PIN CORE SKILL FACTSHEETS: POULTRY REARING

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1. LEARNING OBJECTIVES

1.1 GENERAL OBJECTIVE

To teach the recipients how to operate a small to medium poultry production (focused on meat and/or eggs production) with minimal risks, losses and running costs, with the ability to cover the whole life-cycle of the animals (production of fertilized eggs by laying hens, incubation, rearing chicken, rearing broilers, laying hens) and with the ability to secure as many inputs as possible from own production (own eggs, own fodder, etc.).

1.2 TARGET GROUP

The target group of the materials are teachers and students of Agriculture High Schools and Institutes as well as individual farmers.

1.3 SPECIFIC OBJECTIVES – KNOWLEDGE AND SKILLS

1.3.1 KNOWLEDGE

1) To know the advantages of poultry rearing and the **current situation** in poultry rearing in Afghanistan (small holders, bigger poultry rearing facilities and the technologies they use).
2) To know **which topics are crucial for success** in poultry rearing (like hygiene, fodder, incubation, etc.) – what are the **common mistakes** of poultry keepers in Afghanistan. No care of vaccination, farm management, farm location, feeding is common mistakes of poultry keeper in Afghanistan.
3) To know the **advantages and disadvantages of artificial incubation** and to know in detail the necessary conditions for artificial incubation of eggs.
4) To know the appropriate **housing conditions** of chicken according to their age, sex and characteristics (fodder rations, space requirements, temperature, water).
5) To **know the equipment** used to manage poultry (feeders, drinkers, …).
6) To know **factors affecting hatchability of eggs**.
7) To know **why and how to keep appropriate hygiene** while rearing poultry.
8) To know **the most common diseases** of poultry in Afghanistan and how they can be diagnosed, prevented and treated (especially prevention by good hygiene and vaccination).
9) To know the **necessary composition of fodder** of chicken and what are the possibilities for preparation of such fodder.

1.3.2 SKILLS

1) To be able to **collect fertilized eggs** for incubation and store them properly.
2) To be able to practically **hatch eggs in artificial incubators** (to use the incubator, keep temperature and moisture, record the values, check eggs for embryo etc.).
3) To **care for newly born chicken with the brooder** and secure all the necessary conditions for their growth.
4) To practically **rear chicken in halls** (not cages as this is not very common in Afghanistan).
5) To **prepare appropriate fodder** for the chicken and supply right amounts of water to them.
6) To **vaccinate chicken and properly keep the vaccines** and necessary equipment.
7) To properly **keep the biosecurity rules on the farm and train other staff** to do it.

2 INTRODUCTION

2.1 IMPORTANCE OF POULTRY REARING

Chicken meat and eggs are good source of vitamins, proteins and minerals. Therefore, small-scale poultry rearing should be encouraged in villages in order for people to improve their nutrition. Chicken and eggs are demanded by a lot of people so it is a good marketable product. Also poultry manure can be used as very good fertilizer for agricultural land. Small-scale poultry rearing is a great side income-generating activity which can be also performed by women. Nutritious meat and eggs are available for consumption by the family and what is not eaten can be sold. Bigger-scale poultry production can be a good business creating job opportunities for people.

Therefore, it is very useful for students of Agricultural High Schools and Institutes as well as farmers to learn practically how to establish and manage a poultry farm. If the farm is not managed in a proper way, many chickens can die due to illnesses or other causes and high losses can occur. Then the poultry business cannot be profitable. Technical skills and good management is therefore vital.

This factsheet together with the banners is designed in order to help the students of Agricultural High Schools and Institutes as well as farmers to learn practical skills in poultry rearing.

2.2 KEY TERMINOLOGY

- **Broodiness, "going broody"** – a tendency of hens to sit on a clutch of eggs to incubate them, meaning they cease to lay eggs and start to behave in a defensive manner to protect the eggs. The broody hen will stop laying and instead will focus on the incubation of the eggs (a full clutch is usually about 12 eggs). She will "sit" on the nest, protesting or pecking in defence if disturbed or removed, and she will rarely leave the nest to eat, drink, or dust-bathe.
- **Clutch of eggs** – **A** number of eggs laid by the hen usually in a nest and later incubated by her after she goes broody. A full clutch is usually around 12 eggs.
- **Broiler** – a chicken reared for meat production, usually a hybrid breed.
- **Natural incubation** – After going broody the hen sits on the eggs for several weeks (usually 21 days with domestic fowl) in order to hatch the eggs (eggs of other hens can be put under the broody hen in order to have them incubated).
- **Artificial incubation** – If a farmer wants to hatch many eggs at the same time and rears hybrid hens which do not go broody, an incubator can be used for artificial incubation of eggs
- **Hatchability of eggs** – The ability of fertile eggs to be hatched in the future for chicken; declines with time but can be kept for around 3-weeks maximum if eggs are stored and handled properly.
- **Air sac (air cell)** – Small cell of air inside the egg close to the dull end; its size depends on temperature and moister. If it is perforated or lost, it decreases the hatchability of an egg.
- **Crossbreed (Hybrid)** – An animal with parents of two different breeds and with shared traits of both (hybrid). In the first generation a crossbreed (hybrid) shows high performance in the selected trait, in the next generation this is usually lost. This means hybrids cannot be used for reproduction as their off-springs would lose their characteristics.
- **Cannibalism in poultry –** it's a problem which occurs in different ages and type of poultry and the main reasons of occurrence are keeping large number of birds in small place, uncomfortable housing and deficiency of minerals in poultry nutrition.
- **Morbidity-** un-healthy condition or abnormal stat of numbers of poultry in one flock or specific area is called morbidity which occurred by diseases agent.

- **Morbidity rate**: numbers or percentage of illness in one flock or specific area.
- **Mortality-** incidence of death or the number of deaths in a poultry flock or specific geographic area is called mortality which is usually the rate is less than morbidity in common diseases in Afghanistan.
- **Symptom-** a noticeable change in the body or its functions that indicates the presence of a disease agent or other disorder.
- **Incubation period:** The time distance between contamination and symptom is called incubation period which is more belonging to the amount and type of diseases agent.

2.3 TYPES OF PRODUCTION

2.3.1 SMALL-SCALE REARING FOR MEAT AND EGGS

- people are rearing chickens for meat and eggs on a small scale in rural areas across Afghanistan
- basic coop in the yard with basic equipment is sufficient, indigenous or mixed poultry breeds are
- Usually people small chickens' production in the beginning of spring season with period of three months naturally and artificially by incubator and they use eggs their own backyard hens' eggs for this purpose but for other time they sell in the near market or use for their eating consumption.

Backyard small scale production of chickens and hens for eggs and meat purpose

2.3.2 BIGGER-SCALE REARING FOR EGGS PRODUCTION

Laying hens are kept for eggs production, usually special breeds or hybrids of hens are used in order to gain more eggs (good hybrids can give up to 300 eggs per year and they continue producing eggs for up to one year without "going broody"). Two varieties of the Golden breed of chicken were imported from Pakistan and are the most common breed of chicken found in Afghanistan. They are adaptable to the Afghanistan climate and resistant to the local diseases. 2. Both are raised for egg and meat production. 3. Approximately 80% of the eggs will have a dark shell which is very importance for hatchery and these varieties produced by semi commercial company and supplied to local market in spring season also in urban area distributed golden chicken breed with gas incubators people can purchased with suitable price in the mentioned area, these golden breed imported from Pakistan in the beginning but now raised in Afghanistan.

