# Scientists develop a safe, cheap technology for disinfection of packed eggs

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The cost of irradiation of plastic packaging (10 eggs) will not exceed 1.2 eurocents. Credit: UrFU / Ilya Safarov

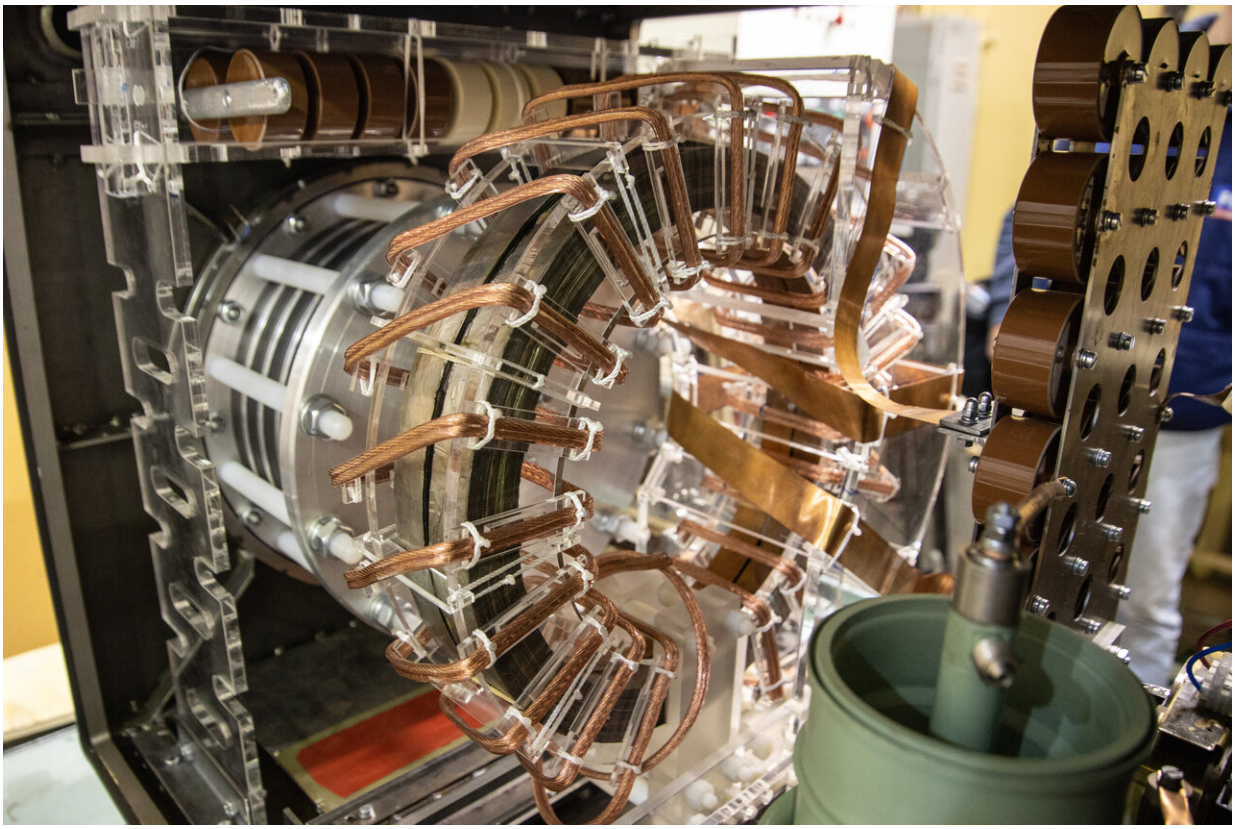
Russian researchers have developed an inexpensive, safe, and reliable surface disinfection technology for packed eggs. This technology helps

to kill bacteria, including salmonella, on eggshells. Also, it allows growing broiler chickens with strong immunity to viral diseases. Packed eggs are disinfected with an electron beam for 50 nanoseconds (one-billionth of a second). Disinfection takes place in plastic containers. The description of the technology was published in *Food and Bioproducts Processing*.

"Disinfection of the packed eggs protects eggs from subsequent contamination during storage," said Sergey Sokovnin, a professor at Ural Federal University and Ural Branch of Russian Academy of Science. "We found out that 5 kGy is enough for disinfection. This dose disinfects the container and eggshells but does not affect the physical properties of the protein, yolk and shell, or their composition. The size of the eggs does not matter."

Disinfection does not affect the quality of meat and the volume of chicks. So if 63% of chickens hatch from ordinary eggs, then from processed ones—64%. But the difference is that healthy chicks emerge from the disinfected eggs.

"86% of chickens from untreated eggs show signs of chronic inflammation. In chickens from irradiated eggs, this figure reached only 4%", said Sergey Sokovnin. "At the same time, chickens from the second group had an increased immunity to Newcastle disease. This is a bird's viral disease. It means that chickens from sterilized eggs will be less sick. And it will be possible to significantly reduce the dose of antibiotics when they are growing."



