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POULTRY MANUAL

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Chapter 1 History of Poultry

History of World Poultry Farming

The origins of modern chicken farming likely trace back to South East Asia. Charles Darwin proposed that today's chickens are descendants of a wild fowl species known as "Gallus Bankiva," which was first domesticated 7,000 years ago and originated in a vast region of Asia, extending from India to the Philippines. Among domesticated animals, fowl have the most frequent mentions in recorded history. References to chickens can be found in Chinese documents dating back to 1,400 BC. Around 400 BC, Aristotle wrote about the Egyptians' use of "artificial" incubation of hens' eggs using dung heaps. Greek writers, such as Aristophanes in 600 BC, also mentioned hens, and the Romans considered them sacred to Mars, the God of War. The earliest documented mention of poultry farming practices is in a treatise by Cato (200 BC), which describes the fattening of hens for meat production. Additionally, a section in the "Book of Agriculture" by the Muslim scholar Abu Zacaria Iahia, who lived in twelfth-century Seville (Spain), is dedicated to poultry farming.

History of Poultry Farming in Pakistan

The poultry industry in Pakistan has been essential in meeting the nation's protein demand. Commercial poultry farming began in the early 1960s and rapidly expanded in the following years, supported by government initiatives and dedicated poultry farmers. Recognizing the significance of poultry production in the food processing sector, the government offered various incentives, including tax exemptions and duty-free imports (Sadiq, 2004). Consequently, the industry experienced annual growth rates of 20-30% in the early 1970s and 10-15% in the 1980s, with domestic poultry meat consumption increasing by over 4% annually. The poultry sector in Pakistan is now well-organized and dynamic, contributing 26.8% to total meat production, 5.76% to the agricultural sector, and 1.26% to the overall GDP. Recently, the industry has demonstrated impressive growth and has become a significant source of employment for over 1.5 million people. Before 1963, native chickens were the primary source of eggs and meat, producing an average of 0.769 kg of meat at four months old and laying about 30 eggs annually. These chickens were mainly raised for household consumption. In 1965-66, the Department of Poultry Husbandry at the University of Agriculture, Faisalabad, developed an improved chicken variety called Lyallpur Silver Black (LSB). This was achieved by crossbreeding the native Desi breed with three imported

breeds: White Leghorn, White Cornish, and New Hampshire. The goal was to create a breed that could thrive in rural environments and lay up to 150 eggs annually.

In the mid-1960s, Pakistan International Airlines (PIA) and Shaver Poultry Breeding Farms of Canada collaborated to establish Pakistan's first commercial hatchery in Karachi, Sindh Province. Concurrently, Lever Brothers Pvt. Ltd. set up the first commercial poultry feed mill in the Rahim Yar Khan district of Punjab Province.

Introductory period (1965–1970)

During this period, the government provided strong support to early poultry ventures, especially those involving financial risks. Poultry production was exempt from national taxes, and producers were allowed to import genetically improved breeding stocks and equipment duty-free. Key factors shaping the early structure of the industry included the perceived human protein deficiency in Pakistan, excellent profit margins, the availability of new technologies, and government support. To assist the steadily growing poultry farming community, the Directorate of Poultry Production was established in Karachi to offer extension services.

Institutional development phase (1971–1980)

The Government's supportive policies towards poultry, combined with lucrative profits, spurred the development of poultry production into a thriving business in Pakistan. This success prompted the government to strengthen institutions serving the industry. During this period, the Federal Poultry Board was established in 1979 to facilitate effective communication between the industry and the government. Poultry research institutes were also founded in Karachi and Rawalpindi in 1978 with assistance from UNDP/FAO funds, providing essential research services to poultry farmers. Pakistan's poultry industry experienced significant growth during this time. The Sindh Government offered special incentives, such as leasing state land for poultry farming for ten years, attracting numerous entrepreneurs to the sector. However, the industry faced challenges including limited marketing opportunities due to an export ban on poultry products, disease outbreaks, high prices of low-quality feed, and restricted availability of feed ingredients. Additionally, the federal government's nationalization of other industries added to these challenges. In 1979, the Pakistan Poultry Association was formed to advocate for the industry and its farmers. From 1971 to 1980, the poultry industry saw remarkable growth, with a 177% increase in total bird population, a 271% rise in poultry meat production, and a 297% increase in egg production.

The following are the major policy decisions by the Government that helped the earlier growth of the industry.

1. Exemption of taxes on income earned from poultry farming.

2. Allowance to import poultry equipment and flocks duty-free.

3. Leasing of state land at nominal rates for poultry farming.

4. Provision of subsidies on grains to produce low-cost, high-quality rations.

5. Designation of Tuesday and Wednesday as meatless days, except for chicken, to promote its consumption.

6. Establishment of Poultry Research Institutes, directorates of poultry production, and the Federal Poultry Board to train poultry farmers, provide research services, and act as a bridge between the government and the poultry farming community.

7. Facilitation of access to loans through various financial institutions.

The depression and adjustment phase (1981–1990)

In the early 1980s, there was a significant shift in the poultry industry's geographic location, with a noticeable decrease in size and volume in the Sindh province. Furthermore, poultry farms in various clusters encountered a range of issues, including disease outbreaks and reduced productivity due to climatic stress, necessitating long-term solutions. Considering these challenges, forward-thinking farmers opted to move their farms to the cooler and more biosecure northern areas of Pakistan. As a result of this transition, the poultry industry saw remarkable growth, with increases of 118% in the total number of birds, 190% in overall meat production, and 94% in egg production.

Severe disease outbreaks and re-emergence of the industry (1991–2000)

During this period, the poultry industry encountered significant challenges, primarily stemming from disease outbreaks. Hydro Pericardium Syndrome (HPS) emerged in 1990, causing substantial harm to broiler and broiler breeder flocks. The following year, Gumboro disease adversely affected broiler, layer, and parent flocks. While recovering from these outbreaks, Avian Influenza struck Murree and Abbottabad in 1995, resulting in mortality rates of up to 80% in parent flocks. These outbreaks prompted the implementation of preventive measures such as vaccination and enhanced biosecurity protocols across the industry. Consequently, new companies were established to import vaccines and medicines. The University of Agriculture in Faisalabad, alongside poultry and veterinary research institutes, played pivotal roles in addressing these challenges.

In contrast, inadequate planning in 1996 led to an oversupply of parent stock, causing the price of day-old chicks to plummet below production costs. In 1997, the federal government's ban on serving lunch at wedding functions—a significant consumer of chicken—further decreased local market demand for poultry products by approximately 40%. However, by 1998, chick prices had recovered, stabilizing the financial positions of breeding and hatchery companies. Despite setbacks in 1999 due to the emergence of influenza-like diseases, the industry continued to expand, demonstrating impressive growth rates. The total number of birds produced, overall poultry meat production, and total number of eggs produced increased by 99%, 125%, and 67%, respectively.

Poultry farming in recent times (2001 until now)

In the late 1990s, the poultry industry began to stabilize and achieve improved profit margins on poultry products. This period witnessed the entry of new investors who embraced modern technologies, including environmentally controlled housing. Substantial investments from these newcomers facilitated the transition from open-sided houses to advanced barn facilities. The establishment of the University of Veterinary and Animal Science in Lahore in 2002 further bolstered the industry's growth by addressing disease management and supplying trained professionals. Graduates with degrees in veterinary medicine and poultry science became valuable assets to the sector.

Up until 2004, the poultry sector enjoyed robust growth and sustained profitability. However, the industry faced setbacks with the outbreak of avian influenza in South East Asia and concerns about

its potential spread into Pakistan. This resulted in Middle Eastern countries imposing bans on poultry product imports, intensifying challenges for the industry. Despite these obstacles, Pakistan's poultry sector exhibited remarkable resilience and expansion. From 2000 to 2010, the total number of birds produced increased by 127%, meat production grew by 126%, and egg production rose by 71%. This impressive growth underscores the solid foundation of Pakistan's poultry industry, which currently provides the most affordable sources of animal protein nationwide, with eggs and meat widely accessible.

