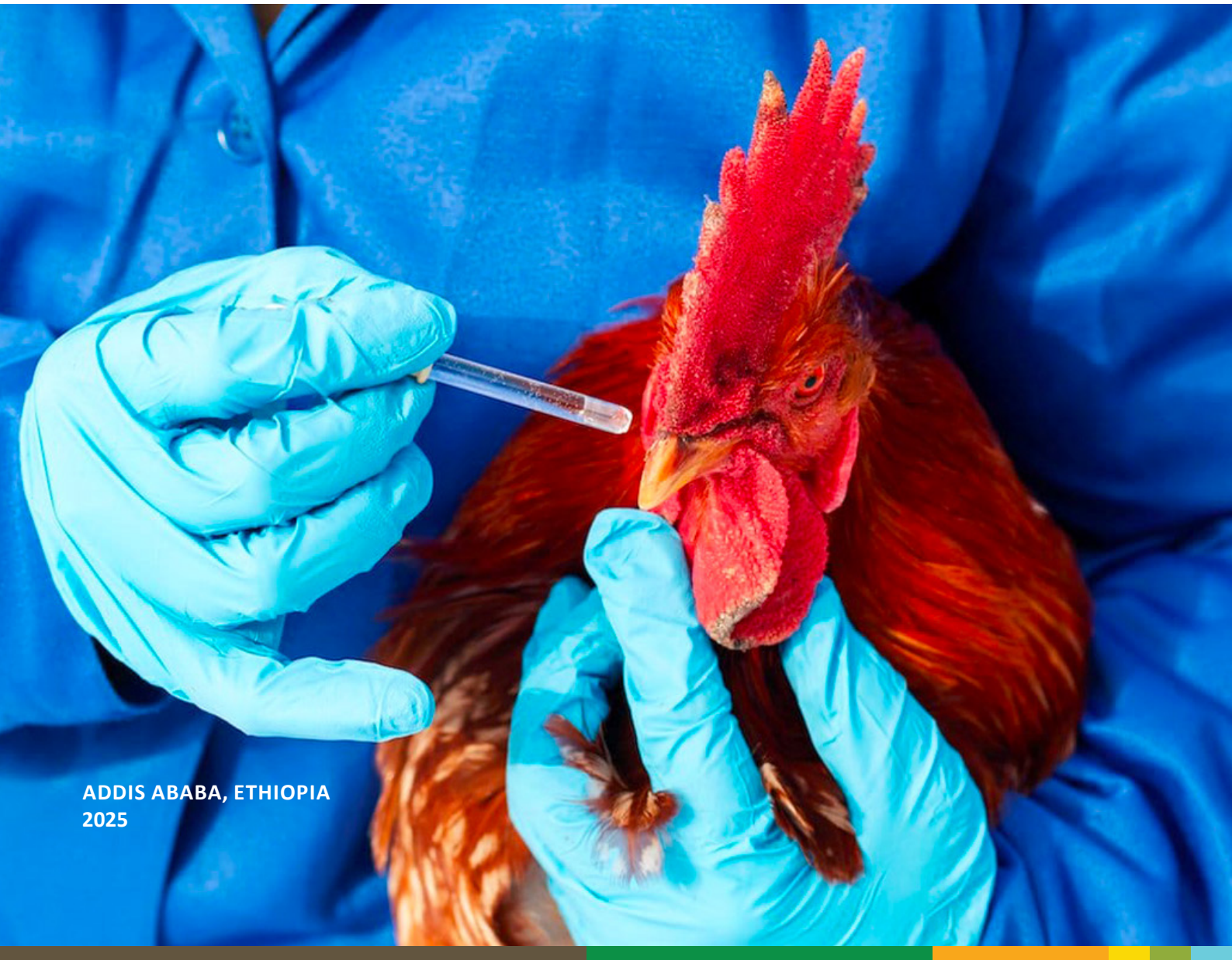
Ethiopian ATI
Agricultural Transformation Institute
የኢትዮጵያ ግብርና ትራንስፎርሜሽን ኢንስቲትዩት

COMMUNITY POULTRY VACCINATION & DEBEAKING BUSINESS

TRAINING COURSE FOR YOUTH AGRI-ENTREPRENEURS

Ethiopian Agricultural Transformation Institute



ADDIS ABABA, ETHIOPIA
2025

Ethiopian ATI
Agricultural Transformation Institute
የኢትዮጵያ ግብርና ትራንስፎርሜሽን ኢንስቲትዩት

Table of Content

OVERVIEW OF THE MODULE 4
INTRODUCTION 5
Training Approach 5
Training Materials 5
TRAINING PARTICIPANTS 5
SECTION 1. VACCINATION 6
1.1. Overview Of The Section 6
1.1. Biosecurity Measures 6
1.2. Factors Affecting Vaccines Effectiveness 6
1.3. Vaccine Transportation 8
1.4. Biosecurity Measures 8
1.5. Handling Of Vaccines 10
1.6. Vaccine Mixing 10
1.7. Vaccine Preparation And Reconstitution 10
1.8. Routes And Vaccination Techniques 10
1.8.1. Mass Vaccination 10
1.9. Post-Vaccination Monitoring 15
1.10. Required Inputs And Equipment 15
SECTION 2. BEAK TRIMMING/ DEBEAKING **15**
2.1. Advantage Of Beak Trimming 15
2.2. Disadvantages Of Beak Trimming 16
2.3. Rules In Debeaking Or Beak Trimming 16
2.4. Methods Of Debeaking 17
2.5. Precautions During Debeaking 17
2.6. Required Inputs And Equipment 17
SECTION 3. FINANCIAL FEASIBILITY **18**
3.1.1. Type Of Investment 19
3.1. Initial Investment 19
3.1.2. Working Capital 20
3.2. Estimated Service Revenue 20
3.3. Profit And Loss Statement 21

3.4. Balance Sheet 21
3.5. Cash Flow Statement 21
3.6. Break Even Analysis 22
3.7. Payback Period 22
ANNEX 23
ANNEX 24
ANNEX 24

OVERVIEW OF THE MODULE

The Ethiopian Agricultural Transformation Institute (ATI) has launched the Agriculture-focused Dignified Employment for Youth in Ethiopia (ADEY) program, with the aim of promoting gender-inclusive job creation—particularly for young women across the country. To support the success of this initiative, robust training modules have been developed to serve as foundational tools for guiding youth organized into Micro, Small, and Medium Enterprises (MSMEs).

This training module is specifically designed to equip youth entrepreneurs with the knowledge and skills necessary to deliver quality poultry vaccination and debeaking services, both at the community level and within large-scale poultry enterprises. These services are vital for maintaining poultry health and welfare, which in turn contribute to the production of safe and nutritious food. In addition, the module plays a key role in fostering job creation and sustainable livelihoods for unemployed youth, especially girls.

The module outlines the essential inputs, tools, and competencies required to carry out effective poultry vaccination and debeaking services. It also highlights best practices, safety precautions, and professional standards necessary for service provision. Furthermore, it identifies potential risks associated with this business and presents strategies for mitigating them.