Commercial production of laying hens for eggs

2.3.3 REARING CHICKEN FOR MEAT PRODUCTION (BROILERS)

Usually special breeds are reared for meat – these broilers are fast-growing and usually reach slaughter-size in 5 to 7 weeks, some slowly growing breeds up to 14 weeks.

Often the farmer buys one-day chicks from a hatchery (with a certificate of a good breed or a hybrid), keeps them until they reach slaughter-size and then sells them. In Afghanistan the one-day hybrid broilers are usually imported

Production of broiler chickens for meat

from neighbouring countries, especially from Pakistan and Iran, because in Afghanistan the cross-bred hybrids are usually not available as there are no stations producing them in country.

3 POULTRY REARING ACTIVITIES

3.1 INCUBATION AND HATCHING

Incubation of fertile eggs means keeping them in a suitable environment until the chicken hatch. It is either **natural or artificial.** To manage it properly is crucial for sustainability of poultry breed. Natural incubation is performed by dual purpose broody hens (also turkey hens can be used for incubation of eggs of domestic fowl) and it is useful especially in small scale backyard production. The artificial incubation is done by incubator and its main advantage is that it allows producing more chickens at one time and the timing of incubation doesn't depend on broodiness of hens.

3.1.1 NATURAL INCUBATION

- Natural incubation means that the hen sits on the eggs (after going broody) in order to hatch them.
- For natural incubation a suitable nest (hatching place) is very important for the hens.
- We can also put eggs of other hens under the broody hen in order to have them incubated.
- Hens of dual purpose or traditional breed or turkeys can be used for natural hatching as they go broody more often than breeds improved for laying eggs.
- So we need to keep dual purpose or traditional breed chicken or turkey hens along with the laying flock.
- Based on author's experience, broody turkey hens are a best choice for natural hatching as in one hatching time they can produce 20-23 chickens (with chicken hens it is usually around 12).
- When the side of the egg which is touching the hen gets warmer, the hen turns the egg with her beak – in this way the embryo does not stick to the wall of the egg which would otherwise harm it.
- Some hens leave the eggs even before the chickens are hatched and get out of the eggs – the hatching process is then stopped. Those hens which experienced hatching once before usually remain until the end.
- The hatching place and the hens themselves should be sprinkled with anti-parasitic drugs before the hatching so that they can sit comfortably on eggs and the chickens are also safe from parasites.

Naturally incubated chickens by turkey hen

Naturally incubated chickens by a hen

3.1.2 ARTIFICIAL INCUBATION

- Incubation of fertile eggs using an incubator machine is a very educational and exciting experience. The process is not simple and must be followed precisely otherwise it will not be successful.
- In the Agricultural High Schools and Institutes both natural and artificial incubation should be performed practically with the students so that they learn both techniques.

Artificial incubation with gas fuelled incubators (capacity 400 eggs)

3.1.3 ARTIFICIAL INCUBATION STEP BY STEP

3.1.3.1 SELECTION OF EGGS FOR INCUBATION AND THEIR STORAGE UNTIL INCUBATION TAKES PLACE

- Fertile eggs need to be selected and kept in a proper way until we have enough of them to start the incubation process.
- Mismanagement during selection, storage or transportation could negatively impact the eggs' quality and therefore their "hatchability". They need to be handled carefully.
- The eggs need to be fertile (fertilized by a rooster) and relatively fresh (avoid keeping them for more than 7-8 days with time their hatchability is reduced but if there was shortage of eggs or not facilities of incubator and broody hens we can keep up to three weeks but need to turn 180 degree around and the temperature will be 12-15 Celsius and the humidity to provide around

Selection off eggs for artificial incubation and placing them on the incubator tray

60%.

When the egg is produced by the hen, even if it is fertile, the embryo immediately stops developing because the temperature of external environment is lower than the internal body temperature of hens. Stopping the development in this stage does not impact the embryo negatively, and the embryo can maintain its properties and stay in a resting phase.

- As soon as a right temperature for incubation is provided to the egg, the embryo wakes up (ends the resting period), and commence re-developing.
- If the temperature (and other conditions like humidity) of the external environment stays favourable the embryo continues developing. If not, it will stop the progress and cannot start again (the embryo is damaged).
- The reasonable temperature for storage of eggs before starting the incubation is 15 – 18 °C; if the temperature is higher than 25°C, the embryo will be developing. But if the egg is left outside of the incubator, it will dry up and the embryo will not survive. Also excessive temperature or sunshine can damage it.
- The outside environment during hatching process needs to be kept at around 60 % moisture, because it helps the egg to keep its internal moisture and not to dry up.
- The eggs must be clean – but they can be cleaned only using dry way. Do not clean eggs in water.
- Eggs waiting for incubation needs to be turned so that the embryo does not stick to the wall of the egg. Eggs produced less than a week ago do not need to be turned. Turning can be done by hand or they can be simply placed in an inclined position which will be regularly changed. This has the same effect as turning (see picture).
- the shell of the egg intended for incubation should be healthy, regular normal shape and without cracks.
- The thickness of the shell as well as size of the egg should be medium. The standard weight of chicken egg for incubating is 45 – 60 grams.

The eggs placed in boxes and kept in an inclined position. This prevents damaging of the embryo in the same way as turning the eggs (the inclination needs to be changed once in a day)

3.1.3.2 FERTILE EGGS PACKAGE AND TRANSPORTATION

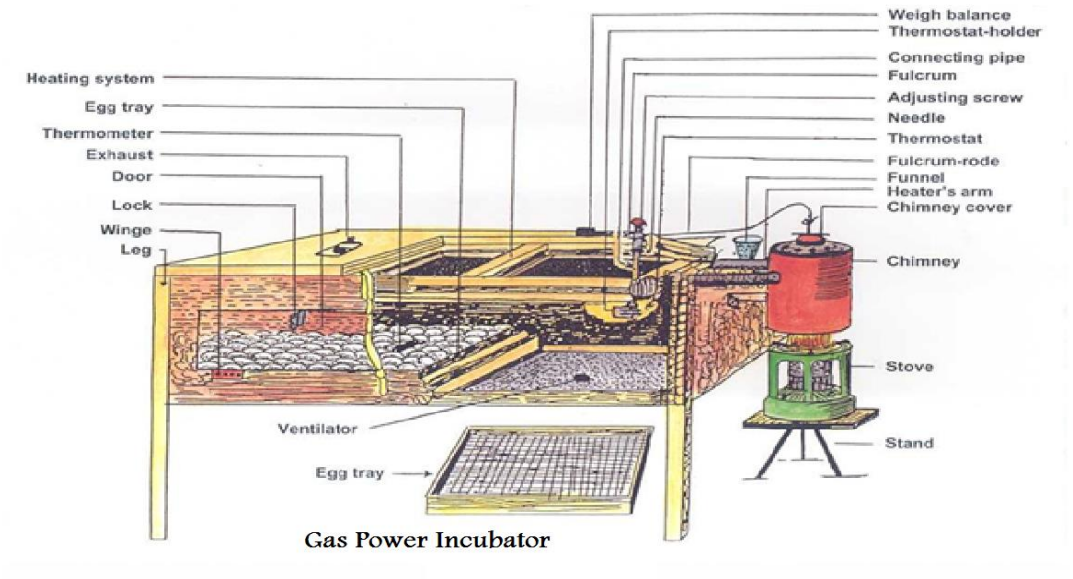
- If fertile eggs intended for incubation are procured from the market or need to be transported to a different location, strict measures need to be followed in order to sustain their hatchability and prevent damage.
- The eggs need to be packed in an egg tray or in straw. Strong shake and jolt have negative impact on fertile eggs, so it must be prevented as much as possible (for example in cars).
- During the transportation the dull side of the eggs will stay on top and the point side will face downward. Experiments have shown that in case of losing the air sac (or air cell) the eggs substantially lose hatchability.
- During summer it is necessary to moisten the eggs with water so that they do not dry up during transportation and keep them as cold as possible.