Present status

Despite significant growth in the industry, the current per capita availability of poultry meat in Pakistan stands at 5 kg per year and 51 eggs per year. In contrast, developed countries report much higher figures, with 41 kg of meat and 300 eggs per capita annually. The World Health Organization (WHO) recommends an average daily intake of 27 grams of animal protein per person. However, in Pakistan, the daily intake is only 17 grams, with poultry contributing just 5 grams. This results in a deficit of 10 grams of protein per person per day. Given Pakistan's population of 180 million, this translates to a shortfall of 788,000 tons of meat annually. While the contributions of beef and mutton to the national meat supply remain stable or are declining, the poultry sector demonstrates significant potential to address this protein deficiency.

Chapter 2 **Broiler Management**

Broiler chickens are specifically bred for meat production, reaching a market weight of up to 1.8 kg.

Broiler breeder male and female

House design for broilers: -

1. Proper location is essential for housing poultry, away from industrial areas.

2. Basic necessities such as electricity and water should be available.

3. Adequate road facilities should be in place.

4. The area should be soundproof.

5. The housing design should be practical and long-lasting.

Structure of housing:

Use affordable and sturdy materials, with coconut lumber as the mainframe material.

Roofing:

Use galvanized iron (GI) sheets, asbestos, and aluminum for roofing materials. GI sheets are good for protecting chickens because they are very strong. GI sheets are usually used in fences and building frames. Asbestos material is also very strong and can protect chickens from direct sunlight and pests.

Types of Housing System for broilers:

- Deep litter system
- Slatted system
- Cage or wire system

<u>Management of broiler chickens:</u>

Equipment management:

These general management are important to follow in housing and broiler conditions:

Insulate the bird's equipment's

- Disinfection
- Health control
- Environment control

Stocking Density Management:

- Stocking density of birds determines the condition and health of the birds. This management is crucial for better bird health and performance because crowding in a small area can lead to various problems:
- Overcrowding
- Stress
- Depression
- Reduced birds' growth
- Poor FCR and many other problems caused due to overstocking

House Preparation Management:

Before arrival the chicks, cleaning and disinfection should be done.

Before arrival of the chicks, litter and all equipment's should be placed within 3 days before arrival of the chicks.

Litter Management:

It is important to ensure that the litter in the poultry shed is dry as it contributes to the birds' comfort and overall health.

Various types of litter can be used in the shed, including rice hulls, chopped straws, and wood shavings.

Wet litter can lead to numerous issues in birds, such as stunted growth, increased risk of disease outbreaks, and elevated levels of ammonia, which can result in higher mortality rates.

Maintaining dry litter allows birds to exhibit natural behaviors such as stretching and dust bathing.

Causes of poor quality

Final Disinfection and fumigation:

The house should be ventilated to remove noxious gases and also used heating procedure for disinfection.

- Disinfection done with 'by formalin and KMNO4'.
- Receiving the chicks:
- When birds receive should be needed biosecurity measures then birds receive otherwise many diseases come in shed.
- Following biosecurity precautions are:
- Spray on bird's boxes and delivery trucks.
- Wear clean boots, uniform and gloves.
- Dip boots
- Sanitize hands
- Delivery chick boxes should be immediately removed from the shed or burned if they are made of cardboard.

Managing the flock:

- Good quality chicks show

- Good health performance
- Some chirping
- Properly healed navel
- Proper beak trimming
- Feathers
- Weight and uniformity of the birds are should be accurate.

Records keeping:

Following records are maintained in shed;

- Flock register
- Equipment registers
- Financial register
- Disease register
- Feeding register
- Vaccination register
- Medication register
- Culling:
- Bad quality birds or diseased birds should be culled or removed from shed.
- Should be separated the weak and abnormal birds from healthy birds.
- If we don't cull the birds from shed, other birds also caused abnormalities or mortality.

Environmental Factors:

Baby chicks don't have thermoregulatory system. It comforts totally depend on following external parameters such as ventilation, humidity, and temperature.

Temperature:

- Temperature management should be proper needed. The temperature zone of baby chicks needed 31 to 33 degrees Celsius.
- Optimum temperature for broiler performance is 34-32, 32-28, 28-26, 26-24, 18-24 degree Celsius for the first to sixth of age of birds.
- Improper temperature decreases birds feed and water intake.

- Huddling and stress seen in birds.

Ventilation:

Ventilation is essential for the survival of birds in sheds as it helps remove harmful gases.

Following types of ventilation are used;

- Transitional ventilation
- Tunnel ventilation
- Minimum ventilation

Humidity:

Proper humidity is linked to good health conditions in chickens. The right humidity level is a sign of birds in good condition, while improper humidity can indicate breathing abnormalities in chickens.

Feeding Management for broiler chickens:

Broiler growth and feed conversion rate (FCR) typically improve when the Starter feed is provided in a sieved crumble or mini-pellet form. If the Grower feed is given before 18 days of age, it should also be in a sieved crumble or mini-pellet form for the initial delivery. After 18 days, the pellet size should be 3-4 mm in diameter. Using pellets larger than 4 mm during the Grower or Finisher periods can negatively impact live performance.

Age	**Feed Type**	**Feed form and size**
0-10 days	Starter	Sieved crumble 1.5-3.0 mm or mini-pellets 1.6-2.4 mm diameter
11-18 days	Grower	Mini-pellets 1.6-2.4 mm diameter 4.0-7.0 mm length
19-24 days	Grower	Pellets 3.0-4.0 mm diameter 5.0-8.0 mm length
After 25 days	Finisher	Pellets 3.0-4.0 mm diameter 5.0-8.0 mm length

Feeding methods

Mash feed

Whole grain feed

Pellet feed

Feeding Systems:

Primary and secondary feed hoppers

Feed lines and pans
Feed plates
Feed line sensors
Feed line Augurs
Feed motors and boots
Feed line winches

Feed Ingredients for broilers:

Corn, wheat, maize bran, rice, cotton seed cake, cotton seed, soya bean meal, sunflower meal, oils or fat, limestone, salt, sodium bicarbonate.

Nutrition diet:

Broilers require high quantities of protein and energy, but low amounts of calcium, as opposed to layers which require high amounts of calcium for egg production.

Broiler feed chart about how much feed bags intake in week.

Age (day)	**Feed bag/1000 birds/weeks**	**Feed bag/30000/week**
7	3-3.1	90-93
14	10-10.5	300-315
21	21-22	630-660
28	36-37	1060-1110
35	56-57	1680-1710
37	63-64	1890-1920

Testing feed physical quality

Before feeding birds, check the feed for size, color, texture, and cleanliness to ensure good quality and prevent bacterial contamination. Poor quality feed can disrupt birds' digestive systems and increase mortality rates.

Watering Management:

When the birds come in shed, the drinking water temperature should be 25-27 degree Celsius.

Water should be used clean and fresh.

Avoid toxic water.

In summer 4-5 times needed birds’ water in a per day

In winter 2-3 times needed birds’ water in per day

Drinking System for birds

Drinker Type	**Requirements**
Nipple drinkers	12 birds per nipple
Bell drinkers	8 drinkers per 1000 birds

Lighting Management:

Light plays a very important role in a bird's performance. Initially, birds require 24 hours of light, but this should be gradually decreased over time. Once the light reaches 16 hours, it should not be reduced further. During the growing period, the light	**95*F (35*C)**	**Full time light**

intensity should be approximately 16-18 hours.**1st week**		
2nd week	**90*F (32*C)**	**23 hours**
3rd week	**85*F (30*C)**	**16 hours**

Vaccination Schedule for Broilers:

Age	**Vaccine**	**Strain**	**Route**
18-day embryo	**Marek's disease**	**HVT and SB-1**	**In-ovo**
1 day in hatchery	**New castle disease** **Infectious bronchitis** **New castle disease**	**B1, B2** **Massachusetts-Connecticut** **B1, B2**	**Spray cabinet** **Spray cabinet** **Water**
14 days	**Infectious bronchitis**	**Massachusetts-Connecticut**	**Water**

Broilers are typically sold at around 7 weeks old and are less susceptible to many poultry diseases that affect older birds. This difference allows for a different vaccination approach compared to birds used for laying and breeding. It's important to maintain a simple vaccination program as additional vaccinations can cause stress and reduce production efficiency.

