REPUBLIC OF UGANDA

MAAIF

Ministry of Agriculture, Animal Industry and Fisheries

OCTOBER 2025

REPUBLIC OF UGANDA

MAAIF

Ministry of Agriculture,
Animal Industry and Fisheries

VETERINARY TREATMENT GUIDELINES FOR COMMON POULTRY DISEASES

Foreword

To transform Uganda into a competitive, middle-income country by 2040, we must strengthen our veterinary services. Doing so directly supports the goals of both **Vision 2040** and the **National Development Plan IV (2025–2030).** By improving animal health and agricultural productivity, we can significantly increase household incomes, create new jobs, and fully monetize our economy.

The overarching goal of Uganda's veterinary services is to provide farmers with **accessible, equitable, and high-quality care** to prevent and control animal diseases and health emergencies. A strong veterinary system is essential for ensuring that animal welfare and health standards are met for both production and trade. This ensures that food and other animal products are safe for consumption and use and, it is vital for managing contagious diseases, including zoonotic and food borne illnesses that can spread to humans.

Unfortunately, inconsistent veterinary services have led to the **irrational use of veterinary medicines.** This has contributed to the rise of antimicrobial resistance and the presence of drug residues in food products. The recent enactment of the Veterinary Practitioners Act 2024 provides a much-needed legal framework to regulate veterinary practice.

These **Veterinary Treatment Guidelines for Common Poultry Diseases** are designed to standardize prescription and treatment protocols. It will serve as a quick and reliable reference tool for veterinary practitioners and front line animal health workers, ensuring proper and consistent care.

I therefore urge all veterinary practitioners in the field and drug outlets to use these guidelines.
By following the manufacturer's recommendations for dosages and administration, we can ensure the **rational use of antimicrobial drugs** in poultry and protect the health of our animals and our people.
.
For God and my country,

Hon. Dr. Rwamirama Bright K. PhD
Minister of State for Agriculture, Animal Industry and Fisheries (Animal Industry)

Preface

The Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) has developed these treatment guidelines to address the critical issue of irrational use of veterinary medicines within Uganda's poultry sector. Our goal is to provide clear, practical guidance for veterinary practitioners, both when treating poultry on farms and when dispensing medicine at drug outlets.

This guide is designed to be an essential tool that complements a practitioner's professional experience and clinical judgment. By focusing on both supportive and curative treatments, especially for common diseases, it provides a solid foundation for managing poultry health. We believe these guidelines will be a critical aid in prescription and treatment decisions.

To ensure relevance and accuracy, a diverse team of stakeholders including veterinarians from the Ministry, academia, local governments, and the private sector collaboratively identified the **13 most common poultry diseases on Ugandan farms.** These diseases, often linked to increased drug use, are categorized by body systems to help with diagnosis based on observed signs. Proper management of these diseases, as outlined in this guide, is expected to significantly reduce the unnecessary use of antimicrobials in poultry.
The development of this guide was a truly collaborative effort. From identifying the initial need to extensive research, drafting, and internal and external reviews by experts on Antimicrobial Resistance (AMR), every step involved key stakeholders.

Ultimately, these guidelines will lead to **rational use of antimicrobials** by promoting proper diagnosis and prescriptions that follow manufacturer recommendations for dosage and administration. As veterinary medicine is a constantly evolving field, this guide will be regularly updated to reflect new research and on-the-ground realities. We encourage you to send any feedback to the **Commissioner Animal Production and Health (MAAIF)** to help us keep this resource current and effective.
While these guidelines offer crucial direction, they are not a substitute for a practitioner's professional clinical judgment.

The ministry sincerely hopes this guide makes a significant contribution to improving our veterinary services and the responsible use of medicines.

Maj. Gen. David Kasura-Kyomukama
Permanent Secretary,
Ministry of Agriculture, Animal Industry and Fisheries

Acknowledgements

The Ministry of Agriculture, Animal Industry and Fisheries is pleased to acknowledge the invaluable contributions that made the Poultry Treatment Guide 2025 a reality.

The ministry extends sincere gratitude to the **United Kingdom's Fleming Fund** for the financial support, which was essential for the development process and for facilitating all the technical working committee meetings.

The ministry is also deeply thankful to the many individuals and organizations who contributed their expertise. This includes the dedicated veterinary practitioners, MAAIF leaders, members of academia, the private sector, and external reviewers who ensured these guidelines meet national and international standards.

A special note of thanks goes to Dr. Eneku Wilfred for his technical guidance and writing support throughout this project. We also recognize all the staff within the Departments of Animal Production and Health, and of Veterinary Regulation and Quality Assurance whose collective efforts were vital to the creation of these guidelines.