To support implementation, the module includes templates for record keeping and vaccination schedules in the annex. Overall, this training module provides a comprehensive guide to conducting successful poultry vaccination and debeaking, helping youth-led businesses—from small-scale operations to industrial enterprises—ensure flock health, reduce cannibalism, and minimize egg damage.

INTRODUCTION

Rapid urbanization, population growth, and rising incomes in Ethiopia have significantly increased the demand for poultry and other animal-source foods. In response, smallholder, medium-scale, and commercial poultry farms are expanding. However, the growth of essential poultry health services, particularly vaccination has not kept pace. This gap has contributed to the emergence and spread of both infectious and non-infectious diseases, leading to high mortality rates and reduced productivity. Evidence suggests that chicken mortality continues to cause substantial losses within Ethiopia's poultry sector.

Vaccination plays a crucial role in disease prevention by mimicking naturally acquired immunity. It involves administering non-pathogenic but immunogenic components of a pathogen called vaccines—to stimulate the bird's immune system. Vaccines are defined as biological preparations that induce specific immunity against disease-causing agents. Active immunization, in this context, refers to the process of introducing antigens to chickens to trigger a long-lasting immune response in individual birds and/or the broader flock.

There are different types of vaccines including live, inactivated, and recombinant—each with varying effectiveness depending on host factors, bird conditions, environmental influences, and human handling. Importantly, vaccination should be integrated with other on-farm disease prevention strategies such as biosecurity, hygiene management, and diagnostic testing, as it is not a standalone solution.

To enhance access to animal health services, community-based vaccination and debeaking schemes, linked with government institutions have been introduced. These systems enable service delivery at the village or farm level, particularly benefiting small-scale poultry operations.

This training module is specifically designed to build the capacity of youth entrepreneurs in the areas of:

- Proper vaccine handling, transportation, and storage
- Vaccine preparation and reconstitution
- Administration of poultry vaccines
- Debeaking techniques and safety precautions

By providing these skills, the module supports youth-led enterprises in delivering quality animal health services that directly improve flock survival, reduce disease-related losses, and increase poultry productivity.

The Agriculture-focused Dignified Employment for Youth (ADEY) program is implemented by the Ethiopian Agricultural Transformation Institute in partnership with the Mastercard Foundation to enable 611,343 inclusive and dignified work opportunities for young women and men and support youth entrepreneurship, employability, and sustainable livelihoods in the agribusiness sector.

TRAINING METHODOLOGY

TRAINING APPROACH

The way this module is presented and delivered to youth entrepreneurs

- Theoretical presentations supported with related pictures
- Participatory approach and Demonstration / videos
- Field visit
- Through tailored and practical training
- Brainstorming
- Presentation
- Group discussion
- Exercise
- Self-education (for online version)

TRAINING MATERIALS

- Stationery
- Flipchart
- Whiteboard
- Markers of different colors
- Equipment for demonstration
- PC and LCD

Total Time Required: *6 days, 8 hours per day*

SECTION 1. VACCINATION

1.1. OVERVIEW OF THE SECTION

Vaccination is one of the most important methods of disease prevention however strictly following biosecurity measures in poultry become also most cost-effective disease prevention and containment strategy.

Learning outcome

- *Acquired knowledge and skills on the basic principles of vaccination, reconstitution, dilution, route of vaccine administration and vaccination program*

***Time Required:** 3 days, 8 hrs. per day*

Learning question

1. *When to conduct vaccination?*
2. *What are the different types of vaccination techniques/methods?*
3. *What factors determine vaccine effectiveness?*
4. *Why biosecurity measures are crucial in the community vaccination?*

1.1. BIOSECURITY MEASURES

Biosecurity is defined as a set of management practices that prevent or greatly reduces the risk of introducing new diseases and the spread of infectious agents into and between farms and other biological hazards. The disease can be transmitted from wild birds, chicken carcasses, and materials, such as feed, water, footwear, clothing, equipment and litter. External biosecurity refers to procedures and practices that reduce the transmission of pathogens from sources off the farm into other farms via visitors, feed deliveries, harvesters, equipment whereas Internal biosecurity practices refer to procedures and practices that are applied in the farm to prevent transmission of pathogens between areas of the farms.

- Washing boots before entering farms, and use of different sets of clothes for working with chicken.
- Install washing pits at farm gates and ensure proper washing during handling of birds.
- Disinfection of farm gate; to reduce the dose of organism and emergence of new diseases in the farm
- Rodents and pest control techniques
- Periodic clean up and disinfection of houses to break the life cycle of disease and its transmission
- The farm production area should be adequately drained to prevent accumulation of litters and waste materials that serve as a source of infection.
- Minimizing pest population to reduce the incidence of disease transmission. Insecticide is used in this case.
- Isolation of new flock or new stock from the rest and this can help to conduct early disease detection and identification of carriers
- Protective clothing and footwear
- Hospitalization of sick birds and use of isolation area for newly introduced birds and clinically sick animals.
- Good ventilation to reduce suffocations, respiratory infections and its syndromes such as pneumonia
- Avoid mixing of birds with different age groups, watering and feeding areas in order to minimize overcrowding and adverse effects
- Proper disposal of wastes and dead bodies by using incinerator or deep burial method
- Vaccinate only healthy birds for endemic and economically important diseases

1.2. FACTORS AFFECTING VACCINES EFFECTIVENESS

I. Vaccine factors

Strain Selection: The selected vaccine must be suited to the type of production, to the epidemiological situation and must correspond to the overall risk to which the farm is exposed (e.g.: Intermediate or Intermediate Plus strain of IBD vaccine, depending on the virulence of the wild virus present). The route of administration of the selected vaccine strain must also match the age of the birds.

The Date of Vaccination: The vaccination date must be accurately determined for each vaccination, based either on historical data (the previous production cycles) or on serological analyses.

Storage: Live and inactivated vaccines are fragile products. Preservation quality is a factor of paramount importance in ensuring their efficacy. They must be stored at between +2°C and +8°C until used, and the expiry date must never be exceeded. The cold chain must therefore be respected from production through to utilisation. In practice, special care should be taken to keep the vaccines cool during transport from the local distributor to the farm, using, for example, electrical or static iceboxes, and transporting non-stop during the coolest hours of the day. They are then stored in a refrigerator.

Caution: *Vaccines in general and inactivated vaccines in particular must never be frozen.*

Quantity of Vaccine: The number of doses made available for the vaccination operation must be sufficient and at least equal to the estimated number of birds. For live vaccines, when the size of the flock cannot correspond to the exact number of vaccine doses (e.g. 19, 400 broiler chickens), the next highest number of doses (20, 000) can be administered without engendering any risk. When administering inactivated vaccines, check that the number of injected doses agrees with the number of vaccinated birds by counting the number of bottles that have been used. Unused doses of inactivated vaccines, in addition to used bottles of live vaccines must be destroyed after use.