Disease control management practices:

Poultry house management

Providing proper ventilation and humidity, checking temperature management regularly, selecting an appropriate location with road facilities, and ensuring a proper environment are important for maintaining the good health of birds and reducing stress and depression in the flock.

Hygiene and Disinfection

The houses, feed and water trough etc. should be cleaned regularly to check the disease spread and occurrences.

Biosecurity Measures

Biosecurity involves implementing measures to prevent the spread of infectious diseases, parasites, and pests to maintain a disease-free environment for the flock.

Some biosecurity measures as follows:

Practice all in all-out system

Should be clean and disinfect equipment.

Used clean and fresh water.

Litter should be disinfected to prevent diseases.

Properly dispose of dead birds with incineration and buried methods.

Monitoring bird's behavior

Regularly observe the behavior of birds. If the birds are performing well, it means their condition is stable. However, if the birds show signs of weakness, depression, or abnormalities such as discharge from the eyes, healed navels, or deformed legs, this indicates that the birds need to be removed from the healthy flock.

Operational procedures:

The movement of people, feed, equipment, and animals on the farm must be managed through procedures to avoid the introduction and transmission of disease. If there is a change in disease status, standard procedures might need to be adjusted.

Trouble shooting common issues in the 0–7-day brooding phase

Observe	Investigate	Likely Causes
• Poor chick quality	**Feed, Sanitation, Air, Water:**	• Inadequate diet of the source flock

• Increased number of dead-on arrivals (D.O.A) • Chicks appear inactive, slow, and weak **General Chick Appearance** • Unhealed navels • Deformed legs • Bent legs	• Health and hygiene status of the source flock • Egg handling, storage, and transportation • Hatchery sanitation, incubation, and management practices • Chick processing, handling, and transportation	• Health and hygiene status of the source flock, hatchery, and equipment • Incorrect parameters for egg storage, including relative humidity, temperatures, and equipment management
Small chicks Days 1-4	**Feed, Light, Water, and Space:** • **Crop Fill at 24 Hours Post Chick Placement:** Ensuring that the chicks' crops are adequately filled within 24 hours after placement. • **Availability and Accessibility to Feed and Water:** Guaranteeing that feed and water are readily available and easily accessible to all birds. • **Bird Comfort and Welfare:** Maintaining optimal conditions for	Less than 95% of chicks with sufficient crop fill by 24 hours after placement are considered weak. This could be due to various factors such as inadequate feeders and drinkers, insufficient feed and water levels, problems with equipment location and maintenance, as well as inappropriate brooding temperatures and environment.

	bird comfort and overall welfare.	
Chicks that are runted and stunted may exhibit smaller sizes compared to their counterparts, sometimes noticeable as early as 4-7 days after hatching.	Factors like feed, lighting, litter, space, sanitation, and security are crucial for the well-being of poultry. Ensuring a reliable source for your flock, monitoring the hydration status of chicks, maintaining optimal brooding conditions, providing high-quality and accessible feed, managing downtime between flocks, and addressing disease challenges are all essential aspects of poultry management.	Challenges like sourcing chicks from various flock ages, chicks struggling to find or access water, incorrect brooding temperatures, difficulty finding feed or encountering poor feed quality, short downtimes between flocks, insufficient cleaning and disinfection protocols, diseases, and lax biosecurity and hygiene practices can all negatively impact poultry health and productivity. Addressing these issues is crucial for maintaining a thriving poultry operation.
Disease Metabolic Bacterial Viral Protozoal Parasitic Toxins	Maintaining hygiene on the broiler farm, addressing local disease challenges, implementing vaccination programs and other disease prevention measures, ensuring high-quality and consistent feed supply, optimizing lighting and ventilation systems are all vital	Poor environmental conditions Poor biosecurity High disease challenge Low disease protection Inadequate or improper implementation of disease prevention Poor feed quality Poor bird access to feed

	components of broiler production.	Excessive or insufficient ventilation
Unusual bird behavior	Potential sources of issues in poultry production include factors such as temperature fluctuations, management practices, and immunosuppressive disorders. These elements can significantly impact the health and performance of poultry flocks.	Inadequate farm management and insufficient equipment can both hinder the efficiency and productivity of poultry operations.
High number of birds D.O.A. to the processing plant: High plant condemnation rate	Feed: Ensure proper feeding practices, including feed quality, formulation, and delivery, to meet the nutritional requirements of broiler chickens at different growth stages. Light: Provide appropriate lighting conditions, including duration and intensity, to optimize broiler growth, behavior, and welfare. Litter: Maintain clean and dry litter bedding in broiler houses to promote bird health,	Respiratory Diseases: Monitor for respiratory signs such as coughing, sneezing, or nasal discharge, which may indicate respiratory infections such as Infectious Bronchitis or Mycoplasma. Implement proper ventilation and biosecurity measures to prevent disease spread. Enteric Diseases: Watch for signs of enteric diseases such as diarrhea, reduced feed consumption, or poor growth, which may indicate infections like Necrotic Enteritis or

	prevent footpad dermatitis, and minimize ammonia emissions. Air: Monitor ventilation systems to ensure adequate airflow, temperature, and humidity levels within broiler houses, promoting optimal respiratory health and comfort for the birds. Water: Provide clean and accessible drinking water to broiler chickens at all times to prevent dehydration and ensure proper hydration, feed digestion, and nutrient absorption. Space: Allocate sufficient floor space per bird to prevent overcrowding, minimize stress, and promote normal growth and movement behaviors. Sanitation: Implement strict biosecurity measures and regular cleaning and disinfection protocols to	Infectious Bursal Disease. Ensure proper sanitation and feed management to minimize disease transmission. Skeletal Disorders: Look out for leg problems, lameness, or abnormal gait, which may be indicative of skeletal disorders like leg weakness or bacterial chondronecrosis with osteomyelitis (BCO). Provide proper nutrition, lighting, and litter management to support skeletal health. Coccidiosis: Monitor for bloody droppings, reduced growth, or poor feed conversion, which may signal coccidiosis infection. Implement appropriate anticoccidial programs and maintain clean litter to prevent disease outbreaks. Management of Relevant Historical Events Affecting Bird Health and Welfare:

	prevent the spread of diseases and maintain a hygienic environment for broiler chickens. Security: Ensure the security of broiler houses and facilities to prevent unauthorized access, theft, or vandalism that could disrupt bird management and compromise flock health. Flock Records and Data: Maintain comprehensive records of flock health, performance, and management practices, including vaccination schedules, mortality rates, and feed consumption. Health Status of Flock: Monitor the health status of the flock regularly, including clinical observations, necropsy examinations, and diagnostic testing, to detect and address any signs of disease promptly.	Previous Disease Outbreaks: Consider the history of disease outbreaks on the farm and implement preventive measures accordingly, such as vaccination programs or improved biosecurity protocols. Environmental Stressors: Take into account any past environmental stressors, such as extreme weather events or power outages, and implement measures to mitigate their impact on bird health, such as backup power generators or improved housing infrastructure. Improper Bird Handling and Hauling by Crews: Training and Supervision: Ensure that all personnel involved in bird handling and hauling receive proper training and supervision to minimize stress and injury to the birds.

	History of Flock During Grow-Out Period: Keep track of any disruptions or incidents during the grow-out period, such as feed or water shortages, power outages, or extreme weather events, and their potential impact on flock health and performance. Potential Equipment Hazards: Identify and mitigate potential hazards associated with equipment used in broiler production, such as feeders, drinkers, heating systems, and ventilation fans, to prevent injuries or accidents. Bird Handling and Transport: Ensure proper training and supervision of individuals involved in catching, handling, and transporting broiler chickens to minimize stress, injuries, and mortality during these activities. Conditions During Catching and Transport: Consider external factors such as	Gentle Handling Practices: Promote gentle handling practices to reduce stress during catching, loading, and transportation processes. Provide appropriate equipment and facilities to facilitate safe and efficient bird handling. Harsh Conditions (Weather or Equipment Related) During Handling, Catching, or Transport to the Processing Plant: Weather Considerations: Monitor weather forecasts and plan bird handling activities accordingly to minimize exposure to extreme temperatures, precipitation, or other adverse weather conditions. Equipment Maintenance: Regularly inspect and maintain handling equipment such as crates, trailers, and loading ramps to ensure their proper function and minimize

	weather conditions, road conditions, and the condition of transport vehicles and equipment during catching and transport operations to ensure the welfare and safety of broiler chickens throughout the process.	the risk of injury to birds during transport.