We would like to give special thanks to the following contributors:

Writers:

Dr. Eneku Wilfred (College of Veterinary Medicine, Animal Resources and Biosecurity, Makerere University)
Dr. Isingoma Emmanuel (Senior Veterinary Officer and AMR Focal Person, MAAIF)
Dr. Kithuka James (Brooke, East Africa)
Dr. Opere Samantha (Brooke, East Africa)

Institutions:

Brooke East Africa
ILRI
Baylor College of Medicine, Uganda
FAO

Contributors

Dr. Ademun Rose Okurut	MAAIF
Dr. James Kakungulu	MAAIF
Dr. Peter Wanyama	MAAIF
Dr. Kahuta Godfery	MAAIF
Dr. Yvette Ssebunya	MAAIF
Dr. Beatrice Nanozi	MAAIF
Dr. James Higenyi	MAAIF
Dr. Izzy Hocking	BROOKE UK
Dr. Namatovu Alice	FAO UGANDA
Dr. Asiimwe K.Grace	MAAIF
Dr. Ceaser Nyolimati Adibaku	BAYLOR UGANDA
Dr. Jesse Mukisa Mutesasira	KAMULI DISTRICT LOCAL GOVERNMENT
Dr. Waiswa Michael	POULTRY PRIVATE PRACTITIONER
Dr. Annet Praise Namboowa	MAAIF
Dr. Oryem Charles	MAAIF
Dr. Tashorora Optatao	MAAIF
Dr. Mukundane Springs Solomon	MAAIF
Dr. Ssenkeera Ben	MAAIF
Dr. Tumusiime Dan	MAAIF
Dr. Maria Flavia Nakanjako	MAAIF
Dr. Kimaanga Michael	MAAIF
Dr. Ronald Muwonge Semakalu	MAAIF
Dr. Mwanja Moses	MAAIF

Table of Contents

Abbreviations

AMR	Antimicrobial Resistance
AST	Antimicrobial Sensitivity Test
AWaRe	Access, Watch and Reserve classification of antibiotics
COVAB	College of Veterinary Medicine, Animal Resources and Biosecurity
ELISA	Enzyme Linked Immunosorbent Assay
EVDL	Essential Veterinary Drug List
FAO	Food and Agriculture Organization of United Nations
IB	Infectious Bronchitis
ILRI	International Livestock Research Institute
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
NAP-AMR	National Action Plan for Antimicrobial Resistance (for Uganda)
ND	Newcastle Disease
NDA	National Drug Authority
PCR	Polymerase Chain Reaction
UBOS	Uganda Bureau of Statistics
WOAH	World Organization of Animal Health
WHO	World Health Organization
WHO-MIA	WHO Medically Important Antimicrobial

Introduction to the Uganda's Veterinary Treatment Guidelines for Common Poultry Diseases

The **Poultry Treatment Guidelines** are designed to support veterinary professionals, animal health workers, and poultry farmers in making informed and responsible decisions when managing poultry health. These guidelines provide standardized, practical, and evidence-based recommendations for the treatment and control of common poultry diseases, with a strong emphasis on prudent use of antimicrobials, improving flock health outcomes and production of safe poultry products. Therefore, the Poultry treatment guidelines will help in the implementation of the NAP-AMR. The plan has 5 strategic objectives. Strategic objective 3 which is **'To promote optimal access to and use of antimicrobials** has a sub-objective which is **`Promotion of optimal prescribing, dispensing and use of antimicrobials in all sectors. '** In that regard, harmonizing the treatment practices by veterinary practitioners in the field and drug outlets is necessary.

The primary objective of the Poultry Treatment Guidelines is to:

- **Promote responsible and rational use of veterinary medicines, especially** antimicrobials, in poultry production.
- **Standardize treatment** across different regions and practitioners to ensure consistency and improve treatment outcomes.
- **Support disease control and biosecurity,** thereby improving productivity and reducing economic losses for poultry farmers.
- **Mitigate the risk of antimicrobial resistance (AMR)** by encouraging the correct selection, dosage, and duration of treatment.
- **Provide a quick reference tool for front line animal health practitioners** working in resource-limited or field-based environments.
- **Support efforts towards production of safe poultry products** for both domestic and international markets

Why the need for treatment guidelines?

The development and implementation of these guidelines are critical for several reasons:

- **Widespread misuse of veterinary drugs,** particularly antibiotics, in poultry farming contributes to poor treatment outcomes and fosters the development of antimicrobial resistance (AMR).
- Many poultry health service providers rely on experience or informal practices, which may not align with current evidence or best practices.
- **Farmers often self-prescribe or under dose medications,** sometimes without proper diagnosis or professional consultation.
- **Lack of harmonized national guidance** has led to inconsistent disease management practices and poor public health outcomes.
- **These guidelines aim to bridge the knowledge and practice gap** by offering simple, practical, and standardized treatment options that align with current veterinary science and public health goals.

