

**EVALUATION OF THE SANITATION IN THE BAKERY OPERATION****¹Vargová M., ¹Veszeličs-Laktičová K., ²Výrostková J. and ³*Zigo F.**

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ABSTRACT

Effective cleaning and disinfection in food processing plants is based on understanding of the type of the dirt to be removed from the surfaces. An efficient cleaning and disinfection consists of rinses using good quality water with application of detergents and disinfectants. Disinfection is required mainly in food plant operations, where wet surfaces provide favourable conditions for the growth of microbes. In this work we focused on the efficiency of sanitation, using microbiological swabs before the start of production and after disinfection. Swabs were taken from different surfaces and technological equipment in the Production hall of the bakery operation. For disinfection, 3% concentration of Savo Original disinfectant was

used. Disinfectant was effective on floor and wall where were no bacteria after disinfection, but on the table and door were detected 1 and 2 colony forming units of total count of bacteria after disinfection. On the mixer we found 2 colony forming units of molds after disinfection. The results from the microbiological swabs represent decrease of microorganisms, in compare with numbers of microorganisms before production which shows that disinfectant Savo Original was effective for decreasing the number of colonies forming units after disinfection. In the food industry, cleaning and disinfection is carried out in order to produce safe products with acceptable shelf life and quality and these processes should be performed as cost-effectively and safely as possible, in the shortest possible time, with low chemical.

KEYWORDS: sanitation, disinfection, Savo Original, Bakery operation, microbiological swabs.

INTRODUCTION

Every year, food-borne diseases cause illness in millions of people worldwide.^[1] One way that food can be contaminated with pathogens is through contact with food-processing equipment.^[2] Bakery products which are an important part of balanced diet, like many processed foods, are subject to physical, chemical but also biological spoilage. The main route of contamination is through surfaces. The most important ingredient of bakery products is flour. It has been estimated that flour contains approximately 8000 mould spores in 1 gram of flour. Flour can be contaminated by moulds and yeasts, species of the genera *Penicillium*, *Aspergillus*, *Rhizopus*, *Fusarium*, *Cladosporium*, bacteria – mainly of the *Bacillus* species, *Pseudomonas*, *Streptococcus*, *Achromobacter*, *Flavobacterium*, *Micrococcus*. Other bakery ingredients represent also a source of microbial contamination.^[3]

Sanitation has decisive position in food industry; because their level greatly affects food quality and safety. The most important means for maintaining efficient microbial control include minimizing the microbial load from outside sources to the process, efficient control of growth at microbiologically vulnerable sites and adequate cleaning and disinfection of the process lines.^[4] Physical, chemical and microbiological cleanliness is essential in food industry. Physical cleanliness means that there is no visible waste or foreign matter on the equipment surfaces. Chemically clean surfaces are surfaces from which undesirable chemical residues were removed, and microbiologically clean surfaces imply freedom from spoilage microbes and pathogens.^[5] The selection of disinfectant in the food processing plant depends on the safety, rinsability and efficacy of the agent as well as where it is corrosive or affects the sensory values of the products manufactured.^[6] Disinfectants approved for use in the food industry are alcohols, chlorine-based compounds, quaternary ammonium compounds, oxidants (peracetic acid, H₂O₂ and ozone), persulfates, surfactants and iodophors. The appropriate disinfectant should be chosen based on each given process.^[7]

The aim of the work was to analyze the effectiveness of disinfectant Savo Original in a 3% concentration by using microbiological swabs on monitored surfaces and equipments in the bakery operation and on the basis of obtained results to assess the level of sanitation.

MATERIAL AND METHOD

The monitored bakery operation produce a wide range of different bakery products. The bakery was divided into parts - Production hall, where swabs were taken; Packing hall and Dispatch hall. The hygienic level of monitored surfaces – door, floor, wall, table and technological equipment - hopper, sliding belt (Figure 1) in the bakery operation was analyzed. The bakery operation use effective sanitation program, which is an important part of HACCP system. All evaluated surfaces and technological equipments are cleaned and disinfected after the process of production.

For disinfection of monitored surfaces and equipments was used disinfectant Savo Original in 3 % concentration, in liquid form, applicated by spraying, without heating with exposure time 30 minutes. Savo Original represent cleaning and disinfecting agent which contains active substance sodium hypochlorite $\geq 1 < 5 \%$; sodium hydroxide $\geq 0.5 < 2 \%$ and $< 5 \%$ anionic surfactant. The disinfectant is effective against broad-spectrum of vegetative bacteria, as same as against fungi, *Mycobacterium*, *Poliovirus*, *Adenoviruses*, but also against *Bacillus subtilis*.



Figure 1: Bakery operation – Production hall - technological equipment - Hopper, Sliding belt.

Samples were taken by microbiological swabs from surfaces – door, floor, wall, table and from technological equipments - hopper, sliding belt, before the production and after disinfection. Each microbiological swab represented average value of 5 swabs taken from same place. The swabs were taken from area of 10 x 10 cm. ISO 18593 and ISO 21527 are standards for the method of sampling surfaces using swabs.^[8,9] Samples for analysis were

taken with sterile cotton swabs using sterile templates, placed in a sterile tube containing 10 ml of sterile saline solution. From this mixture 0.1 ml was applied to the different agar plates (Figure 2). For coliform bacteria (CB) was used Endo agar (EA), Meat peptone agar (MPA) was used for total count of bacteria (TCB) and Sabouraud agar (SA) was used for yeasts and molds. The results from the Endo agar and Meat peptone agar were obtained after 24 hours incubation at 37 °C and expressed in CFU (colony forming units) units. The results from the Sabouraud agar were obtained after 5 days incubation at room temperature, expressed in CFU.