Breeders Farming

Breeders mention that these birds are hatched from eggs for the purpose of egg production.

Brooding starts at eight weeks of age and continues for eight weeks; during this time, the birds can survive without the need for additional heat. Prior to the arrival of the chicks, certain tasks need to be completed. These tasks include cleaning the room, preparing the bedding, and disinfecting the area. All surfaces, floors, and equipment should be thoroughly cleaned to eliminate germs. Before fumigating the area, all items should be removed. The house should be completely sealed to prevent air from entering, and the room should be closed for a minimum of 24 hours. The brooder should be heated to 95 ºF 24 hours prior to the chicks' arrival. It is important to maintain cleanliness and sterilize footwear and clothing when handling the chicks. Additionally, the brooder should not be placed directly on the ground, but rather on a raised platform.

The temperature needs to be 95 ºF. Save the wire before the thieves arrive. At the start, scatter the food on paper so that it is easily accessible for them to eat. Provide water that is hot, not cold. Product Needs -IV -I LIV - Broader This is the process of heating at an early stage, using wood or gas, etc. * If you have Lane Breeders, then a brooder is sufficient for 400 birds. If each pregnancy is 350 days old, use a browner. Give the chicks 95 ºF in the first week, then reduce the temperature by 5 ºF per week until it reaches 75 ºF. If all the chicks are huddled together, it indicates that the temperature should be lowered. If the chicks move away from the brooder, it indicates that the temperature is too high, so it should be lowered. Arrange the chicks neatly throughout the space. To keep the chicks, close to the brooder, install a 50 cm high chuck guard (protective wall) at a distance of 1.5 to 2 meters from the brooder. Avoid sudden changes in temperature and humidity,

and ensure a consistent and timely supply of food and water, while minimizing disturbances from noisy chickens.

Air exhaust and Proper ventilation of poultry farms

The young birds received enough air to breathe (continued to receive oxygen. Ii. Poisoned carbon dioxide, methane, etc.) and emitted heat. To provide sufficient conditions for small chicks, it is recommended to allow three to four times the volume of water in a cage in the brooding room. It is advisable to avoid excessive humidity levels even if the proportion in the air is 65%. If the air's moisture content is high, the bedding will remain damp, promoting the growth of germs, which can be harmful to the chicks. Conversely, if the humidity is low, the bedding will be dry, and the dusty environment can lead to respiratory diseases. A thick layer of absorbent bedding should be spread on the floor. It is not recommended to reuse used bedding. The bedding should be absorbent and safe for the chicks. Using wood sawdust is preferable to using bark, as hardwood sawdust does not contain the harmful substance (N-Tennin). Clean water must be provided for the first few hours, and the water temperature should be 65 degrees Fahrenheit. Water containers should be kept clean to prevent germ growth and contamination. Additionally, sugar should be added to the first water to provide a light sweetness. Initially, provide 15 thick, unsweetened water to ensure the chicks' stomachs are clean. The sweetness of the syrup should be similar to what we would drink ourselves. For the first three to four days, mix vitamins and salts in water to promote the chicks' growth. Water should be given three hours before feeding to prevent dehydration. The water pot used for the chicks is suitable for one hundred (100) chicks for the first ten days. Place the watering can for the chicks at a distance of one meter. A single nipple is sufficient for 12 to 15 chicks. After 7 to 10 days, start using larger water pots. The initial pot should not be placed on the ground. As the chicks grow, adjust the height of the pots until the water level is equal to their waist.

Feeding

Chicken feed needs to be provided promptly. You can achieve this by flipping over the lids of the boxes containing the chicks or by using a specific type of tray. One container is sufficient for 100 chickens. Alternatively, large food containers or automatic feeders can be utilized once the chicks reach three days old. During the initial three days, a box lid can be used for 100 chickens. Ensure that the chickens are placed 7.5 cm apart in the feeding trough. A circular container should be used for thirsty chicks.

Weight

It is very important to keep the weight in the beders, because of their overweight (chickens) birds will lay less eggs and will not be able to. The chickens should be weighed according to the chart from where the breeder is to be fed, for example

Legal rain standard weight

Weight in aged tissues (kg) Weight in kg (kg) 1 0.114 0.09 2 0.18 0.14 3 0.27 0.22 4 0.36 0.27 5 0.42 0.36 6 0.55 0.41 7 0.68 0.50 8 0.77 0.59 (Hubbard Broiler Breeder) Weight of Hubbard Broiler Breeders The weight of evil in age matters (grams) Weight of matter (grams) Feed per bird per day (grams) Add your food without as much skin as you want 1 41 41 1 115 110 30 2 250 225 30 3 370 325 35 4 490 425 40

Phosphorus (%)

From 8 years old, give chickens 4.5 kg per thousand birds once a week with zero number chips. Always provide food as needed to prevent the birds from gaining weight. To feed every day, follow the bird's need chart so they don't gain weight. Skip one day of feeding, and on the next day, provide good food for two days. This method can be used from 4.5 weeks to 14 weeks. Feed for five days and fast for two days using the bag rearing method. Distribute the daily feed by multiplying the outgoing food by 7. Give the birds a five-day diet with two-day fasting, such as not feeding on Wednesdays and Sundays.

Keeps wet separately

It's important to keep male and female animals separated until they are 23 months old to easily manage their weight and control their puberty. This will require proper equipment and careful attention to detail.

Raising males and females together

When space and equipment are limited, it's best to collect males and females at six to eight weeks of age. At this age, the weight of each should be more than 100 to 150 grams, and they should not be kept with the substance. If combined with the substance at an older age, their weight should be monitored. Collect eggs at least four times a day, especially more frequently in hot weather. Those who collect and pack eggs should wash their hands thoroughly. Avoid mixing dead eggs and nesting eggs laid on the floor to prevent diseases. Collect floor-laid and dirty eggs separately and sell them in the market.

Use a sugarcane tray or a clean plastic tray for egg collection, placing the thickest part of the egg upwards. Eggs should be fumigated after collection. Maintain a room temperature of 18 degrees Celsius and 75% humidity for storing eggs. Keep the room free of germs by using germicidal agents twice a week. Hatch eggs at least twice a week, keeping the truck temperature at 18 degrees Celsius and humidity at 75-80%. Cover eggs with plastic during transport to prevent temperature changes from affecting them. Protect eggs from sweating. If eggs are stored for more than 8 to 10 days, maintain a room temperature of 12 to 15 degrees Celsius and position the eggs with the broad end facing upwards.

Breeders' diet:

Breeder birds gain weight quickly, so controlling their weight through diet is crucial. The diet and feeding methods for breeder birds differ from those of other birds at each stage of their life.

(A) Litter breeder feed

a) Layer breeder feed during brooding. The diet for breeder chickens is almost the same as for normal chickens. During the first five weeks, it's important to feed the chicks more than they need. When feeding chickens, the amount of protein in their diet is crucial. If their diet is high in protein, give them this food in a short time. If the diet is low in protein, feed them for a longer period. Additionally, consider the feeding needs during litter breeding.

The following methods are used to control the weight of female breeders during rearing.

Never start these methods before the age of eight weeks with water and finish at the twentieth week.

1-Feeding the female less while feeding

If the female breeders are gaining too much weight, they are given less food to control it. The following methods are commonly used for this purpose.

2- Giving less food every day

Give breeders less food than they need. For this, the daily dose can be reduced by about 15%. The method is more suitable in Pakistan.

i. Feeding one day except one day

For this, breeders are not given food on one day (good food for two days) on the need of another day. Battery is more suitable for cold regions. Adoption in hot areas weakens breeders' legs. Breeders are not given food for one day and are given good food (doi) for two days. Battery cages are more suitable for cold regions, while adoption in hot areas weakens breeders' legs. Feed lighter breeders according to their production.

ii. Feed liter breeders according to their production

Litter breeders should be fed as usual during regular production, but it's important to pay attention to the proportion of ingredients in the diet that can boost the hatching rate of the eggs. Litter breeders should begin receiving feed based on their production at 20 weeks, so that by 22 to 24 weeks of egg production, some nutrients can be stored in their bodies. The feeding method for breeders should be the same as in a normal commercial environment.