Proper packaging of eggs for transportation; straw can be used to improve the protection. In hot weather the temperature must be kept low and moisture provided.

3.1.3.3 THE INCUBATOR MACHINE

- An incubator is a machine which provides heat, ventilation and humidity to eggs in order to hatch them artificially.

Different kinds and different sizes of incubators are available. One important characteristic is fuel (usually kerosene, gas or electricity), the other one is capacity. An electric incubator is in general not suitable for use in Afghanistan due to unreliable electricity supply especially in urban area.



Gas Power Incubator

Thermometer with Hygrometer: is an instrument which measures the water vapor and heat of the inside of the incubator and the best humidity for incubator 60-70% and temperature should be 93 degree of sulcus.

Thermostat: is and instrument which the primary function of it to maintain a 93 degrees of sulcus temperature, it must arrange when the degree become high than 39 degree it should be up the chimney cover when the temperature become
39 degree the chimney cover become down.
Water Tray:

Thermometer with hygrometer


Thermostat


large and small size water trays

3.1.3.4 INSTALLATION OF A GAS INCUBATOR WITH 400 EGGS CAPACITY

- The incubator needs to be well balanced on its legs, so that the eggs do not tend to roll to one side.
- The water tray should not block the ventilators; it should be filled to 1/3 with warm water.(we will find picture according the comments)
- The radiators need around 8 liters warm water (60 – 70°C)
- The incubator needs to be installed at least 12 hours before putting the eggs in as it needs to pre-heat.
- For better Installment of the machine thermometer needs to be accurate sat with the eggs' height, 5 cm away from machine-door – Horizontally. Machine installation is done by tiding and loosing (Adjusting screw). A machine is not standard activated unless the thermometer shows 39/5 Celsius degrees and the chimney cover should be 2.5 cm upper than the radiator-chimney. So after the normal or standard activation of incubator it should not be touched with the adjusting screw, and after the incubator pass the 12 testing hours successfully its ready for functioning. (we will find the real picture for this part according the comment)

3.1.3.5 MANAGEMENT OF INCUBATOR

During the incubation process four important factors need to be considered in order to successfully hatch the chickens:

Temperature:

- Temperature must be between 38 - 39°C during the whole time of the incubation process.
- Temperature is controlled by a thermostat which is located inside the incubator. The responsible person needs to monitor the temperature every 2 or 3 hours.

Humidity:

- As time goes, eggs left in room conditions loose moisture and the air sac increases its volume as shown in the picture. If the egg dries too much, the incubation process is stopped and the embryo dies. Therefore, water needs to be put in the water-tray located inside the incubator. The required moisture level is 55 - 60 %. When you refill the water tray, use warm water. Hot or cold water would affect the temperature of the incubator too much. To increase the humidity level during the last three days, spray water on the floor of the incubator room or put a wet sponge into the incubator. But do not let the eggs to have direct contact with water at any time. Too much moisture can harm the embryo as well.

The size of an air sack as moisture is lost from an egg with time

Ventilation:

- Air circulation plays a vital role during incubation. While the embryo is developing, oxygen enters the egg through the shell holes, and carbon dioxide escapes from it at the same time. Therefore, ventilation needs to be provided otherwise the embryos will die. The ventilation system is usually controlled by two ventilators which are located in the bottom and two exhaust ventilators at the top of the incubator. More details about ventilation are provided below in the section on Daily Operation of the incubator.

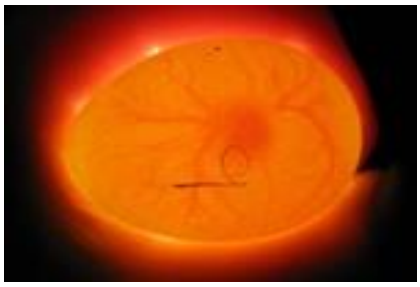
Eggs Examination:

- We need to examine the eggs for fertility and development of embryo to see if the process is going well or not.
- Before you start examining eggs, wash your hands. You should also make sure the light source you are using is clean; good hygiene is a must when handling eggs.
- The room should be warm and must be dark (so according to field experience it is best to do the examination in the evening time).
- We need low wattage bulb or a simple hand torch.
- We do the examination 3 times during the incubation (day 4, 7 and 14)

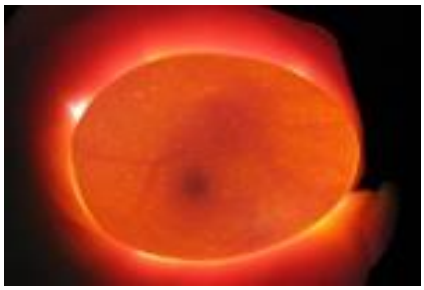
Examination of an egg for fertility or defect

- Day 4 Examination:
    - On day 4, we will see in fertile eggs a small spot (the embryo) with a net of blood vessels radiating out from the embryo. The non-fertile eggs seem clear or show a dark ring without spreading blood vessels network.
- Day 7 examination:
    - On day 7, the embryo looks like a dark spot in the center; blood vessels can also be seen but not so clear as on day 4.
- Day 14 examination:

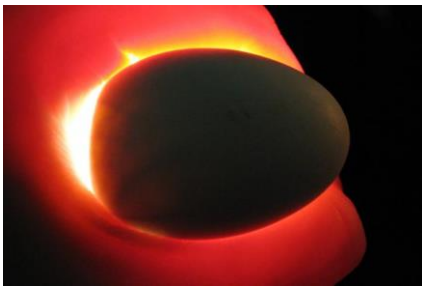
- After 14 days inside incubator the embryo is well developed and is covering most part of the egg - it seems dark and only the air cell looks semi dark.