How to use the guidelines in daily practice

- **Reference during diagnosis and treatment planning:** Use the guidelines as a quick consult to confirm or support treatment choices based on symptoms and suspected diseases.
- **Ensure correct drug usage:** Follow the recommended drug, dosage, route of administration, and duration for each condition.
- **Incorporate with clinical judgment:** While the guidelines are evidence-based, practitioners should use them alongside professional experience, especially when dealing with complex or mixed infections.
- **Educate farmers:** Use the content to advise farmers on best practices, withdrawal periods, and preventive measures.
- **Documentation:** Maintain treatment records as suggested in the guidelines to monitor outcomes and improve future decision-making.

General approach to disease investigation

A proper disease investigation is essential for the successful treatment. It involves taking clinical history, physical examination and sample testing to arrive at accurate diagnosis for specific treatment. Veterinary practitioners ought to investigate the disease before recommending a treatment. More importantly, to note that a 'trained eye' sees the flock differently from the ordinary farmer's eyes. Therefore, avoid telephone or long-distance diagnosis or prescriptions except for referral cases or a consultation by another veterinary practitioner.

Aspects considered in disease investigation/ steps to consider during farmer consultation

- **The farmers complaint:** this offers the first glimpse of the nature of the disease on farm, in terms of acuteness, contagiousness (number affected in a time frame) or severity (associated with deaths or production loss). Generally, get information about the clinical signs, severity of the disease in individual birds or flock, number of birds affected, whether the disease is present in the neighbourhoods. Ask the farmer to preserve freshly dead or sick birds with typical signs before you visit.
- **Review of production records:** Farms that keep records help much in assessing the onset of health event or production losses. The veterinary practitioner should review daily performance records (for eggs laid, weight gain), feed consumption, new feed deliveries, visit by external personnel among others. Also review history of previous disease outbreak on farm and current record of mortalities.
- **Flock examination:** This is very important and should not be overlooked. Examine the farm and house conditions for the level of biosecurity and vermin/wild birds' control. While in the poultry unit/, check litter/manure condition, air quality, temperature, light and its distribution, presence of feeds and water, assess flock behaviour and distribution of the birds in house. Flock behaviour is a good indicator of health status. Other important flock activities include; noise levels, eating and drinking.
- **Clinical examination:** Observe for the signs of disease in individual birds and determine the predominant signs (the body systems most affected). Also look at several birds and determine the consistent signs in the flock.
- **Postmortem examination (necropsy):** Open at least 5-10 birds that are dead or sick with the characteristic signs. Do not examine autolyzed or putrefied birds with greenish crop or abdomen as the body tissues are already altered by rotting. Examine the birds, record the consistent lesions and where possible, take close photos of the lesions seen for further consultations with experienced veterinarians. When the pathological lesions are not conclusive for syndromic diagnosis, further samples or chickens should be submitted for laboratory diagnosis

- **Laboratory diagnosis:** Laboratory diagnosis is important for further confirmation of the disease suspected clinically or at field necropsy. Several laboratory tests exist. In active or acute infections, tests aim at determining the causative agent, which may be an organism or a toxin. In this case, samples should come from the sick or birds that have freshly died from a disease with similar signs. The samples include whole birds (5-10 in number), tissues, swabs or blood that are appropriately collected and preserved. Serum is not suitable for detecting the causative agents. For chronic cases or testing for evidence of previous exposure to a disease, serum is the best sample to detect antibodies produced against the infectious agent.

The tests include:

- Independent necropsy to determine lesions attributable to a causative agent
- Impression smears or wet preparations to directly visualize the agent (coccidia, helminths, bacteria, fungi).
- Culture and sensitivity to identify the bacteria and determine which antibiotic is more effective against the bacteria isolated.

How the laboratory supports the use of the guideline

- **Confirming disease diagnosis** to ensure appropriate treatment is selected, especially in cases with overlapping clinical signs.
- **Identifying specific pathogens** responsible for disease outbreaks (e.g., Bacterial, viral, parasitic).
- **Conducting antimicrobial susceptibility testing (AST)** to inform drug choices and reduce potentially ineffective treatments.
- **Monitoring resistance patterns** which feed back into the periodic revision of the treatment guidelines.
- **Surveillance support:** Labs contribute data to national AMR and disease surveillance systems, helping improve the overall quality and relevance of the guidelines. The post vaccination antibody titres help in understanding flock immunity status to diseases and to determine the appropriateness of vaccination methods.

Important principles to consider before you treat poultry with antimicrobials.

