

# Poultry Biosecurity & Disease Prevention



# Introduction

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Poultry sector provides livelihood to millions of farmers in developing countries. The recent years have witnessed a huge demand for poultry products (meat and egg) and this has resulted in a production boom in this sector. On the basis of flock size, poultry holders are classified as small-scale poultry holders (300 - 3000 birds), medium-scale poultry holders (10000 – 50000 birds) and large-scale poultry holders (50000 – 400000 birds). Small poultry holders are those farmers with a flock size ranging from a very few hundreds to few thousands in clusters. They usually practice extensive, semi-intensive, and intensive types of poultry rearing. The large scale poultry production has evolved to maximize the production through development of better strains of birds (broilers attaining the slaughter weight by 35-42 days and layers with longer egg laying period). In the race for maximum production, there is an increased unscientific usage of antimicrobials as growth promoters in feed. This pose a great risk to the existing AMR crisis. The implementation of biosecurity measures and good management practices ensure the flock health and safer poultry production

## Good Management Practices for Animal Welfare and Better Production

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Farmers must be aware about the significance of ensuring animal welfare in each and every aspect of poultry production. The five most important domains of animal welfare are : Nutrition, Physical Environment, Health, Behavioural Interactions and Mental State.

**Nutrition:** Freedom from hunger and thirst, by ready access to fresh water and diet to maintain health and vigor. Hygienic ad libitum water must be provided to the birds. Feeding must be done according to the nutrient requirement of the particular bird type (layer/broiler) and age group. Good nutrition is reflected in the bird's performance and its products. Farmers may formulate their own feed (Based on latest specifications for poultry feed; Eg., Farmers may formulate their own feed ( Based on latest specifications for poultry feeds. Eg., IS 1374(2007) Poultry Feeds) or purchase commercial feed appropriate for the birds.

**Physical Environment:** Freedom from discomfort, by providing an appropriate environment including shelter and a comfortable resting area. The floor space requirement of the birds must be met. Overcrowding creates stress and disease outbreak.

**Health:** Freedom from pain, injury or disease, by prevention and rapid diagnosis of diseases and timely treatment.

**Behavioural Interactions:** Freedom to express normal behavior, by providing sufficient space, proper facilities and company of the animal's own kind ( rear birds in groups rather than segregated).

**Mental State:** Freedom from fear and distress, by ensuring conditions and care which avoid mental suffering. Do not expose the birds to loud sound, which frighten them. Handle the birds gently and scientifically.

Activity Check: **Every time you enter a poultry house you should always observe the following activities: • BIRDS EATING • BIRDS PLAYING • BIRDS DRINKING • BIRDS CHIRPING • BIRDS RESTING • BIRDS SHOULD NEVER BE HUDDLING**

## Biosecurity Toolkit

Facilitator's manual to conduct a workshop on biosecurity with small scale poultry (around 1200 birds) farmers. Understanding biosecurity, antimicrobial resistance and disease management.

# Purpose of this Toolkit

Antibiotic resistance is a growing problem, affecting human, animal and environmental health. Routine and unnecessary use of antibiotics within food animal production helps fuel this global health crisis, and there is a need to shift to farming practices that require less antibiotics. By improving biosecurity (eg animal health and hygiene) on farms, farmers can reduce spread of disease, and antibiotic resistance. Perhaps something on that it is not easy and requires support (especially as antibiotics are often cheap and easily available as a substitute to good farming practices), but could in the longer run enable reduction of unnecessary antibiotic use in a way that does not affect productivity of the farms.

This toolkit is aimed at organisations, unions and groups for conducting workshops with farmers to support transition to more sustainable poultry farming operations. The purpose is to encourage responsibility and motivate action through a participatory process.

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# How to Use this Toolkit



**FACILITATORS:** Are the ones who will anchor the workshops, there maybe 2-3 of them. They should introduce each of the modules and steer conversations and prompts. They should encourage the participants to ask questions and give suggestions.

**VOLUNTEERS:** The people accompanying the facilitators and the anchors, should be aware of the ongoing conversations. They should keep time and alert the facilitators, they should go around helping and overlooking the participants. They should clear their doubts, answer their questions and encourage them to speak up.



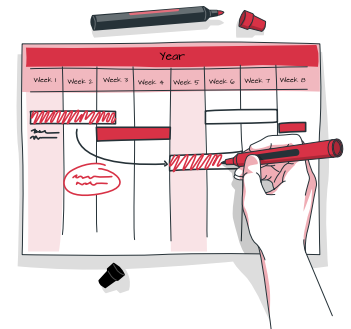
**PARTICIPANTS:** The ones who'd be attending the workshop. They should be encouraged to be curious and attempt to create changes after the workshop.

**PARTICIPATION:** Each module has instructions as to how it is supposed to be conducted, the facilitators are advised to maintain the order and conduct the activity and encourage participation. With prompts, games, feedback sessions, there should be two way interaction with facilitators also trying to understand the participants.



**GIVEAWAYS:** These are the materials that need to be reproduced every time a workshop is being conducted, as giveaways to the participants after the workshop or even after that particular module is completed.

**ENGAGEMENT MATERIALS:** Some of the materials in the toolkit are meant only to be used by the facilitators for engaging with participants and should not be shared with the participants. The posters will be marked as either giveaways or engagement material that'll stay with the toolkit for further sessions.



# Schedule & Timing

The facilitators are advised to follow the schedule below as the manual suggests. The time allotted for each module is approximate and facilitators are free to initiate discussions and address queries as and when needed. The aim is to attempt and develop a sense of biosecurity amongst the participants.

Serial Number	Module	Time
—	Introductory Session	15 Mins
1	One Health & Biosecurity	45 Mins
2	Location & Infrastructure	30 Mins
3	Sanitation Practices	30 Mins
4	Diseases and Pest Control	30 Mins
5	AMR and Outbreak Control	30 Mins
—	Concluding Session	—

# Introductory Session

This session is to be conducted as soon as the participants settle and have taken their seats. The facilitator should introduce the relevant organisations and organisation committees and introduce himself and the other volunteers.

With only 15 mins for this exercise the facilitators can make a call if all should go one by one, or just the ones who would like to volunteer to share their thoughts. Similarly also for the other exercises and demonstrations, the facilitators can make a choice if all the participants should participate together, or if they should be split. Whatever feels more engaging and more interactive is encouraged. At each point the facilitators are requested to encourage the participants to speak up and express themselves. It is advised that at each stage some volunteer could document the workshop for future references.

## Breaking the Ice

A simple exercise to break the ice is a round of introduction along with a few questions or topics that the participant can talk about.

**Q: What is their name? When did they start their practice?**

**Q: What are their thoughts about this workshop?**

**Q: What do they expect from this workshop?**

# One Health & Biosecurity

**Objectives:** This module is to essentially impart the idea and knowledge about One Health before they are introduced to the concept of biosecurity and its details. Through the One Health engagement exercise, the farmers are given an active say into what they identify as an issue and how would they tackle it.

**Duration:** 45 min total: One Health Activity (35 min), Introduction to biosecurity (10 min).

**Activity in the module:** One Health Engagement Flashcards, Introduction to biosecurity.

**Methodology:** The One Health engagement is to be carried out in three stages with the instructions provided on the flashcards. At each stage the participants are encouraged to share their views on the system and their suggestions. After this the facilitators will explain the term biosecurity and its purpose to begin the other modules that are more specific.