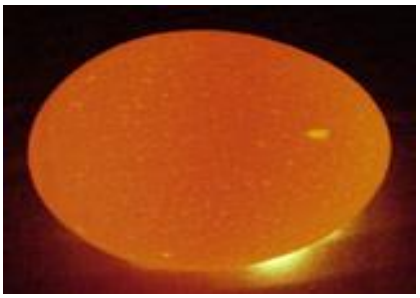
Day 4



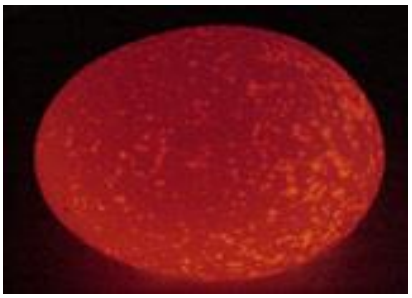
Day 7



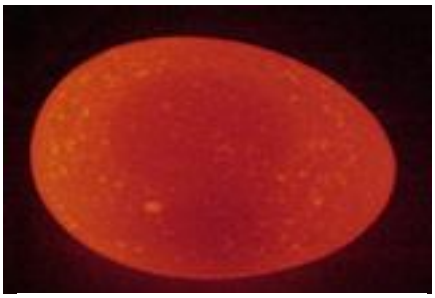
Day 14



Non-fertile egg



Maybe contaminated by bacteria



No net is present, embryo is not developing

3.1.3.6 POSITION AND TURNING OF EGGS

Eggs need to be turned during the incubation period in the same manner as they needed before they were put into the incubator. From day 3 up to day 17 the eggs are turned usually two times per day. It is necessary to mark the eggs so that we can be sure that they were turned. Mark eggs with a marker (it is better to use a pencil in order not to damage the embryo by chemicals from the marker). Put an M (Morning) on one side of the eggs and an E(Evening) on the opposite side. All the eggs should be turned at the same time on the E side and then at the same time on the M side. For the first three days and the last three days, the eggs should not be turned. This is because during the first two days, the embryo will be developing and any turning may destroy it and in the last three days, the chick will be fully developed and does not need any turning**.**

Eggs are marked to make turning easier

3.1.3.7 CHICKEN DISPOSAL FROM INCUBATOR

The normal chickens hatching period is 21-23 days. Maybe the first chicken will be hatched 8 hours earlier or later than others, that is not a problem and there is no need to dispose the chickens from the incubator because the chickens are wet and need to dry. If a wet chick becomes quickly chilled it can die soon after removal. On the other hand the primary reason for not allowing the chicks to stay in the incubator for longer periods is excess dehydration of the chicks. It is recommended that if all the eggs have not hatched during the 10 hours after the first hatching emerged, open the incubator doors and remove all dried and strong chickens as well as the shells from the eggs. The removed dried chickens should be put into a

Live chicken on the incubator tray

brooding box which is described below in an appropriate section.

- In case the small chickens are to be transported or sold right after incubation, this needs to be done during the first 24 hours after hatching, as the chicken still have energy from the egg yolk. Otherwise high mortality rate can be expected.

3.1.3.8 INCUBATOR OPERATION RECORD SHEET

Days #	Eggs total #	Fertile eggs #	Non-fertile eggs #	Dead embryos #	Broken eggs #	First eggs examination done	Second eggs examination done	Incubator temperature during day	Incubator temperature during night	Room temperature during day	Room temperature during night	Comment of the Incubator Manager
0												
1												
2												
3												
4												
5												

6												
7												
8												
9												
10												
11												
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20												
21												

Domesticated bird	**Incubation period**
Chicken	21-23 days
Turkey	28-29 days
Duck	28 days
Geese	29-31 days
Guineafowl	26-28 days
Peafowl	28 days

Incubation period of eggs of different domesticated birds

3.1.3.9 DAILY OPERATION OF AN INCUBATOR

Day 0

- Arranging the clean and sorted eggs on the egg-trays
- Placing the thermometer inside of the incubator about 5 cm away from the machine's door.
- Disinfecting the incubator with a mix of 5 CC or ML formalin with 4-5 crystal of potassium-permanganate in a plate with 15 cl of water and a tissue paper.
- During the heating of the machine the water will flow from the radiator which is not a problem and it will stop after the heating is done. The exhaust ventilator holes should be completely blocked, but the bottom ventilators should be 1/3 open.

Day 1 and 2

- In the morning and afternoon the eggs-trays should be replaced with each other and turned 180 degrees in order to have all eggs heated similarly. Checking of the temperature and humidity as usual.

Day 3

- After spending 2 days in the incubator the eggs need to be turned. This operation should be done as fast as possible because the room temperature and humidity is different from the inside of the incubator.
- In the morning and afternoon the eggs-trays should be again replaced with each other and turned 180 degrees.

Day 4

- Turning the eggs in the morning.
- In the evening perform a Day 4 Examination - remove unfertilized and damaged ones. The examination needs to be done quickly and in a warm room.

Day 5 and 6

- Cooling eggs 4 degree of C in the morning it means to reduce 4 degree the temperature.
- In the morning and afternoon the eggs-trays should be again replaced with each other and turned 180 degrees.

Day 7

- In the morning and afternoon the eggs-trays should be again replaced with each other and turned 180 degrees.
- Opening the down ventilator about 2/3 of its space. In case if the room temperature is lower than 25 C0 the upper ventilators need to be open about 1/3 of its total space, but if the room temperature is lower than 25 C0 keep the upper ventilators close up to day ten.

Day 8

- In the morning and afternoon the eggs-trays should be again replaced with each other and turned 180 degrees.
- In case if the weather is dry and not rainy the room need sprinkling of water, it is better to use humid

Provided artificial humidity during dry season (sprinkling water under the incubator)

sands under the incubator until the end of incubation process controlling incubator.

Day 9

- In the morning and afternoon the eggs-trays should be again replaced with each other and turned 180 degrees.

Day 10, 11, 12 and 13

- Turning the eggs around in the morning and afternoon controlling the room-temperature, if the upper ventilators are not open yet because of the cold weather up to day seven. It is necessary to be opened 1/3 of its total space, Adding warm water to radiator and attention to gas-balloon humidity room temperature.

Day 14

- In the morning making the eggs as cold as putting on the back of the eye will feel a little warmness than, Turning the eggs around in the morning.
- doing general check-up of eggs in the evening and remove death embryo ones
- filling the water-tray 2/3 total space of the tray,
- Opening the lower ventilators (2/3) of its total space.
- Disinfect the machine for disinfection mix 3-4 crystals of Potassium permanganate and 1.5cc Formalin with 15cc water and pure it in a plate having tissue paper or sponge on board then put the plate between two drawers inside the machine for about 5 minutes.

Day 15 and 16

- the same direction as day ten.

Day 17

- the same direction as day ten and full filling the water-tray with warm water and more water spraying in the floor of the room.

Day 18

- Turning the eggs in the morning and evening for the last time.
- Keep the doors close up to the end of the incubation.

Day 19

- the same direction as day ten and, covering the door with a curtain.

Day 20

- the same direction as day ten and full opening the ventilators.

