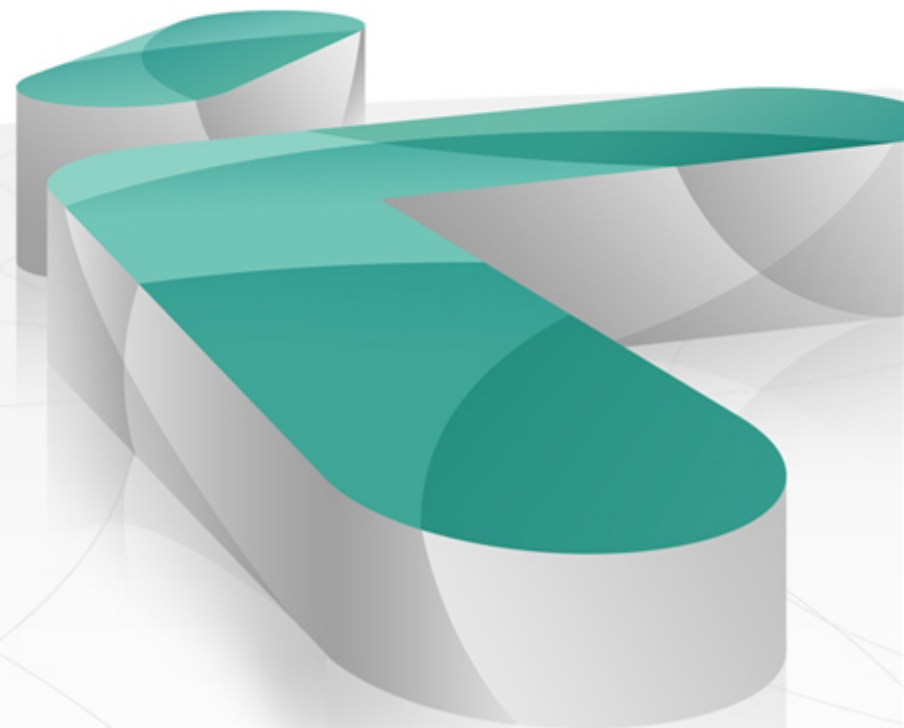


Characterization of biological value and safety properties of fish oil from low value fish catch and fish processing

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Global issues – maximum resource utilization

- Global (along with Lithuania) animal production industry data has shown that a large rest raw materials (meat, fish, dairy industry) are still not utilized or are used for low value feed products.

The term “Rest raw material” instead of “by-products”

- The term rest raw material will be used in this presentation, substituting the term by-products which can have a negative meaning for the consumers.

Trend:

Fish processing – maximum utilization

- Utilizing rest raw material from round fish processing is very important for the fish industry where great economic, nutritional and environmental values can be obtained by **increasing the yield of raw material in fish filleting operation.**
- Increased utilization and value of the raw material can lead to better profit of the fish processing companies.

Trend:

Fish harvesting - maximum utilization

- The fishing quotas indicate allowable quantities for harvesting from some of the most important fish species in order to control their exploitation.
- The quota system has influenced and changed the attitude toward utilization of all harvested fish.
- Both fishermen and processors have become more **interested in making marketable products from raw materials previously used for fish meal or discarded as waste.**

Rest raw materials may be transformed to highly valuable products

- The rest raw material has mainly been utilized for production of low value products such as mince, fish meal and silage, resulting in low profit.
- The knowledge within this field has grown and is still growing.
- With increased scientific understanding of the properties of proteins and fish oil, **the rest raw materials may be transformed to highly valuable commodities**, in some cases even higher in value than the main flesh or fish fillets.

The aim for Lithuanian fish processors

- Development of new technologies to extract new bioactive compounds from marine processing rest raw materials may bring more value from what is today considered a waste.

**~ 3200 t
lipids**

**~ 1200 t ω – 3
lipids**



**Daily living
needs ~ 3,25
million people
per year**



**Daily living
needs ~ 0,63
million people
per year**

**~ 10700 t
proteins**

Main objectives of the research

Today activities:

- Development and evaluation of ingredients from rest raw materials in the processing industry.