**Essential talking points in the module:** Importance of One Health Approach in the current scenario, farmers as changemakers, importance of biosecurity in India, poultry as a promising sector.

**At the end of the workshop, the participant should be able to:** Understand the need for biosecurity, his/her role in the food systems, his/her responsibility towards the systems, need for biosecurity in the current scenarios.





# Short Description of Module 1

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As human beings who inhabit this planet with a lot of other ecosystems, we have to understand that our interdependency and our interactions with different ecosystems call for balance, understanding and empathy. Multiple systems like food systems, environment, human health and animal welfare are intricately connected with multiple participants. It is a complex system with many smaller systems functioning and interacting with each other. Changes in one does affect the other and consequently the entire system.

There is a need for us to introduce the approach of One Health to tackle multiple domains to address a single global health threat by generating awareness and empowerment amongst the people.

**One Health Approach:** 'One Health' is an approach to designing and implementing programmes, policies, legislation and research in which multiple sectors communicate and work together to achieve better public health outcomes.

The areas of work in which a One Health approach is particularly relevant include food safety, the control of zoonoses (diseases that can spread between animals and humans, such as flu, rabies and Rift Valley Fever), and combating antibiotic resistance (when bacteria change after being exposed to antibiotics and become more difficult to treat).

COVID-19 pandemic helps us understand how so many systems are interconnected, with a zoonotic disease becoming a pandemic, that brings the entire world to a standstill, directly impacting the country's economy and the smallest of businesses. It makes us more aware of what we eat and how we consume and where our food comes from.

In this manual, we attempt to acknowledge the problem at a macro level but address it and act on it at a micro level. Routine antibiotic use in animal farming drives antibiotic resistance development in bacteria in animals, on the use of antibiotics in animal farming and its consequences, and why disease prevention and biosecurity is important to also address AMR. We need to address how we can limit the spread of resistant bacteria, reduce the spread of diseases and improve our food systems and make them more robust. With this manual we attempt to disseminate the idea of taking responsibility amongst the poultry practitioners and for them to understand their role, and that improving their practices that could be beneficial for their business, as well as their health.

**'Biosecurity'** is the set of management and physical measures designed to reduce the risk of introduction, establishment and spread of animal diseases, infections or infestations to, from and within an animal population. (OIE Terrestrial Animal Health Code, 2019). Poultry in India is a very promising farming sector, providing employment, enhances soil fertility serves as an additional income as well as has low investment requirements along with India being the 3rd largest producer of eggs which with a protein rich diet. With the ever increasing demand observed for meat and eggs, the Indian market is set to reach INR 4,340 Billion by 2024. It is vital that we address all inquiries and practices that would need safety measures and proper way of conducting. To limit the spread of infectious disease and to control pests and rodents, suitable measures need to be identified. Implementation of proper animal husbandry and infection prevention and control practices could in the long run result in healthier animals without a loss in productivity.

This toolkit and its modules aims to identify issues and correct measures, and convey the same to the farmers. It is essential that they are able to identify and adopt what is best for their farms and how they can create a safer environment by bringing the necessary changes to their practice.

# One Health Engagement Exercise to Identify Issues, Stakeholders and Solutions

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## ABOUT THIS EXERCISE:

This game/engagement is to be played after the ice-break, so as to make sure that the farmers feel free to speak up and discuss. The game is based on One Health Approach and the facilitators are advised to mention local problems and issues that can be discussed as topics. They should attempt to encourage the students to put forth their views and empathise with each other.

The exercise is accompanied by a set of 36 prompt cards that the facilitators should give to the participants at the beginning of the workshop and collect them back at the end of the module. The set of flashcards are divided into three sets further that the facilitators should explain before each step.

The exercises should be conducted by dividing all the participants into three and conducted in three stages, each ending with a small presentation by each group. **They may be given post-its or papers and pen to discuss and brainstorm.** The facilitators may make changes or double the groups as they feel appropriate but keep in mind the time constraints. They should at all time be happy to assist and discuss with the participants.

The game shouldn't take more than 35 mins along with all the discussions and presentations. A general round of feedback can be done at the end or at the end of the workshop as time permits.

# One Health Engagement Probes

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**Step 1:** During the first round of discussion, after the participants are divided into three groups, each of them get a set of probe cards for each of the One Health approach topic. Participants are encouraged to think from that particular perspective and bring out issues that they face or they can think of. Behind each of the card there are points to help them, but the facilitators should encourage them to talk about real life examples and possibilities that are happening around us. The participants may then map at least 3 solid issues they would like to further explore and work on. As they talk about their issues to other of the participants, they should be encouraged to mention, what is this particular issue, what are the drivers of this issue, what human behaviour patterns are responsible for this and so on? The rest of the audience and the facilitators then give them a feedback as to which of the three should be prioritised for discussion in the next round.

**Step 2:** After selecting one single issue, the facilitators have to discuss the topic of stakeholders and how different stakeholders come together to approach a single issue. The participants should be explained the 4 types of stakeholders that they can apply to their problem and identify people responsible for their problem. Facilitators at this point should explain how they need to think of the the entire system from the point of view of the different stakeholders that will be involved. These stakeholders can then be discussed informally with the rest of the group without a presentation. Once this is done the group is then encouraged to map out solutions for their problems.

**Step 3:** As the participants are encouraged to look for solutions, the next set of cards provide prompts for what the solution be and how they can engage the stakeholders previously identified. Understanding the four prompts, the participants have 10 mins to come up with a solution and present it to the rest of the people. The facilitators should encourage the other participants to give feedback about the solutions. Once the exercise is over, the facilitators are encouraged to do a quick round of feedback about one health and then move on to explain the purpose of the workshop and so introduce the topic of biosecurity.



## MODULE TWO

# Location & Infrastructure

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**Objectives:** After the introduction of biosecurity in the first module, this module should help the participants evaluate their place and their practice. It is also advisable for people who want to expand and what they can look into beforehand. Along with location prerequisites, there are also recommendations on how one can design and organise their farm in different ways and be mindful of the arrangement and management.

**Duration:** 30 min. Total. Design your farm (15 min), Discussion (15 min)

**Activity in the module:** Design your farm activity and discussion.

**Methodology:** In this activity the participants are asked to mark the questions on the given worksheet meant. Once they are done the facilitators will explain each of the question (given in the description) and their answers along with reason to the participants. At the end they are asked to evaluate themselves as to how 'safe' their farms are. They should be encouraged to ask questions and/or provide additional suggestions.

**Essential Talking points:** Location of the farm: Nearby farms and diagnostic facility. Infrastructure: Arrangement and construction of shed, wind flow in the farm, handling and spacing of birds.

**At the end of the workshop, the participants should be able to:** Know what things to keep in mind if they want to expand their existing farms, what sort of changes they can make for a better environment. If they face any financial constraints while doing so.

## Short Description of Module 2

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The geographical location of the farm impacts the biosecurity in different ways. The key facts to be considered while choosing a location for a poultry farm are discussed here.

( These points are important if you plan to begin a new farm or relocate your farm).

