.9 g

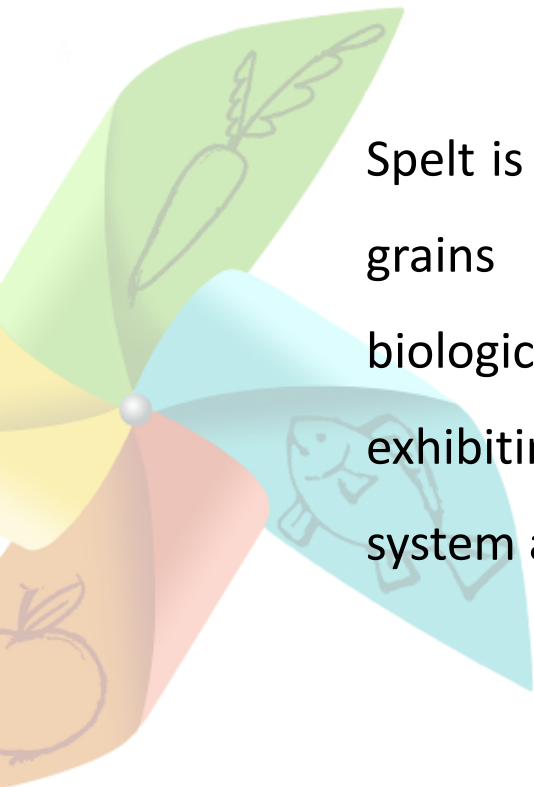
fat - 0.4 g

fiber - 3 g

glycemic index - 22



- ✓ Cherries contain anthocyanins that protect against free radicals.
- ✓ Preferably affect the red cell production.
- ✓ They provide vitamins C and A.
- ✓ Conducive to lowering cholesterol and sugar, they bind heavy metals and remove them from the body.
- ✓ Thanks to the content of potassium and sodium are diuretic.
- ✓ Cherry juice has anti-inflammatory properties - reduces fever, relieves muscle pain, improves the absorption of drugs.



Spelt is an old species of wheat, the grains are a rich source of biologically active substances exhibiting enhancing immune system and support hematopoiesis.



Spelt flour contains more total fat, vitamins, micro- and macronutrients compared to the flour obtained from common wheat. In addition, the spelt is richer in protein of high biological value.

Spelt – nutritional value (100g):

calories – 338 kcal

carbohydrates – 70.2 g

protein – 14.6 g

fat – 2.4 g

fibre – 10.7 g

Wheat – nutritional value (100g):

calories – 327 kcal

carbohydrates – 71.2 g

protein – 12.6 g

fat – 1.5 g

fibre – 12.2 g





Wheat-rye bread with 2% of onion dry skin



**Spelt bread with 10% of dry cherry
and 2% of cherry concentrate**



	Total phenolic [mg ferulic acid/kg d.m.]	Tocopherols [$\mu\text{g/g}$]	Available lysine [mg/g d.m.]
control wheat-rye bread	0.26 \pm 0.00	29.20 \pm 0.02	2.01 \pm 0.01
wheat-rye bread with 2% of onion dry skin	1536.12 \pm 12.67	83.15 \pm 1.76	1.80 \pm 0.04
control spelt bread	0.23 \pm 0.02	136.72 \pm 5.87	2.04 \pm 0.03
spelt bread with 10% of dry cherry and 2% of cherry concentrate	10.73 \pm 0.07	95.14 \pm 3.01	2.30 \pm 0.08

