

## Evaluation of the Effectiveness of Disinfectants

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### Abstract

The disinfection process in poultry farming is the most important direction in the control of pathogens of infectious diseases. Currently, many farms carry out disinfection based on standard rules: manure transportation, dirty washing, clean washing, disinfection, fumigation. This study was conducted in order to determine whether disinfectants for poultry houses of poultry farming are effective for reducing bacteria, viruses and fungi. Poultry houses for breeding were selected for field tests. The disinfectants evaluated were chloride, glutaraldehyde and formalin. In order to determine the total number of aerobic and anaerobic bacteria, as well as the number of yeast and mold fungi, samples were inoculated into the nutrient medium. The tests were mainly carried out to determine *E.coli*, *Campylobacter spp.* and *Salmonella spp.* As a result of research conducted at the “Saba” poultry farming, a significant decrease in the number of microorganisms was observed. The results show that the percentage and type of disinfectants may vary depending on the type, degree of application, duration of storage and the strength of the effect of organic substances on common aerobic bacteria.

**Key words:** glutaraldehyde, Salmonella, E. coli, disinfection

### Introduction

Poultry farming is a field of activity where poultry are kept for breeding and broiler types. The biggest obstacle to the development of the poultry industry is the presence of pathogens of bacterial, viral and fungal origin. Diseases cause serious damage to the farm at all stages of poultry development. In particular, the spreading of

pathogenic microorganisms in the technological process increases the likelihood of contamination of products going/ transferring to the consumer (Black, 1991; Bragg and Plumstead, 2003).

The disinfection process at poultry farms is the most important stage of the biosafety regulations. An important issue in maintaining the epizootic state of poultry farming is compliance with biosafety rules. There are several ways for installation of biosafety barriers: physical-decontaminators, chemical-disinfectants and logistical - this is a measure of the rules depending on the age of the bird and the status of the disease. One of the important parts of biosafety rules is disinfection. Due to disinfection, it is possible to minimize/ decline the number of microorganisms. *E.coli*, *Campylobacter* are usually found in poultry houses, where poultry is bred (Bender and Mallinson, 1991; Kitis, 2004)

*Salmonella* occurs in the environment and poses a danger to the health of birds in all phases of their development. Birds are kept in poultry houses until they are sent for slaughtering, and then, a large amount of feces accumulates. Here, cleaning of poultry houses in poultry farming from litter, which is mandatory for the reproduction of *Salmonella*, *E.coli* and other pathogens, occupies a major place/comes to the most priority in the prevention of diseases. The successful implementation of this process is the correct organization of the sanitary program. As a result, birds become healthier, productivity increases and the spread of pathogenic microorganisms is prevented (Corrier et al., 1992; Davies and Wray, 1995; Long, 1981). For the effective application of disinfectants, the dirty floor should be completely cleaned.

Aspergillosis, Candidiasis, Dactylios, Favus, etc., are related to fungus diseases of poultry. Fungal diseases, mycotoxins (contained in wheat and feed) or having an infectious nature cause significant economic damage to the poultry industry. Fungi cause to the occurrence of diseases, an increased mortality rate, especially an increase in growth in infected young birds, diarrhea and encephalitis (Kuldeep et al., 2013).

Disinfectants can be used in various forms such as: fumigation, spraying, misting, wet disinfection (Eckman, 1994). Usually the composition of disinfectants consists of alcohol, chlorine, aldehydes, phenol, halogens (Meroz and Samberg, 1995).

In Azerbaijan, poultry meat occupies an important place/plays a key role/is so crucial in meeting the needs for food. There are farms for the production of poultry meat and eggs in the country. Each of them has/faces with different risks depending on its location and direction.

The "Saba" poultry farming is located on the territory of the Shabran district. Here, an incubator, poultry houses for breeding, a slaughterhouse and a testing laboratory are located on the same territory. In a complex farm of this type, preventing the spread of pathogens is much more difficult. In addition, the Shabran district is under the migration routes of birds, which, in turn, is one of the risk factors for the occurrence of avian influenza.

The purpose of this investigation was the studying the effects of various disinfectants and determining the most effective.

## Material and methods

### *Research area:*

Length of each poultry house 77 m, width -18 m

### *Sampling plan:*

After a dirty cleaning of the poultry house, a disinfectant was applied, and a smear sample was taken from 10 places. The samples were immediately sent to the testing laboratory. During the testing period, the samples were stored at a temperature of 4-8 °C.

X	X	X	X	X
Enter of house		middle		end of house
X	X	X	X	X
X				

**Graph 1. Sampling procedure from poultry houses**

## Laboratory tests

Using sterile swabs, smears were taken from 3 places of the poultry house. With the addition of PBS in a ratio of 1:10, the smears passed through a centrifuge. A 1 ml of sample taken from the supernatant was inoculated on MPA, End, Magconci agars. The inoculations in Petri dishes were kept for 2 days at a temperature of 37 °C. Colonies that gave growth were also taken and microscopized (SOP 02-V-2).

## Result and discussion

The purpose of sanitation and disinfection is reducing or elimination the number of microbes that pose a danger to the health of the flock. All disinfectants - sprays, foams, aerosols or fumigants - act much better at temperatures above 20 °C.

**Table 1. Test results of disinfectants**

Name of substance	Percentage	Field of application	Period	Test results			
				GNM (number of colonies)	BCBG	Salmonella spp.	Yeast and mold fungi
Glutaraldehyde 15% Benzalconium chloride 10%	2.75%	Breeding poultry houses	30 minutes	300	-	-	-
Glutaraldehyde Benzalconium chloride (GAC)	0.1-0.3%	Breeding poultry houses	30 minutes	450	-	-	-
Formalin - fumigation	%	Breeding poultry houses		-	-	-	-

Poultry houses for breeding are places where birds live from 0 day/from the day zero to slaughter (33-35 days). Disinfection works/measures in poultry houses are not carried out/taken before the birds are sent for slaughter. Field tests have shown a large number of common aerobic bacteria. After a clean wash (i.e. washing and rinsing with a foaming substance following waste disposal), disinfectants were applied in the 1st and 2nd sections. The exposure of all three substances was the same. According to the results, the bacteria *Campylobacter spp.*, *Salmonella spp.*, *E.coli* did not give growth.

The time of affection had a significant impact on the number of aerobic bacteria, because the mortality rate of organisms is affected by the duration of exposure to an antimicrobial agent (Black, 1996). Disinfectants are commercially available and care must be taken before choosing the appropriate remedy. Not all disinfectants are

classified as broad-spectrum; therefore, the selected substance must be effective for destroying the organism causing special problems. When mixing disinfectants, the correct proportions must be specified. It is important to follow the recommended procedures, the proportions of application - it is necessary to take some other factors into account such as water, temperature and the surfaces on which to be applied (Murray, 1991; Reiber et al., 1990).

The results of this study show that the area to be disinfected, the degree of application, as well as the duration of exposure, can affect populations of *aerobic bacteria*, *E.coli*, *Salmonella* on different surfaces. Along with this, it is important to ensure that all surfaces and empty organic materials are cleaned for field testing before applying the disinfectant.

## Conclusion

Currently, disinfectants of various compositions are used. The basis of all disinfectants are chlorine compounds: sodium chloride, hypochlorite, hydrogen peroxide, iodine, acids. When choosing sanitation products, it would be better/it looks wise to change them periodically. This will help reduce the resistance of bacteria and other microbes on the farm. When using step-by-step cleaning methods, the microbial load on the farm can be minimized. This contributes to the fact that in the future a stable poultry farm will enjoy a working/an effective functional biosafety system.

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