It is ideal to choose **a place previously unoccupied by a poultry farm**, to prevent the chance of occurrence of disease from pathogens in the environment (left from the previous flock of birds). In the tropics, the heat due to INSOLATION (Incoming Solar Radiation) can be minimized by **constructing the poultry sheds in the east-west direction**. So, it is better to choose a land with more east-west direction. **The poultry farm must be reasonably away (at least 1.6 km) from other poultry farms in the locality**. This is the safe distance found to prevent the spread of disease causing pathogens between different poultry farms. **Proper road** accessibility is important in carrying out almost every farm activities from farm construction to transportation of birds and eggs. **Availability of essential amenities to run a successful poultry farm** like facilities for proper water and electricity supply. Availability of veterinary aid, disease diagnostic facility, vaccine, medicine and other inputs within a reasonable distance are also important for ensuring proper farm operations. **Availability of farm labourers** with reasonable wages and skills to carry out various farm operations is critical. The location of the farm must be in a region with **reasonable distance from the nearby market** or marketing facility, to reduce the cost of transportation.

**Infrastructural Facilities** to ensure successful farm management include structural designs for protection of the farm and sheds from incoming physical, biological and chemical risks. Protect the sheds by fencing the entire area around the farm to avoid intruders and entry of stray animals. **Layout should not allow visitors or outside vehicles**

**near the birds. The farm must be constructed on an elevated area**, to avoid water logging and to ensure proper drainage.

**Roads in the farm** should preferably be of concrete material or tarred, so that transport of organisms through soiled shoes and tyres can be reduced.

**Orientation of the poultry sheds must be with their length facing East-West direction** - To prevent direct sunlight and rainfall entering the building. The farm buildings must be designed in such a way that **the normal wind flow is from younger flock to older flock**. This is to avoid the spread of air-borne pathogens from older flock to younger flock.

**Distance between two different sheds of same type should be 30 ft. and of different type should be 100ft. The farm buildings must be designed to be rodent proof and well ventilated** ( A minimum of three metres width around the farm buildings must be kept clean without any vegetation cover to prevent the entry of rodents). **The egg store room, office room and the feed store room should be located near the entrance** to minimize the movement of people around the poultry sheds. **The disposal pit and sick room should be constructed only at the extreme end of the site**, to prevent rodents and fly menace. **Separate brooder, grower and layer sheds are ideal**. There should be a minimum distance of 50-100 feet between chick and grower sheds and minimum 100 metres distance between grower and layer sheds. **It is always better to manage either layer or broiler poultry in a particular farm**. The management practices like feeding and productive life cycle varies between layers and broilers. **Birds of different age groups must be maintained separately** to avoid pecking behaviour.

**Foundation of the sheds must be good** to prevent seepage of water into the poultry sheds. It is better to construct a concrete foundation with 1 to 1.5 feet below the surface and 1 to 1.5 feet above the ground level. Poultry sheds must be provided with concrete floor for easy and proper cleaning. **Bird proofing** must be done (using nets) at exposed regions of the shed, to prevent entry of wild birds.



## ABOUT THIS WORKSHEET:

This worksheet is given to the participants at the beginning of the second module as the facilitators introduce the topic to them, they are free to keep it with them after the workshop ends. The worksheet has YES/ NO questions based on the location and infrastructure of the farm. This sheet should be filled in by the participants, using pens/ stickers/stamps provided by the facilitators.

After they are done with the exercise, the facilitators should ask each question and ask the participants to raise their hands if they've answered yes/no. The facilitators are asked to discuss each of the question from the worksheet along with their answers and explanations given in the description of the module. They should also encourage the participants to discuss their views and give suggestions.



## MODULE THREE

# Sanitation Practices

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**Objectives:** A very important aspect of handling animals is to maintain hygiene and practice it safely. This module discusses the sanitary practices that should be ideally followed at the farm.

**Duration:** 40 mins total. Discussion of posters (30 mins)  
Discussion (10 mins).

**Activity in the module:** Posters and listing down local vendors.

**Methodology:** This module is divided into three parts focusing on sanitation practices, water hygiene and method of cleaning. Each poster is a giveaway that can be given to the participants after the workshop ends or during. Each poster should be explained and discussed along with the participants encouraging examples and further suggestions. After the last poster the participants should be encouraged to name all their local vendors for materials and feed.

**Essential Talking points:** Sanitation: Importance of sanitising spaces and equipments, documentation of incoming vehicles and people, personal hygiene, use of safety gear, water hygiene and the process of cleaning before a new batch or after an outbreak.

**At the end of the workshop, the participants should be able to:**  
Have a knowledge about how and when to sanitise different parts of their farm, get to know local vendors and agents.

# Short Description of Module 3

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Routine cleaning and disinfection is the key to farm hygiene. It plays a crucial role in disease control in poultry farms. Sanitation refers to the cleaning and disinfection of poultry houses, people, materials, and equipment. The critical points through which there exists risk of pathogen entry must be monitored regularly to maintain hygiene.

## **SANITIZATION OF THE SHEDS**

**Sanitation between two production cycles:** Complete cleaning and disinfection protocol must be done between 2 production cycles; the steps include dry cleaning, wet cleaning, disinfection, vacancy period, and monitoring the efficacy.

**Sanitation before introduction of new chicks or new batch of birds into the sheds:** Thoroughly clean the shed by removing the litter/debri. Simultaneously clean the poultry shed equipments like feeders and waterers. Then wash the shed thoroughly using soap and water. Farmers may also use flame gun for disinfection of floor and wall (depending on the materials used). For disinfection of floor and wall, apply whitewash (suspension of calcium hydroxide) on floor and wall. Leave the space as such for 24 hrs (May do fumigation to ensure the disinfection of entire shed and equipments, especially following a disease outbreak). In deep litter system of rearing, spread the litter (from a known hygienic source without any contaminants), then spray disinfectant (at smaller concentration) or lime powder (calcium oxide) over the litter (do this procedure one or two days before the arrival of the birds as most of the disinfectants are effective for 7-10 days. In the cage system of rearing, the used cages must be cleaned thoroughly using disinfectant solutions and then dried properly.

**Litter management:** Litter must be spread with 12-15cm thickness. Wood shavings are considered one of the best litter materials. Litter must not get too wet. The moisture content of litter is very

important (can affect ammonia built-up), and excess litter moisture increases the risk of disease occurrence. Litter must be mixed well everyday. Before mixing the litter, it is advised to add wood ash and superphosphate (fertiliser grade) at 4:1 ration (amount: 5kg/10 square meter) to expel the excess ammonia. Litter must not be moist and caked; and must not have the pungent ammonia smell. Maximum moisture level in litter should be 12-30%. If the moisture content goes beyond 30%, caking starts.

## **SANITISATION OF FARM EQUIPMENTS**

**Clean the feeders and waterers:** The feeders and waterers must be cleaned daily before giving feed and water in the morning. The waterers must be washed using disinfectant solution. The feeders should be scraped daily to remove cakes of feeds (to prevent fungal growth). **Use farm-specific instruments** to prevent contaminated equipment from being brought into the company by contractors (ladders, tools, etc. used in the farm).

## **FARM PERSONNELS AND VISITORS' HYGIENE**

**Restrict the visitors:** Biosecured farms must restrict visitors from entering the farm premises and particularly the sheds, and it must be closely monitored through the visitors' register. Only authorised personnel should enter the farm, that too with all hygienic precautions. Keep "Restricted Entry" signs posted at drive entrances and poultry shed entrances.