Dietary requirements during brooding (0 to 35 days)

To ensure optimal nutrition for breeders, the following dietary guidelines should be followed:

- Vitamin A: 4188 IU per kg of food
- Vitamin D3: 500 ICU per kg of food
- Riboflavin: 3.9 mg per kg of food
- Niacin: 41.98 mg per kg of food
- Pantothenic Acid: 11.75 mg per kg of food
- Choline: 1320.44 mg per kg of food
- Energy: 2994.2 kcal per kg of food
- Protein: 20.03%
- Phosphorus: 0.41%

After egg production begins for breeders weighing 1.6 to 2.3 kg:

- Energy: 2952.4 kcal per kg of food

- Protein: 17.01%
- Phosphorus: 0.45%
- Vitamin A: 5990 IU per kg of food
- Vitamin D3: 1000 ICU per kg of food
- Riboflavin: 5.522 mg per kg of food
- Niacin: 33.747 mg per kg of food
- Pantothenic Acid: 12.54 mg per kg of food
- Choline: 1100.044 mg per kg of food

Male breeders typically consume 25% more food than female breeders during rearing. However, during egg production, both males and females consume the same amount of feed. Implementing a weight control program helps in managing the weight of normal layer breeders effectively.

It is important for birds to have a feeding program to control their weight, especially when they are housed with chickens for egg production. A curl feeder can be used for male breeders, which is designed at a height that prevents female breeders from eating from it. If males and females are kept together and a feeding program is implemented, the breeders may not lose enough weight, in which case a Cockerel Feeder may be used to provide additional feed. Each feeder is used for 20 breeders. The crawl feeder should have enough food until the male breeders reach their target weight, after which the daily feed should be gradually reduced.

B) The food of Bringer breeders

Branker breeders tend to grow faster, so if they are overfed, they gain weight, leading to fat accumulation and reduced egg production. It is crucial to meet specific dietary requirements for branker breeders. Disease prevention strategies for breeder chickens are considered more critical than their diet. This is also true for preventing diseases in Bradfluck. While disease prevention is crucial for both egg-laying and meat-producing birds, the economic significance of breadflakes has made them even more important. The arrangements for breeding are more critical for breadflakes than for regular birds, so a successful poultry farmer is knowledgeable about disease prevention and control. A closer examination reveals various hygienic principles, including the use of low-quality or substandard food, and the presence of toxic substances.

Inherited causes contribute to the development of diseases in farm birds, such as cancer. This is mainly influenced by the immune system and the genetic makeup of the bird breeds. The offspring inherit traits and vulnerabilities from both parent breeds. Therefore, understanding genetics is

crucial for disease prevention, especially when the disease resistance is high. This knowledge can also help lower the risk of disease in the future.

The application of biotechnology, specifically genetic engineering, represents a significant advancement in our time. It allows for the identification and elimination of disease-resistant fetuses through genetic engineering, ensuring their eradication from the respective breed. This technology can safeguard Sindh from diseases by selecting and utilizing breeds that are resistant to these ailments. In doing so, it is possible to ensure the birth of disease-resistant livestock. This also involves the construction and location of breeder farms.

The speed of work on any poultry farm building and its location on the farm greatly impact various disasters and risks. When selecting a farm location, consider being at least two distances away from the population, while ensuring there is access to a road. Additionally, ensure there are not too many poultry farms in the area to prevent the spread of disease from one farm to another. Poultry experts recommend that the distance between breeder farms should be at least three miles, and the minimum distance between farm sheds should exceed 300 meters. Avoid establishing farms in areas where standing water ponds are prone to flooding.

In warm regions, it's advisable to position the farm building from east to west, allowing the sun to rise from one side and set on the other side of the roof. Conversely, in cold areas, the orientation should be reversed. It's beneficial to have farm walls and floor coverings that provide refuge for pests like ticks and lice, preventing them from attacking birds and weakening their immune systems. Having a thick layer of bedding on the floor can greatly mitigate extreme weather conditions.

The availability of electricity and gas on the farm not only simplifies the tasks for the farmer, but also accelerates the growth and production of birds, as the use of electricity and gas causes less pollution compared to burning coal, which pollutes the atmosphere. Undoubtedly, air pollution has a negative impact on the bird's development.

The presence of a farm auger will not only safeguard the farm, but also help prevent various disasters. Proper farm system and management, providing adequate space for birds, maintaining optimal temperature, and ensuring a fresh air supply while ventilating dirty air are crucial. Although farmers are generally aware of these bird requirements and manage them as best as possible, other measures such as food, water, light, and vaccinations are also important.

Additionally, ensuring safety and addressing factors contributing to stress on the farm are essential requirements that need to be addressed. Preventing these factors is also crucial.

The following points highlight the important points.

Balanced diet

The significance of providing a balanced diet for chickens cannot be overlooked, and it is equally crucial to select food that is free from toxins. This is due to the fact that as the old food decomposes, it becomes more acidic, posing a serious threat to the birds' health. Along with high-quality food, maintaining clean food utensils is essential. Failure to clean these utensils on a daily basis can result in food adhering to the stomach, causing it to spoil and become acidic, with toxic effects that may even prove fatal for the birds.

Supply of fresh and clean water

Water, an essential natural resource, is indispensable for all living beings. It is a prerequisite for life. In addition to supplying water, its quality also significantly impacts breeding chickens. High-quality water is clear, flavorless, and has a pH value ranging from seven to eight. To enhance water quality and safeguard it from detrimental effects, it is advisable to periodically add one gram of chlorine per 25 liters of water to the water tank.

High salt content in water

Otherwise, there is a chance of illnesses like diarrhea and foot lesions. Additionally, because of its harmful effects, birds may develop swollen bellies and engage in abnormal mating behavior. Her well-being is secure and in good condition, and her robust health allows her to produce as much as any bird can.

Vaccinations

It is essential to give a sequence of vaccinations to protect the farm from diseases by granting the birds immunity from various illnesses. Vaccines are planned for each section to stop the disease from spreading, so vaccinations are always more comprehensive within the section.

Prevention of nervous stress of birds

Breeding chickens are highly sensitive creatures. The smallest oversight can result in nervous stress. Even minor adjustments to food containers or lighting schedules can trigger stress in the birds, and they may quickly become aware of the change. It's important to maintain the farm routine as scheduled and avoid sudden alterations to prevent the chickens from experiencing

nervous tension. Otherwise, their productivity may be significantly impacted, and the chickens may become susceptible to minor health issues.

Biosecurity

The breeder farmer must ensure regular testing of the flock for various diseases. If any infected bird is discovered, it should be promptly destroyed, and the remaining hens should receive appropriate treatment. This is to prevent the transmission of any harmful germs to the chicks hatched from the eggs of Breed Rafflack. Workers change into their work clothes before entering the farm and change back into their normal clothes after they finish work. A person entering the farm must dip their feet in a disinfectant solution. Only farm workers are allowed to enter the farm, not anyone else. The workers of different age birds or parakeets wear specific-colored clothes so that the manager can easily distinguish them from each other.

1. Prior to entering the farm, ensure that the vehicle's tires are completely immersed in the disinfectant solution.
2. Keep the farm free from predators such as lizards and dogs.
3. It is advisable to only include birds of different ages in the flock, and if possible, keep track of their age groups.
4. Separate the animals immediately and avoid reintroducing them to the flock even after recovery.
5. Assign separate workers for birds of different ages.
6. Use a plastic tray to collect the eggs and make sure to wash them with formalin after each use.
7. Once the eggs are collected and placed in the store, they should be washed immediately to eliminate any germs.
8. Use mane bags for food every time.