Several published literatures offer a wide range of information on misuse and overuse of antimicrobial agents. However, only recently, what constitutes appropriate use has been published in systematic reviews and consensus multinational stakeholder meetings. In general, 22 elements that constitute responsible use are grouped under six subcategories in disease prevention and treatment process (Monnier et al., 2018):

- **Pre-treatment principles-** disease prevention through routine husbandry practices, herd health surveillance and education programs are first line in infection prevention and control. Using alternatives to antimicrobial agents in production is beneficial.
- **Diagnosis-**accurate diagnosis from epidemiological, clinical, necropsy and laboratory tests are important in ensuring targeted efficacious treatments at affordable costs.
- **Therapeutic objective and plan-** based on diagnosis, decide whether antimicrobials are necessary or not and what supportive therapeutic remedies are available. Often, supportive therapy is essential in ensuring recovery of the flock. Focus should not be on drug administration only.
- **Drug selection-** there should be justifiable use of antimicrobials. Antimicrobials should not be used to mask husbandry management failures. Consult the treatment guidelines to inform antimicrobial selection. Use of culture and sensitivity result is an important drug selection guide. All second choice treatment options should be after culture and sensitivity result from the laboratory.
- **Drug use-** adhere to the dosage regimens, duration of treatments, contraindications, drug interactions, target animal species, record keeping and monitoring of response.
- **Post-treatment activities-** observance of withdrawal periods in meat and eggs, minimize environmental contamination with antimicrobials, undertake periodical antimicrobial susceptibility surveillance and continuously evaluate the prescribing patterns of the antimicrobials.

Administering of drugs in poultry

Management of disease outbreaks on poultry should take into account infection prevention measures first, particularly biosecurity measures. Biosecurity in referring in this case to include vaccinations, quarantine, isolation, optimal nutrition, good breeds, housing and optimal husbandry practices. Unlike

companion and large animal veterinary practice where treatment is targeted to individual animal affected, in poultry, treatment is for the entire flock but not an individual. Often, the sick birds have little appetite and consume less water and feed.

Therefore, their drug intake orally is low. The treatment is often a prophylaxis to other birds in the flock. This therefore underscores the importance of disease preventive measures instead of focusing on drugs. As poultry are produced for human consumption, food safety considerations are prioritized. The focus and choice of treatment should consider short-term response and long-term commercial returns. Diseases that result in carrier status in the long-term after treatment are better targeted for elimination on the farm.

Decision to use or not to use antimicrobials in poultry

- **When to use:** valid grounds for antimicrobial medication- these include animal welfare, the risk of disease to other flocks, if the disease is a potential zoonosis and real risk of economic loss due to lack of alternative management options.
- **When not to use**: when it is going to be ineffective, for example in viral, fungal or nutritional diseases. Medication should not be used to provide non-specific cover in stressful times, or just to provide peace of mind to the farmer nor just to use up excess drug stocks. Medication is counter-productive in instances of live bacterial vaccinations.

How to decide which antibiotic to use as first choice or second choice

- **First-choice** antimicrobial prescriptions are generally preferred due to their effectiveness, favorable risk-benefit ratio, and lower potential for resistance development.
- **Second-choice** antibiotics are considered when the first choice is not suitable or has failed, and they tend to be broader-spectrum with a higher risk of resistance or less favorable side effects.

WOAH list of veterinary critically important antimicrobials and the WHO AWARE classification

The World Organization of Animal Health (WOAH), Food and Agricultural Organization (FAO) of United Nations and World Health Organization (WHO) through their technical working committees developed the critical veterinary antimicrobials list and critically important antimicrobials list for humans. Humans, animals and plants sectors have a shared responsibility to prevent or minimize the antimicrobial resistance selection pressures on both human and non-human pathogens and reduce the spillover of antimicrobial resistance into the environment. Overlapping antimicrobials in veterinary use and medical practice were targeted for prudent use. The WHO developed the AWaRe (Access, Watch and Reserve) classification for the choice of antimicrobial treatments in both humans and also developed Medically Important Antimicrobials (WHO-MIA[1]) list for drugs that are used only in humans or animals and overlaps in both.

AWaRe classification of antibiotics

- **Access** antibiotics have a narrow spectrum of activity, lower cost, a good safety profile and generally low resistance potential. They are often recommended as empiric first or second-choice treatment options for common infections.
- **Watch** antibiotics are broader-spectrum antibiotics, generally with higher costs and are recommended only as first-choice options for patients with more severe clinical presentations or for infections where the causative pathogens are more likely to be resistant to Access antibiotics.
- **Reserve** antibiotics are last-choice antibiotics used to treat multi drug-resistant infections.
- **Antibiotics not recommended-** These are fixed-dose combinations of multiple broad-spectrum antibiotics whose effectiveness is not evidence-based and not recommended for use in clinical practice. The list includes multiple combination of antibiotics of different classes. The WOAH[2] and WHO[3] list of critical antimicrobials are available on-line.
- The first and second choice options of treatments for poultry diseases in this guideline are predominantly classified under 'Access' for use.

