

COMPARATIVE STUDY OF VARIOUS DISINFECTANTS EFFICIENCY IN POULTRY FARMS

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Abstract. Pathogenic Micro-organisms are contaminating poultry or animal farms through various ways such as air, water, labors, feeds, insects, birds etc. For this reason, need to have biological risk management protocols, which are important to prevent, control and removing the risks of diseases and spread of microbes. Disinfection protocols, when implemented appropriately, economically and according to productivity rate is better for the reducing pathogenic Micro-organisms and it is a significant step for several biological risk Management programs and preventions from various diseases. Anticipation and disinfection of disease is normally very easier, economically and medically effective than addressing outbreak circumstances of the diseases. Therefore, general awareness about systematically disinfection protocol for the control and prevention of infectious disease has become chief for poultry farms and control of the diseases which is need to become develop. Aim of this study is to evaluate the efficiency of some available disinfectants in poultry farms and examine of its advantages and benefits against the control of various diseases. Four broiler farms were selected for the experiment, which had treated with three types of disinfectants: Veterinary Disinfectant cleaner, glutaraldehyde, quaternary ammonium salt and last one is the control group. Finally the result had shown a farm in which we had used Veterinary Disinfectant cleaner spray economically was better than other three groups. Similarly glutaraldehyde treated farm are better in second stage and quaternary ammonium salt treated farm are less economically better than the control group. Thus using of disinfectant in farm reducing the pressure and load of micro-organism and prevent farm from various diseases.

Keywords: disinfection, prevention, micro-organisms, poultry farm, disease.

1. Introduction. Disinfection is the procedure and process for the eliminating, controlling and killing of the various infections by using of chemical, biological or physical agents (Jeffrey., 1995). The antimicrobial agents or disinfectants are occasionally used for as sterilizing, preventing, sanitizing or anticipating. Generally, disinfectants are using in animal or poultry health, which are fairly, effectively strong, persistently antimicrobial, chemicals, and are helpful to contaminated surfaces for the removing or controlling of microbes. These Disinfectants and chemicals are using in food processing companies which are normally less amount toxic and further

diluted. Furthermore disinfectants are finding in various complex formulations of chemicals, soaps and detergents which develop diffusion of the active ingredients and more effectiveness against micro-organisms. Thus in fish farming, disinfectants are using for the cleaning of ponds, tanks, equipments and utensils (Blocks., 1991).

Biocide or bactericides are chemical agents that, controlling, destroying and removing of microorganisms. Disinfectants, antiseptics and antibiotics are the common terms and words, which are using for the removing of microbes. Bactericide and biocides are usually acting in the response with cell proteins,

mainly inactivates essential enzymes of microbes. These disinfectants are acting as oxidation, hydrolysis, denaturation, and inactivation of the enzymes (Ewart and Smith., 2000). When the removing actions are occurred in a biological cell, the term - cide like (biocide, bactericide, virucide, sporicide) is used in the end of word, and term of the static (bacteriostatic, virostatic) is used for those microorganisms growth, which is basically inhibited or prevented from multiplying and decreasing of cell growth rate (Joklik., 1992).

Hygiene and sanitation are playing most important role for the control and prevention of various diseases and very effective for the managing of biological risks program in live stock and poultry production sector. One of the very important requirements for the prevention and control of diseases in poultry farms to facilitate hygiene and sanitation is accomplishment of the all method (Joklik., 1992). Livestock and Poultry farms must be complying with necessities for separation from the environment and severe examination of values of hygiene and sickness control. Poultry farms and buildings must be systematically set hygienically, cleanly and methodically for the entry of all new chickens. Consideration, inspection and evaluation must be rewarded to the terminal sanitation of poultry farms and equipment subsequent to depopulation (Ewart and Smith., 2000). Demanding care, consideration, inspection and evaluation should be exercised in the actions of hygienic procedures later than a disease outbreak and microbial loads in a farm. Physically urgent removal of dead and sickly chickens is significant and effective apparatus in preventing and controlling the distribution of variety infections and diseases. Normal imaging, evaluation, visual and effective examination, inspection together with regular routine and normal testing by microbiological managing and controlling methods, is very effective and important in inspection the efficacy of cleaning, anticipating and disinfection (Joklik., 1992). Iodine Compounds are broad spectrum Disinfectants and antimicrobial agents for the removing and controlling of a variety bacteria, mycobacterium, fungi and viruses (Jeffrey., 1995). Iodine's acting as denaturing proteins in a cell

to interfere with the enzymes and kill the microbes (Maris.,1995).

Iodine's are from halogens group's elements which are regularly formulated with soaps and always use as careful slightly safe (Grooms., 2003). Concentrated and higher dosage iodine compounds and its mixed components can be irritating to the body surface and also can discolor dresses or damage rubber and various metals equipments (Shulaw and Bowman., 2001).