Day 21

- It is good and normal if the chickens are quite, but if the chickens make shout and noise it means the weather is hot reduce temperature.
- Take the broken egg-shells out to facilitate enough space for the chickens; regarding taking the egg-shells out it is not compulsory to take the drawers off. If the chickens were dry so take them out, otherwise wait more time to become dry.
- The chickens that are not able to come out yet, help them only with its head to come out, do not to displace the fin avoid helping its abdomen to come out, and these ones should remain for more hours in the shell.

3.1.3.10 INCUBATOR CLEANING

- it is also a part of management when the hatching is completed first try to remove all shell and unhatched eggs and clean dry, remove the water from radiator, clean all parts of the incubator with warm water and soap, after add and mix 8 cc formalin with 7-8 crystal of Potassium-permanganate in a plate consist of 20 cc water and tissue paper on then sitting the plate for one hour inside the machine after that out the machine from the room and keep under sun place for 5 hours.

3.2 POULTRY HOUSING

Visitors in an indoor farm need to wear plastic shoes, clothes and hats that are disinfected in order to prevent spread of diseases in the flock.

A fenced outdoor pen for laying hens combined with indoor housing where the nests are located.

Some pictures of backyard chickens coop

3.2.1 GENERAL RECOMMENDATIONS FOR HOUSING OF POULTRY

- The main purpose of chicken house (coop) is to protect chickens from bad weather (too hot, too cold, wind and rain) and also from wild animals; for laying hens also to give them a suitable place where to lay eggs.
- In-door production is better for protection of poultry, can be combined with fenced outdoor pen.
- There are two basic kinds of housing for poultry – housing for laying hens and housing for broilers.
- Before designing and building a poultry farm the owner needs to decide what kind of poultry and how he or she wants to keep.
- A good design of housing for chickens rearing will reduce many problems and assist with keeping the animals healthy.
- Good ventilation system is one of the key factors which keep chicken healthy – the temperature must not be too cold or too warm.
- House design should help to retain the heat in the house in temperate areas and also to provide ventilation during hot weather.
- Cement floor is preferred as it is easy to clean and disinfect. Thus, control of diseases and parasites are more effective.
- If clay floor is used replace the new litter with a new litter of clay prior to introduction of new batch.
- Floor of the farm should be cemented and it should be sloped 10 cm also Inside wall of the farm should be cemented (20 t0 30 cm) to be easy for cleaning during washing.

3.2.2 HOUSING FOR LAYING HENS

- It has usually two parts, first is an indoor area where the hens sleep and lay the eggs (a coop with perches and nests).
- The floor of the coop should be covered with litter (straw or saw-dust).
- The litter should be replaced once in two months; or a new layer of litter can be added on top.
- The outdoor area is also very important as here the laying hens will feed and spend the majority of the day.

Space Requirement for laying Chickens

Age of Chickens per days	Chickens #	Space requirement
1-30	25	M2
31-60	17	M2
61-140	9	M2
Chickens arrived to production period	5-7	M2

Space Requirement for Broiler Chickens

Age of Chickens per Week	Chickens #	Space Requirement
First Week	17	M2
Second Week	15	M2
Third Week	12	M2
Fourth Week	10	M2
Fifth Week	8	M2

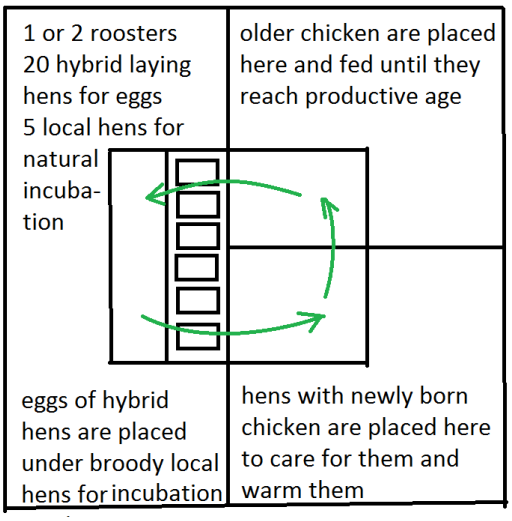
Sixth week	7-8	M2

3.2.3 HOUSING OF BROILER CHICKENS

- Broiler chickens are kept by farmers in Afghanistan for 35-50 days in an indoor the farm. This provides more protection and controlled environment compared to outdoor pen.
- After the chicken are grown, removed and sold from the farm, the farm is cleaned, disinfected and prepared for a new batch of broiler chicken to be kept there.

3.2.4 LOCATION OF POULTRY FARM

Before construction of the poultry farm it's important to consider the direction should be constructed facing east to west to pass direct sun during day with consideration of the wind blows in the chosen location to reduce wind or draft that can affect chickens it is also mentionable to consider market and water source facilities, distance from neighbour house, public areas, wells, Stream, flood way, other poultry farms to avid spread of poultry outbreak diseases and consideration human health.



3.2.5 INSTALLATION AND USAGE OF FEEDERS AND DRINKERS

Small Chickens feeder tray: feeder tray is used from first day up to 2 weeks of chicken's age, one time each day must be clean.

Large Chickens feeder: this feeder is used for chickens after weeks of age and differen capacity acailible in the market

Different size drinker and feeder

Local Chicken feeder

Small chicken drinker: different kind simple and classic of chicken drinkers are available in the market we can used it from small to large size according chickens age

Classic chicken drinker

Simple Chickens drinkers with different capacity

Feeder Installation: in the beginning 2 days small chickens (Pullets) are need to easily access feed around the ground and the ground should covered with litter up to six days after passing the mentioned time up to 12 days age use Chickens feeder trays as feeder and need to clean physically one time per day after 12 days age its need to install feeders in one line and space between 2 feeder will be 1.5 matters and the high will be consider according chicken access and passing under the feeder also it will be good after feeding to upped the feeders to be clean and

provide spaces for chickens.

Drinker Installation: in the first 2 weeks of small chickens age its need to provide small drinkers in differed parts of the ground without consideration putting in line because small chickens still not familiar with drinking, with the completion of 2 weeks it's better to collect small size drinker and install large size automatic drinker instead. It will be better to install automatic drinker before coming small chickens to the farm because installation and fitting the drinker take more time, losing water in chickens room due to increase moisture in the room and disturb chickens also its need a technical person to install its recommended that don't install drinker near to heat source because some time we use vaccine and medicine in water.

- The drinkers need to be checked every day as in case of water spilling onto the ground or into the litter it increases humidity in the room which in turn negatively influences spread of diseases within the flock.

3.2.6 HEATING AND VENTILATION

Small chickens (pullets) need special care and attention to ensure their good health and survival. The brooding room should be heated 6 hours before to arrival of the chicks as they need a precise and stable temperature. A newly hatched chick requires artificial heat to maintain its body temperature; therefore, an external heat source must be provided to young birds in the first few weeks. Brooding temperature should be kept according to the outline below as well as according to observations of the birds. The behaviour and sounds of the chicks will indicate their comfort level.

The correct temperature from brooding the chicken is 35°C during the first week, decreased by around 3°C per week. Providing the right temperature during the first three weeks is essential for the good development and health of the pullets.

