

Resistance to antibiotics of bacteria isolated from smoked fish.

Marcin Sobota, Lucja Laniewska-Trokenheim, Iwona Warminska-Radyko

marcin.sobota@uwm.edu.pl
Chair of Industrial and Food Microbiology
Warmia and Mazury University
pl. Cieszyński 1
10-726 Olsztyn
POLAND

Durability of smoked fish depends on:

- raw material property,
- conditions of a technological process,
- microbiological state,
- salt content,
- water content,
- temperature and time of heating,
- quality of smoke components adsorbed during the time of smoking.

First of all fish are smoked to obtain a product of high sensoric virtues not containing pathogenic microorganisms.

The aim of work

The aim of work was isolation, identification and determination of resistance to antibiotics of rods gram-negative from *Enterobacteriaceae*, gram-negative rods from *Pseudomonas* sp., cocci from *Staphylococcus aureus* and *Enterococcus faecalis* and gram-positive rods from *Listeria monocytogenes* taken from smoked fish.

Material and methods

The material for research contained smoked fish retail trade: sprats, cool smoked salmon, warm smoked salmon, flounder, mackerel and pickling. 30 samples of fish were examined. Rods isolation from *Enterobacteriaceae* was carried out on VRB (Violet Red Bile) Agar medium taken from Merck. *Staphylococcus aureus* isolation was carried out on Mannitol Salt Phenol-red Agar medium prepared by Merck. Streptococci from *Enterococcus faecalis* species were isolated on Chromocult Enterococci Agar medium made by Merck. The presence of *Listeria monocytogenes* was determined in 25g of the product applying the following media: Listeria Selective Enrichment Broth acc. to FRASER (Fraser I Merck, Fraser II Merck), Oxford Listeria Agar made by Merck. Isolated colonies of *Listeria monocytogenes* were confirmed by Tecra Unique Listeria tests made by Noack, The strains which were isolated from cultures on differentiated media were identified by API tests produced by bioMérieux susceptibility/resistance to antibiotics was determined by a defensive method with the application of discs with ampicillin, rifampicin, nitrofurantoin, vancomycin, kanamycin, gentamicin, neomycin, streptomycin, nalidixic acid, colistin, piperacin, doxixilin,

chloramphenicol produced by bioMérieux on Mueller-Hinton Agar medium prepared by Merck.

The strains were classified as susceptible, medium susceptible and resistant to a given antibiotic on the basis of diameters of growth inhibition zones.

Examination results

From 30 samples of smoked fish isolated: 75 strains of *Escherichia coli*, 23 strains of *Enterobacter aerogenes*, 24 strains of *Pseudomonas fluorescens*, 22 strains of *Staphylococcus aureus*, 18 strains of *Enterococcus faecalis* and 6 strains of *Listeria monocytogenes*.

From isolated strains 84 ones were resistant to colistin and 50 ones to kanamycin and streptomycin.

Two strains of *Staphylococcus aureus* and four strains of *Enterococcus faecalis* were resistant to chloramphenicol.

One strain of *Staphylococcus aureus* was resistant to kanamycin, two strains of *Staphylococcus aureus* and four strains of *Enterococcus faecalis* were medium resistant to this antibiotic.

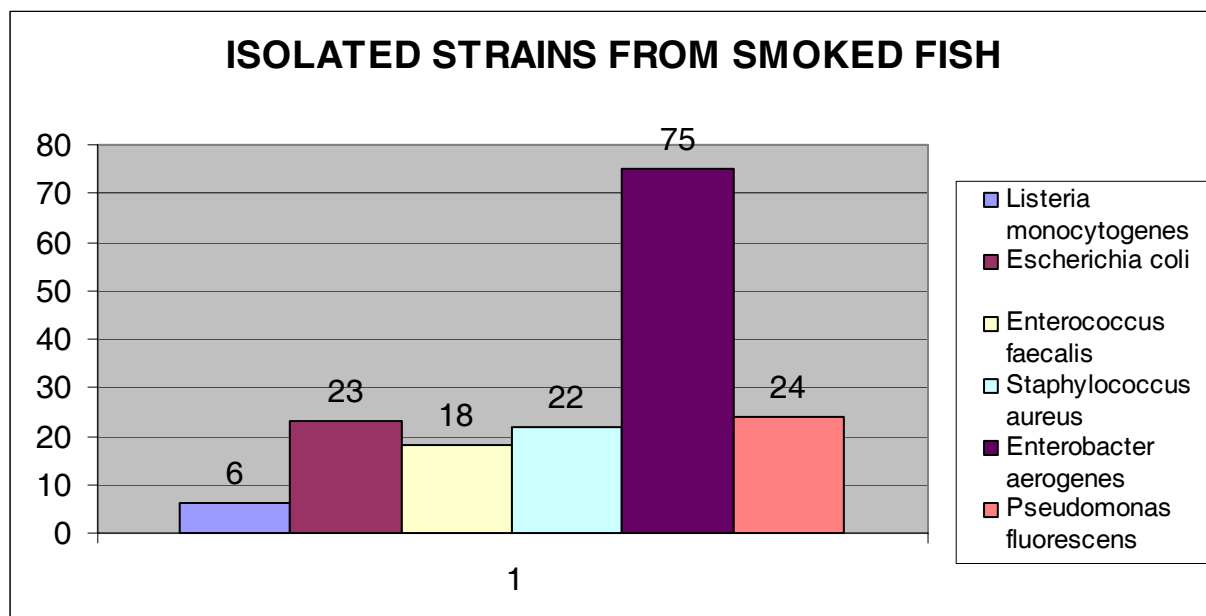
From isolated strains of gram-negative rods 118 were resistant to ryfampicin, 50 to ampicillin, 30 to nitrofurantoin, 8 to chloramphenicol and 5 to kanamycin.