II. The Human Factor

Technique: Although the techniques used to administer vaccines are not complex, each step may contribute to a certain loss of efficacy if it is not performed according to the rules. It is therefore essential that clear and thorough explanations are given to all the personnel who administer the vaccine, and that the instructions are understood. Thus, it is preferable to train all those involved and not simply the team leader. It is also strongly advisable to check that the training has been understood by rehearsing, involving giving blank vaccinations (i.e. with no vaccine). The training can also be broken down based on the type of task (preparation, administration, organization, monitoring) or on the administration method so as to enable the persons involved to specialize. The laboratory which manufactured the vaccine, or its local representative, can help or intervene during these training sessions.

Equipment: The equipment used must be checked and prepared the day before so that the vaccination operation can be started as early as possible. It can be useful to draw up procedures that list the necessary administration material (including spares) and that describe how the preparation (cleaning, greasing) and the checks should be carried out (calibrating the syringes, operating the nebulizer). It is important not to overlook the water used in sprayed administrations, the solvents (for the wing-web and eye drop method) as well as water treatments (for administration via drinking water). It is also preferable to prepare in advance the clothing to be worn by each person.

Organization: Vaccination is by essence a stressful event for the bird, and so it must be performed under optimal conditions. Moreover, it is virtually impossible to stop an administration once it has started. Checks must therefore be conducted in advance to ensure that the material is available, that there is enough vaccine, that the personnel are trained and that the birds are healthy. This check should be carried out not later than the day before. This is also a convenient time to record the water consumption.

Monitoring: Monitoring the vaccination is at least as important as its preparation. It involves checking, during the hours following the vaccination: that immunization has been induced (when administering via the drinking water); the birds' level of stress; and in some cases the early signs of post-vaccinal reactions.

III. The Bird Factor

The birds themselves are one of the key factors affecting the success of the vaccination. The quality of their receptivity is dependent on their immune status and on the influence of the environment.

Health Status: The health status of the flock should be checked 1 to 2 days before vaccinating, with particular attention paid to all chronic or sub-clinical pathologies which could either reduce the effect of the vaccination or be the cause of secondary infections encouraged by a post-vaccinal reaction (mycoplasma Pasteurella, E.

coli, coccidiosis mycotoxins, etc.). These potential risks should therefore be taken into consideration (known latent mycoplasmal infection), for example by giving a preventive treatment before and after the vaccination.

Immune Status Birds: Vaccine should not be given to immune-compromised birds.If the health status of the birds is not acceptable; the vaccination must be postponed until the treatment has had time to take effect. Moreover, this monitoring can conveniently be combined with measuring the average water consumption. It is essential to minimize the adverse effects of stress either by avoiding periods of predictable stress (e.g. handling) or by introducing a supplementation program based on metabolic correctors and/or vitamins before and after the vaccination date.

The stresses induced directly by a vaccination are minimized when the operation is prepared and performed correctly. The health status of the flock should be monitored for a few days after vaccinating, as mentioned previously.

The Environment: The atmospheric conditions should be adjusted to their optimal values (temperature, lighting, ventilation, etc.) so as to keep the birds calm before, during and after the vaccination. When mycotoxicosis is suspected, it is a very good idea to analyze the feed at the start of the production cycle. If this is not possible, a supplementation with a high emphasis on curative ingredients should be given continuously from the first day of rearing right up to the vaccination date against infectious bursal disease, or longer. It is then possible to modify this supplementation program either by giving occasional treatments with the same active ingredient (e.g. 1 week out of every two) or by replacing it with a preventive supplementation (e.g. adsorbents).

1.3. VACCINE TRANSPORTATION

- Maintaining the cold chain, from transport to storage to ensure vaccine quality
- Use an insulated cooler with frozen ice packs
- Look the expiry date before purchasing and transporting

Figure 1. Recommended Vaccine Transportation Facilities

1.4. BIOSECURITY MEASURES

For all vaccines:

- Vaccines should arrive with cool packs in a well-insulated box.
- If vaccines arrive hot, follow manufacturer or distributors instruction
- Storage temperatures should be +2°C and +8°C
- Avoid freezing, extreme heating and intense light

For live vaccines:

- Transport to farm in coolers with ice packs to keep temperature constant.
- Mix with diluent (reconstitute) just before application.
- Use vaccine within 45 minutes after dilution for Marek's vaccine and up to 2 hours for Infectious Bursal Disease and Newcastle Disease

For inactivated vaccines:

- Follow the manufacturer's instructions regarding preparation and delivery of any vaccine.
- Inactivated vaccines are susceptible to temperature extremes or poor handling. These

products are typically in an oil emulsion and mishandling these products can result in disruption of the emulsion, known as a broken emulsion.

- Pre-warm oil emulsion vaccines at room temperature for 12 to 24 hours or using a warm water bath (do not exceed 37.7ºC (100ºF) for more than 5 hours).
- Pre-warming the vaccine reduces the viscosity of the mineral oil, making the administration easier and reducing any intense local reactions.
- Gently agitate bottles thoroughly prior to use. If the vaccine still has separate layers after agitating, shake the bottle vigorously for 2 minutes. Let the bottle rest for 5 minutes. If separation persists, do not use that bottle of the vaccine and contact the manufacturer
- Do not leave bottles in sunlight during transport to farm.
- Vaccines should be stored at b/n 2-8^{o}C in a refrigerator, with a preferred average of 5^{o}C, though some should remain frozen in a range between-15 to-50^{o}C
- Vaccine should be protected from light and are packaged appropriately to its damage
- Vaccines must be always stored and transported within the recommended T range of +2°C to +8°C
- The vaccine should never be stored in refrigerator doors
- Freezer unit should be-15oC to-50oC

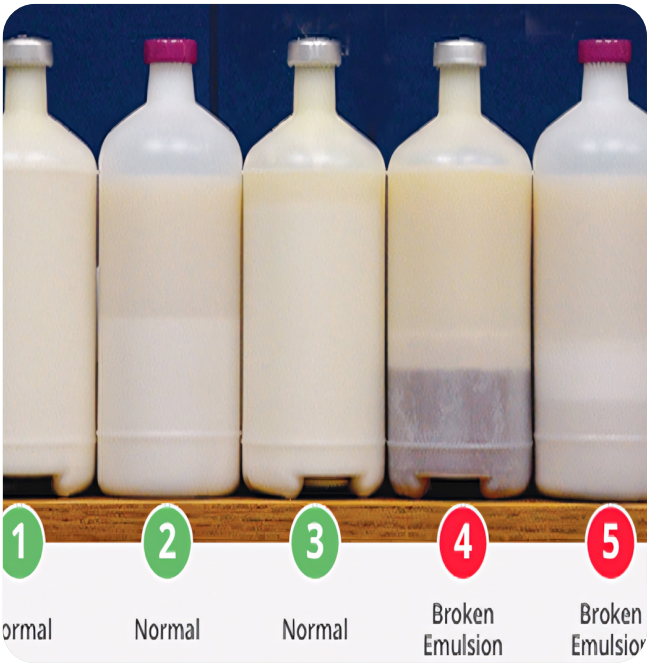


Figure 2. Vaccine Storage and Its Arrangements

Figure 3. Storage of Vaccines Using Refrigerators and Freezers

1.5. HANDLING OF VACCINES

- Label the vaccine
- Properly determine the dosage, reconstitution and diluents
- Place vaccines in refrigerator or freezer immediately upon receiving shipment
- Safeguard the electrical supply to the storage unit.
- Always use the vaccine with the soonest expiration date first