Age (weeks)	**Brooding Temperature (°C)**
0 – 1 week	35 – 32
1 – 2 weeks	32 – 29
2 – 3 weeks	29 – 26

The behaviour of the chicken will indicate their temperature comfort level:

- Comfortable chickens will be equally spaced around the room and chirping and noising normally.
- Cold chickens will huddle in the warmest part of the room nearest to the heat source and will be chirping loudly.
- If the birds are too hot, they will generally be positioned against the walls away from the heat source, and will be panting or possibly sitting with their wings outstretched and feathers fluffed out.


Different kinds of heating of the brooding room for small chicken pullets.

- The chicks will do a better job than a thermometer of telling you about their comfort level.
- It is good to put small fences around the heaters as otherwise the pullets can be spread in the whole

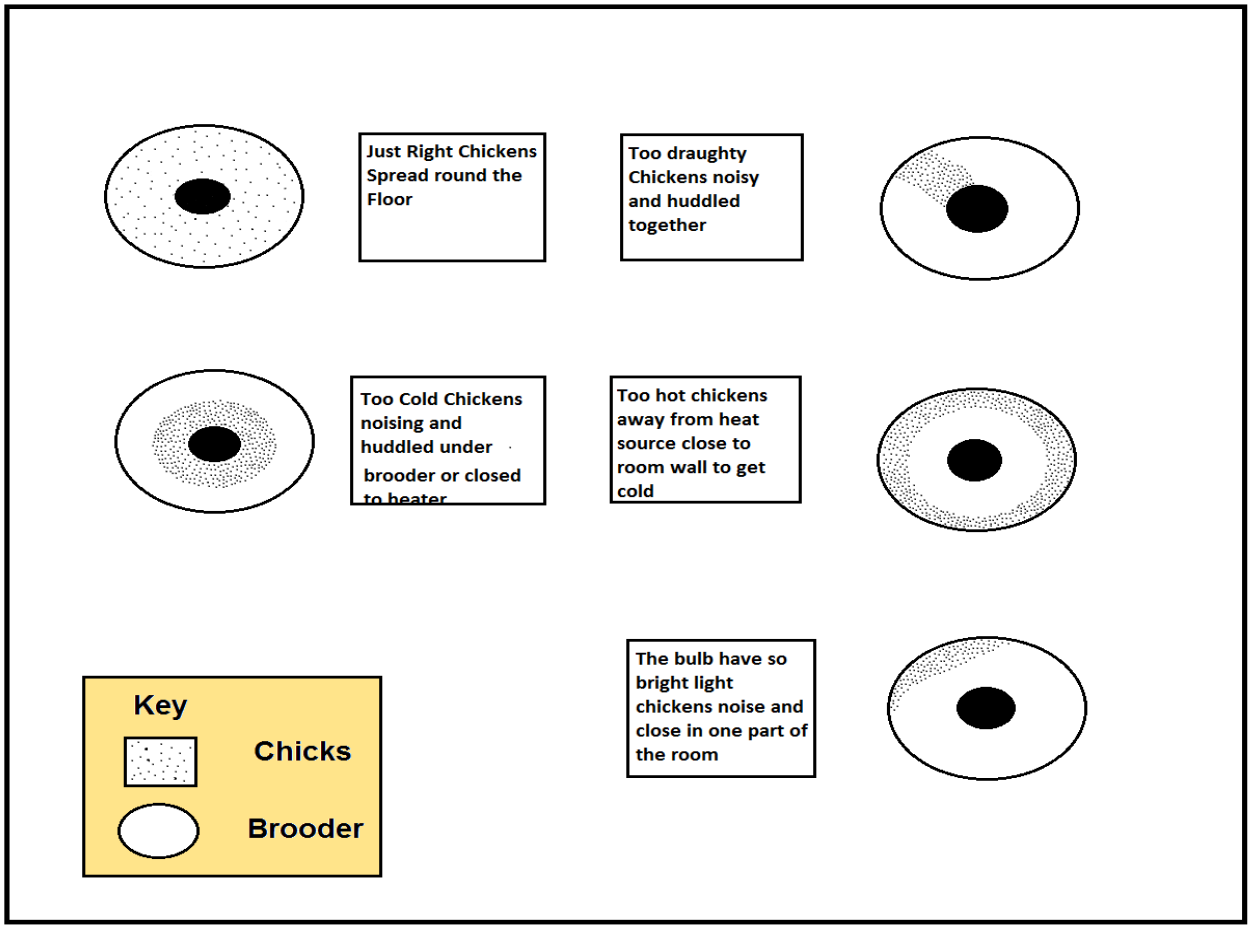


Diagram showing behavior of chicken according to temperature comfort.

room and more heating is required in that case.

3.3 VACCINATION OF POULTRY

- Prevention of diseases by vaccination (as well as other measures) is better and more economic than treatment.
- Several infectious diseases can be prevented by vaccination.

- Vaccine is a biological substance which is applied to prevent a specific disease by stimulating the immunity of the animal.

Vaccination Schedule for Broiler Chickens

Chick Age in Days	Vaccine	Strain	Route
5th Day	ND + IB	B1 + H120	Drinking water / Eye Drop
12th Day	IBD	Intermediate (D78)	Drinking water / Eye Drop
18th Day	ND + IB	Lasota + H120	Drinking water / Eye Drop
24th Day	IBD	Intermediate Plus(228E)	Drinking water / Eye Drop

3.3.1 VACCINATION PROCEDURE

Before the vaccination:

- Determine the number of birds to be vaccinated and the method (based on available medicines and their recommended vaccination method).
- Prepare necessary equipment (according to type of vaccination - clothes, vaccine carrier, ice, vaccine, dropper, syringe and needle, etc.).
- Sterilize all equipment which will be used during the vaccination.

The vaccination process:

Fours methods of poultry vaccination are very common in Afghanistan:

1) **Application through drinking water**
    - The water that we use for adding vaccine must be free of Chlorine; water tank and drinker must be clean and free of any kind of other medical substance.
    - Calculate the amount of drinking water and vaccine substance to be used.
    - Prevent chicken from drinking around 1-2 hours before the vaccination. If the chicken are too thirsty then they drink the vaccine too quickly and not all of them will receive it. If they are not thirsty enough, they will not drink it within the recommended time of 2 hours (after which the vaccine water should be removed and replaced with fresh water).

2) **Application by injection**
3) **Spraying vaccine by sprayer**
4) **Applying vaccine by eye dropping**

Before Vaccination:

After vaccination:

Mixing vaccine with drinking water

drinking method of vaccination

Apply vaccine by injecting method

Applying vaccine by drop method

- Record all information about the vaccination (date, numbers of birds, medicine used, method of application, doses, as well as any stress which may have occurred during the vaccination process) - this record may be important for the evaluation of the results for the future.
- All medication must be removed from the drinking water until 24 hours after vaccination latest.
- All needles, syringes and plastic tubes must be washed prior to sterilization, using autoclave, alcohol or boiling water.