Disinfecting and anticipating of a farm is very useful method to maintain the well being and health of high producing animals, poultry farms and buildings. This is particularly the case in intensive modern farming method where high concentration and high yield increases the infection loads, rate and various diseases (Maris.,1995). Systematic cleaning and modified disinfection decreases or control the pathogen level and prevents the disease cycle in poultry farm sectors. Initial assessment, evaluation and management of the poultry farms, buildings, clinic, hotels and the needs for disinfection will be imperative in the development and improvements of an effective protocol as well as disinfectant assortment (Shulaw and Bowman., 2001). According the goals for the disinfection protocol in this study or research is to evaluate the efficiency of some available disinfectants in poultry farms and examine of its advantages and benefits against the control of various diseases. Also we have plane to prevent infectious diseases, decrease disease spread, or control an outbreak in poultry farms.

2. Aims: Aim of this study is to evaluate the efficacy of some available disinfectants in poultry farms and examine of its efficiency, advantages against various microbes and diseases in Batikot districts Available poultry farms.

3. Material and Methods

The experiments are completed in the summer season 2020 at Bati kot District, Nangarhar Province, Afghanistan. There were no residents or other farms located surrounded by 15 km of our experimental farms. The broilers are raised on a net, and the broiler farms, which has 62 m length, 15 m width, and 3.3 m in height. The chicken capacity of every broiler farm was approximately 22, 00.

The temperature inside the farm was 28-30C, and the humidity was 66-72%. The farms are reasonably equipped with necessary tools, equipments, feeding and water. The chickens had full access to feed and water regarding to the feeding norms. The Spray system by spray pump was used in this research, and the disinfectant spray is prepared to certain concentration and dosages used deep well water. The quantity of disinfectant spray pump was planned based on 10 ml/m³ of the chicken's farms. Four broiler farms are selected for this experiment, which are treated with three types of disinfectants:

Veterinary Disinfectant cleaner (100 g/h, 1 h), quaternary ammonium salt (1:2000, spray), glutaraldehyde (1:1000, spray), and one were the control group. During 42 days every farm healthy condition are noted for the presence of New castle, IB, Enteritis, fowl cholera and E.coli. The data had shown in tables by simple percentage calculation.

4. Result

The results of this study are showing that there are many farms of chicken husbandry which are located in open area and there is no control for the people contact that are visiting and seeing the farms. But three to four farms are commercial which is located in close area and not allowed for the peoples visiting.

The present study which had completed, that was done in open area farms and there were no limits for the control of people contacts. We had used three types of disinfectants for three farms in summer season and one farm was the control group.

A farm in which we had used Veterinary Disinfectant cleaner spray economically was better than other three groups. Similarly glutaraldehyde treated farm are located in second position and quaternary ammonium salt treated farm are less economically better than control group. The exact study result is showed in below tables.

Table 1. Show the Efficiency of Veterinary Disinfectant cleaner spray by controlling of various diseases in chicken farm

Name of the disease	Amount of Sick chickens	Percentage of the sick chickens%
New castle	0	0
IB	50	2.5
Enteritis	0	0
Fowl cholera	0	0
E.coli	0	0

Table 2. Show the Efficiency of glutaraldehyde spray by controlling of various diseases in chicken farm

Name of the disease	Amount of Sick chickens	Percentage of the sick chickens%
New castle	80	4
IB	180	9
Enteritis	120	6
Fowl cholera	0	0
E.coli	0	0

Table 3. Show the Efficiency of ammonium salt spray by controlling of various diseases in chicken farm.

Name of the disease	Amount of Sick chickens	Percentage of the sick chickens%
New castle	0	0
IB	65	3.25
Enteritis	0	0
Fowl cholera	180	9
E.coli	0	0

Table 4. Show the Efficiency of control group chicken farm which did not sprayed by disinfectant.

Name of the disease	Amount of Sick chickens	Percentage of the sick chickens%
New castle	0	0
IB	220	11
Enteritis	50`	2.5
Fowl cholera	120	6
E.coli	180	9

Table 5. Effect of various disinfectants on broilers farms health conditions.

Name of Disinfectant	ND	IB	ENTRITIS	Fowl cholera	E.coli	Total
Veterinary Disinfectant cleaner spray	-	+	-	-	-	20%
glutaraldehyde	+	+	-	-	+	60%
ammonium salt	-	+	-	+	-	40%
Control group	-	+	+	+	+	80%

5. Discussion

Disinfection and anticipation of the livestock and poultry farms has become a significant measure to prevent, control the diseases and decrease microbial loads. The commonly using chemical disinfectants for broiler chickens farms and buildings are consist from chlorine, Veterinary Disinfectant cleaner, quaternary ammonium salt, and glutaraldehyde (Meroz and Samberg., 1995; Saklou et al., 2016; Chidambaranathan and Balasubramaniam., 2017). Different disinfectants had used for high amount disinfection of broiler farms, buildings and houses operate via different mechanisms of sprays, and thus, their disinfection efficacies also differ from each other (Chidambaranathan and Balasubramaniam., 2017; Suwa et al., 2013).