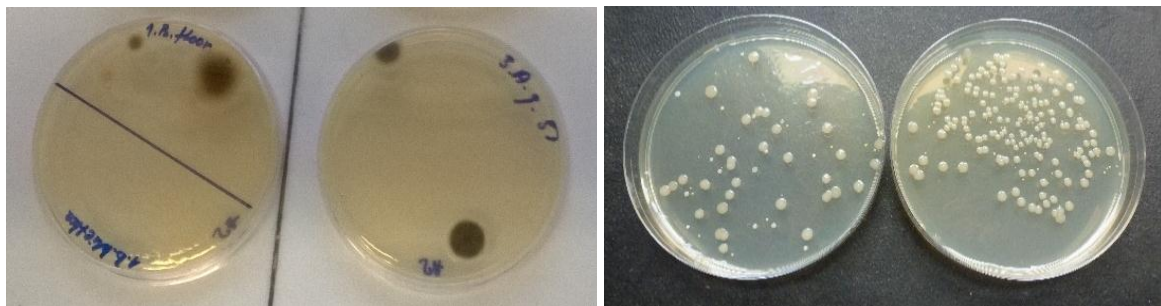


Figure 2: Sabouraud agar for molds and Meat peptone agar for total count of bacteria.

RESULTS AND DISCUSSION

Disinfectant Savo Original was effective on floor and wall where were no bacteria after disinfection, but on the table was detected 1 CFU of TCB, and on the door were detected 2 CFU of TCB after disinfection. Insufficiently cleaned working table in the production hall points to a certain hazard possible secondary contamination of products. If cleaning and disinfection are not effective enough, attention must be paid to the suitability of the agent used for this activity, but also to the procedure of the performance of this activity.^[10] Good hygienic design of bakery operation and equipment prevents the contamination of product and simplifies the cleaning of equipment.^[3] Floors, walls, and other surfaces require construction materials that are cleaned and maintained easily. The materials used should be smoothly surfaced, inert and resistant to dirt absorption.^[11] Flooring material represents a critical point of sanitation, but the way the floor is constructed is also important. Covering at a floor-wall joint facilitates cleaning by preventing accumulation of bits of food that attract insects and rodents. Sealed concrete floors make the floors nonabsorbent and reduce possible health hazards from cement dust.

At evaluation of effectiveness of used disinfectant on monitored equipment we found 2 CFU of molds on the mixer. Flour represent the most important ingredient of bakery products and

it can be contaminated by mould spores. The hygienic design of process equipment has a significant impact on reducing the risks of contamination of food during production. Poor hygienic design of process equipment and components used in the food processing industry can result in food contamination, because such equipment is difficult to clean. Having a good hygienic design the lifetime of the equipment will increase, the maintenance and the manufacturing costs will also be reduced. The process equipment is easy to clean if the surface materials are smooth and in good condition.^[3] Proper cleaning and disinfection of surfaces and equipment with the right choice of effective disinfectant is very important. The analyzed results of microbiological swabs cultivation from monitored surfaces and technological equipment in the bakery operation shows that the numbers of monitored species of microorganisms decreased after disinfection which means that the process of disinfection was sufficient and effective (Table 1, 2).

Table 1: Effectiveness of disinfectant Savo Original on the monitored surfaces before production and after disinfection.

		Surfaces			
		door (CFU)	floor (CFU)	wall (CFU)	table (CFU)
before production	TCB	30	150	25	14
	CB	0	0	0	0
	M	2	0	0	1
after disinfection	TCB	2	0	0	1
	CB	0	0	0	0
	M	0	0	0	0

Note: CFU - colony forming units, M – moulds, TCB – total count of bacteria, CB – coliform bacteria.

Table 2: Effectiveness of disinfectant Savo Original on the equipment before production and after disinfection.

		Equipment		
		hopper (CFU)	sliding belt (CFU)	mixer (CFU)
before production	TCB	12	10	20
	CB	0	0	0
	M	1	1	0
after disinfection	TCB	0	0	0
	CB	0	0	0
	M	0	0	2

Note: CFU - colony forming units, M – moulds, TCB – total count of bacteria, CB – coliform bacteria.

Effective sanitation step is a part of a program to inactivate microorganisms, preventing the accumulation of microbial cells and particulates on the surfaces of equipment as well as biofilm formation.^[12] The aim of using a disinfectant is to reduce the number of microbes left on surfaces after cleaning and to prevent microbial growth on surfaces before restart of production.^[13]

CONCLUSION

Effective sanitation is mandatory for the reaching of a safe food supply. The continued interest in and consumer demand for food safety and security have increased the need for improved sanitary practices from processing to consumption. Hygiene in food processing plants is highly dependent on hygienic design of the process lines and equipment as well as on cleaning efficiency. Based on our results obtained in practical conditions it can be presented that the disinfectant Savo Original which was used in 3 % of concentration was effective on monitored surfaces and equipment.

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