Practical Work (To be done by students)

Housing and Equipment's

Supplementation/Stress Management

Brooding Management during Summer

Brooding Management during Winter

Feeding Management during Summer

Feeding Management during Winter

Weekly Body Weight Gain of Chicks

FCR Calculation

Health Management of Chicks during Summer

Health Management of Chicks during Winter

Growth Monitoring and Record Keeping

Litter Management during Summer

Litter Management during Winter

Harvesting and Processing

Marketing rates of chicks

Review and Evaluation

Chapter 3 Viral Poultry Diseases

Bacterial and viral diseases are common in broiler chickens, with viral diseases caused by viruses exhibiting specific characteristics:

1. **Highly Contagious:** Viral diseases spread rapidly among broiler chickens within a flock and can also be transmitted between flocks through direct contact, aerosols, or contaminated equipment.
2. **High Mortality Rate:** Viral diseases often result in significant mortality rates within affected flocks, leading to economic losses for poultry producers.
3. **No Available Treatment:** Unlike bacterial diseases, viral diseases in broiler chickens typically do not have specific treatments or cures. Management strategies focus on prevention through vaccination and biosecurity measures.
4. **Short Incubation Period:** Viral diseases usually have short incubation periods, meaning infected birds can show clinical signs shortly after exposure to the virus.

Examples of viral diseases commonly found in broiler chickens include:

- **Newcastle Disease:** Newcastle Disease Virus (NDV) causes Newcastle Disease, characterized by respiratory, nervous, and gastrointestinal symptoms. It can lead to high mortality rates in broiler flocks, especially in unvaccinated birds.
- **Infectious Bronchitis:** Infectious Bronchitis Virus (IBV) causes Infectious Bronchitis, a highly contagious respiratory disease that affects broiler chickens of all ages. It leads to respiratory distress, decreased weight gain, and poor feed conversion.
- **Infectious Anemia:** Infectious Anemia, caused by the Chicken Anemia Virus (CAV), primarily affects young broiler chickens. It leads to anemia, immunosuppression, and increased susceptibility to secondary infections.
- **Infectious Bursal Disease:** Infectious Bursal Disease Virus (IBDV) causes Infectious Bursal Disease (IBD), also known as Gumboro Disease. It targets the bursa of Fabricius, resulting in immunosuppression, increased susceptibility to secondary infections, and mortality in young broiler chickens.

Newcastle Disease

Introduction

Newcastle disease (ND) is a highly contagious avian disease affecting chickens and other poultry species. Symptoms of ND include greenish diarrhea, nervous system disorders, respiratory issues, and fever. The severity of the disease depends on the strain of the virus and the immunity of the affected bird. The incubation period ranges from 2 to 15 days.

Cause of Disease

NDV, the causative agent of Newcastle disease, belongs to the Paramyxoviridae family and the Avulavirus genus. It is an RNA virus classified into three groups based on virulence:

- Lentogenic (low virulence)
- Mesogenic (moderate virulence)
- Velogenic (high virulence)

Velogenic and mesogenic strains are also referred to as virulent NDV, whereas lentogenic strains are less virulent. Areas with live vaccine practices report fewer cases. NDV has a high mortality and morbidity rate, with most deaths resulting from respiratory failure, dehydration, and anorexia. The virulence of the virus and the host's immunity determine the severity of the disease. Chickens are primarily affected, while waterfowl are less susceptible.

Effect of Different Strains of Virus on Birds

- **Lentogenic Strains:** Primarily affect the lungs, causing mild respiratory symptoms and general sickness, especially in young birds, with a mortality rate of 5 to 10%.
- **Mesogenic Strains:** Lead to neurological symptoms and have a mortality rate of 50-98%.
- **Velogenic Strains:** Affect the gut and are associated with a 100% mortality rate.

Spread of Disease

Newcastle disease is prevalent in Asia, Africa, and parts of North and South America. The USA and Canada control the disease by culling affected birds. Pigeons and imported birds can carry and spread velogenic and mesogenic strains, while waterfowl are usually infected by less virulent strains. The virus can spread through air, nasal discharges, feces, and contaminated eggs, making it a vertically transmitted disease. Contaminated food, water, and contact with infected birds or people can also spread NDV.

Clinical Signs

Symptoms of ND include:

- Watery discharge from the eyes
- Conjunctivitis
- Coughing and rales
- Sneezing and gasping
- Decreased egg production and changes in egg color and shape
- Greenish diarrhea
- Paralysis of legs and wings, leading to droopy wings and lameness
- High mortality and morbidity rates
- Swelling of the head, torticollis (twisted neck), and spasms

Lesions

Prominent lesions associated with velogenic ND include:

- Small hemorrhages on the proventricular gland
- Hemorrhages resembling egg yolks
- Congested lungs
- Hemorrhages on the cecal gland
- Severe damage to the ovaries, testes, and kidneys

Diagnosis

ND can be diagnosed using:

- Hemagglutination tests
- Postmortem PCR
- Virus isolation from cloacal swabs

Control Measures

Given the high mortality rates associated with ND, controlling the disease involves two main approaches: vaccination and biosecurity management.

Vaccination

- Vaccination with live ND vaccines is essential to prevent the disease.
- Administering two doses of the vaccine is necessary to provide adequate immunity.

Biosecurity Management

- Strict biosecurity protocols must be followed.
- Restrict access to the poultry shed to outsiders.
- Use sanitized equipment and disposable needles for vaccinations.

- Disinfect the poultry house regularly.

By adhering to these control measures, the spread of Newcastle disease can be significantly reduced, safeguarding poultry health and productivity.

Infectious Bursal Disease

Introduction

Infectious bursal disease (IBD) significantly impacts the poultry industry by suppressing the immune system of young chickens, resulting in substantial financial losses worldwide. The disease primarily affects the lymphoid organs, particularly the bursa of Fabricius, leading to the depletion and destruction of lymphoid cells. Chickens are most vulnerable to IBDV between 3 and 6 weeks of age, coinciding with the peak development of the bursa of Fabricius. IBDV is categorized into two serotypes: serotype 1, which affects chickens, and serotype 2, which primarily affects waterfowl. Within serotype 1, strains are classified as classical virulent, very virulent, antigenic variant, and attenuated IBDV strains.

Economic Impact and Control Measures

In recent years, highly virulent IBDV strains have caused significant economic setbacks for the poultry industry. While variant IBDVs do not usually cause death, classical strains can result in up to 20% mortality. The highly stable and resistant nature of IBDV makes vaccination the most effective control method. The emergence of highly virulent IBDV (vvIBDV) in Western Europe during the late 1980s marked a shift from subclinical infections with low mortality to severe infections with mortality rates up to 25% in broilers and 60% in layers. Consequently, vaccines derived from mild strains were insufficient against vvIBDV, necessitating the use of more aggressive strains in vaccine production. However, less attenuated strains may cause bursa follicle lesions and immunosuppression. Thus, live IBD vaccines must balance immunogenicity with safety.

Transmission and Serotypes

IBD is transmitted through feces or by consuming contaminated feed or water, with feces being a major source due to the high virus concentration. Fomites can also spread the virus. While serotype 1 affects chickens, serotype 2 primarily impacts waterfowl, which are more resistant to the disease. IBD suppresses the immune system, making birds susceptible to secondary infections such as

Newcastle disease, IBH, CRD, Marek’s disease, and IB. Though IBD can infect other birds like penguins, it does not cause disease or symptoms in them.

Clinical Signs and Lesions

Clinical signs include stress, anorexia, dehydration, white pasty diarrhea, lethargy, and reduced feed intake. Lesions typically involve the enlargement and hemorrhage of the bursa, atrophy of the bursa, hemorrhages on thigh muscles, dehydration, and swollen kidneys, which may lead to kidney failure and swollen urates.

Diagnosis and Treatment

IBD can be diagnosed through PCR v2 gene detection, virus isolation techniques, postmortem procedures, ELISA, and serological antibody count methods. There is no specific treatment for viral diseases like IBD, but the disease's impact can be minimized through supportive care:

- Flushing the bird’s system
- Preventing secondary bacterial infections with antibiotics
- Administering multivitamins, particularly Vitamin E and Vitamin C
- Using saline solutions or ORS to meet the bird's salt and water needs

Bird Flushing Technique

Add 4% sugar to the water at a moderate temperature and use it within 3-4 hours. Follow with a mixture of 1/3 milk and 2/3 water with added multivitamins to support the bird in fighting the disease.

Disease Control Methods

Biosecurity: Strict biosecurity protocols are essential. Limit access to the shed, sanitize equipment before use, and use new, sanitized needles for vaccination. Disinfect the house after each flock.