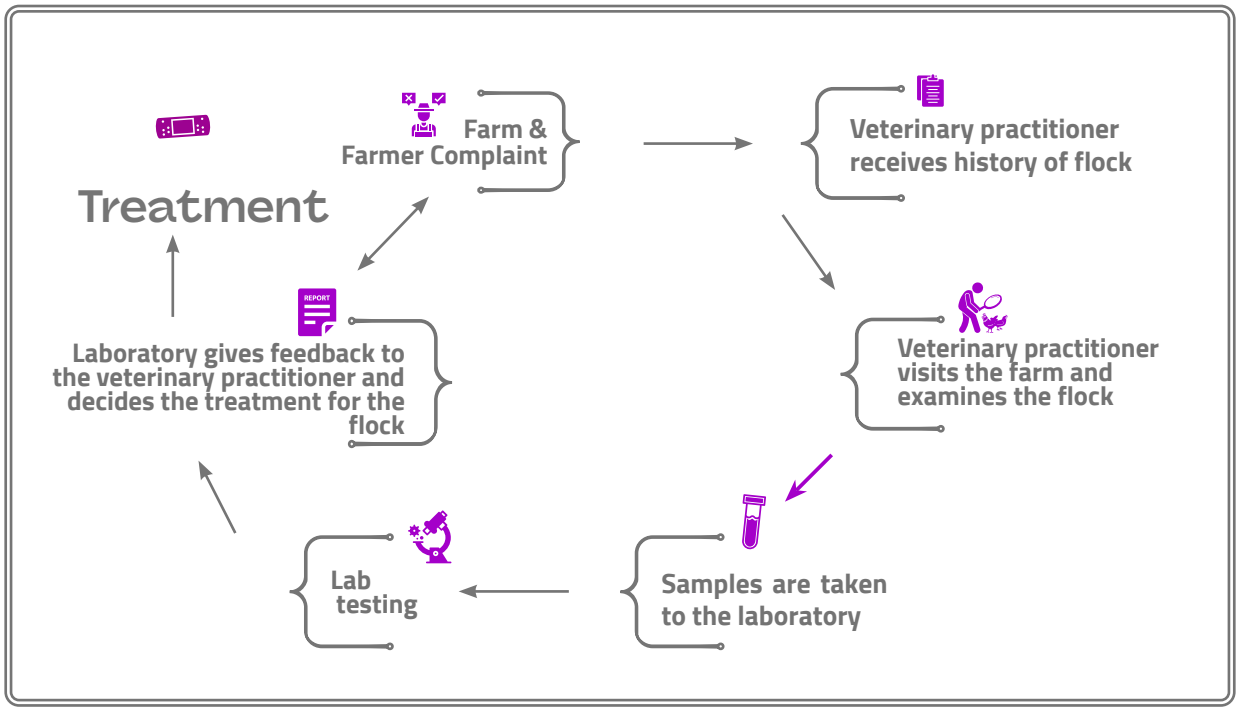
The Essential Veterinary Drug List and National Veterinary Drug Register

MAAIF developed the **Essential Veterinary Drugs List (EVDL)** for Uganda that provides broad range of antimicrobials and other classes of drugs for use in veterinary practice. National Drug Authority (NDA) of Uganda maintains a register of all drugs for veterinary use in the country and the list is updated regularly. The register contains drugs approved for use in animals in Uganda.

In the preparation of this guidelines, the AWaRE classification,WOAH and the NDA veterinary drug register were used to obtain recommendations for the first and second choice treatments to ensure relevance of the guidelines to Ugandan conditions.

A summary list of the available drugs in Uganda based on the AWaRE classification is in Annex Poultry production is one of the components of the livestock sub-sector which has gained popularity and is increasingly becoming a major economic activity in Uganda. This is being triggered by growing human population, reduction in land size for agriculture, changing livestock production systems and food consumption trends. According to 2021 National Livestock Census, 75.4% of all households in Uganda owned poultry, of which chicken was the predominant poultry type found in 7 in every 10 households. The number of households that kept chicken increased by nearly 50% between 2008 and 2021, the livestock census years.

Follow this quick decision chart before starting antimicrobial therapy



[1]https://cdn.who.int/media/docs/default-source/gcp/who-mia-list-2024-lv.pdf
[2]https://www.woah.org/app/uploads/2021/06/202501-en-woah-trd-list.pdf
[3]https://www.who.int/publications/i/item/WHO-MHP-HPS-EML-2023.04

General overview of poultry production in Uganda and prospects of the poultry industry

The national chicken population increased from 37.4 million in 2008 to 57.8 million in 2021, representing a 54.5% increase in about 10 years. Poultry production is expected to increase further as the market demand for foods of animal origin, especially the white meat expands coupled with adoption of intensive agriculture as a strategy for sustainable and profitable livestock production. Local chicken production still constitutes the predominant chicken type kept by small scale holders. Though commercial chicken is on the increase resulting from the current efforts in transformation of food systems, the increase in commercialization of chicken rearing comes along with the need for intensive production to meet the market demands. In turn, this practice of confinement of birds creates conditions ripe for environmental contamination by waste generated by chicken and routine management activities.

