Cairo University
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The Efficiency of Disinfectants and Disinfection Programmes Commonly Adopted in Poultry Farms in Egypt

تأثيرفعالية المطهرات وطرق التطهير المعتاد تطبيقها فى مزارع الدواجن فى مصر

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Abstract

This study aimed to evaluate the cleaning and disinfection programmes in small scale of poultry production houses. Every procedure in cleaning and disinfection has a role to achieve the standard optimization for disinfection process. Local disinfectants Egyptian should be evaluated periodically for the efficiency and validity of active material. The use of Foam technique and the addition of chlorine to surfactant in cleaning process produced an excellent result. Biofilm is a problem in poultry farm which could be developed in water pipes and the cages of the birds. Plankton could be developed on the water pipes by the water which has a high microbial load. Disinfection process must be done periodically to remove the biofilm and the plankton by Clorox 2.5% or Calcium hypochlorite 1%. Also, this study aimed to replace liquid foot pan in the poultry farm, with a novel model using dry disinfectants as Calcium hypochlorite, Staldren, Halamid, Paraformaldehyde and Virkon S that is used more effectively in biosecurity program convenient with the workers in Egyptian farms that avoid the ordinary foot pan.

Key words: Sanitation - disinfection - cleaning - biofilm - foot pan - *Salmonella* - *Pseudomonas* -plankton - total colony count.

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Introduction

The complexity of cleaning and disinfection in poultry industry and other veterinary activities is frequently underestimated, and the many variables complicating this process are easily overlooked.

The art and science of disinfection practice has developed from this empirical beginning to a science of considerable degree in poultry biosecurity applications. Today, some experts debate the qualities of many products, procedures and evaluation methodologies. However, with advances in chemistry, biochemistry, microbiology and molecular biology, the mechanisms of disinfectant actions are being elucidated and a scientifically-based disinfection technology is emerging

Sanitation and disinfection constitutes the most important parts of commercial poultry production and management which is usually mistreated. Sanitation starts with the quality of cleanliness, while disinfection refers to the reduction of contamination. Reducing the load of pathogens in the environment of the flock will decrease the risk of disease. Various deficiencies in cleaning and disinfection(C&D) procedures may induce a chain of infections which will not break pathogen from one stock to another. Thus, there is an urgent need to investigate disinfection methods that will be effective in poultry houses, and which can be evenly distributed especially for small scale production and rural area production as an improper cleaning, can do more harm than good. If it is done properly, a good cleaning can remove 90% of the pathogens (**Gordon and Morishite, 2007**). The operations of cleaning and disinfection are essential parts of the poultry farms and the efficiency with which these operations are performed greatly affects final product quality.

In a study by **(Sauer 2003)**, bacterial communities that are attached to a surface, so-called biofilms, and their inherent resistance to antimicrobial agents are a cause of many persistent and chronic bacterial infections. The development of biofilms in water lines, drinking cups, bell drinkers, water drought, nipples, floors, walls, feeding augers, soils and poultry cages may causes many problems in poultry industry, because biofilms function as

reservoirs for diverse species of bacteria, provide specific, limited niches and a protective refuge from competitors, predators, or harsh environmental conditions, which are also the most difficult to clean and disinfect properly due to their complex inaccessible equipment. It is therefore highly beneficial for microorganisms to adhere to surfaces, and biofilms will develop if given the right conditions to do so (**Korber *et al.*,1995**). Biofilm becomes a specialized ecosystem with the microorganisms embedded within the polysaccharide matrix **(Christensen 1989).**

As poultry pathogens, can be introduced to the poultry house via vehicles, people, clothing, footwear, equipment, utensils, water, feed, feathers, carcass of dead birds, litter, insects, rodents, wild birds and pets. A footbath is a very simple form of biosecurity that it helps to prevent the potential spread of disease. Organisms have the potential to survive for several days or weeks in the dirt stuck to the bottom of shoes.

Bacterial growth in aqueous solution of disinfectants has been reported and foot baths could thus serve as a contamination source. The use of foot baths also results in additional wetness on floors. (**Heinzel &Bellinge 1982**)

Mechanical transmission of the poultry pathogens is throughout common behavior of farm workers, boots and personnel movement including workers and visitors. Soles of personal footwear could contaminate fomites into farm setting, resulting in contamination of the floor of the farm anteroom and the ventral surfaces of containers after contact with the contaminated anteroom floor. (**OIE - FAO 2008**). Egyptian stockman behavior always averts the wet foot bath in the farm calming that wet foot bath may destroy foot wear. The same says in wheels dip of the farm.

Therefore, this work aimed to:

1- Apply simple and effective procedure for cleaning and disinfection (C&D) in small scale poultry production using available traditional material that easily obtained from the Egyptian market.

2- Chemical evaluation of the used current disinfectants.

3- Evaluate the performance of each steps of (C&D) process, performance which made the necessity for evaluation of the disinfectant that used in Egyptian markets and their role in reducing the bacterial load in commercial poultry farms.

4- Effect of some disinfectants on the biofilm (*Salmonella* & *Pseudomonas*) which formed on the galvanized wire (cages of birds) & PVC (water lines) in poultry farms**.**

5- Evaluate the efficiency of some disinfectants on the planktonic bacteria which formed on the PVC.

6- Apply a novel model of foot pan using dry, semi liquid and a mat which have efficiency against aerobic bacteria.

7- Study effectiveness of model of foot pan using dry, semi liquid and a mat which have efficiency against *Salmonella*.

Study 1
Evaluation of some traditional disinfectants which usually used in small sector of Egyptian poultry farms

1.1 Socioeconomic importance of the small sector poultry production in Egypt

Poultry production systems in Egypt are quite diverse, ranging from rural very small-scale, extensive poultry production to highly intensive caged systems with over 70,000 birds per house in industrial commercial systems. In 2000, 63% of Egypt's chicken meat output was produced by the commercial sector. In contrast, traditional operations produce 22% of chicken meat, 64% of ducks, 34% of turkeys, and all geese and pigeons **(Taha, 2003)**.

The cultural and socio-economic role of rural poultry production can play a vital role in gender equality, food security, animal protein availability and income and employment generation. The rural poultry sector is important for Egypt's development overall and specifically for poor landless rural households.**(Dolberg 2003)**

Rural poultry production can be one of the tools to combat food insecurity and a first step on the path leading people out of poverty **(Jensen and Dolberg 2003)**.

Smallholder poultry production will not generate large amounts of income, but it represents a known skill to most poor women and it can assist them in moving into a positive spiral of events that may lead them on to a path out of poverty (**Jensen and Dolberg 2003).**

Characteristics of a typical small scale broiler production, unit Small-scale broiler production in Egypt (less than 15,000 broilers per cycle) accounts for approximately 74% of total broiler production. The majority of the sheds have a total area of approximately 500m^3. Ventilation is natural with windows or open sided curtains. A litter system is used with manual hanging feeders and bell drinkers. Special brooding equipment involves butane heaters, simple gasoline burners and ventilation is very poor during brooding (to save on heating) causing respiratory