3.4 FODDER AND FEEDING

3.4.1 PROVISION OF WATER

Water Requirements for 100 Broiler Chickens

Age of chicken in weeks	Daily water requirements (litres)	Water requirements (per two hours - ml)
1	3.8	316
2	5.72	476
3	7.6	632
4	9.92	828
5	12.8	1068
6	16	1332
7	18.6	1552

3.4.2 PROVISION OF FODDER

- Feeding and the quality of fodder plays a key role in poultry rearing – and it is the costliest part of the production as well – therefore it requires special attention.
- Chicken feed is often imported to Afghanistan from neighbouring countries – used by farmers especially during the first 0 up to 18 days of production as a starter feed. It can be replaced with crushed maize.
- For layer chickens we have to consider the following formulation chart:
- All the component of ration should grind and mix according the ration schedule in the big produced poultry feed company and also people locally can do these methods.
- Bone powder we can produce by two methods boiling and burning, we put fresh bone in boil water and we heated for 6 hours after we put this boiled bone under sun for some days to me come dry, the dried bone we grind after grind the product is called bone powder.
- Blood meal we can collect the fresh blood from slaughter and transfer to a cleaned place and put under sun after spending 2 days become dried and hard we can small by machine and add in the poultry feed.

Ration preparation for laying hens		
Ingredients	**Minimum Recommended Amount**	**Maximum Recommended Amount**
Maize	 6	 7
Wheat/ Millets	 2	 3
Barley	 1	 1
Rice Polished	 1	 1
Pulses	 3.5	 2.5
Cured the product that receved after batter from the milk	 1	 1
Seed Cake safflower and sesame	 1.5	 1.5
Bone Powder	 1/5	 0.5
Lime stone	 1/5	 0.5
Alfalfa hay	 0.5	 1
Blood Meal	 1	 1
Broken Rice	 1	 1

Broiler chickens' daily feed requirement

Week No.	Chick age (days)	Daily feed (grams)	Expected daily weight increase (grams)	Total body weight of chick (grams)
Frist week	1	8	8	44
	2	11	9	53
	3	15	10	63
	4	19	16	79
	5	23	18	97
	6	27	20	117
	7	31	21	138
Second Week	8	34	22	160
	9	36	25	185
	10	38	28	213
	11	41	31	244
	12	43	34	278
	13	45	37	315
	14	48	40	350
Third Week	15	52	42	392
	16	57	44	436
	17	62	47	482
	18	68	49	532
	19	74	52	584
	20	81	55	637
	21	89	54	693
Fourth Week	22	93	55	746
	23	97	56	802
	24	101	57	859
	25	105	58	917
	26	109	59	976
	27	113	60	1036
	28	118	61	1097
Fifth Week	29	122	61	1158
	30	125	61	1219
	31	127	61	1280
	32	130	62	1342
	33	134	62	1404
	34	138	62	1466
	35	142	62	1528
Sixth Week	36	143	62	1590
	37	144	62	1652
	38	146	62	1714
	39	146	63	1777
	40	148	63	1840
	41	150	63	1903
	42	152	63	1966

The above formulated schedule is based on field experience and other country information there are some factors which are have sufficient effect on this formula as Chickens quality, feed nutrition value, house management, and

health condition, Feed is the most expensive item in the broiler business Pay attention in storage, filling in and height of the feeders and Purchase feed from a reliable sources, Store the feed in dry and safe place as fungus can grow when it is wet.

4 BIOSECURITY IN POULTRY REARING

4.1 DEFINITION AND IMPORTANCE OF BIOSECURITY

Biosecurity can be defined as security of the animals and their environment from harmful organisms, such as germs. At the same time, the poultry farm itself can be a biosecurity threat if not managed properly. If the farm is not kept free of diseases and germs, these can be spread to other animals as well as humans. Therefor biosecurity must be a top priority for each farm keeper – it helps to have good and safe production which at the same time ensures good income for the farm keeper.

Common infectious chicken diseases like Coccidiosis, Gambro and other are always the most challenging problems for chicken producers and farmers. They can severely limit the production of the farm. The best way how to prevent diseases on the chicken farm is to strictly follow the biosecurity measures. These are:

1) Cleaning and disinfection of the farm
2) Sanitation rules for employees
3) Controlling the farm visitors

Diseases can be spread to a farm via eggs, flying birds, humans, cars, tools, boots, cloths, water, food, food-packages, litter, wild animals, insects and any other physical contact. Even though a perfect prevention of diseases is impossible, the more the biosecurity measures are applied, the better is the chance that the diseases will not spread and negatively affect the chicken.

4.1.1 SANITATION AND HYGIENE AT THE POULTRY FARM

Disinfection and cleaning of the farm is an important step in biosecurity. Whenever the farm is vacant it is necessary to clean and disinfect it before introducing new chickens. The basic aim of disinfestation of the farm is to decrease the amount of pathogens (bacteria, viruses, parasites) which causes chickens' diseases. In a dirty

Wet cleaning of the farm and adding detergent material with water

environment these pathogens can always multiply much more easily than in a clean environment.

4.1.1.1 DISINFECTION AND CLEANING OF FARM STEP BY STEP

- Litter as well as other organic materials (blood, dead bodies, etc.) must be first removed from the farm. Organic material works as a suitable space for spreading of disease agents. Therefor all of it must be removed. **This is called dry cleaning and must be always done before wet cleaning.**
- The whole farm then needs to be cleaned with water. This wet cleaning does not mean only filling the farm with water, but a process of soaking, washing, rinsing and drying of the farm. High pressure of water can be used from a hose. The farm needs to be dried completely because wet environment helps the germs to spread.
- After cleaning the farm, it is good to paint the floor and part of walls (see picture) with lime (calcium hydroxide), which has strong anti-bacterial effects. Painting with lime is not always necessary, application of disinfectants like aldehyde can be enough.

A room painted with lime after cleaning.

- Application of antiseptics (disinfectants) is the last step. Formalin (formaldehyde) is very essential (the room must be closed including ventilation system, doors and windows for about 24 hours as it is disinfected by the vapour).
- Other common disinfectants that can be used:
    - Chlorine agents such as sodium hydro chloride or chlorine dioxide
    - Iodine
    - Phenol

4.1.2 CONTROLLING FARM VISITORS

All sides of the farm need a fence – if the farm is open for wild animals as well as for other people, the diseases can freely spread. A good rule is that only those can visit farms that are responsible for working there. Each external visitor is a threat for the animals as bacteria, viruses or parasites can be brought easily on his or her clothes, shoes, equipment etc. Especially in the first days of life of newly-born chicken the visits should be avoided. At the same time, some visitors can be accepted for learning purposes later. The visitors need to wear special clothes and boots which are kept in a clean and safe place at the farm every one (veterinarian, farm owner). The reason is that the visitors could have been in touch with other chicken, birds or animals in other places or they could have just stepped in a chicken excrement in a village – and now this material will bring a disease to the farm and can

Important biosecurity measures – visitors wear special clothes and boots as well as face masks to minimize risk of spread of diseases to the chicken in the farm.

endanger the whole population.

Rules for employees

Employees need to understand that visiting other poultry farms and other animals out of farm can spread diseases inside his or her farm. They should not keep pets and chickens at home. Employees also have to change their clothes and boots before entering the farm and always put lime in the door.

