

Let's Talk Chicken!

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Farm Disinfection: SENTINEL OF BIOSECURITY

With the threat of Bird Flu looming over like the proverbial Damocles' sword for some time now and currently quite prevalent even in developed countries, all involved in and concerned with the sustainable poultry production in our country should take stock seriously of all bio security measures being employed at our farms. We need to make sure that we keep our chicken pens far away from any infective germs haunting them.

By vaccination and anti microbial medication (antibiotics and others) we try to keep our poultry free from diseases. But the efforts made to achieve this will become an exercise in futility if we do not take care of the hygiene and disinfection of poultry rearing environment. Therefore hygiene and disinfection should form the hallmark of bio security system practiced at the farms. The overall bio security if strictly implemented, brings in over all flock health, a substantial reduction in cost of medication, helps prevent or minimize vaccination failures, reduction in the mortality rate and facilitates an environment in which the birds grow and perform to their full potential. **Remember, bio security is not an option, but uncompromisingly mandatory! And Disinfection becomes its sentinel!**

Disinfection is the means to kill or eliminate the disease causing micro organisms, such as bacteria, viruses, fungi present in the poultry rearing premises. It can be achieved through chemical or physical interventions. Hygiene on other hand facilitates setting up barriers to restrict the entry of disease causing germs to the flock and limit the spread of infection among the birds. For the success of an efficient disinfection programme hygiene plays an equally important role.

Let us go back to basics!

The fact is that bacteria and viruses can live for several months if protected with organic matter and the spores of bacteria can live almost indefinitely in the soil or in cracks and crevices of the poultry shed. Coccidial oocysts remain infective in infested premises.

Natural disinfection is achieved through sun light (U.V rays are very powerful disinfectant), heat, cold, desiccation and agitation.

A certain degree of destruction of germs is possible by these means but their usefulness is limited due to the nature of building (roofed and closed on sides), air flow in the shed etc. More reliable means of disinfection are therefore by using chemical agents most of which react with protein and in particular the essential enzymes of micro-organisms so that they can not survive or multiply.

At the outset we should realize that disinfection is not a substitute for cleanliness (Hygiene). The chemicals used to disinfect the poultry shed will be effective only when the shed is relatively clean of organic matter such as litter, feed materials or any dirt that greatly interfere with the efficacy of the disinfectant used.

Selecting a disinfectant

Many disinfectant preparations are available in the market, but selecting the best or most suitable for the farm conditions is most important. We need to get the product that has a broad spectrum of action to destroy bacteria, bacterial spores, viruses (both enveloped and non-enveloped) and fungi.

Virus contains a single type of nucleic acid (DNA or RNA). The nucleic acid is surrounded by a protein coat called capsid. Capsid is again surrounded by a lipid membrane, such virus is called enveloped one. On the other hand non-enveloped virus does not have the lipid membrane. Enveloped viruses include Avian Influenza (Bird Flu), Mareks' Disease, Newcastle Disease, Fowl Pox and Infectious Bronchitis. The examples of non-enveloped viruses are Gumboro and Egg Drop Syndrome (EDS 76).

When we select a disinfectant we need to consider mainly the following:

1. Effectiveness against
 - a) both enveloped and non-enveloped viruses
 - b) both bacteria and bacterial spores
 - c) fungi
2. Effectiveness in the presence of organic materials
3. Effectiveness in the presence of soap
4. Residual activity

Let us discuss now some of the common chemicals used as disinfectants and how they fare as good disinfectants.

CRESOL and CRESYLIC Acid are liquid yellow or brown coal tar derivatives. They have strong odour, irritate the skin and turn milky when water is added. They are quite excellent germicidal but their strong odour is injurious to very young chicks. These chemicals can be used for disinfecting floors, equipment etc.

EFFICACY OF DIFFERENT DISINFECTANTS IN USE

PROPERTIES/ ACTIONS	Aldehydes	Quaternary ammonium	Chlor- hexidine	Iodine/ iodophor	Oxidising agents	Phenol	Chlorine	Alcohol
Virucidal activity against non-enveloped virus	+++	No.	No	++	++	No	+++	No
Virucidal activity against enveloped viruses	+++	+++	+++	++	++	+++	+++	++
Bactericidal	+++	++	++	++	++	++	++	++
Sporicidal	++	No	No	+	+	No	+	No
Fungicidal	+++	++	++	++	+	+++	+++	+
Activity in the presence of organic matter	+++	++	++	++	+	+++	+	+
Activity in the presence of soaps	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Residual activity	Fair	Fair	Good	Poor	Poor	Poor	Poor	Fair

+++ = High activity/very good;
 ++ = Moderate Activity /good;
 + = Slight Activity/Fair

PHENOLS are also coal tar derivatives with a base of Carboic acid. Phenols are effective against fungi, gram-positive and gram-negative bacteria, enveloped viruses but not against bacterial spores. Synthetic Phenols are used to sanitize hatchery and equipment and as foot bath.

IODINE COMPOUNDS available as ionophores are good disinfectants in acid situation (pH: 2-4). They are quite effective against both gram positive and gram negative bacteria, fungi and some viruses. But they are not effective against bacterial spores

CHLORINE COMPOUNDS are good disinfectants but their efficiency diminishes in the presence of organic matter such as droppings (faeces), soil etc. to produce stable compounds, thereby reducing the content of free chlorine substantially.

Chlorine is effective against fungi and bacteria. Chlorine arising from hypochlorite is also virucidal (kills virus). However bound chlorine as in Chloramine is a poor

disinfectant. Sodium Hypochlorite is very active, but its disinfecting activity is short where as Calcium Hypochlorite is less active but its activity persists for a long period.