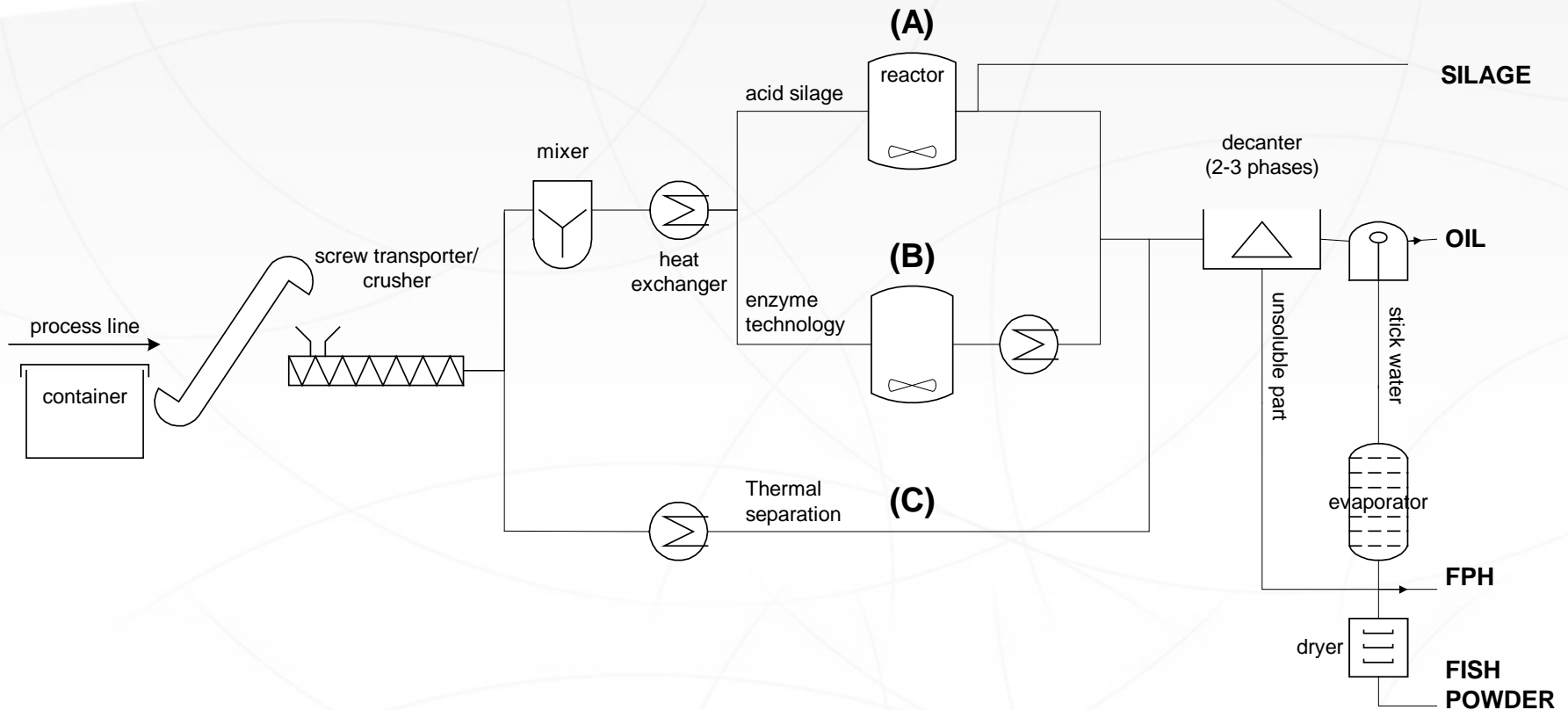
Future activities

- Improve competitiveness of the fish industry.
- Ingredients with specific functional properties based on the demands from the market and the industry.

