USE OF COMMERCIAL AND UV-INDUCED PHAGES FOR PROTECTION OF CHICKEN MINCE FROM CONTAMINATION BY MICROORGANISMS

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Introduction. Poultry meat is a popular product. Experts predict that by 2020 it will occupy 1 place in the total consumption of meat products. However, after the consumption of products obtained from sick poultry or secondary contamination by bacteria, often causes outbreaks of food infections in humans. Contaminants are phage-sensitive and lysogenic (carrying a prophage) microbes that can be destroyed by commercial bacteriophages (BPs) or UV-induced BPs from lysogens. Therefore, at the stage 1, the aim of our work was to study the effect of commercial BPs on artificially contaminated chicken mince (CM)

Figure 1 Flasks with bactriophages

Materials and methods. In our research we used 4 BPs from "Microgen" manufacturer, Moscow: Coliproteus bacteriophage, Pyobacteriophage, Intesti-bacteriophage, Staphylococcal bacteriophageAs test CM contaminating strains we used *Proteus vulgaris*, *E. coli*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Salmonella enterica Typhimurium*. Also the organoleptic and physicochemical properties of the contaminated CM with BPs and without them were studied. Lytic activity of BPs was estimated according to Appelman. Sensitivity of the cultures was assessed by presence of lysis zones on nutrient agar and optical density in a photocolorimeter. Statistical analysis was carried out using parametric criteria.

Results. Lytic effect of BPs was revealed after 24 hours of incubation at 37°C (Table 1, Fig 1-2) and was different by titer (10^{-4} - 10^{-7}). The greatest activity was revealed in the mixture of Pyobacteriophage with *Pseudomonas aeruginosa*: complete lysis was observed.

These data matched the results on the photocolorimeter (Table 2). Titers of the BPs were on average one log unit higher than in control. Probably, the protein substrate of CM promoted lysis of the bacteria and their death, which protected the CM

Physicochemical and organoleptic properties of the CM with BP didn't change during storage at + 2 ... + 4 ° C (Fig 3).

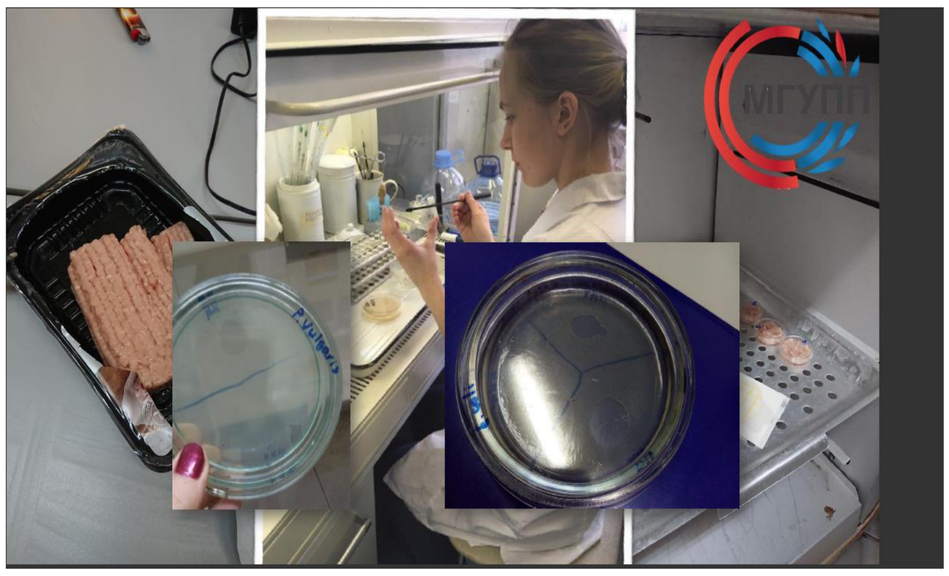

Figure 2 Efficiency of coliproteus bacteriophage

Table 1. Results of visual determination of lytic activity of commercial bacteriophages on bacterial contaminants of food products

Tested bacteriophage	Test strain	Presence of visual growth	Phage titer
Coliproteus bacteriophage, batch H31	E. coli	Turbidity from 7-th dilution	10^{-6}
Pyobacteriophage, batch H27	Pseudomonas aeruginosa	No turbidity	$>10^{-7}$
Stapylococcal bacteiophage, batch H54	Staphylococcus aureus	Turbidity from 7-th dilution	10^{-6}
Coliproteus bacteriophage, batch H31	Proteus vulgaris	Turbidity from 4-th dilution	10^{-3}
Intesti bacteriophage, batch H68	Salmonella enterica Typhimurium	Turbidity from 6-th dilution	10^{-5}

Figure. 3. Organoleptic research

Table 2. Results of OD measurements in control phage titration to tubes on test strains after 24 h incubation

Mixture of bacteria + phage	Median values of OD in dilutions of mixture didutuions							Multiplication factor for indicators						
	10^{-1}	10^{-2}	10^{-3}	10^{-4}	10^{-5}	10^{-6}	10^{-7}	X_1-X_2	X_1-X_3	X_1-X_4	X_1-X_5	X_1-X_6	X_1-X_7	phage titer
E. coli + Coliproteus bacteriophage	0,380 ±0,01	0,081 ±0,01	0,206 ±0,01	0,309 ±0,01	0,294 ±0,01	0,382 ±0,01	0,454 ±0,02	4,7	1,81	1,23	1,3	0,99	0,84	10^{-6}
P. aeruginosa + Pyobacteriophage	0,113 ±0,005	0,076 ±0,005	0,084 ±0,004	0.125 ±0,005	0,056 ±0,002	0,067 ±0,003	0,087 ±0,004	1,51	1,4	0,92	2,05	1,71	1,32	$>10^{-7}$
S. aureus + Stapylococcal bacteiophage	0,072 ±0,003	0,061 ±0,003	0,071 ±0,003	0,078 ±0,003	0,080 ±0,004	0,064 ±0,003	0,230 ±0,01	1,2	1,01	0,92	0,9	1,13	0,31	10^{-6}
P. vulgaris + Coliproteus bacteriophage	0,275 ±0,01	0,253 ±0,01	0,221 ±0,01	0,387 ±0,01	0,069 ±0,003	0,318 ±0,01	0,304 ±0,01	1,1	1,24	0,71	3,99	0,96	0,9	10^{-3}
S. enterica Typhimurium + Intesti bacteriophage	0,074 ±0,003	0,077 ±0,003	0,080 ±0,004	0,202 ±0,01	0,111 ±0,005	0,362 ±0.01	0,236 ±0.01	0,96	0,925	0,73	0,66	0,204	0,31	10^{-5}

Conclusion. Evidence suggests that BP can prolong the shelf life and, therefore, sales of poultry products, inhibiting the growth of bacteria and reducing the risks of microbial spoilage. Therefore, in order to increase the shelf life of poultry products, it is advisable to continue research on the use of commercial BP for the contaminant destruction, which can also be caused by UV induced BP (stage 2 of research). In this case, the death of the bacteria from BPs and UV-rays will occur.