It is necessary to place lime in front of door for disinfection of shoes of those who want to enter the farm.

All involved people must park their vehicles outside an away of the farm. The trucks and cars that need to enter into the compound of the farm have to be cleaned and antisepticised. The trucks that were used to carry dead chickens should never enter the farm. All trucks and vehicles increase the chance of spreading diseases.

Other biosecurity risks

Next to those already mentioned, these other biosecurity risks need also be taken into account:

- **New chickens brought to the farm** - are a big danger as they can be infected by viruses, bacteria and parasites and spread them to the farm; these chicken need to be put in a separate room and watched for a certain period of time 2 weeks for signs of diseases; blood-sampling test can be also done along this check-up; also the source of new chickens is important – it should be a well-kept farm free from diseases.
- **Boxes used for carrying small chicken** - use only plastic boxes rather than wooden as wooden ones could not be easily cleaned and can carry germs for a long time.
- **Rodents, insects, wild animals** – they can be also deadly carriers of diseases for your poultry; make sure the farm is not surrounded by litter or organic material harbouring mice and insects, use protective measures like nets or insecticides to protect farm; also use nets to protect farm from wild birds.
- **Untrained staff –** the biosecurity rules must be followed by all staff otherwise protection is not ensured; it is necessary for staff not only to learn the rules and to follow them but also to learn signs of diseases and report any abnormal situation in the farm immediately; deaths and diseases of animals have to be recorded - higher death rates, lower production of eggs, breathing problems or abnormal behaviour must be carefully watched as possible signs of diseases; fast reactions are needed.
- **Dead chickens -** must be immediately removed from the farm and buried or brunt safely so that diseases are not spread.

Training of staff in all biosecurity rules as well as signs of diseases which need to be immediately reported is essential.

- **Sick and weak chickens** - sick chicken or chicken that are weak and can be the first to be infected by a disease pose a threat as they can become carriers of disease agents; detecting them and eliminating them from the farm plays and important role in avoiding the diseases to spread.

Living time of diseases' agents in the outside environment

The living time of agents (germs) of different diseases in the outer environment is different. Some reach months or even years. Therefor biosecurity is essential for protecting the farm animals.

Disease	Living period of agents in the outside environment
Gambro	Months
Coccidiosis	Months
Duck plague	Days
Fowl cholera	Weeks
Marek des	Months
New castle	Weeks
Salmonellosis	Weeks
Avian tuberculosis	Years

4.2 COMMON POULTRY DISEASES

4.2.1 AVIAN COCCIDIOSIS

Description - Avian coccidiosis is caused by parasites that invade the intestine of the chicken and cause bleeding and damage of the intestinal tract. The chicken is the only natural host. Younger birds are more easily affected than older ones, and disease is often most severe in the age of 3 - 6 weeks. This disease is widely known in Afghanistan. Morbidity is high and mortality is variable.

Transmission - coccidiosis is a contagious disease which transmits by spreading the cysts of parasites from the faeces of infected chickens to others who eat them.

Symptoms and diagnosis – The intensity of the disease depends on number of ingested cysts and pre-existing immunity in the flock; ingestion of just a few cysts of parasites will result in mild disease and subsequent immunity. If many cysts are present and there is no previous exposure in the flock, disease will be severe. Within 2 to 3 days after ingestion of cysts, there is bloody diarrhoea and birds are markedly depressed and dehydrated. The chickens



are droopy, listless, they lose appetite, lose yellow colour (in small broiler chickens), lose feather quality, have diarrhoea and there is blood or mucus in the faeces. The disease leads to poor feed digestion, poor weight gain and even death. If you want to be sure about diagnosis, do a necropsy – put plastic gloves and cut open a dead chicken, look at the intestines and cut them open. The necropsy must be done soon after death; it may be possible to identify characteristic lesions or sores in the gut. Coccidiosis causes a thickening of the intestines, which makes them feel like a sausage. There may be light-coloured spots on the surface of the gut, and inside the gut, haemorrhages and streaks.

Control and prevention - Prevention of coccidiosis is difficult because the protozoa parasites are found worldwide and in all types of poultry husbandry. The best is to keep good sanitation and hygiene and to use anticoccidials to minimize the damage. It is recommended to remove weak chickens from flock, replace the litter and closely observe biosecurity rules.

Treatment - There are numerous anti-coccidial drugs available; drugs like Amprolium and Coccidic give good result in Afghanistan. They must be used according instruction on the leaflet or of the veterinarian.

4.2.2 GUMBORO DISEASE

Description - Gumboro disease is also known as IBD (Infectious bursal disease). It is an acute viral disease of growing chickens causing extensive damage to the Bursa of Fabricius organ (placed in the cloaca of the birds), diarrhoea and subsequent immunosuppression (failure of the immunity system of the bird).

Transmission - Environmental contamination is the major means of transmission. Virus is dispersed by actively infected birds and persists in the litter, on equipment, clothes etc. Spread between flocks happens through contaminated equipment, through visits of people with contaminated clothes, through contact with contaminated animals etc.

Symptoms and diagnosis - The incubation period is 34 days, morbidity is 10-80 percent and infected animals show signs of depression and anorexia, they have white watery diarrhoea, their bursa in the cloaca is palpably enlarged initially but as diseases progresses, it becomes small. Poultry have uncoordinated movements and maybe recumbent (lying on the ground), deaths begin to occurs at about the third day of the illness, mortality is usually around 10 percent but maybe as high as 30 percent. Even those who survive the disease remain immunosuppressed and so are less able to resist infection with other viruses and also are less able to respond effectively to vaccination. Clinical signs and post mortem lesion are often enough to make a diagnosis of the Gumboro disease (IBD).

Control and Prevention - Vaccines exist for the Gumboro disease and have good effective prevention. Critical period for exposure is during the time when maternal immunity wanes and so vaccination should be targeted always Strict biosecurity on the farm will prevent entry of viruses, disinfection after an outbreak is essential.

Treatment - There is no effective treatment for the Gumboro disease (IBD) but a low energy and protein diet should be imposed on the poultry until the diseases outbreak subsides.

4.2.3 NEWCASTLE DISEASE

Description – Newcastle disease is a highly contagious viral disease of poultry causing significant morbidity and mortality and often occurring in an outbreak form.

Transmission – Secretions and excretion from sick chickens contains virus and the disease is transmitted through contact and contaminated equipment, clothes, boots etc., insufficient cleaning of cages is a common means of transmission.

Symptoms and diagnosis – Newcastle disease in birds may affect the respiratory, nervous and gastrointestinal systems. It should be suspected on the basis of clinical signs (symptoms) and also when large number of dead wild birds are found in the environment. Clinical signs in domestic birds include the following:

- Decreased egg production.
- Depression.
- Twisting of the head and neck (see picture).
- Diarrhoea
- High number of sudden deaths in a flock or in the field in wild birds.
- Tracheitis (inflammation of the respiratory tract).
- Bleeding in small and large intestine.

Post mortem position (visible after the death of the bird)

Control and prevention – good vaccination, biosecurity and quarantine are essential

Treatment – this is a viral disease and so far no suitable drug is available for its treatment