**Entrance to the sheds:** Foot dips with disinfectants (daily replaced) must be provided to disinfect the footwears carrying potential pathogens into the sheds. Any visitor that enter into the shed must walk through the foot dip. If a dedicated foot dip is not constructed at the farm entrance, the farmer must place a basin containing the disinfectant solution. (The preferred foot dip sanitizer is a mix of 50% lime powder + 50% Bleaching powder).



**[Disinfectants used:** Two of the most common disinfectants used in foot dips and tyre dips are Potassium permanganate solution and calcium oxide (lime) powder. **Details mentioned in Annexure]**

**Dress changing room for Farm personnels at the farm entrance:**

The farm personnel must wear separate clothings and footwear while entering the farm, and during the working hours. Those routinely working with the poultry flock should have specific clothes and shoes or boots that never leave the clean areas (except to be washed).

**Separate footwear for farm visitors:** To prevent entry of pathogens, it is best advised to provide separate footwears/boots for farm visitors like veterinarians, para-veterinarians or the vaccination team. Foot covers must be ready (if more people come in and there is a shortage of separate footwear).

**Sanitation of vehicles: Tyre dips** with disinfectant solution (daily replaced) should be placed at the farm entrance/gate or disinfectant sprays arranged at the entrance for application on tyres of incoming vehicles. Only cleaned and disinfected trucks should be allowed to enter the farm. Trucks/lorries/vehicles reaching the farm to collect the birds are potential sources of pathogens, as they often move around carrying and delivering birds in different farms. Restrict entry of other vehicles and drivers as much as possible.

**Separate the clean and dirty functions:** Identify and separate tasks within the farms as dirty and clean. Clean functions include bird handling, egg pickup, and feed handling. Dirty functions include manure pickup and handling of dead birds. It is important to do the clean functions early. Workers should not go from dirty farm operation/task to clean tasks without showering and changing their clothes completely.

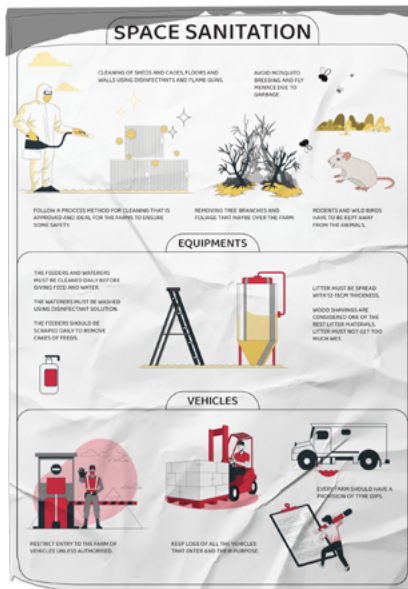
## **ENVIRONMENTAL HYGIENE**

**Clean the surroundings of the farm** to prevent insect growth and hiding places for rats and mice. Keep grass and weeds mowed to two inches or less. **Overhanging tree branches and foliages** must be removed regularly to prevent wild bird droppings. **Proper disposal of the litter/manure** must be done. Careless dumping of litter in the farm premises leads to fly menace (vectors of disease transmission). **Waste management** is critical to ensure the environmental hygiene. **Disposal of dead birds** must be done properly. Remove the dead birds (once found) to ensure no contact with other birds which can act as a source of infection to other birds. The appropriate way to dispose of dead birds is by burial or incineration after the post-mortem examination (if an unknown etiology of infection is suspected). **Disposal of poultry droppings** as fertilizer or fish feed must be done cautiously as many viruses remain active in poultry droppings for several days to weeks (it is ideal if poultry manure is left undisturbed for at least 90 days before it is used as fertilizer).

## **FEED AND WATER HYGIENE**

**The feed** must be procured from known hygienic sources. Store the feed in proper rodent and pest proof feed storage rooms. Feed must not get moistened, as this may lead to growth of harmful fungus in the feeds that can lead to mortality and reduced production in birds. Use moisture free dishes and hands while handling feed. Store the feed at a height of at least one feet above the floor. **Water hygiene** is critical in preventing water borne diseases. Always be cautious about the water quality as several diseases get transmitted through contaminated water. Do routine water quality testing to ensure safe drinking water to birds. Chlorination is one of the cheapest method of water sanitation. Farmer's may use commercially available water sanitizers as per the manufacturer's direction.

Awareness: All farm personnel and routine farm visitors like truck drivers, technical assistants etc. should be made aware of (or instructed regarding) the hygiene and sanitisation routines.



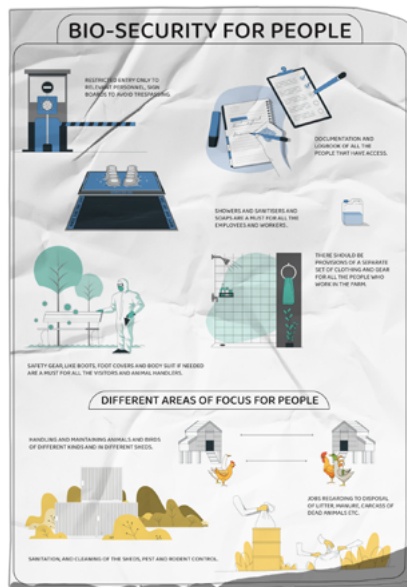
## ABOUT THESE POSTERS:

**Basic Sanitation:** This poster discusses areas of focus for sanitation on the farm, which includes equipments, feeders, birds, foliage, people, vehicles, sheds, job handling and safety gear.

The facilitators are advised to explain the poster but are also advised to discuss the local aspects (since different places have different ways of doing things and habits) of each of the topics.

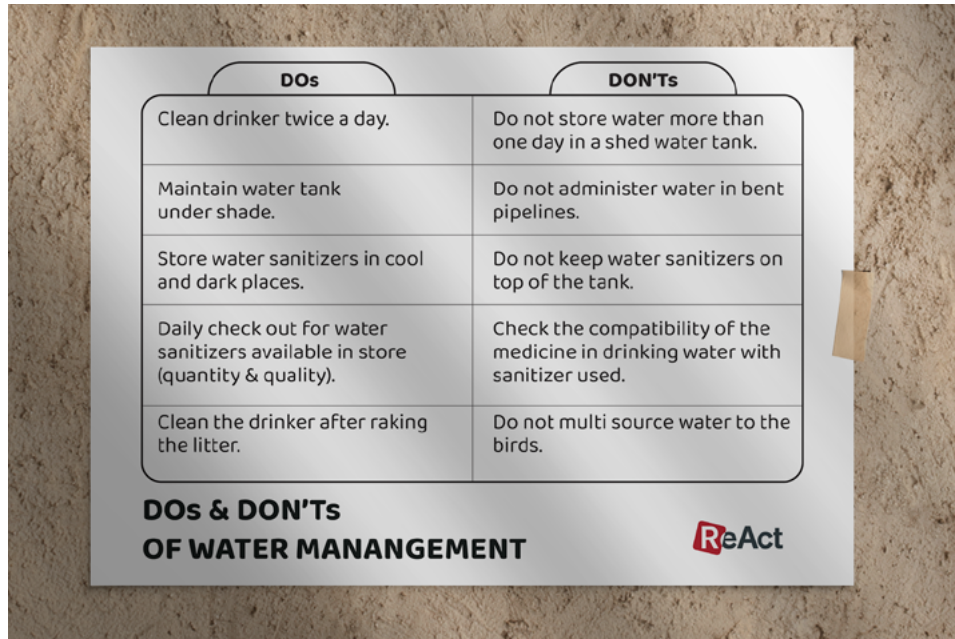
The following are some of the things they can look into before the workshop and prepare for a demonstration.