Vaccination: IBD vaccination should occur at 14 days old, with a booster dose at 28 days. Vaccination should only be done if no signs of IBD are present to avoid enhancing the virus in infected birds. Ensure all birds are vaccinated by adding a color dye to the water; the dye on the

beak confirms vaccine consumption. Always use clean containers and take precautions during the vaccination process.

Infectious Bronchitis; Avian Corona Virus

Introduction

Infectious bronchitis is a highly contagious respiratory infection in hens that leads to decreased egg production and poor egg quality. Some strains may also cause nephritis. While vaccinations, including live and killed attenuated vaccines, are available, they do not offer cross-protection against different antigenic variants of the Infectious Bronchitis Virus (IBV). Diagnostic assays such as ELISA, HI tests, RT-PCR, and virus isolation in embryonated eggs are used to identify the virus. The Spike gene is utilized for the genetic typing of the virus.

Cause of Disease

Infectious bronchitis, caused by the avian gamma coronavirus, primarily affects chickens but can also be found in peafowl and pheasants, which may not show clinical signs. This virus is globally widespread and exhibits multiple antigenic variations that can coexist within a specific area. While some strains are widespread, others are region-specific. In both vaccinated and naturally infected chickens, the virus can be sporadically transmitted for up to 20 weeks post-infection. The incubation period is 1 to 2 days, with peak viral excretion from the respiratory tract occurring 3 to 5 days after infection. The pathogenicity of IBV and the affected physiological systems depend on various factors, including cold, stress, virus strain, age, immunological condition, diet, and co-infections with Mg, MS, E. coli, and/or A. paragallinarum.

Clinical Signs of Disease

IB has a morbidity rate of 100% within 10-14 days. Chicks may show symptoms like sneezing, coughing, and tracheal rales, along with conjunctivitis, dyspnea, and facial edema in cases of bacterial sinus infection. Chicks huddling under heat lights may appear lethargic, with reduced food consumption and weight gain. Nephropathogenic strains cause respiratory symptoms, despondency, ruffled feathers, moist droppings, increased water intake, and mortality. In layers, egg production can drop by 70%, with deformed eggs showing thin, rough, light shells, wrinkles, and smaller size. It can take up to 8 weeks for egg production and quality to normalize. Mortality

rates in most outbreaks are below 5%, but they can reach 58%-60% when exacerbated by bacterial infections or nephropathogenic strains causing nephritis. Infection in chicks can lead to false layer syndrome due to chronic oviductal damage.

Lesions

Lesions in infected birds include serous, catarrhal, or caseous exudates in the trachea, sinuses, and nasal passages. Air sacs may show foamy exudate progressing to hazy thickening. E. coli infections can lead to caseous airsacculitis, perihepatitis, and pericarditis. Birds may have cystic oviducts, reduced weight and length of the oviduct in laying birds, and regressed ovaries. Nephropathogenic strains cause enlarged, pale kidneys with urate-filled tubules and ureters. Birds with urolithiasis may have clogged ureters and atrophied kidneys.

Diagnosis

Diagnosis involves identifying developing antibody titers using ELISA or HI testing, while RT-PCR and sequencing help differentiate and classify viruses. Laboratory confirmation is essential due to symptom overlap with other respiratory diseases like Newcastle disease, avian metapneumovirus, ILT virus, mycoplasma, A. paragallinarum, and Ornithobacterium rhinotracheale. ELISA can demonstrate seroconversion or increased antibody titers against IBV in cases of respiratory disease or reduced egg production. Virus detection and identification provide a definitive diagnosis. Virus isolation involves inoculating homogenates of tracheal, cecal tonsil, and/or kidney tissue into 9- to 11-day-old SPF chicken embryos, with IBV development indicated by embryo changes and variable mortality. Tracheal organ cultures and RT-PCR methods are also used to detect viral RNA.

Control

Control of infectious bronchitis involves using live and inactivated vaccines, but due to limited cross-reactivity between vaccine types, selecting the appropriate vaccine is crucial. Antimicrobial therapy can reduce mortality from secondary bacterial infections, but it cannot alter the course of IBV infection. Increasing the ambient temperature can reduce mortality, while decreasing protein levels in feed and providing electrolytes in drinking water can help during nephropathogenic outbreaks. Live-attenuated vaccines, which may cause mild respiratory symptoms, are administered to 1- to 14-day-old chicks via spray, water, or eye drop, with revaccination 2 weeks

later. Using different serotypes for revaccination may offer higher protection. In breeders and layers, attenuated or adjuvanted inactivated vaccines can reduce egg production losses and provide protective maternal antibodies to offspring. Due to the continuous emergence of new or variant strains, vaccine selection should be based on knowledge of the most prevalent virus types in the region. Massachusetts strains are included in the most widely used live vaccines globally. Additionally, live and killed autogenous vaccines are tailored to the region's variant virus.

Key Points

- Infectious bronchitis is caused by an avian coronavirus.
- Ongoing surveillance is required to detect IBV types prevalent in a given area due to the virus's ability to evolve rapidly.
- Selecting the right vaccine(s) for protection is critical as different antigenic types do not cross-protect.

Chicken Infectious Anemia

Introduction

Chicken infectious anemia in young chicks is caused by the Chicken Anemia virus. This disease is characterized by aplastic anemia and generalized lymphoid atrophy, leading to concomitant immunosuppression. The presence of secondary viral, bacterial, or fungal infections complicates the disease further. Vaccinating breeder chickens helps control the disease by enabling them to pass on maternal antibodies to chicks, thus protecting them from exposure to the virus in the field. Anemia becomes evident in infected birds after 14 days, with the percentage of red blood cells in the body remaining between 6 to 27%. The chicken's body will appear yellowish in color due to blood loss. The duration of the disease is typically 2-4 weeks.

Cause of Disease

Chicken anemia virus (CAV) belongs to the Anelloviridae family, commonly known as Gyrovirus, with a size of 25 nm. It is a non-enveloped, single-stranded, negative-sense, circular DNA genome. Initially classified as a circovirus, it was later reclassified into the Anelloviridae family due to significant differences. It is consist of three viral proteins.

- Viral Protien1
- Viral Protein 2
- Viral Protein 3

Modes of Outbreak

Chicken Infectious Anemia (CIA) is transmitted both vertically and horizontally. High levels of the Chicken Anemia Virus (CAV) are present in the stools of infected chickens, and the virus can be ingested by other chickens through contaminated water and feed. Additionally, the virus can be transmitted through the air. It typically takes about 1-2 weeks to infect an entire flock. Subclinical signs of infection can be observed in the flock after this period.

Signs of Disease

- Laziness
- Low feed intake
- Disarranged feathers
- Yellow comb, wattles, eyelids, or curled-up legs under the brooder
- Reduced growth rate
- Skin color turning from red to blue
- Gradual weight loss
- Monotony
- Stressed condition

Ways to Diagnose the Disease

- Virus isolation techniques
- Polymerase chain reaction (PCR)
- Enzyme-linked immunosorbent assay (ELISA)
- Detection by increased antibody titers

- Immunoperoxidase staining

Post Mortem pictures

Treatment and control Measures

Virus infections, including Chicken Infectious Anemia (CIA), have no specific treatment. Management primarily relies on vaccination. In cases where CIA is complicated by bacterial infections, antibiotics or natural immune system boosters may be used. Vaccination for CIA is ideally administered before the onset of egg production. It can be given via drinking water or injection.

Practical Work

Vaccination schedule for broiler birds

Vaccine	Day	Route

Vaccination schedule for layer birds

Vaccine	Day	Route

Vaccination schedule for breeder birds

Vaccine	Day	Route

Chapter 4 **Bacterial Poultry Diseases**

1. Introduction

Bacteria, also known as microorganisms, are tiny organisms that cannot be seen with the naked eye. They are widespread and play a significant role in the environment, with some species capable of surviving in extreme conditions. All animals harbor various bacteria in their bodies, which can either be beneficial or harmful to them. Bacterial diseases have a detrimental impact on birds and are a major cause of loss. The lack of management is a significant factor contributing to bacterial attacks. There are numerous bacterial infections that can be severe enough to increase the mortality rate by as much as 70%.