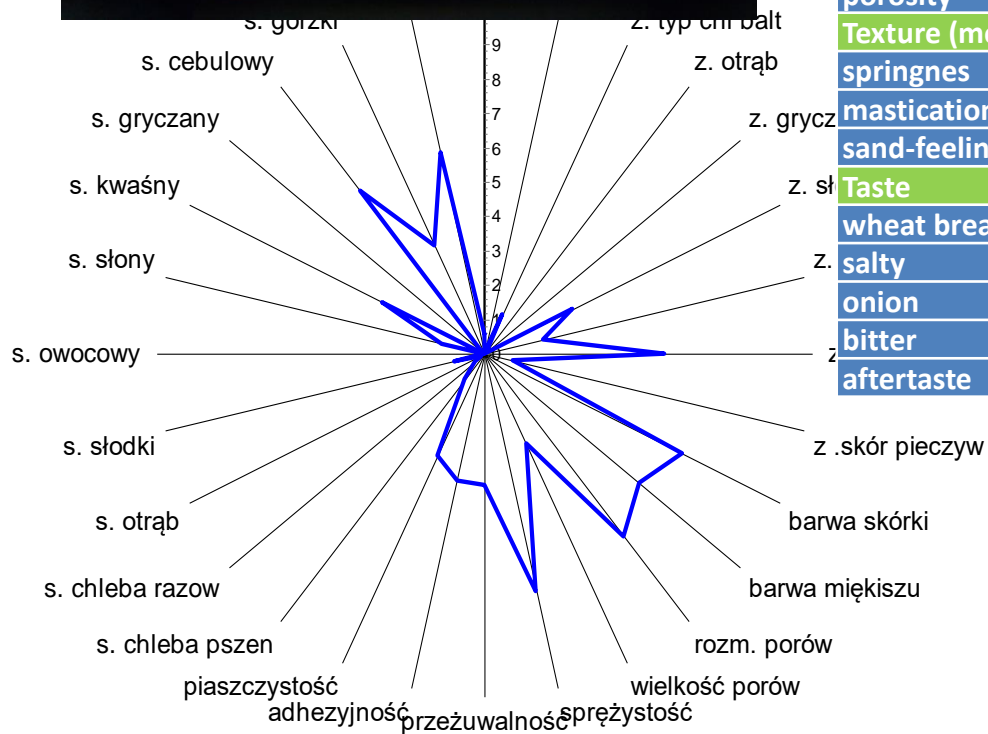


	Maillard		
	FIC [FI/mg d.m.]	FAST [%]	Browning index [AU]
control wheat-rye bread	396.62 ± 3.56	57.58 ± 3.89	0.49 ± 0.02
wheat-rye bread with 2% of onion dry skin	165.5 ± 15.8	59.2 ± 5.51	0.64 ± 0.01
control spelt bread	314.44 ± 7.90	396.62 ± 10.23	0.40 ± 0.01
spelt bread with 10% of dry cherry and 2% of cherry concentrate	471.8 ± 8.40	229.2 ± 18.01	0.82 ± 0.05

FIC – the free fluorescent intermediate compounds
FAST- FIC/tryptophan



	Antioxidative potential [$\mu\text{mol Trolox/g d.m.}$]		
	ABTS	DPPH	PCL
control wheat-rye bread	1.82 \pm 0.03	1.3 \pm 0.02	1.27 \pm 0.04
wheat-rye bread with 2% of onion dry skin	15.77 \pm 0.08	12.84 \pm 0.09	15.15 \pm 0.03
control spelt bread	1.23 \pm 0.01	1.37 \pm 0.01	1.21 \pm 0.05
wheat-rye bread with 10% of dry cherry and 2% of cherry concentrate	4.38 \pm 0.04	3.62 \pm 0.01	5.25 \pm 0.02

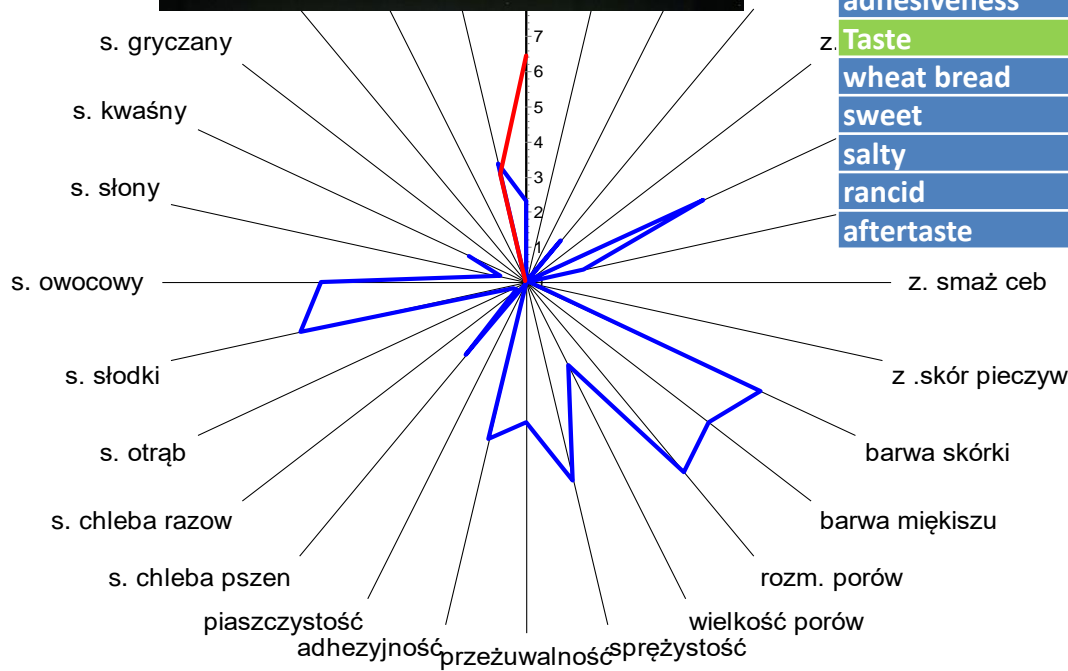


	with onion dry skin	control
Odour		
wheat bread	0.57	0.53
typical for that kind of bread	1.26	5.44
sweet	2.98	1.53
rancid	1.83	4.11
fried onion	5.48	0.02
Appearance		
crust colour	6.69	2.13
crumb colour	6.01	0.76
porosity	6.8	6.13
Texture (mouth feel)		
springnes	7.08	7.31
mastication	3.82	3.42
sand-feeling	3.29	0.04
Taste		
wheat bread	0.95	2.17
salty	1.33	1.61
onion	6.07	0.03
bitter	3.52	0.29
aftertaste	6.00	4.17