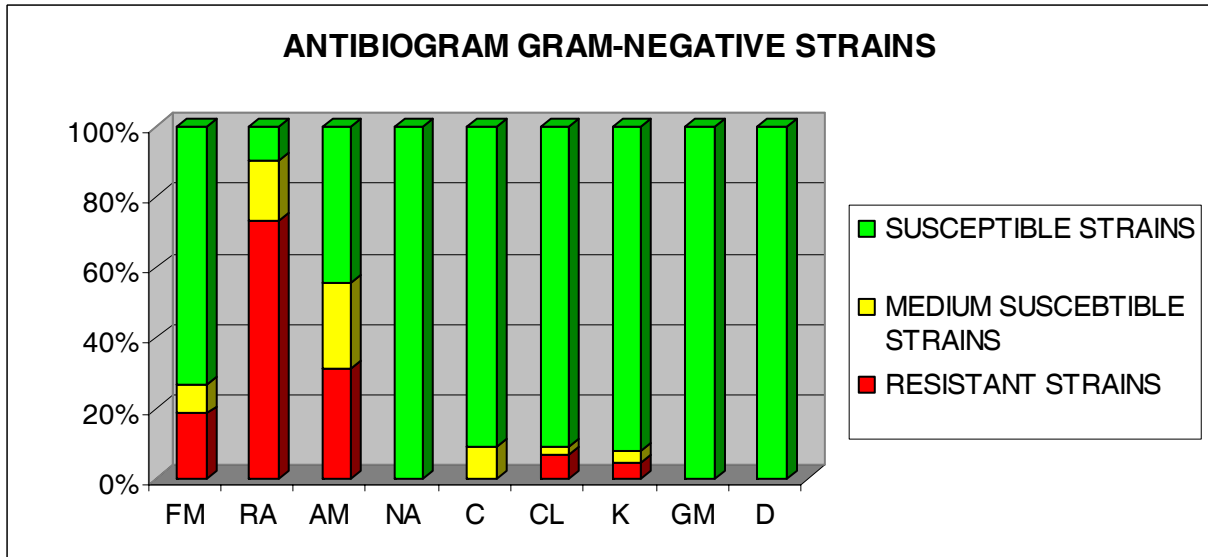
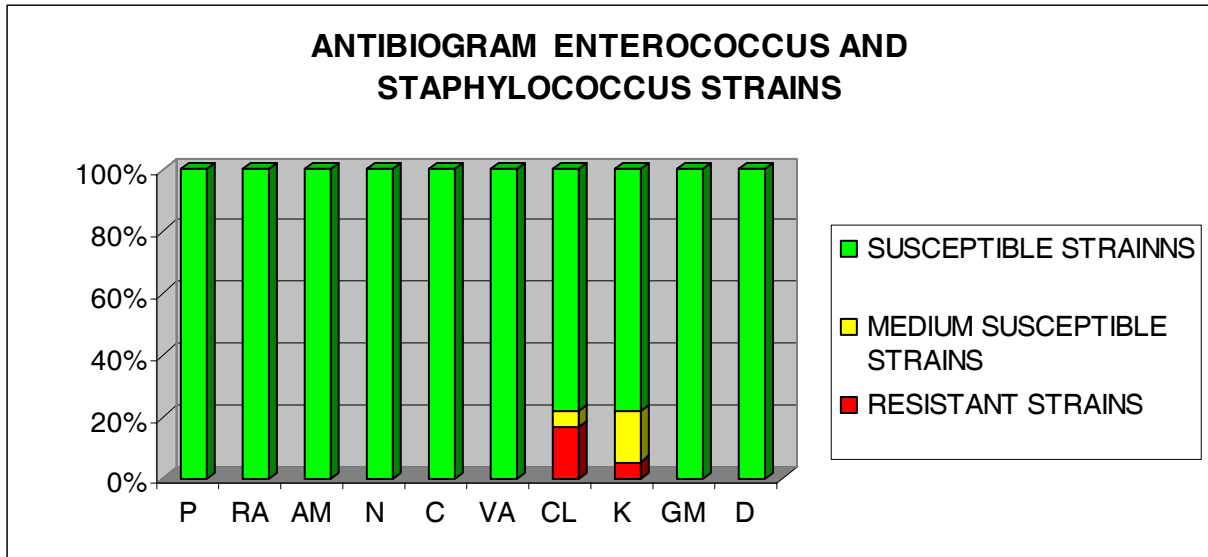
Conclusions