- Litter and Feed management: Vendors, Availability, Pricing
- Logbook for documentation of visitors and vehicles from the outside
- Specific Safety gear and their vendors in the area



### ABOUT THIS POSTER:

Water Hygiene- This chart discusses the do's and don'ts of water hygiene on a farm that should be discussed with the participants.



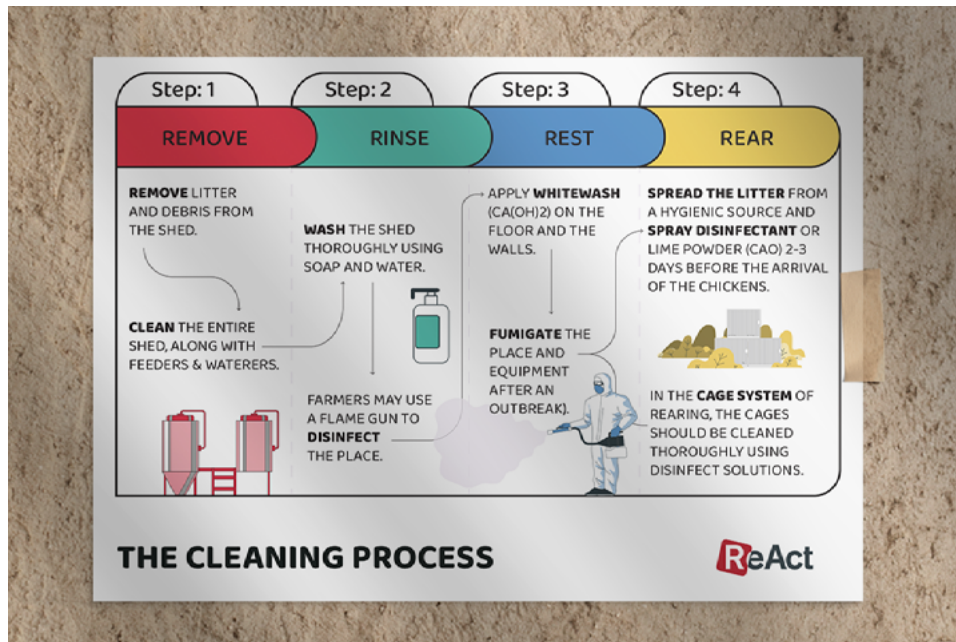
DOs	DON'Ts
Clean drinker twice a day.	Do not store water more than one day in a shed water tank.
Maintain water tank under shade.	Do not administer water in bent pipelines.
Store water sanitizers in cool and dark places.	Do not keep water sanitizers on top of the tank.
Daily check out for water sanitizers available in store (quantity & quality).	Check the compatibility of the medicine in drinking water with sanitizer used.
Clean the drinker after raking the litter.	Do not multi source water to the birds.

**DOs & DON'Ts  
OF WATER MANAGEMENT**

**ReAct**

## ABOUT THIS POSTER:

**Cleaning process:** The cleaning process given here is a general one and standardised, the facilitators may relate it with the local ways of cleaning and add the necessary details. **They are advised to discuss particular brands/vendors and kinds of disinfectants that are locally available and are efficient and safe.**



## MODULE FOUR

# Vaccination & Pest Control

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**Objectives:** There are numerous possibilities for an outbreak of an infectious disease on a farm. The aim of this module is to discuss robust methods like pest control and vaccination that can help prevent an outbreak and spread of diseases.

**Duration:** 30 mins total. Explanation (20 mins) Discussion (10 mins)

**Activity in the module:** Pest control identification and introduction to vaccination schedules.

**Methodology:** The pest control methods should be discussed in a presentation with an opportunity given to the participants to talk about their own experiences as well. The diseases in the vaccination schedule are to be explained and handed out to participants.

**Essential Talking points:** Identification, impact and control measures for pests. Diseases that are prevalent locally, proper facilities for vaccination, vaccination schedule for broilers and layers.

**At the end of the workshop, the participants should be able to:** Identify pests and how they are controlled. Participants should be aware of proper measures to take in case of an infestation. They should have a schedule that they can adhere to for the vaccination of their forthcoming batches.

# Short Description of Module 4

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**VACCINATION IN POULTRY:** Vaccination is intended to prevent and control the occurrence of a disease and reduce the transmission of the pathogenic agent (OIE, 2019). Vaccination is an essential method to prevent several diseases in poultry that are endemic in the region and has the potential to result in mortality and production loss.

(Facilitators are advised to consult the nearby Veterinarian to clarify on the vaccination chart followed in that particular region; as there might be variations in the vaccines given depending on the diseases endemic in the region).

## **IMPORTANT POINTS TO BE CONSIDERED IN VACCINATION:**

- Carry out vaccination in the birds with the advice of a Veterinarian. The farmer's may seek the help of trained para-veterinarians to carry out vaccination.
- Ensure the quality of vaccines purchased ( see the expiry date).
- Ensure that the appropriate storage conditions like cold chain are maintained during storage and transportation of the vaccines (this can affect the efficacy of the vaccine).
- Handle the vaccines with care. Leftover vaccines, needles and syringes must be handled cautiously (keep away from birds) and dispose properly.

Major pests in poultry include insect pests, rodents and wild birds. These pests act as vectors of disease transmission and affect the poultry production in various ways.

**INSECT PESTS OF POULTRY:** Insect pests of poultry act as vectors of disease transmission (ectoparasites). Ectoparasites result in itching, and other disturbances to the birds. Fly menace in and around poultry farms is also major environmental hygiene concern. Insect pests are broadly divided into ectoparasites and habitat pests.

**Ectoparasites:** The fowl mites which include northern fowl mite, chicken (red) mites, scalyleg mite and depluming mite.

**Habitat pests:** In confined poultry houses a variety of insects and mites will be found in the manure and litter which come under the heading of habitat pests. These include darkling beetles, fleas, and flies.

**Management of fly menace:** Use ectoparasiticides (applied on birds as dips, as per a Veterinarian's advice), proper litter management.

**WILD BIRD CONTROL:** Wild birds/ migratory birds have been found as the prime vectors that transmit zoonotic pathogens like Avian Influenza into domestic birds and poultry. It is really important to take all the measures to prevent the entry of birds and their secretions into the poultry sheds, feed and water. The following measures must be strictly implemented in the farms to avoid entry and contact with wild birds.

- Overhanging branches of trees over run-area of poultry like turkey, ducks etc. should strictly be pruned/ removed to avoid droppings of feral birds. Ideally no dense foliage and trees should be there.
- Ensure bird-proofing nets in all units to prevent entry of small feral birds into sheds
- Cover any open drains to avoid attraction of wild animals
- There should be no roosting site for wild birds

- There should be a proper drainage facility and water should not stagnate. The production area should be adequately drained to prevent accumulation and stagnation of water likely to attract other birds, especially in the areas around sheds and range areas.

## RODENT CONTROL

The effectiveness with rodent control are mostly centred on people and not the rodents themselves. Therefore, the effectiveness of rodent control in poultry farms depended on the farm personnel's responsible intervention. The crucial steps are:

- Regular monitoring
- Well trained operators
- Record keeping- Always record details of the rodent baiting program. Keep records of every bait station location, bait station check and when bait is added to each station.