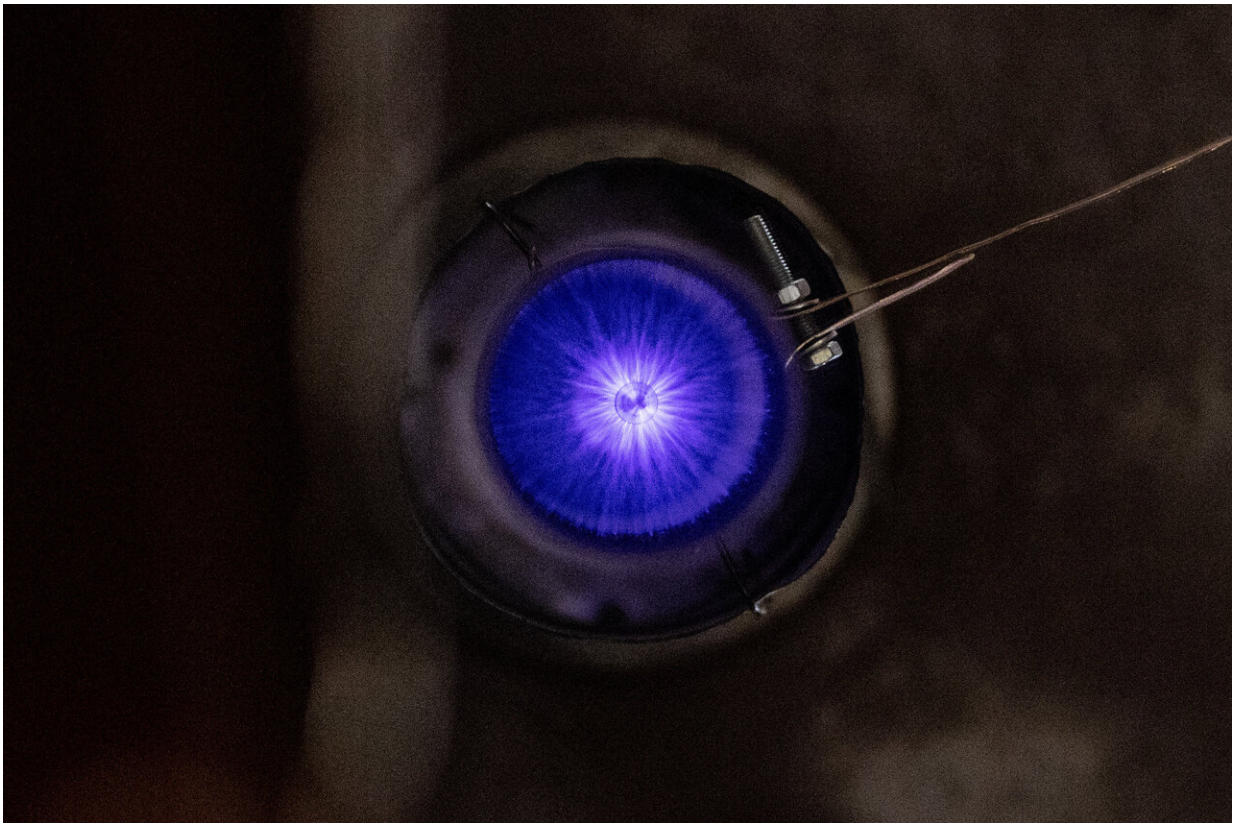
Irradiation experiments were carried out by the means of the URT-0.5 accelerator. Credit: UrFU / Ilya Safarov

The technology also saves time for industrial manufacturers. To hatch chickens from clean eggs, take about six hours less. Instead of the usual 22-24 hours, chickens appear in 16-18 hours. This is extremely important, as it reduces production costs.

"The accelerator capacity is 108 million eggs per year, which is enough for a large poultry farm," said Sergey Sokovnin. "It permits irradiation up to 40 eggs per second. The cost of irradiation of plastic packaging for 10 eggs was 1.2 Eurocents. If one technological line will operate in one shift of 250 working days a year, then the investment will be returned in five years. The main costs are staff salaries, overhead costs and

equipment costs."

There are no serious technical problems with the implementation of the technology. The small size of the accelerator makes it easy to integrate into existing lines for control and packaging of eggs in poultry farms. The technology, according to scientists, can also be used to disinfect the surface of eggs of other birds, as well as products with peels or another natural packaging (seeds, bananas, oranges).



Electron beam irradiation with a dose ≥ 5 kGy is sufficient for full disinfection of the egg surface. Credit: UrFU / Ilya Safarov

**More information:** Sergey Sokovnin. An electron beam technology of surface disinfection of the packed egg, *Food and Bioproducts Processing* (2021). DOI: 10.1016/j.fbp.2021.03.009

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