General process flows for utilisation of marine rest raw materials

- Acid hydrolysis
- Enzyme hydrolysis
- Thermal separation

General process flow for utilisation of marine rest raw materials



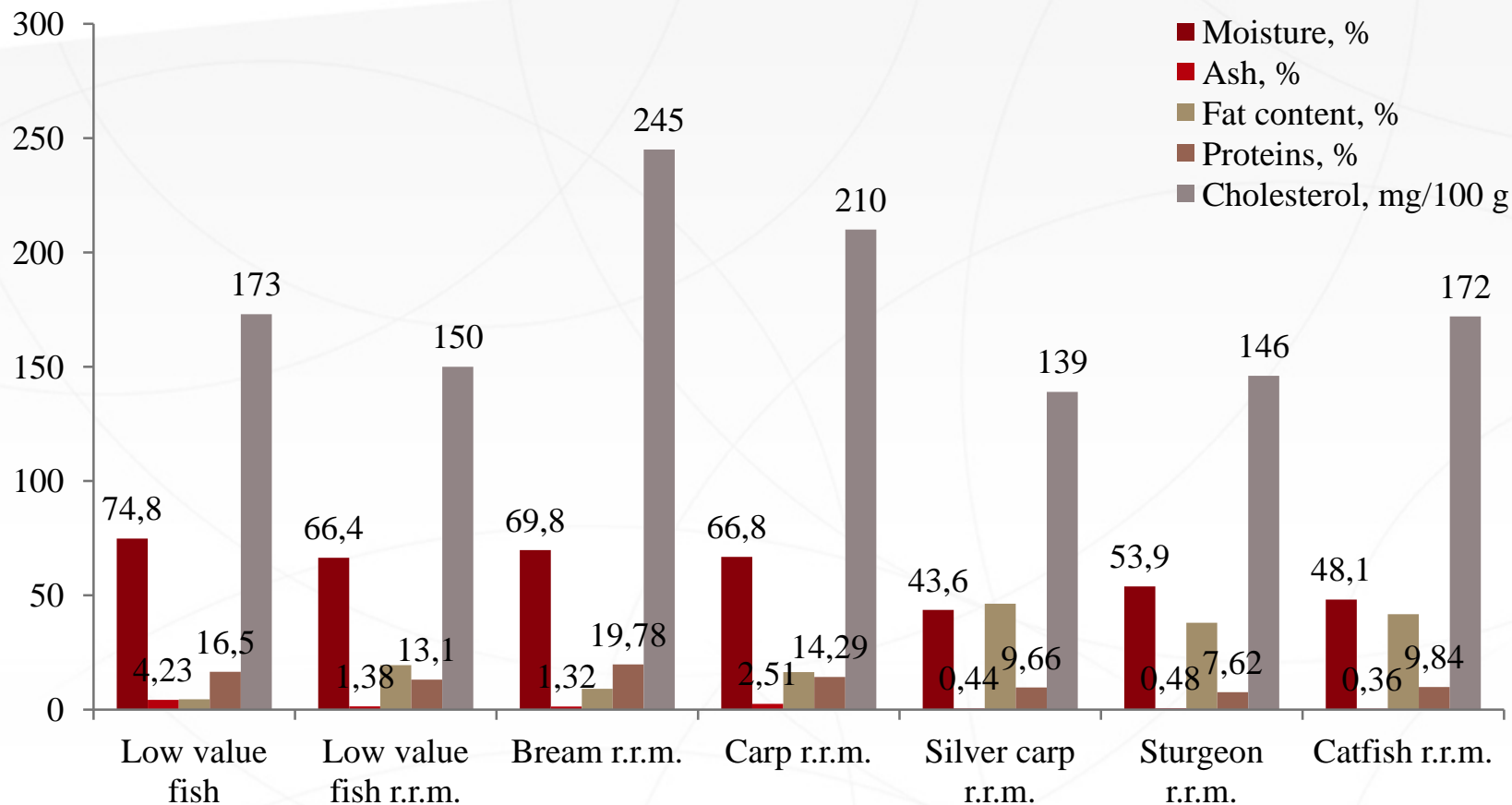
Research objects

- *Low value fish and low value fish rest raw materials;*
- *Fish rest raw materials (intestines, guts, etc.):*
 - ▶ *Bream;*
 - ▶ *Carp;*
 - ▶ *Silver carp;*
 - ▶ *Sturgeon;*
 - ▶ *Catfish;*
- Enzymatic hydrolysis using enzymes: papain and bromelain.