**Impacts of rodent menace** in poultry farms include feed loss, damage to buildings and equipment, damage to flocks, and rodents act as agents of disease transmission.

## RODENT CONTROL MEASURES

The investment for rodent control is far less than the actual loss caused due to rodent menace.



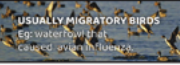
### Best practices for rodent control includes:

1. Minimising access points into buildings. Cracks and openings into sheds should be sealed with a material that cannot be gnawed by rodents, such as sheet metal, hardware cloth or cement.
2. Preventing access to feed, water, and shelter.
3. Elimination of nesting places. Make sure any material that would be attractive to rodents for nesting is placed in rodent proof storage areas. If the storage area cannot be rodent proofed, move the material at least every week to prevent rodents from establishing themselves in it. Place all bagged food and equipment on a platform about 60 centimetres off the ground and 60 centimetres from any wall.
4. Always keep the building surroundings tidy. A heavy grass and weed growth around a stack of undisturbed timber or other material or equipment makes an ideal nesting site.
5. Close outdoor burrows by filling with soil/cement and monitor it.
6. Appropriate sanitation conditions, including: tidying the shed inside by removing items that do not belong there and keeping strips near walls clear; regular cleaning by sweeping and removing all spilt feed, dead birds and broken eggs; checking incoming and outgoing materials for infestation; and, occasionally clearing the entire shed and cleaning it out thoroughly.
7. Baiting and/or trapping programmes. (ANNEXURE)



## ABOUT THIS POSTER:

**Pest control Guide:** This guide is to be given to the participants during the module after the presentation about pests (pictures) has been discussed. It discusses the impact, examination and control of these. The facilitators are advised to discuss the control measures more if needed along with local methods to trap and get rid of pests.

Kind of Pest	Insects	Rodents	Wild Birds
<b>IDENTIFICATION</b>	 <p>FLIES, MITES, LICE TICKS, FLEAS, FOWLS</p>	 <p>RATS, MICE, PIGEONS, BATS</p>	 <p>USUALLY MIGRATORY BIRDS Eg: waterfowl that caused avian influenza</p>
<b>IMPACT AND EXAMINATION</b>	<p>These insects irritate and stress the birds making them more susceptible to other problems: anaemia, diseases, and reduced egg production.</p> <p>They can be found on birds in daylight or using a flashlight, since the light will cause the insects to move. Also check for clusters in the crevices and crass</p>	<p>Rodents are capable of reproducing very fast at the same time deserting feed, eggs, building structures, they also tend to carry zoonotic pests like lice.</p> <p>Rodents can be observed by the nuisance they create, with the sound of movements damages to the equipments and frightening the birds.</p>	<p>Wild birds/ migratory birds have been found as the prime vectors that transmit zoonotic pathogens like Avian influenza into domestic birds and poultry.</p> <p>One should be aware of the season for the migratory birds to be around and keep in mind that the farm is not near water bodies.*</p>
<b>SAFETY AND CONTROL MEASURES</b>	<p><b>Use of insecticides:</b> carry efficient treatment that is needed to get rid of the insects. It is advisable to keep the other lot of birds away from the ones who are undergoing treatment.</p>	<p><b>Baiting with rodenticides:</b> Mapping the entry/exit points of the rodents into the farm and building bait stations to make sure that the rodents consume it.</p> <p><b>Trapping:</b> Set traps for the infested rats and check them often and replace them.</p>	<p>Avoid the entry of birds into the shed, by proofing nets, by getting rid of any overhanging foliage for them to rest, at the same time, any sort of stagnant water that would attract them.</p>

### PEST CONTROL FOR POULTRY





## ABOUT THIS TABLE:

Disease Management: This disease/ vaccination schedule is an overall chart that discuss diseases that are not only avoided by vaccination but also only by biosecurity measures. The facilitators are advised to read the chart to understand, the causes of the diseases, their symptoms, the different vaccines for the same diseases, different vaccines for broilers and layers and the diseases that have no vaccines for them. This schedule is to be given to the participants to keep. The same format can be followed to map out diseases for not only different areas but also different animal groups as and when required.

DISEASE	CAUSATIVE AGENT	SYMPTOMS	AGE	VACCINE	DOSE	ROUTE	REMARKS
<input type="checkbox"/> HAREK'S DISEASE	VIRUS: HAREK DISEASE VIRUS (HDV)	Clinical signs associated with peripheral nerve dysfunction are frequently the most easily noticed. One leg stretched forward and one leg backward is a typical presentation of leg paresis in a chicken with Harek disease.	1 DAY	HYTHO VACCINE	0.2 ml/bird	IM Injection	Given at hatcher, level, it can be given up to the age of 3 days.
<input type="checkbox"/> RANIKET DISEASE	VIRUS: AVIAN PARAINFLUENZA VIRUS (PAV-1)	Symptoms depend on the strain of virus infected. Some of the symptoms are: gasping, coughing, sneezing, and rales. Nervous signs of tremors, paralyzed wings and legs, twisted necks, cringing, cloacal spasms, and complete paralysis.	4-7 DAYS 5-6 WEEKS 8-10 WEEKS 15-18 WEEKS	ROFT or LASOTA VACCINE ROV VACCINE ROV2B or ROV2B VACCINE	1-2 drops 1-2 drops 0.5 ml/bird 0.5 ml/bird	Nasal or Ocular route Eye Subcutaneous (Inject) Subcutaneous (Inject)	Booster dose to be given at 5-6 weeks of age. In case of broilers it is to be used at 21-23 days of age. — —
<input type="checkbox"/> GUMBORO DISEASE	VIRUS: INFECTIOUS BURSAL DISEASE (IBDV)	Affects the young poultry (3-6 weeks of age). Depression, watery diarrhea, ruffled feathers, and dehydration are noticed.	15-18 DAYS 8-10 WEEKS	IBDV GUMBORO VACCINE IBDV GUMBORO VACCINE	200 doses in 2L of water or 1000 doses in 8L of water	Drinking water Drinking water	Booster may be given at 6-7 weeks of age. —
<input type="checkbox"/> INFECTIOUS BRONCHITIS	VIRUS: INFECTIOUS BRONCHITIS VIRUS (IBV)	Upper respiratory tract infection with cough, sneeze and rales. Drop in egg production (up to 70%), and eggs are often misshapen, with thin, soft, wrinkled, rough, and/or pale shells, watery albumen.	15-16 WEEKS	IB VACCINE	0.5 ml/bird	Subcutaneous (Inject)	—
<input type="checkbox"/> FOWL POX	VIRUS: AVIPOXVIRUS	Proliferative lesions in the skin that progress to thick scabs (cutaneous form).	7-8 WEEKS	FOWL POX VACCINE	0.01 ml/bird	Injection at wing web or 1 drop by pecking of feeders	Single vaccination is sufficient in the bird's life.
<input type="checkbox"/> COLIBACILLOSIS	BACTERIA: ESCHERICHIA COLI	Reduced appetite, respiratory distress, poor growth.					
<input type="checkbox"/> COCCIDIOSIS	PROTOZOAN PARASITE (SEVERAL SPECIES OF THE GENUS EIMERIA)	Sometimes birds remain asymptomatic. Mild loss of appetite, weight loss or decreased weight gain, diarrhea (which can be bloody), dehydration and death.					
<input type="checkbox"/> AVIAN INFLUENZA	A/VIRUS OCCURS NATURALLY AMONG WILD AQUATIC BIRDS WORLDWIDE	Infection of poultry with Low Pathogenic A/Viruses may cause no disease or mild illness and may only cause mild signs (such as ruffled feathers and a drop in egg production) and may not be detected.					