1.6. VACCINE MIXING

- Mix the vaccine on the farm, just prior to vaccinating each house.
- Use clean or distilled water, non-chlorinated
- Water should be no warmer than 80° F (27º C)
- Dissolve the vaccine in the vaccine bottle using distilled water, and then add the vaccine to the water in the sprayer tank. Rinse the vaccine bottle(s) thoroughly
- Shake the sprayer to allow the vaccine to be mixed thoroughly
- Record the serial number and expiration date for the vaccines used

1.7. VACCINE PREPARATION AND RECONSTITUTION

- Open the vaccine vial
- Use water that will be used in the vaccination, fill the vial 2/3 full
- Close the vial with the rubber stopper and gently agitate in order to reconstitute the lyophilized vaccine
- Rinse the vaccine vials several times to remove all the vaccine. Use a graduated plastic bucket or prepare the vaccine directly in the water tank
- Determine the volume of water used to prepare vaccine in the bucket
- Mix with the vaccination and the stock solution after adding vaccine stabilizer, following manufacturer's directions
- Pour the reconstituted vaccine into the drinkers
- Walk the birds to check if they are all drinking water. If using hand drinkers, redistribute drinkers if necessary
- Note that the birds must drink vaccine solution in no more than two hours
- Never force vaccine through a syringe, as this will break down vaccine cells, and dramatically reduce the potency of the vaccine
- Record the contents and the time when the vaccine is prepared on the diluent bag.
- Discard all used needles, syringes, and vials in an appropriate waste receptacle

1.8. ROUTES AND VACCINATION TECHNIQUES

There are various routes of vaccination and administration techniques

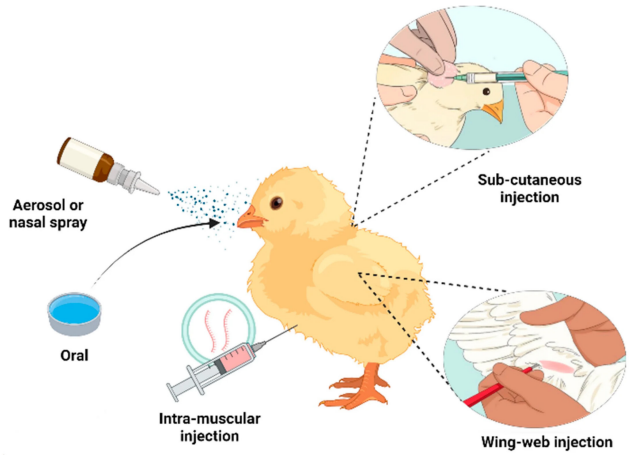


Figure 4. Routes of Poultry Vaccination

1.8.1. MASS VACCINATION

I. Drinking Water

Vaccination via the drinking water is certainly the most used vaccination technique in the field. Vaccination via the drinking water is ideally administered early in the morning. This is the period when the birds are active in terms of drinking and is often the coolest part of the day in regions which have a hot climate.

The water used must:

- *Be Clean and Drinkable, and As Fresh As Possible:* Free from suspended organic substances and bacteria.
- *Have a pH = 5.5 to 7.5.* Acidify if the water is alkaline
- *Be Free From Chlorine and Any Disinfectant:* If the water is chlorinated by a chlorine pump, shut down the system at least 48 hours prior to administration and restart it 12 to 24 hours after vaccinating. To neutralize the chlorine, present in the water, and to protect the dissolved vaccine virus, use dried skimmed milk (2.5 g / litre of water) or sodium thiosulphate (16mg / litre of water). These products should be added systematically into the water 10 minutes before reconstituting the vaccine.

- *Have A Very Low Metals Content:* Borehole or well water often contains large amounts of iron or copper. The metal ions may neutralize the vaccine virus. It may be necessary to use water from the public supply for vaccination.

Figure 5. Drinking Water Vaccination

The various stages in the operation are described below

The birds should be water-starved by depriving them of water for 1 to 2 hours to encourage them to drink when the vaccine solution is distributed During very hot periods, or in hot countries, the water-starvation period should be limited to 1 hour.

Turn off the incoming water supply, raise and drain the lines of nipples and clean and brush the drinkers. If the birds are excessively water-starved, they will push and shove each other to access the water points. This disturbance causes vaccine solution to be lost. Competition between the birds results in the weaker birds being deprived of vaccine in favor of the stronger birds.

I. Preparing the Vaccine Solution: Use only plastic material, reserved for vaccination and not disinfected but rinsed thoroughly and dried. This applies to containers, stirrers, watering cans, etc.- The volume of water needed for vaccination for a consumption period of about 2 hours is:

- One liter of water per day of age per 1000 birds, minimum amount. For example: 1000, 15-day old birds = 15 liters 5000, 20-day-old birds = 20 liters x 5 = 100 liters This volume of water must be multiplied by 1.5 or 2 during periods of very hot temperatures (temperatures above 30°C).
- or 1/5 of the previous day's water consumption. This method involves measuring, on the day prior to the vaccination, the quantity of water drank by the birds in 24 hours and then using 1/5 of this volume for vaccination. If the water measurement is reliable, this technique ensures that the volume of vaccine solution used is perfectly suited to the characteristics of the farm.

II. The Distribution of the Vaccine Solution: Must be rapid: When distributing the water to the drinkers by hand, three to five employees are required to distribute the product with plastic watering cans around the entire building. The water must be distributed within 30 minutes to avoid any excessive discrepancies in the water starvation period from one end of the building to the other. Moreover, rapid distribution limits any loss of quality associated with the preservation of the vaccine in the water. When the product is distributed via lines of nipples, the water supply must be supplied to all the lines at the same time. Must be complete: Check that no drinker has been forgotten.

III. The Consumption Duration: The consumption duration affects the homogeneity of flock immunization. Each bird must drink enough vaccine solution to receive a complete vaccinal dose. Each bird must therefore have sufficient time to ingest this vaccinal dose. However, since vaccine viruses are relative sensitive in solution, this distribution time must be limited. The consumption duration classically recommended is one and a half hours as a minimum, and up to 3 hours as a maximum. The volumes of water indicated in the sections on "preparing the vaccine solution" have been calculated for two to two-and-a-half hours of consumption.

IV. Monitoring the Consumption: As the vaccine solution is being consumed, it is important that one or more operators move around the building. The main reason for this is that it encourages any birds who are lying down to get up and drink.

Stimulation of the birds throughout the vaccination period ensures that good levels of drinking are obtained, whilst maintaining a fairly short water starvation period. Moreover, moving around the building also provides the opportunity to check that vaccine is being delivered to all the drinkers and to all the lines and finally to evaluate the proportion of birds who have drunk.