The environmental hygiene related factors predispose to infectious diseases which more often result into increased antibiotic use. Therefore, good husbandry practices are essential in maintaining a good environment for chicken and prevent or minimize risk of infections by bacterial pathogens. In that regard, the adage that good husbandry practices cannot be replaced by drugs in maintaining livestock health applies strongly in poultry rearing. For more information about husbandry practices and poultry management, please refer to Poultry Training Manual for Uganda, by MAAIF 2020, available here online[4] .

In intensive poultry rearing, housing is a very important factor in disease prevention. Briefly, here is why this is important;

- Chickens spend their entire lifespan in the house. They eat, sleep and excrete all in-doors
- What affects their health most, therefore comes from within the house (commonest) or introduced from outside (less common)
- Commonest diseases reported/diagnosed are hygiene or managemental in nature (Coccidiosis, Colibacillosis- 7 different syndromes, helminthiasis and other bacteria)
- Less common but with devastating effects include Newcastle Disease introduced from outside

[4]https://www.agriculture.go.ug/wp-content/uploads/2020/07/MAAIF-Poultry-Manual.pdf

Common poultry diseases diagonised in uganda

The diseases commonly diagnosed in Ugandan poultry flocks were identified jointly in a consultative meeting held at Entebbe on 21st to 23rd January 2025 by review of laboratory records for diagnosis of animal diseases, syndromic diagnosis by the practitioners and review of published poultry diseases in Uganda.

Thirteen (13) diseases were listed as common including; **colibacillosis, coccidiosis, Newcastle disease, fowl Cholera and helminthiasis. Others were salmonellosis, respiratory conditions (infectious bronchitis and mycoplasmosis), infectious coryza, gumboro disease, aspergillosis, fowl pox, ectoparasites and nutritional deficiencies.**

The diseases were grouped according to the major organ systems they affect and treatment guidelines were thus structured according to diseases of the organ systems. It is therefore clear that housing & management systems have a great effect on the health and ultimate production of birds later in life.

What aspects must one consider in a house?
Space allowance per bird/stocking rate
Ventilation/humidity/temperature
Lighting

Respiratory system diseases

This is one of the major systems of the body for the survival of the bird. It is also directly exposed to the outside environment through the nasal passages, buccal cavity and eyes.

The main functions are:

Provision of oxygen and removal of excess carbon dioxide- very important for healthy living of the bird and normal production. The environment should not pause risk to interfere with this function.

Rapid adjustment of acid-base balance- removal of carbon dioxide among others influences the acid base balance of the bird. Very viral in survival and egg production. Note that eggshell calcium and bicarbonate ions. Bicarbonate is formed from dissociation of carbonic acid, into hydrogen and bicarbonate ions. Variation in levels of ions influences egg-shell quality and production of the birds.

Removal of excess heat (thermoregulation)- the route by which the birds lose heat build-up in the body. The normal body temperature of chicken is 40-41°C and the feather coat in adults (like a non removable jacket) increases the risk of heat stress in poorly ventilated area. Excess heat (hyperthermia) stops several enzyme functions and quickly kills birds in a short time. Worse still, when the respiratory tract is affected, the efficiency of body temperature regulation is affected. This is evident in birds with obstructed airways exhibiting sudden deaths in the flock.

Vocal communication- among birds but changes in vocalization or stoppage of it reflects a serious respiratory disease.

Signs of respiratory diseases

The signs are relatively easy to recognize.
Early signs include; teary or foamy discharges on the eyes, sneezing, mild cough and sneaks
Advanced signs include; respiratory rales (noises), nasal and oral discharges, severe cough with extended neck, gasping, laboured breathing

A lot of respiratory problems are easy to manage; in case they are not mixed infections or come alone. But often, they are never alone but complicated with other infections or conditions. This makes antimicrobial treatment in disease outbreaks both challenging and unrewarding.
Therefore, it is important to control potential predisposing factors to control respiratory diseases.

Potential triggers of respiratory diseases include:

Environmental factors; Humidity, temperature, ammonia and dust (ventilatory problems and litter management)
Feed factors; Fungal spores in feed (aspergillosis) and Mycotoxins
Management factors; Overcrowding (overstocking or crowding due to uneven light distribution) and stress

The list of common respiratory diseases of poultry in Uganda

Bacterial diseases:

I. Colibacillosis (caused by Escherichia coli)
II. Mycoplasmosis (caused by Mycoplasma gallisepticum and M. synoviae)
III. Fowl cholera (caused by Pasteurella multocida)
IV. Infectious coryza (caused by Avibacterium paragallinarum

Fungi

- Aspergillosis or Brooder pneumonia (caused by Aspergillus fumigatus)

Respiratory parasites

- Gape worm (Syngamus trachea)
- Cryptosporidiosis

Viral diseases

- Newcastle disease (ND)
- Infectious bronchitis
- Fowl pox

Note: Respiratory signs may also appear for any condition that initiates yolk degeneration in laying birds. Spillage of the yolk into the peritoneum and air sacs can induce laboured breathing and other respiratory signs.