with onion dry skin
control



	with cherry	control
Odour		
wheat bread	2.32	6.46
sweet	5.38	2.77
rancid	1.6	0.99
Appearance		
crust colour	7.13	1.38
crumb colour	6.39	1.17
porosity	6.92	7.92
Texture (mouth feel)		
springnes	5.78	5.86
mastication	3.99	4.21
adhesiveness	4.59	4.9
Taste		
wheat bread	2.67	5.82
sweet	6.33	2.52
salty	0.74	1.66
rancid	1.73	1.98
aftertaste	3.45	3.16



with cherry
control



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Joanna Honke

Dorota Szawara-Nowak

Joanna Topolska

Wiesław Wiczkowski

Beata Szmatowicz

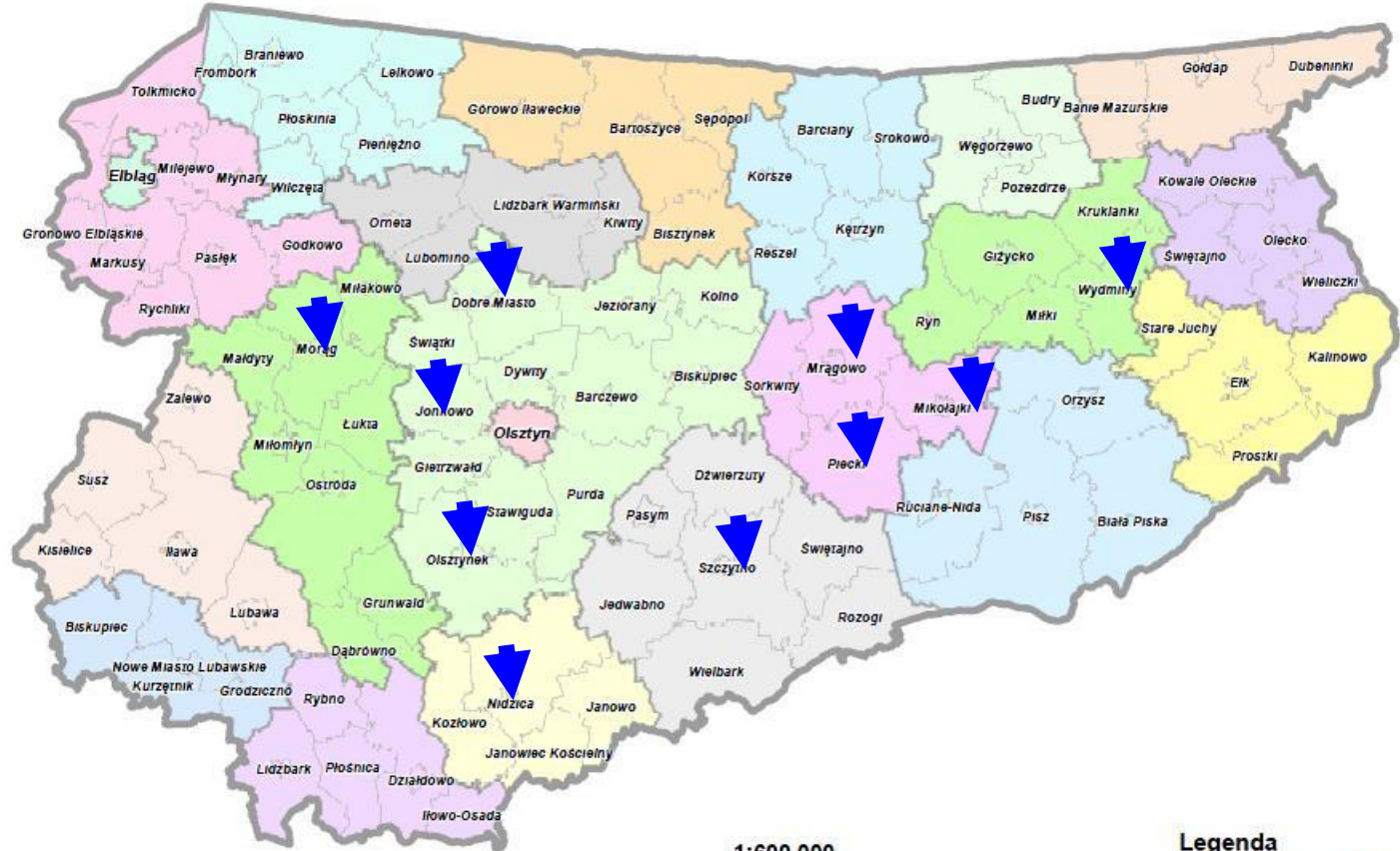
Anita Ostaszyk

Grzegorz Lamparski

Anna Majkowska

Danuta Rostek

Bakeries:



1:600 000

0 25 50 Kilometry

Legenda

- granica województwa
- granica powiatu
- granica gminy



Thank you for your attention