Spray vaccination procedure

Vaccinating via coarse spray is a very effective method of administering vaccines against respiratory diseases such as infectious bronchitis, Newcastle disease or TRT. This technique is designed to bring the vaccine into contact with the eyes (Harderian gland), the nasal cavities and the upper respiratory airways. This technique requires specially adapted equipment that allows the size of the sprayed droplets to be set before use.

- Chicks are vaccinated with live vaccines using a spray cabinet that administers defined amount of water-borne vaccine to each box of chicks.
- Vaccination can be visualized on the chicks as moisture
- This method is typically used for respiratory vaccines (IBV, NDV)

Pre-Vaccination (Follow the procedures)

- Spray 1 gallon of water through the backpack sprayer
- Observe spray particle size and pattern
- The sprayer must be used for vaccination only (never for pesticides, herbicides, or disinfectants)
- Wear gloves, mask and safety glasses during preparation and vaccine administration

Figure 6. Backpack vaccination (left) and Handheld spray vaccination (right)

I. Intraocular or eye drop Vaccination

Administering via the eye-drop method is one of the most effective techniques since it ensures that a complete dose is administered to each bird. However, it is very time-consuming and labor intensive and is often carried out poorly under field conditions, particularly when a large number of birds are involved.

The water or diluent used: Normal saline or mineral water 30 to 35 ml for every 1000 doses, varying depending on the dropper used. It is useful to test the dropper to determine accurately the volume of diluent to be used. This is achieved, using water to which no vaccine has been added, by counting the number of drops corresponding to 5 ml or 10 ml of water, and from this calculating the dilution volume required for 1000 doses.
Ambient heat and warmth from the operator's hands tends to heat up the small volume of solution involved quickly. For this reason, it is advisable to prepare only enough vaccine for 1000 doses at any one time, and then to divide this volume up into 500-dose bottles for each operator. At a rate of 10 to 15 chicks per minute, these 500 doses are used up in about 35 to 50 minutes, thus avoiding excessive long-term warming of the vaccine solution. Any 500-dose bottles which are not needed immediately can be kept temporarily in a cool box.

The techniques are described as follows:-

- Confirm that the vaccine to be administered by eye drop is approved and manufactured for eye drop application. Serious issues may occur if the wrong vaccines are dropped into the eye
- Vaccine mixing
- Open the vaccine vial and the diluent bottle,

removing the aluminum seals and the rubber stopper. At the time of vaccine reconstitution, the diluent's temperature must be between 2º C & 8º C

- Open the diluent bottle and, using a syringe, remove 3 ml of diluent, inject into the lyophilized vaccine vial. Some vaccines come with a special adapter to mix diluent
- Rinse the vaccine vials several times with diluent to remove any residues
- Slowly shake the diluent bottle with the already reconstituted vaccine, without shaking vigorously
- Use eye drop application
- Attach the dosing/eye drop nozzle onto the diluent bottle
- Vaccination will only be considered successful if the drop (0.03 ml) is placed into the opened eye or nasal cavity and absorbed. For this to occur, it is important to wait a few seconds after administering the drop, before releasing the bird

Figure 7. Ocular Route Vaccination

Wing web Vaccination

The vaccine is applied to the birds by transfixing the internal face of the wing membrane using a double or single needle which had previously been dipped in the vaccine solution.

The Diluent: Use the sterile diluent provided by the manufacturer. In general, 10 ml for 1000 doses
This method may use for the below poultry diseases

- Fowl Pox
- Avian Encephalomielitis
- Chicken Anemia and Live Fowl Cholera

Vaccine Preparation

- The preparation of this vaccine is similar to that of the eye-drop vaccine
- The vaccine is lyophilized and be reconstituted in the same manner as other vaccines
- Only use the specific diluent which comes packaged with the vaccine
- Shake the vaccine vial carefully

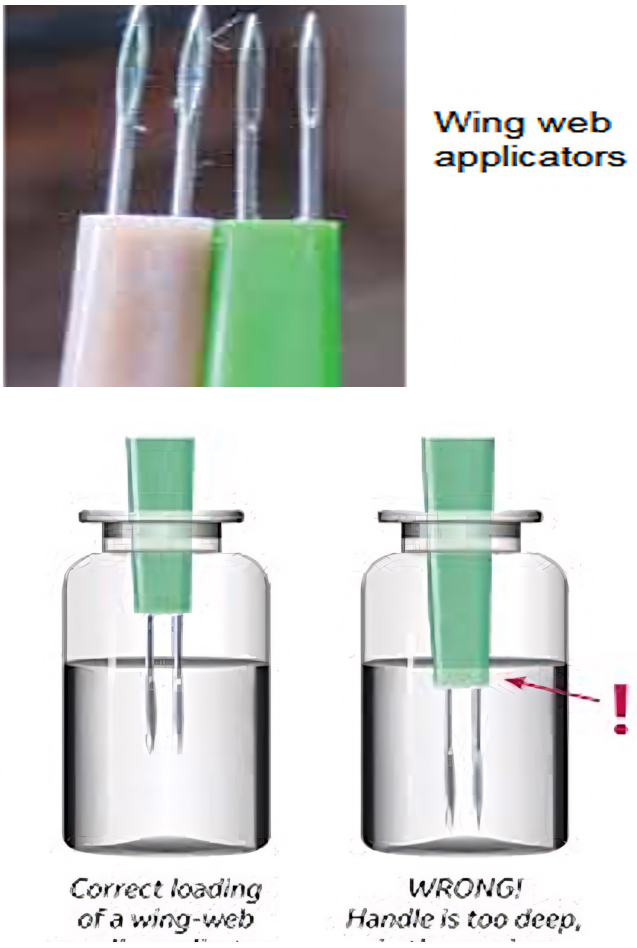


Figure 8. Wing Web Applicator and Loading

VACCINE ADMINISTRATION

- Administer the vaccine in the center of the wing web, using a two-pronged needle applicator or other wing web applicator (Grant inoculator or others).
- Remove the feathers located on the wing web before exposing it for vaccination.
- Dip the two-pronged applicator into the diluted vaccine and pierce the web on the underside of the wing, avoiding feathers, blood vessels and bones.
- Change the needle if necessary and the needles can be disinfected and re-used, most probably change needles every 500 to 1,000 birds
- If during the application the wing vein is punctured, immediately change the needle and repeat vaccination
- Post vaccination, needles can be disinfected and used again if they remain sharp and have not been used on more than 1,000 birds.

Figure 9. Location of Wing Web

Checking the Vaccination: The check is performed 6 to 10 days after vaccinating. Immunization of the birds is indicated by a local inflammatory reaction at the transfixion point(s): swelling and redness of the skin. Remove the feathers located on the wing web before exposing it for vaccination.

III. Injectable (inactivated) vaccines

Vaccination via subcutaneous (SC) or intramuscular (IM) injection is used for the administration of certain live vaccines (Marek's disease, reovirosis for example) and systematically for the administration of inactivated vaccines. Most of the time mass vaccination method is applied in poultry however some vaccine types may require to be administered individually in the form of eye drop, oral drop, Wing web, IM injection and sub-cutis.