In the examined products the strains of *Escherichia coli* and *Pseudomonas fluorescens* were the most numerous.

All isolated gram-negative rods were susceptible to nalidixic acid, gentamicin and doxixilin and they were resistant to ampicillin, ryfampicin, nitrofurantoin, chloramphenicol and kanamycin.

Staphylococcus aureus and *Enterococcus faecalis* were susceptible to 8 out of 10 applied antibiotics in the examinations.





Literature

1. Aburjai T., Rula M. Darwish, Al-Khalil S., Mahafzah A., Al-Abbadi A., Screening of antibiotic resistant inhibitors from local plant materials against two different strains of *Pseudomonas aeruginosa*, *Journal of Ethnopharmacology* 76, (2001) 39–44,
2. Čižman M., The use and resistance to antibiotics in the community, *International Journal of Antimicrobial Agents* 21, (2003) 297-307,
3. Franz C., Stiles M. E., Schleifer K. H., Holzapfel W. H., Enterococci in foods-a conundrum for food safety, *International Journal of Food Microbiology* 88, (2003) 105– 122,
4. Jahncke M., Herman D., Control of Food Safety Hazards During Cold-Smoked Fish Processing, *Journal of Food Science, Supplement to vol. 66, No. 7, 2001s.* 1104-1112.
5. Jeppesen C., Media for *Aeromonas* spp., *Plesiomonas shigelloides* and *Pseudomonas* spp. from food and environment, *International Journal of Food Microbiology* 26, (1995) 24-41,
6. L. Mannu, A. Paba, E. Daga, R. Comunian, S. Zanetti, I. Duprè, L.A. Sechi, Comparison of the incidence of virulence determinants and antibiotic resistance between *Enterococcus faecium* strains of dairy, animal and clinical origin, *International Journal of Food Microbiology* 88, (2003) 291– 304,
7. Marchant G., Ducoffre G., News on outbreaks and infectious diseases, <http://www.eurosurveillance.org/ew/2003/031002.asp>,
8. Miranda C. D., Zemelman R., Antibiotic Resistant Bacteria in Fish from the Concepcion Bay, Chile, *Marine Pollution Bulletin* 42, (2001) 1096-1102,
9. Møller Aarestrup F., Agersø Y., Ahrens P., Østergaard Jørgensen J.C., Madsen M., Jansen L. B., Antimicrobial susceptibility and presence of resistance genes in staphylococci from poultry, *Veterinary Microbiology* 74, (2000) 353-364,
10. Neely A. N., Holder I. A., Antimicrobial resistance, *Burns* 25, (1999) 17-24,
11. Schroeder C. M., White D. G., Meng J., Retail meat and poultry as a reservoir of antimicrobial-resistant *Escherichia coli*, *Food Microbiology* 21, (2004) 249–255,
12. Schroeder C. M., White D. G., Ge B., Zhang Y., McDermott P. F., Ayers S., Zhao S., Meng J., Isolation of antimicrobial-resistant *Escherichia coli* from retail meats purchased in Greater Washington, DC, USA, *International Journal of Food Microbiology* 85, (2003) 197– 202,
13. Soumet C., Ragimbeau C., Maris P., Screening of benzalkonium chloride resistance in *Listeria monocytogenes* strains isolated during cold smoked fish production, *Letters in Applied Microbiology*, 41, (2005) 291–296,