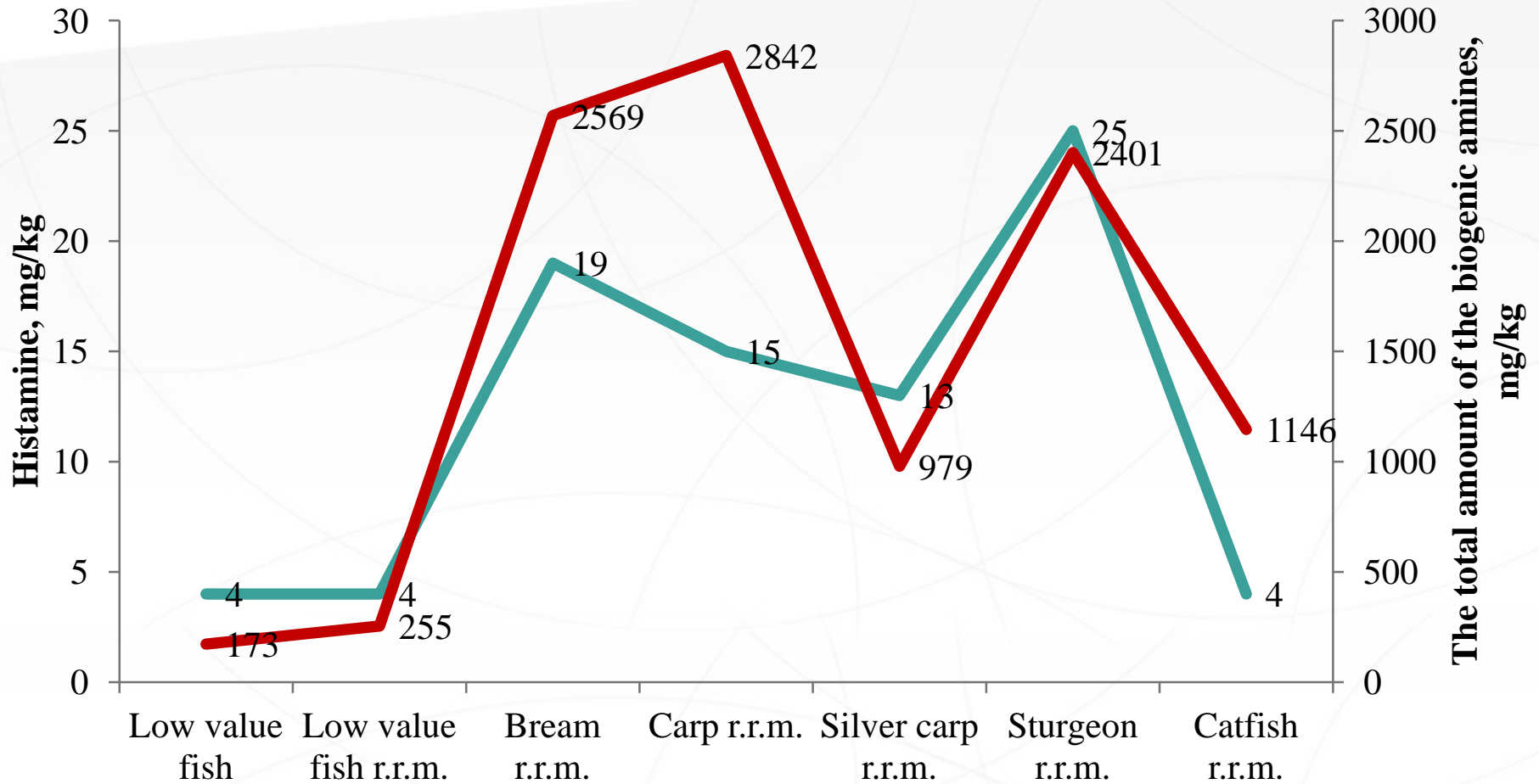
Analysis

- ▶ chemical composition of low value fish and fish rest raw materials (moisture, ash, fat content, protein content and cholesterol);
- ▶ biogenic amines;
- ▶ microbiological contamination;
- ▶ fat.

Chemical composition of low value fish and rest raw materials (r.r.m.)



Biogenic amines



Microbiological contamination

	Low value fish	Low value fish r.r.m.	Bream r.r.m.	Carp r.r.m.	Silver carp r.r.m.	Sturgeon r.r..	Catfish r.r.m.
Aerobic colony count, CFU/g	$2,4 \times 10^6$	$1,4 \times 10^6$	$7,4 \times 10^6$	$1,6 \times 10^6$	$1,2 \times 10^7$	$3,0 \times 10^7$	$5,4 \times 10^5$
Enterobacteriaceae, CFU/g	1×10^1	$3,5 \times 10^2$	1×10^1	1×10^1	1×10^1	1×10^1	1×10^1
Coliform bacterial count, CFU/g	1×10^1	$5,2 \times 10^2$	$2,0 \times 10^4$	$2,3 \times 10^4$	$1,4 \times 10^4$	$1,9 \times 10^4$	$8,0 \times 10^3$

Fat analysis

	Low value fish	Fish rest raw materials
Fat yield, %	62,8	78,0
Fat hydrolysis value, g/kg	265	276
Saponification number, g/kg	34,2	1,8
Content of Fatty acids, saturated, %	1,48	5,23
Unsaturated, %	2,43	10,92
Pounsaturate, %	0,58	3,22
FFA, g/100g	5,82	6,64
Omega 3	0,17	1,27
Omega 6	0,40	1,70
Phospholipids, %	8,0	4,8
Peroxyde value, mekv/kg	3,6	4,0

Conclusions

- Histamine content detected in the fish rest raw materials and low value fish samples didn't exceed the requirement established in EU regulation 2073/2005.
- Linear relationship was established between the microbiological contamination and total amount of biogenic amines both in the fish rest raw materials and low value fish samples
- The highest concentration of omega-3, omega-6 and more expressed lipid oxidation was found in the fish rest raw materials samples compare to those of low value fish samples,

**Thank you for your
attention!**