1. Colibacillosis

Colibacillosis manifests in several forms in poultry depending on the route of entry of the pathogen and age affected. Forms of colibacillosis according to route of entry of pathogens are Omphalitis, cellulitis, colisepticemia, peritonitis, salpingitis and airsacculitis. Although omphalitis commonly occurs due to Escherichia coli infection, it can occur due to other diseases such as salmonellosis, staphylococcosis, pseudomonas and all precipitated by poor temperature maintainance in the incubators. Therefore, omphalitis is not synonymous with colibacillosis.

Three-day-old chicks with poorly healed nave? (left) and un-reabsorbed fum yolk (bottom image). Normal yolk disappears in three days, should be small and fluidy (not firm or discoloured) at this age

Colibacillosis-Omphalitis

Definition

Omphalitis is an infection of the navel or yolk sac in young poultry. Although commonly caused by Escherichia coli, other bacteria such salmonella, staphylococcus, pseudomonas also caused that too.

Pre-disposing factors

Primarily due to unhealed navels caused by:

- Poor regulation of temperature or humidity in the incubators and hatchers.
- Poor hygiene (bacterial contamination) in the incubators and hatchers leading to contamination of the navels by bacteria.

Diagnosis

Farmers Complaint

- Dull chicks
- High mortality on arrival or soon after
- Chicks appear smaller in size.

Clinical signs

- Dullness,
- Whitish pasty vent, loss of appetite,
- Cuddling together near heat source
- High mortality rate.

Postmortem & Laboratory test

Further testing

- Examine at least 5-10 freshly dead chicks (see photos)

Major lesions

- Scab on the navel,
- Prominent pectoral bones,
- Reddened or discolored yolk or firm unabsorbed yolk.
- Microbiology:
- Submit freshly dead or sick chicks to the laboratory for bacterial culture and susceptibility testing
- Collect yolk sac, liver and heart aseptically and submit to nearest equipped laboratory

Differential diagnosis

- Salmonellosis
- Staphylococcus
- Pseudomonas

Case Management

Supportive care (Husbandry practices)

- Provide adequate warmth, slightly higher brooding temperatures (33-35°C)
- Lower the humidity in the house by opening for ventilation
- Litter should be pre warmed as well.

Treatment

First Choice

Sulphadiazine/trimethoprim at dose rate of 25mg sulphadiazine/kg and 2.5mg trimethoprim/kg per day for 3-5 days

Second Choice:

- Neomycin 10mg per kg body weight in drinking water for 5 days when other systemic infection is detected.
- **Or** Norfloxacin 15mg per kg body weight in drinking water for 3-5 days.

Note: Treatment with antibiotics is often ineffective. Severely affected chicks often die despite treatment

Prevention and control

This is primarily incubation problem at the hatchery.

- Advise farmers to provide feedback to the supplier for future prevention
- Advise farmers to reject chicks if at least 3-5% of sampled chicks of 100 have unhealed navels
- Advise farmers to farmers to cull off chicks that are dull with scabs on the navel
- Advise hatchery owners and management to ensure good hygiene and sanitation in the incubators

Colibacillosis in all Ages

Definition

An infectious disease in which Escherichia coli is the primary pathogen or a secondary invader causing septicemia, peritonitis, cellulitis, salpingitis, air sacculitis and coligranuloma. E. coli infections often result from management failures; often a secondary infection

Pre-disposing factors

- This is an environmental disease associated with poor hygiene and sanitary conditions on the farm and hatchery. It is not transmitted from bird to bird. Poor ventilation in the house
- Birds laying on the ground.

Diagnosis

Farmers Complaint

Persistent cough in flock, swollen eyes with white material, wounds on skin, dullness, drop in egg production, high death rates among others.

Clinical signs

Laboured breathing, dullness, swollen eyes, wounds on the skin, drop in production, distended abdomen, whitish pasty vent in laying birds, loss of appetite and high mortality rate.

Further testing

Postmortem & Laboratory test

- Examine at least 5-10 freshly dead chicks (see photos)

Major lesions

- Conjunctivitis
- Airsaculitis and polyserositis
- Salpingitis
- Cellulitis
- Arthritis
- Septicemic form with swollen liver and spleen, fibrin in body cavities

Microbiology:

- Submit freshly dead or sick birds to the laboratory for bacterial culture.