QUATERNARY AMMONIUM COMPOUNDS are highly water soluble and the efficiency goes down in the presence of organic matter. They are very effective against gram positive and moderately against gram negative bacteria and also against enveloped viruses. But they are not effective against non-enveloped virus (Gumboro) and bacterial spores. They are easily inactivated by soap and their activity gets reduced by fibrous and porous material around.

ALDEHYDES

Aldehydes have the strongest and widest germicidal spectrum of action.

Glutaraldehyde and Formaldehyde are the most commonly used disinfectants. Glutaraldehyde has highly effective virucidal (both enveloped and non- enveloped), bactericidal, fungicidal and sporicidal activity. **It is also fairly effective in the presence of organic matter. Their residual activity is better than most of the other chemicals. They are still active in the presence of soap**

Formaldehyde is one of the best disinfectants against most microbes, fungi, bacteria or virus.

Formaldehyde in the form of solution with 40% concentration is called Formalin. Para-formaldehyde is a powder form with 91% concentration. As 5 percent solution it is widely used as a general disinfectant as a spray.

Both these forms produce Formaldehyde gas when heated. The gas is quite toxic, with a tolerance of 5 ppm in the air and inhalation by chicks or poultry men should be avoided.

Glutaraldehyde

A combination of Formaldehyde, Glutaraldehyde and Quaternary ammonia compounds is considered to be the best for disinfecting poultry environs.

Which ever disinfectant is chosen, it is absolutely necessary to read and follow the manufacturer's directives for usage.

We should also be aware of certain interaction between some disinfectants. For instance Chlorine inactivates Quaternary Ammonia Compound and Phenols upon

direct contact. Certain soaps and disinfectants are incompatible. Usually disinfectants are applied by spraying or foaming with a medium pressure sprayer.

As a strategy, use of different disinfectants can help prevent micro-organisms from building up resistance to any one particular disinfectant.

Disinfectant: Some practical tips

1. **Before** applying the disinfectant all removable equipment such as drinkers, feeders, nest boxes etc. and other fittings should be taken out of the poultry house and be scrubbed and soaked in a disinfectant bath.
2. **All** used litter and other materials should be removed from the shed. Heap the litter in different sites in the shed and keep it for about two days before removing it from the shed. This helps in reducing the germ load of the litter. Treating the heaps of litter with white wash lime - slaked lime (pour down the white wash lime on the heap of the litter) will hasten the decomposition and thereby kill the micro-organisms in the litter more effectively.
3. **The** roof, sides and pillars should be dusted thoroughly. The floor, sides and the roof should be washed – preferably with a pressure pump. There after mix disinfectant in water and spray for getting better results.
4. **After** disinfection allow the house and equipment to dry completely before the chicks are placed.

Fumigation

For fumigation, use both Potassium Permanganate and Formalin. For every 100 cubic feet (30 cubic meters) 20 Gms of Potassium Permanganate and 40 ml of Formalin can be used (approximately for every 10 sq. meter area, that means for keeping about 100 broilers).

- (i) Close the shed completely, side walls, door etc.
- (ii) Use deeper containers, earthen pots or any unbreakable containers (metal drums). For a 1000 broilers rearing house (approx. 300 cubic meters) we need to keep the containers at 4 sites in the shed about 2.5 meters away from each other. Keep 50 gms of Potassium Permanganate in each container. Pour 100 ml of Formalin in to the Potassium Permanganate in each container. This exercise should be carried out as fast as possible, since the reaction takes place so

fast. The person should come out of the shed immediately after he finishes with the fourth container. Start the exercise from the far end and finish it with the fourth one kept near the exit door . **Do not ever drop Potassium Permanganate in Formalin but add Formalin to Potassium Permanganate.**

Keep the shed closed for 12 hours. Precaution should be taken not to have any litter or any inflammable materials near the site of fumigation in order to prevent any fire hazard. At least the house should be kept open for 6/8 hrs hours before the chicks are placed so that all residual fumes escape from the house in ample time.

Control of ectoparasites should be a part of sanitation. Ectoparasites cause nuisance to both birds and poultry attendants. They also carry infective agents and indirectly spread any disease among birds. Mites, Ticks, Lice, Fleas, Bugs, Beetles and Cockroaches are some of the villains of this genre.

Most effective control of insects is achieved by means of preparations containing organo-phosphorous compounds. Such chemicals are hazardous to humans and must be used with great care.

Wild birds are another source of infection as carriers of germs. The poultry shed should be protected against their intrusion with proper wire mesh etc.

To conclude we have to bear in mind that a thorough cleaning of the premises should be carried out before disinfecting or fumigation. Remember, many germs that cause diseases are extremely resistant to destruction if they are attached to any dirt or debris. Salmonella or Gumboro Virus can survive for months under ordinary conditions. After thorough washing, application of hydrated or slaked lime (white wash) will help in reducing the germ load within the shed.

In addition, the areas immediately around the site may have infested dust and debris with germs especially lice, mites etc and is often ignored while cleaning up the premises. Vermin such as litter beetle can also easily carry infections from this part to the growing area.

A general pattern should be observed in order to have the poultry houses and premises disinfected in their entirety, as given below:

- (i) Move out all birds, litter and equipment.
 - (ii) Wash, repeat washing with a detergent.
 - (iii) Spray with a disinfectant.
 - (iv) Fumigate.
 - (v) Provide and maintain wheel bath at the gate and foot dips with proper disinfectants at the entrance of poultry houses and use them effectively.
- When the chicks are placed the poultry shed should be free from all harmful germs; as you know the first few weeks of the chick's life are especially important as the maternal immunity slowly fades away and new immunities produced by vaccination

build up during this period. Freedom from any disease challenge at this crucial time will be your gift to your birds and guarantee to your success!

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