The diseases which occur due to the bacteria such diseases are Called Bacterial Diseases.

Bacterial Diseases in Poultry

- Salmonelloses
- *E. coli* Infections
- Fowl Cholera
- Paratyphoid Infections
- Cholangiohepatitis In Broiler Chickens
- Riemerella Anatipestifer Infections
- Necrotic Enteritis
- Mycoplasma
- Gangrenous Dermatitis
- Chicken Tuberculosis
- Infectious coryza

Here is short Explanation about above disease including the name of bacteria which is cause of that disease

Salmonellosis

Causative agent: *Salmonella*

Salmonella is an enteric microorganism that can contaminate nearly all living creatures, including humans. In poultry, salmonellosis is caused by Gram-negative bacteria from the genus Salmonella.

Signs.

- Intestine hemorrhages
- Off Feed

***E. coli* Infection**

Causative agent: *E. coli*

A disease or infection characterized by the accumulation of body cells and tissue caused by E. coli bacteria is called an E. coli infection.

Signs

Liver damage, Laziness, Off feed, Infection on liver

Fowl Cholera

Causative agent: *Pasteurella multocida*

Fowl cholera is an infectious disease in poultry caused by the bacterium *Pasteurella multocida*. It typically results in low mortality rates but can exhibit various signs such as laziness, swelling of wattles, pneumonitis, and twisting of the neck.

Paratyphoid Infections

Causative agent: Salmonella

Paratyphoid infections, primarily caused by Salmonella, are significant poultry diseases often stemming from contaminated feed. Salmonella contamination, usually originating from feces, can lead to contamination of eggshells and subsequently the germinal disk. Signs include stress, reduced growth, laziness, diarrhea, and dehydration.

Cholangiohepatitis (CAH) in broiler chickens

Causative agent: Unknown, but *Clostridium perfringens* and other bacteria found in affected livers

Cholangiohepatitis (CAH) in broiler chickens is characterized by liver enlargement and hardening, although the exact cause remains unidentified. Bacteria such as Clostridium perfringens, Escherichia coli, Pasteurella haemolytica, Streptococcus equisimilis, and Campylobacter sp. have been found in infected livers. Signs include liver enlargement, yellowing, hardness, weight loss, and reduced feed intake.

Riemerella Anatipestifer Infections

Causative agent: *Riemerella anatipestifer*

This infectious disease affects ducks, geese, and other avian species, caused by the gram-negative bacterium Riemerella anatipestifer I. Signs include coughing, sneezing, nasal discharge, watery green feces, and nervous signs.

Necrotic Enteritis

Causative agent: Clostridium *perfringens*

Necrotic enteritis is a poultry disease characterized by the overgrowth of Clostridium perfringens, primarily types A and, to a lesser extent, type C, in the small intestine. This bacterium produces toxins that damage the intestinal wall, typically affecting chickens aged 2-6 weeks. Signs include severe stress, diarrhea, dehydration, reduced feed intake, and disarranged feathers.

Mycoplasma

Causative agent: *Mycoplasma gallisepticum* (MG)

Mycoplasma gallisepticum (MG) is a common respiratory disease in chickens caused by the bacterium Mycoplasma gallisepticum. Signs include watery eyes, tracheal lesions, runny nose, coughing, reduced feed intake, and weight loss.

Gangrenous Dermatitis

Causative agents: *Clostridium septicum*, *Clostridium perfringens* type A, Staphylococcus

Gangrenous dermatitis is a disease affecting hens and other avian groups, caused by Clostridium septicum, Clostridium perfringens type A, and Staphylococcus. It is associated with high mortality rates and manifests as darkening of the skin, wings, and breast, weight loss, and reduced feed intake.

Chicken Tuberculosis

Causative agent: *Mycobacterium avium* subsp. avium

Chicken Tuberculosis, caused by *Mycobacterium avium* subsp. avium, primarily affects small birds like pigeons and pheasants, as well as birds in free-range environments. Signs include weight loss, decreased production, and stress.

Infectious Coryza

Causative agent: *Avibacterium paragallinarum*

Infectious Coryza is a respiratory illness caused by the bacterium *Avibacterium paragallinarum*. Clinical signs include runny nose, lethargy, facial swelling, swelling of wattles, wheezing, poor respiration, and a decrease in egg production by 10-40%. Administering antibiotics during the early stages can aid in bird recovery. Preventative measures include implementing proper biosecurity practices, good management, and vaccination, especially in multi-stage farms where Infectious Coryza is prevalent.

Control Measures for Bacterial Diseases

Two main methods are employed for controlling bacterial diseases:

1. Use of Antibiotics: Antibiotics are used to treat bacterial infections in birds. It's essential to use registered antibiotics and adhere to proper dosage guidelines. However, prolonged use of the same antibiotics can lead to antibiotic resistance.
2. Biosecurity: Implementing biosecurity measures helps prevent the spread of bacterial diseases. This includes practices such as controlling bird movement, disinfection, and maintaining clean environments.

Vaccine for Bacterial Diseases

Vaccination against bacterial diseases can be effective, although there is a risk of antibiotic resistance development. Using newly developed vaccines can aid in faster bird recovery, as bacteria are less likely to develop resistance to them. It's crucial to use vaccines that are registered and follow recommended vaccination protocols to ensure effectiveness.

Biosecurity

We need to adhere to strict biosecurity measures. The shed should not be accessed by anyone from outside. Use sanitized equipment. Administer antibiotics using single-use and sanitized needles. Disinfect the house after each flock during cleaning. Large farms should implement a high level of biosecurity at the BBB level.

Antibiotic Resistance and its solution

Antibiotics must be used in the correct dosage. Repeated use of an antibiotic can lead to resistance, making it ineffective against the disease the next time. Overuse of antibiotics can also contribute to antibiotic resistance in humans. When we consume bird meat, we indirectly ingest residual antibiotics on a daily or weekly basis. To address this issue, it is important to use antibiotics according to the prescribed dosage and avoid using antibiotics in broiler birds from 32 days of age until slaughter. Herbal remedies can be used as an alternative to antibiotics, or new antibiotics can be considered.

Conclusion

The study provides appropriate guidelines for addressing bacterial poultry disease and advises on methods to decrease or minimize the risk of antibiotic resistance in poultry. Additionally, it outlines the indicators, manifestations, and effects of the disease, which could facilitate its diagnosis. After reading the paper, this study will enable a non-professional to identify bacterial poultry diseases.

References

1) Astill, J., Dara, R. A., Fraser, E. D., Roberts, B., & Sharif, S. (2020). Smart poultry management: Smart sensors, big data, and the internet of things. *Computers and Electronics in Agriculture*, *170*, 105291.
2) Olejnik, K., Popiela, E., & Opaliński, S. (2022). Emerging precision management methods in poultry sector. *Agriculture*, *12*(5), 718.
3) Bumanis, N., Arhipova, I., Paura, L., Vitols, G., & Jankovska, L. (2022). Data conceptual model for smart poultry farm management system. *Procedia Computer Science*, *200*, 517-526.
4) Antonov, A., Ivanov, G., & Pastukhova, N. (2019, June). The poultry waste management system. In *IOP Conference Series: Earth and Environmental Science* (Vol. 272, No. 2, p. 022050). IOP Publishing.
5) Galarneau, K. D., Singer, R. S., & Wills, R. W. (2020). A system dynamics model for disease management in poultry production. *Poultry science*, *99*(11), 5547-5559.
6) Abbas, G., Jaffery, S., Hashmi, A. H., Tanveer, A. J., Arshad, M., Amin, Q. A., ... & Mahboob, U. (2022). Prospects and challenges of adopting and implementing smart technologies in poultry production. *Pakistan Journal of Science*, *74*(2).
7) Sangeetha, K., Kanthimathi, M., Monisha, S. R., Reethika, M., & Amirthabowmiya, M. (2022, November). Poultry Farm Control and Management System Using Wireless Sensor Networks. In *2022 1st International Conference on Computational Science and Technology (ICCST)* (pp. 712-715). IEEE.
8) Wang, L. (2020). Design of Logistics Management System for Livestock and Poultry Breeding Enterprises. *Revista Científica de la Facultad de Ciencias Veterinarias*, *30*(4), 1868-1876.