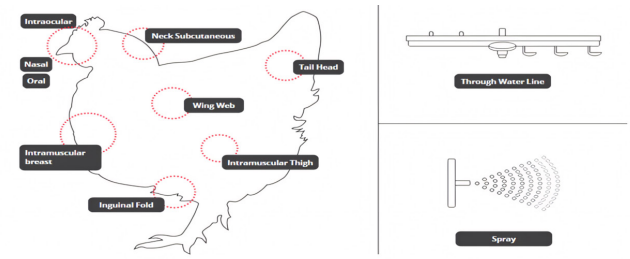


Figure 10. Sites of Vaccinations

Injectable vaccines must be manually injected into each bird using an 18 gauge by 1/4" needle.

- ***Sites:***
  - Intramuscular (IM) – into the muscle
  - Subcutaneous (SC) – under the skin
- ***Precuation:*** Reaction at the injection site (bleeding, shock, death)

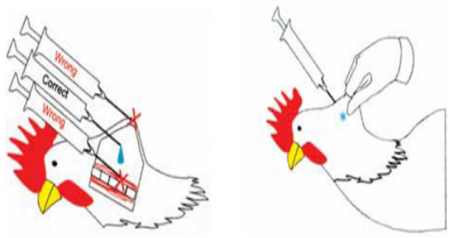


Figure 11. Subcutaneous Injection

1.9. POST-VACCINATION MONITORING

- Record all vaccine information as well as any problems which may occur with the birds or the vaccination process. This information may be important for the evaluation of the results.
- Use vitamins and other biologicals to relive stress due to vaccination- administer 24 hours before a predictable stress, and for the entire duration of the stress, and administer via fresh drinking water, to prevent any degradation

1.10. REQUIRED INPUTS AND EQUIPMENT

Some of the inputs which are required to provide vaccination and debeaking services are listed below.

- *Different Types of Vaccines:* live attenuated, freeze dried, combined and recombinant, attenuated thermostable
- *Vitamins:* vitamins A, E, C and B which strengthen the immune defense system
- Minerals
- Probiotics
- Ice box, refrigerator, freezer, ice pack, waste containers, scissor, blade and blade handle, syringe, dressing and bandages, double-sided sponges, vaccination kits
- Antiseptics/disinfectants

Post assessment questions

1. List down at least 6 (3 for vaccination and 3 for debeaking) main inputs required to provide vaccination and Debeaking services
2. Define bio-security and mention at least 5 bio-security interventions
3. List factors reducing the effectiveness of vaccines
4. Which route of vaccination is best to give fowl thypoid vaccine?

Take away message

Always vaccinate healthy chickens according to the schedule with an appropriate method

SECTION 2. BEAK TRIMMING/ DEBEAKING

OVERVIEW

Poultry beak trimming, also known as debeaking, is a common practice where a portion of a bird's beak is permanently removed. This is typically done to prevent feather pecking and cannibalism in chickens raised in close quarters. While some argue debeaking improves chicken welfare by reducing injuries, others raise ethical concerns about the procedure itself.

Learning outcome

- Applied the right procedures and methods of debeaking
- Acquired knowledge on the basic rules and precautions of debeaking

Time Required: *2 days, 8 hrs. per day*

Learning question

1. Do you know the importances and techniques of debeaking?
2. What are the management practices after debeaking?

2.1. ADVANTAGE OF BEAK TRIMMING

I. Reduced Feather Pecking and Cannibalism

Feather Pecking: This is a behavioral issue where birds peck at the feathers of themselves or other birds. It

can lead to:

- *Stress and Injury:* Constant pecking can damage feathers, causing discomfort and stress for the birds.
- *Reduced Egg Production:* Stressed birds lay fewer eggs.
- *Open Wounds:* Feather pecking can break the skin, creating entry points for infections.
- *Cannibalism:* In severe cases, feather pecking can escalate to cannibalism, where birds attack and kill flock mates. This can cause significant economic losses for farmers.

II. Improved Feed Conversion and Flock Uniformity:

- *Feed Conversion:* Beak trimming can improve feed conversion ratio (FCR), meaning birds require less feed to gain weight. This translates to cost savings for farmers.
- *Flock Uniformity:* Untrimmed beaks can lead to dominant birds bullying others, preventing them from accessing enough feed and water. Trimming helps maintain a more uniform flock with better overall growth.

III. Lower Mortality Rates

By reducing feather pecking and cannibalism, beak trimming can indirectly contribute to lower mortality rates within the flock.

2.2. DISADVANTAGES OF BEAK TRIMMING

I. Pain and Stress for Birds:

- The beak trimming procedure itself can be painful for birds, causing them stress and discomfort.
- *Improper Trimming:* If not done correctly, beak trimming can cause further injuries and long-term pain.

II. Impaired Beak Function:

- The beak is a vital tool for birds, used for preening, feeding, and natural behaviors. Excessive beak trimming can hinder these functions, impacting their well-being.

III. Increased Risk of Infection:

- The wounds caused by beak trimming can become entry points for bacterial infections, potentially leading to illness and even death.

2.3. RULES IN DEBEAKING OR BEAK TRIMMING

Beak trimming, sometimes inaccurately called debeaking, has some established rules to minimize harm to the birds and ensure its effectiveness. Here are some key points:

I. Amount Removed

- Generally, no more than one-third of the upper beak and at least one-third of the lower beak is trimmed.
- Some regions recommend even less, like the UK's suggestion of removing only the sharp tip.

II. Age of Bird

- Ideally, beak trimming is done early in a chick's life, around day-old, 6 weeks, or no later than 12 weeks.
- This minimizes stress and blood loss.

III. Technique

- The beak should be cut at an angle to remove less of the lower mandible.
- Operators should be trained and ensure the tongue isn't cut
- Blades should be maintained at the proper temperature to avoid unnecessary burning.

IV. Bird Welfare:

- Minimizing stress is crucial. This can involve keeping the birds cool during trimming and providing easily accessible food and water after
- Proper beak trimming should not be used to improve feed efficiency, but only to prevent harmful pecking behaviors

Properly Debeaked Pullet

Properly Debeaked Adult Bird

Figure 12. Debeaking Points

2.4. METHODS OF DEBEAKING

Three common methods of debeaking chicks are: *(1)* block debeaking in which one-third of both the upper and lower mandibles are removed in one operation, *(2)* removal of two-thirds of the upper mandible only and *(3)* removal of one-third of the upper mandible and the tip of the lower mandible.

The procedures discussed as below:

- A debeaking crew should consist of two or more workers.
- The debeaker blade should be heated to a cherry red color by placing the thermostat on reserve heat.
- Two birds at a time should be handed (feet first) to the operator.
- Insert the index finger into the bird's mouth to force the beak open and the tongue down and back.
- Place the top mandible on the cutting bar, lower the head to obtain a 20- to 30-degree slant back toward the roof of the mouth and cut the mandible 1/8 to 3/16 of an inch in front of the nostril. Cut slowly, allowing the blade to cauterize the tissue.
- Place the lower mandible on the bar and cut so that it will be 1/8 to 3/16 inch longer than the upper. Cut the lower mandible in a straight block form.
- Each mandible should be rolled against the blade to round the edges and to further cauterize.
- Carefully check each mandible and touch it up if improperly cut. Missed birds and those carelessly debeaked cause trouble later on.