KEY	
SAFETY MEASURES INCLUDE BIOSECURITY AND VACCINATION	VACCINES TO BE GIVEN TO LAYERS
SAFETY MEASURES INCLUDE ONLY BIOSECURITY	VACCINES TO BE GIVEN TO BROILERS

**ReAct**









## MODULE FIVE

# AMR & Outbreak Control

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**Objectives:** This module introduces the participants to AMR and outbreak management. It discusses the misuse of antibiotics growth promoters and zoonotic diseases. Outbreak management is a four-step process one can take if they observe that a disease outbreak is actually plausible.

**Duration:** 40 mins total. Video (5 mins) Framework (20 mins) Discussion (15 mins)

**Activity in the module:** Video on AMR due to livestock, Outbreak Management Framework and discussion.

**Methodology:** The video on AMR explains the global health phenomenon of antimicrobial resistance and how it spreads, it reiterates back to the first module about the One health emphasizing on the spread of diseases to animals and human health as well. The four step process for outbreak management should be individually explained part by part from identifying signs of disease infection to improvement of the overall environment Farmers can be divided in groups to then analyse Avian Influenza as a disease and try to put it into the framework.

**Essential Talking points:** Antibiotics for growth promotion, AMR as a health challenge, spread of zoonotic diseases, identifying an outbreak, important people to inform (local authorities).

**At the end of the workshop, the participants should be able to:** Explain AMR due to livestock, understand the onset of an outbreak and measures to control the spread of the disease.

# Short Description of Module 5

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## **Key measures for disease prevention:**

- Biosecurity measures
- Vaccination
- Good management practices

## **The key measure for disease management, once disease outbreak is noticed is through:**

- Timely diagnosis of disease with the help of a qualified Veterinarian (Post-mortem examination, clinical and laboratory diagnosis).
- Isolation of the affected and exposed birds.
- Treatment under the guidance of Veterinarian
- Inform the Government's animal husbandry department, if any notifiable diseases like Avian Influenza is suspected.

**Deworming in poultry:** Poultry can get affected by numerous endoparasites which reduce the performance of the birds. It is advised to do the deworming of the birds every month. It is important to give the drug prescribed by a Veterinarian. Unscientific misuse of antiparasitic drugs often result in drug resistance in worms, which make it difficult to manage the scenario.

**Medication in Poultry:** Farmers often get confused with the usage of vaccines, medicines, and feed supplements in poultry. Understanding the difference between these three is essential to use each one of these cautiously and effectively.

**Vaccine:** Vaccine is a product that stimulates immunity towards a particular disease. It must be done according to the directions given by a Veterinarian.

**Medicines:** Medicines are used specifically to treat a particular disease, this includes antibiotics, dewormers. These must be administered with the prescription by a veterinarian.

**Feed additive:** A feed additive is a feed supplement to compensate the lack of nutrients from regular feeds that the farmers provide and include vitamins, amino acids, fatty acids, and minerals.

## **WHAT IS ANTIMICROBIAL RESISTANCE (AMR)?**

Antimicrobials are a very important class of drugs that are crucial in the treatment of infectious diseases caused by microbes. It includes antibiotics, antiparasitic drugs (dewormers), antifungals etc. The unscientific misuse of antimicrobials result in the development of the phenomenon called 'antimicrobial resistance (AMR)', in which the microbes develop resistance to the drugs that are used to combat them. This results in development of 'drug resistant pathogens' that can even cause deadly infections in humans and animals.

The careless use of antimicrobials in animal husbandry sector greatly contributes to the aggravation of this scenario. Several studies across the globe have validated the misuse of antimicrobials in poultry and the presence of antimicrobial residues in poultry meat and eggs.

## **IMPORTANCE OF JUDICIOUS USE OF ANTIMICROBIALS**

Consumers are increasingly concerned about the quality of the meat and eggs in the market. Presence of AMR pathogens and antibiotic residues in meat and egg is a major public health concern. This affects the marketing and international trade of poultry products. AMR is a threat to each one of us. Antimicrobial residues can accumulate in the meat and egg of birds. This can also lead to development of resistant pathogens that get excreted through poultry droppings and this enters the environment. This reaches humans and the human food chain through handling poultry waste and consumption of meat and eggs.

Use antimicrobials with the guidance of a Veterinarian. Never purchase and use antibiotics with the advice of pharmacists or unqualified quack practitioners. Never use antibiotics as growth promoters. Always be conscious about the quality and content of feed and feed additives given to the birds in the farm. Ensure these do not contain antimicrobials. Use of antimicrobials to prevent infections should not be practiced. You can prevent diseases in birds by implementing biosecurity measures, good management practices and timely vaccination. Follow the withdrawal period specified on the drug to ensure safer meat and eggs.



## ABOUT THIS BROCHURE:

Outbreak Management: The four stages of outbreak management, help understand the participants how they should react under such circumstances if needed. The facilitators should emphasis on the how to identify using the symptoms for diseases in the previous module (vaccination schedule), as well prepare a list of people, diagnostic labs and local authorities the farmer should ideally reach out to in such cases.

## Case Scenario

Give a brief discussion on the Avian Influenza transmission and risk factors. Show a short movie demonstrating Avian Influenza case in Kerala. Ask farmers to form small groups to discuss and analyse the Avian Influenza scenario. They should answer the following questions:

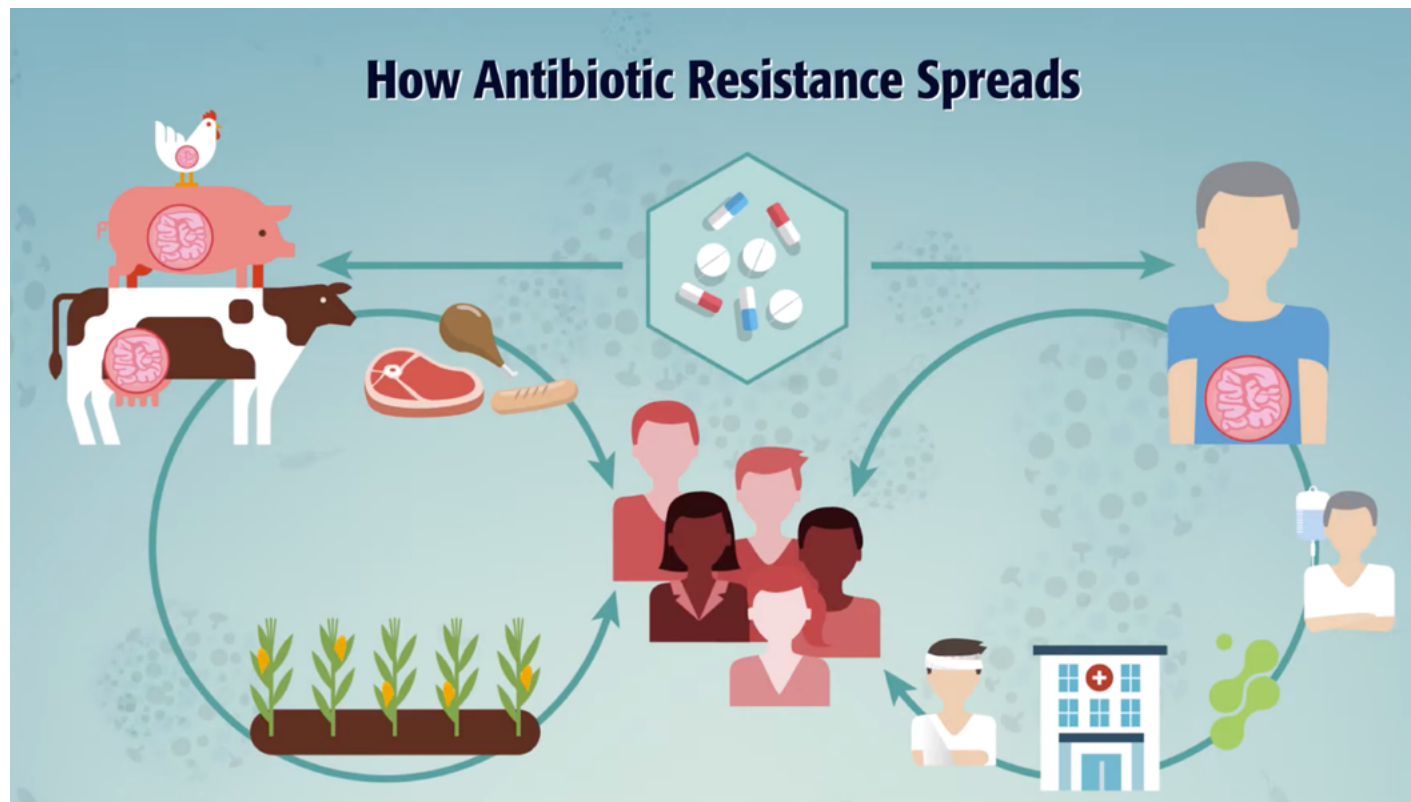
How serious is the Avian Influenza outbreak?

What are the most significant risk factors in the Avian Influenza outbreak?

Who are the guidelines for management of the disease?

What is a major concern in an Avian Influenza outbreak situation?

After reviewing questions, each group should propose one or more method(s) to reduce the outbreak.



### ABOUT THE VIDEO :

AMR Video: The video in the presentation is to be played for the participants for an introduction to Antimicrobial resistance and their connection to the practice of poultry. After the video the facilitators may have a small discussion of identifying behaviours among farmers that may lead to AMR and its spread, probes like outbreak, zoonoses and safety measures should be discussed. There are other links to multiple videos as well, that the facilitators may show to the participants if there is enough time.

### VIDEO CREDITS:

The video is produced by Captiva Marketing in association with bioMérieux, that pioneers in diagnostic solutions (systems, reagents, software, services) which determine the source of disease and contamination to improve patient health and ensure consumer safety.



# Short Discussion on Disease Management Case Scenario



Give a brief discussion on the Avian Influenza transmission and risk factors. Show a short movie demonstrating Avian Influenza case in Kerala. Ask farmers to form small groups to discuss and analyse the Avian Influenza scenario. They should answer and discuss the following questions:

**How serious is the Avian Influenza outbreak?**

**What are the most significant risk factors in the Avian Influenza outbreak?**

**Who are the guidelines for management of the disease?**

**What is a major concern in an Avian Influenza outbreak situation?**

After reviewing questions, each group should propose one or more method(s) to reduce the outbreak.



## Concluding Session

### Post Test

After the last module and discussion, the facilitators can give everyone a short 10 min break to discuss and go over all the written material given to them so they give a concluding test.

**Duration:** 20 mins total Test (5 mins) Feedback (15 mins)

**Methodology:** The final test and the concluding session for the workshop includes a small multiple choice questions quiz for the farmers to take to ensure they have understood all the modules. From the below four scenarios, there is one answer of each of the four options that is wrong, the participants have to mark the answers that are wrong. The worksheet for this should be given to the farmers as well as should be presented on the monitor.

### Feedback Session:

After the test, the facilitators should discuss the feedback with the participants. They should discuss how they feel about their practice and what changes they would like to bring, they should be encouraged to discuss about how they visualise to see the future of poultry farming. They should also be able to give general feedback as to how the workshop was conducted and what were their takeaways.

# Annexures / Appendix

## DIFFERENT TYPES OF POULTRY HOUSES

- **Brooder / chick house:** It is used to brood and rear egg-type chicks from 0 to 8 weeks of age.
- **Grower house:** It is used to grow egg-type birds from 9 to 18 weeks of age.
- **Brooders cum grower house-Here, the birds are** reared from 0 to 18 weeks of age (entire brooding and growing period of egg-type chicken).
- **Layer house:** Birds over 18 weeks of age are reared here, usually up to 72 weeks of age.
- **Broiler house:** Here broilers are reared up to 6 weeks of age.
- **Breeder house:** In which both male and female breeders are maintained at appropriate sex ratio.
- **Environmentally controlled (EC) house:** In which, entire environment is manipulated in such a way that is optimum for the birds growth.

Farmers may formulate their own feed ( Based on IS 1374(2007) Poultry Feeds <https://law.resource.org/pub/in/bis/S06/is.1374.2007.pdf>)

## FLOOR SPACE REQUIREMENT FOR POULTRY – LAYERS

Age (Weeks)	Deep litter (ft <sup>2</sup> )	Cages (ft <sup>2</sup> )
0-8	0.60	0.20
9-18	1.25	0.30
18-72	1.50	0.50

**Reference:** Expert system on poultry, ICAR-TANUVAS-TNAU

## FLOOR SPACE REQUIREMENT FOR POULTRY – BROILERS

Age	Floor space/ bird
Upto 18 days	450 cm <sup>2</sup> (0.5 sq.ft)
From 19 to 42 days	1000 cm <sup>2</sup> (1.1 sq.ft)

## WATER QUALITY PARAMETERS

CONTAMINANT, MINERAL OR ION		AVERAGE LEVEL	MAXIMUM ACCEPTABLE LEVEL
<b>Bacteria</b>	Total bacteria	0 CFU/ml	100 CFU/ml
	Coliform bacteria	0 CFU/ml	50 CFU/ml
pH		6.8 - 7.5	6.0 - 8.0
Total hardness		60 - 180 ppm	110 ppm
<b>Naturally occurring elements</b>	Calcium (Ca)	60 mg/L	—
	Chloride (Cl)	14 mg/L	250 mg/L
	Copper (Cu)	0.002 mg/L	0.6 mg/L
	Iron (Fe)	0.2 mg/L	0.3 mg/L
	Lead (Pb)	0	0.02 mg/L
	Magnesium (Mg)	14 mg/L	125 mg/L
	Nitrate	10 mg/L	25 mg/L
	Sulfate	125 mg/L	250 mg/L
	Zinc	—	1.5 mg/L
	Sodium (Na)	32 mg/L	50 mg/L

**Reference:** Muirhead, S., 1995. Good, clean water is critical component of poultry production. Feedstuffs [Cited in Avian Advice, 2 (2): 11-16]

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### WEBSITES

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- <https://poultry.extension.org/articles/poultry-management/using-lime-in-poultry-houses/>
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