Veterinary Disinfectant cleaner has widespread medical applications according to its useful antimicrobial role, decreasing of the microbial loads in a farm (Ozturk et al., 2017) and antioxidant defense against free radicals in the body (Delgado-roche et al., 2017). Gram-negative bacteria are further sensitive to Veterinary Disinfectant cleaner than Gram-positive bacteria, and bacteria are further responsive than a yeast strain after disinfection the farms (Moore et al., 2000). Jacobs and Heidelberger (Jacobs and Heidelberger., 1915) had synthesized quaternary ammonium salt compound with bactericidal capability to killed micro-organism and decrease the load of microbes in a farm. So its bactericidal mechanism of salts involves changing cell permeability, follow-on in extravasations of

the bacterial internal content. Quaternary ammonium salts are cationic surfactants, which has given that actions demonstrate bactericidal property based on lipophilicity and otherwise that the cell wall of Gram-positive bacteria contains further lipids than Gram-negative bacteria, Gram positive bacteria are very simply inactivated by quaternary ammonium salts. Glutaraldehyde can be acting directly on bacterial proteins and enzymes thus affect bacterial cell metabolism and cause to die bacteria. Glutaraldehyde can also block the release of dihydrochloride from the outer coat of the bacterial spores to prevent sporulation and prevent bacteria from spore formation. Therefore, glutaraldehyde is functional more effective and normal disinfectants for disinfection surrounded by broiler farms and buildings (Battersby et al., 2017; Castro et al. 2017). Glutaraldehyde had shown broad bactericidal spectrums activity with a highly efficient killing capability for the decreasing and removing of bacteria and virus. Glutaraldehyde as well showing a strong consequence on the spores generated bacteria such as clostridium, which can cause necrotic enteritis, and thus it is commonly used for the disinfection and anticipation of bacterial spores (Miner et al., 1993; Rutala et al., 1993; Brantner et al., 2014).

During intensive farming and rearing, livestock and poultry live bodies can excrete bacteria and viruses, including opportunistic, infectious pathogens, during feces, expiration and the respiratory region and generate bio-aerosols in the air, water, which may risk for

humans and the environment too (Hojovec, et al., 1968; Bessarabov, et al., 1972; Petkov and Bařkov., 1984; Just et al., 2011). Comparatively in this study a farm in which we had used Veterinary Disinfectant cleaner spray, according to Mortality and morbidity rate economically its efficiency was better than other three groups. Similarly glutaraldehyde treated farm are better in second stage and quaternary ammonium salt treated farm are less economically better than control group.

6. Conclusion.

Microorganisms are presents all over the places such as in air, soil, water, on animals,

on humans and on poultry farms or environments. The aims of disinfections are to decrease infection pressure, microbial loads and thus decrease disease prevalence. Choosing the disinfectant adapted to each specific situation leads to effective prevention and profitable poultry farms.

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СРАВНИТЕЛЬНОЕ ИССЛЕДОВАНИЕ ЭФФЕКТИВНОСТИ РАЗЛИЧНЫХ ДЕЗИНФИЦИРУЮЩИХ СРЕДСТВ НА ПТИЦЕФАБРИКАХ

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Аннотация. Патогенные микроорганизмы загрязняют птицеводческие или животноводческие фермы различными путями, такими как воздух, вода, рабочая сила, корма, насекомые, птицы и т.д. По этой причине необходимо иметь протоколы управления биологическими рисками, которые важны для предотвращения, контроля и устранения рисков заболеваний и распространения микробов. Протоколы дезинфекции, если они выполняются надлежащим образом, экономично и в соответствии с уровнем производительности, лучше подходят для снижения количества патогенных микроорганизмов и являются важным шагом для нескольких программ управления биологическими рисками и профилактики различных заболеваний. Предупреждение и дезинфекция заболеваний, как правило, гораздо проще, экономически и с медицинской точки зрения эффективнее, чем устранение последствий вспышек заболеваний. Таким образом, общая осведомленность о протоколе систематической дезинфекции для контроля и профилактики инфекционных заболеваний стала главной для птицефабрик и борьбы с болезнями, которую необходимо развивать. Целью данного исследования является оценка эффективности некоторых доступных дезинфицирующих средств на птицефабриках и изучение их преимуществ в борьбе с различными заболеваниями. Для эксперимента были отобраны четыре бройлерные фермы, которые были обработаны тремя видами дезинфицирующих средств: ветеринарным дезинфицирующим средством, глутаральдегидом, четвертичной аммониевой солью, и последняя – контрольная группа. Наконец, результат показал, что ферма, на которой мы использовали ветеринарный дезинфицирующий спрей-очиститель, с экономической точки зрения была лучше, чем в других трех группах. Аналогичным образом, ферма, обработанная глутаральдегидом, на втором этапе работает лучше, а ферма, обработанная четвертичной аммониевой солью, экономически менее эффективна, чем контрольная группа. Таким образом, использование дезинфицирующего средства на ферме снижает давление и нагрузку на микроорганизмы и предохраняет ферму от различных заболеваний.

Ключевые слова: дезинфекция, профилактика, микроорганизмы, птицефабрика, заболевание.