2.5. PRECAUTIONS DURING DEBEAKING

- The debeaking blade should not be too hot, too cold or dull. An excessively hot blade causes blisters in the mouth. A cold and/or dull blade may cause the development of a fleshy, bulblike growth on the end of the mandible. Such growths are very sensitive and will cause below average performance.
- The mandible should not be pulled away from the blade until it is completely severed. Incomplete severance causes torn tissue in the roof of the mouth.
- The bird's tongue must be held away from the blade. Burned or severed tongues result in cull hens.
- The debeaking blade and cutting bar must be in perfect alignment. The blade should fall on the highest part of the bar.
- Never use a warped or bent blade. Change blades often. Debeaking should be checked frequently to assure proper crew performance. Improperly debeaked pullets cannot reach their optimum potential in the laying house.

2.6. REQUIRED INPUTS AND EQUIPMENT

- Chicken debeaking, while it may seem like a simple procedure, requires specific skills and equipment to be performed correctly and minimize harm to the birds. Here's why just anyone shouldn't debeak chickens:
- *Precision is crucial:* Debeaking removes part of the beak, and taking off too much can cause lasting pain, difficulty eating and drinking, and even death. Experienced individuals understand the exact amount that needs to be trimmed and have the practiced hand-eye coordination to achieve this.
- *Proper equipment makes a difference:* Debeaking is often done with heated blades or lasers. Using the wrong equipment or equipment that's not properly maintained can lead to burns, infections, or incomplete cuts. Trained professionals know how to use this equipment safely and effectively.

Figure 13. Hand-held Debeaking Machine (left) and Automatic Debeaking Machine (right)

An electric shear-type debeaker usually is used to debeak day-old chicks. A debeaker of this type removes a portion of the beak with a quick stroke of the blade but does not cauterize the end of the beak. A debeaker that cauterizes the cut to prevent excess bleeding is used to debeak older pullets.

Certain recommended management practices to minimize mortality and reductions in feed consumption and body weight after debeaking include:

I. Birds should be kept cool if debeaked during hot weather. Water must be available at all times.
II. Extra vitamin K should be fed or added to the water for 4 to 7 days prior to debeaking to minimize bleeding problems.
III. For the first 4 to 7 days after debeaking, fresh mash-type feed with a minimum depth of 2 inches should be kept before the birds.
IV. Mechanical feeders should be operated frequently to stimulate feed consumption. If cart fed, birds should receive feed at least twice daily.
V. Birds should not be subjected to stress from housing, vaccinating or wonning during the week prior to or the week after debeaking.

Post assessment questions

1. What are the rules in Debeaking?
2. Why Precision is crucial in Debeaking?

Take away message

Be careful not to debeak beyond the recommended portion of the beak and consider the age of the chickens.

SECTION 3. FINANCIAL FEASIBILITY

OVERVIEW

Financial feasibility describes whether agri-business is financially viable. It involves determining initial investment (resource) requirement to start the business, estimating production cost, operation expenses, and sales revenue.

These are used to determine the initial investment requirement, profitability of the business, break-even point (minimum level of production) to attain the profit zone, and pay-back period (number of years required to recover initial investment). These series procedures are used to make wise decisions to accept or reject the agribusiness investment alternative.

Learning outcome

Trainees equipped with:

- *How to determine initial investment requirement to start the business*
- *How to estimate periodical production costs, operating expenses, and sales revenue of the business*
- *How to determine profitability and cash flow of the business*
- *How to calculate break-even point (minimum level of production) to recover total cost and generate profit.*
- *To calculate payback period (time requirement to recover initial investment and*
- *How to make decision to accept or reject the investment alternative*

Time Required: *4 hours*

Learning question

1. Do you know how to determine financial feasibility of the given specific agri-business to make wise investment decision?

3.1. INITIAL INVESTMENT

- Initial investment is the minimum capital requirement to start the business.
- Example of initial investment requirement to start vaccination and debeaking business includes tools and equipment, vaccine storage, working capital, etc

DESCRIPTION	TOTAL COST	REMARK
Tools and equipment		
Vaccines		
Anticeptics/disinfectants		
Vitamins		
Storage house/shop		
Working capital		
Etc		
TOTAL		

Table 1: Template to Estimate Initial Investment Requirement for Agri-business

3.1.1. TYPE OF INVESTMENT

- Long-term investment in agri-business involves all asset requirement for the business which can serve for more than one year.
- Example tools and equipment, debeaking machine, storage/shop, etc

TYPES OF INVESTMENT	UNIT OF MEASUREMENT	QUANTITY	UNIT COST	TOTAL COST

3.1.2. WORKING CAPITAL

- Working capital for the planned agri-business includes all payments requirement for day-to-day operating activities such as production costs and operating expenses.

EXAMPLE:

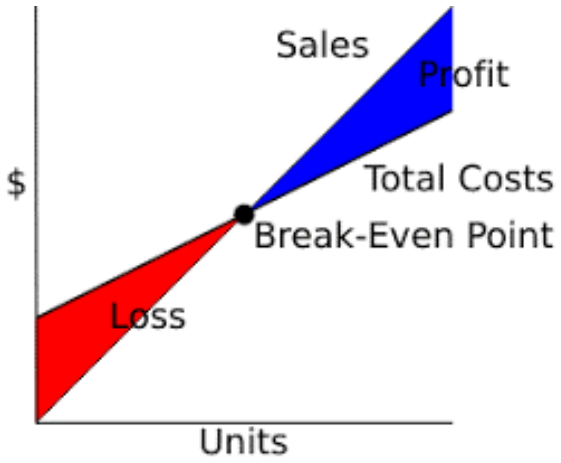
- Production costs include cost of vaccine, antiseptics, labor cost etc
- Operating expenses includes administrative salary, sales commission, promotion, etc
- Working capital excludes long term investments such as warehouse/shop, tools and equipment etc.

A. PRODUCTION COST

- Production costs are a key component in agri-business.
- It includes all costs associated with production including value addition to make the product ready for sale.

TYPE OF COSTS	UNIT OF MEASUREMENT	QUANTITY	UNIT COST	TOTAL COST
Vaccines	Dose			
Vitamins	Ml			
Ice box	Number			
Ice pack	Number			
Debeaker	Number			
Vaccination syringes	Number			
Gloves	Pack			
Loading and unloading	Qtl			
Transporting	Qtl			
Storage if rental/month	Birr			
TOTAL				

Table 3: Template for Estimating Service Cost for Vaccination and Debeaking



B. OPERATING EXPENSES

- Operating expenses are all costs not directly associated with production.
- They are common costs incurred for administrative and selling activities.
- Example administrative salary, promotion cost, transport cost for service, etc

TYPES OF COSTS	TOTAL COSTS
Administrative salary	
Utility (electric, water, gloves, tele.)	
Interest	
Promotion	
Sales commotion	
Tax	

Table 4: Template to estimate operating expenses for agri-business

3.2. ESTIMATED SERVICE REVENUE

- The main source of revenue for the agri-business to generate profit is through providing service.
- To determine the expected service revenue for the planned service.

FORMULA
Total Service Revenue = Total Number of Service X Unit Service Price

A	B	C	D
Type of Service	Total Service	Est. Service Price/Unit	Total Service Revenue
(BX C)			
Vaccination			
Debeaking			
Total service revenue			
Tax			

Table 5: Template for estimating volume of production and sale revenue

3.3. PROFIT AND LOSS STATEMENT

- The primary objective of any business is to generate profit.
- Profit and loss statement is the main tool to calculate profitability of the business.
- It is used to accept or reject the investment based on estimated profit

FORMULA
a. Gross profit = Total service revenue – Cost of inputs
b. Net profit = Gross profit – Total operating expenses

DESCRIPTION	INPUT COST/ EXPENSE	SERVICE INCOME
Service Revenue		
Vaccination		X
Debeaking		X
Total Service revenue		X+X
Cost of input (-)		
Vaccine, vitamins	X	
Gross profit		X
Total Operating Expenses (-)	X	
Net profit		X

Table 6: Template for profit and loss statement preparation

3.4. BALANCE SHEET

- Balance sheet used to know the total resource owned, amount of claim by creditors and amount of owners' equity
- Balance sheet contains asset, liability, and own capital
- Assets are all resources available for use/sale
- Example cash, inventory, storage/shop, equipment etc
- Liabilities are all debts obtained from bank, microfinances, individuals or others
- Own equity/capital involves own/member contribution, grant/donation, etc

DESCRIPTION		
Asset		
Current asset		
Cash		
Inventory		
Total current asset		
Fixed asset		
Tools and equipment		
Total fixed asset		
Total asset		
Liability and Capital		
Liability		
Bank loan		
Debt from relative		
Total liability		
Owners' capital		
Own capital contribution		
Grant/donation		
Total owners' capital		
Total liability and capital		

Table 7: Template for balance sheet preparation

3.5. CASH FLOW STATEMENT

- Cash flow is all cash inflow and outflow for any purpose in the business operation
- *Example:* Cash inflows include service income, debt obtained from banks, members capital contribution, etc
- Cash out flow includes purchase of input, payment for construction, repayment of debt, payment for salary, etc

FORMULA
Beginning cash balance + total cash inflow = ending cash balance + total cash out flow

3.6. BREAK EVEN ANALYSIS

- Break even analysis is used to determine the minimum level of production to cover total cost
- At break-even point no profit no loss
- To make profit, level of production/service and sale should exceed/greater than breakeven point.
- Fixed costs are fixed in total amount regardless of increase/decrease in volume of production.
- Example depreciation, shop rent, administrative salary, promotion cost, etc
- Variable costs varied in total in response to increase/decrease in level of production

FORMULA
Break-even Point = Fixed Cost / (Unit Service Price – Unit Variable Cost)

3.7. PAYBACK PERIOD

Payback period is used to determine number of years/ periods it takes to recover initial investment.

FORMULA
a. When the annual profit of the business is uniform/equal
Payback period = Initial investment/annual profit
b. When the annual profit fluctuate/vary from year to year
Pay back period = # of year before coverage + uncovered amount/profit of the next year

PAYBACK PERIOD
The amount of time it takes to recover the cost of an investment.

Post assessment questions

1. Which of the following is part of working capital?
a. Purchase of vaccine,
b. Purchase of debeaking machine,
c. Transportation cost,
d. Purchase of antiseptics

2. Which of the following should include in profit/loss statement?
a. Purchased tools and equipment,
b. Sales/service revenue,
c. Debt,
d. Owner investment

3. Which of the following is variable cost?
a. Purchase of vaccine,
b. Administrative salary,
c. Depreciation,
d. Rent of storage

KEY MESSAGE

Analyzing financial feasibility of agribusiness enables to pre-determine the applicability of the business in terms of initial investment requirement, profitability, and sustainability

POTENTIAL RISKS AND MITIGATION STRATEGIES

This section helps the youth entrepreneurs to predict the possible/unexpected challenges they may face and prepare for reversing the risks of daming their business.

NO	POTENTIAL RISKS	MITIGATION STRATEGIES
1	Vaccine failure	Proper handling, storage, transportation, use and techniques. Post vaccination monitoring
2	Failure to follow vaccination schedules	Strict adherence to routine vaccination regime
3	Input price/availability instability shocks	Advance/wholesale inputs purchase arrangements, having emergency stock
4	Adverse weather shocks	Prepare facilities to overcome
5	Failure of quipments (debeaker) and Electric flactuation	Prepare manual debeaker, if possible use generator or reserve more ice packs
6	Lack of acceptance/confidence by the community	Trust building, promotion, awerness creation
7	Conflict of interest	Provide mind set trainings
8	Emerging market competitors	Diversifying the business

ANNEX

VACINATION SCHEDULES

LAYERS

AGE OF BIRD	TYPE OF VACCINE	ROUTE OF ADMINISTRATION
Day 1	Marek's vaccine	Subcutaneous
Day 3	Newcastle disease HB1 vaccine	Eye drop
Day 7 and 21	Gumboro vaccine (IBD)	Eye drop/water
At day 27, 63, 112 and every 3 month	LaSota Newcastle disease vaccine	Eye drop/water
At 6 and 12 weeks of age	Fowl typhoid vaccine	Subcutaneous
From day 70-90	Fowl pox vaccine	Wing web

BOILERS

AGE OF BIRD	TYPE OF VACCINE	ROUTE OF ADMINISTRATION
Day-1	Marek's vaccine	Subcutaneous
Day-1	Newcastle disease (NCD)	Coarse spray
Day 14-21	Newcastle disease (optional)	Drinking water
Day-21	Gumboro vaccine (IBD) (optional)	Drinking water
Day-40	NCD +IB, if birds are kept beyond 42 days	Drinking water

NOTE: This is an example of a typical vaccination program. Individual programs are highly variable and reflect local conditions, disease prevalence, severity of the challenge, and individual preferences

ANNEX

RECORD KEEPING TEMPLATES

INVENTORY RECORD

S.NO	ITEMS	UNIT OF MEASUREMENT	QUANTITY	UNIT COST	TOTAL COST	REMARK
1	Vaccines					
2	Vitamins					
3	Drugs, insecticide,					
4	Vaccination Kits, ice box					
5	Vaccine carriers, vaccine diluents					
6	Cleaning and sterilization materials (antiseptics, chemicals, detergents, Disinfectants,					
7	PPE /safety equipment (PPE, gowns, gloves, aprons, face shields, boots, goggles)					

ANNEX

SERVICE DELIVERY RECORD

S/NO	DATE	LOCATION	DELIVERED SERVICES	VACCINE	DOSES OF VACCINES	SERVICE CHARGE	REMARK
NAME OF SERVICE PROVIDER				SIGNATURE			

Ethiopian ATI

Agricultural Transformation Institute

የኢትዮጵያ ግብርና ትራንስፎርሜሽን ኢንስቲትዩት