Differential diagnosis

- Fowl cholera due to septicemic form
- Salmonellosis due to liver and spleen lesions
- Staphylococcus due to necrotic skin wounds
- Mycoplasmosis due to airsaculitis

Case Management

Supportive care (Husbandry practices)

- Improve the hygiene and sanitation in the house
- Provide adequate ventilation to allow in fresh air
- Provide adequate nesting space for the layers
- Block direct sunrays into the house when swollen eyes are seen. Bright sports encourage congregations in those areas and excessive playing resulting in eye and respiratory infections by fecal bacteria and ammonia form urates in the litter.
- Remove sharp objects that may cause wounds on skins
- Remove cheesy materials from eyes and flush with clean water
- Cull-off layers that have pasty vents, distended firm abdomen and prominent keel bones

Prevention and control

Treatment is best after culture and susceptibility testing

- **FirstChoice:**Sulphadiazine/trimethoprim at dose rate of 25mg sulphadiazine/kg and 2.5mg trimethoprim/kg per day for 3-5 days
- **Second Choice:** Neomycin 10mg per kg body weight in drinking water for 5 days when other systemic infection is detected.
- **Or** Norfloxacin 15mg per kg body weight in drinking water for 3-5 days.

Note: Sulfonamides are not suitable for use in laying hens.

		Prevention and control Do not resort to antibiotics in most cases of colibacillosis. Instead, try to investigate and correct the root cause. Target the main form of manifestation and identify the route on entry of the pathogen into the bird. ▪ Good litter management at the farm ▪ Ensure hygiene and biosecurity at the places of feed, egg nests and appropriate housing with uniform micro environment. ▪ Provide adequate nest/laying boxes ▪ Adequate ventilation in the poultry house ▪ Use feeders that minimize birds roosting on them **Control aspects** ▪ Regular cleaning of feeders and waterers ▪ Chlorination of drinking water inactivates the bacteria

Other forms of manifestation of colibacillosis (E.coli infections)

a. Conjunctivitis

Conjunctivitis in the inflammation of the conjunctiva of the eye. It is often accompanied by or associated with other respiratory signs such as rales, sneezing, and laboured breathing. Early signs appear as teary eyes, later progress to swollen eyes with cheesy materials beneath the eye lids. Such birds should be isolated from the flock and the material in the eyes squeezed out gently and flush the eyes with water.

The birds can then be given treatment under colibacillosis in the treatment guide.
The predisposing factor is excessive dust from sunbathing promoted by uneven light distribution (direct sun rays) when house orientation is not in east west direction in open-sided houses. Therefore, this form of colibacillosis is mostly in deep litter system.

Conjuctivitis with cheesy white material covering the eyes in pullets

b. Cellulitis

This is the inflammation of subcutaneous tissue characterized by fibrin deposition or scab in the affected area. Such occur due to invasion of the fecal bacteria to those areas of skin injury. Treatment is not effective, culling off the affected bird is necessary. Search for possible cause of skin injury in the house, such as sharp nails or wires on wooden structures and remove the cause.

Cellulitis

Fibrin deposition in the subcutis of a broiler and contaminated wound of a layer bird

c. Air sacculitis and polyserositis

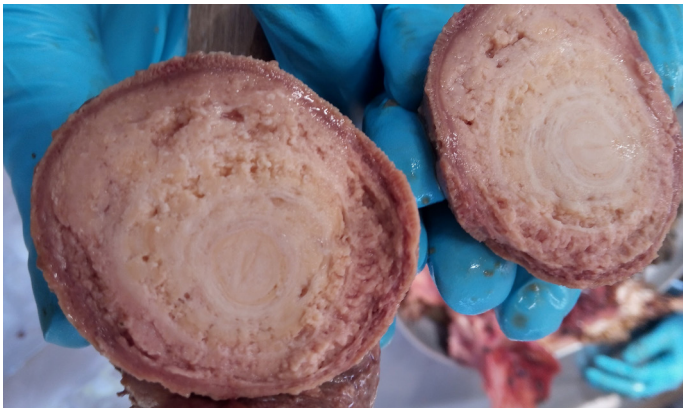
Air sacculitis is the inflammation of the air sacs of the birds while polyserositis refers to the inflammation of all serous surfaces, including the air sacs, peritoneum, pericardial sac and perihepatic tissue. This is severe form of colibacillosis often associated with septicemia and high morbidity and mortality rates. Antibiotic treatment at this stage is often ineffective. Severely sick birds are better culled. However, if treatment is attempted, sulfonamides such as Sodium sulfamethazine/trimethoprime may be used to save the flock at dose indicated in the table. Prevention is by observing stocking rate, even light distribution and flock distribution in the house and ensuring adequate air flow (ventilation) into the house.

Marked fibrin deposition on the air sacs and serous membranes covering organs

d. Salpingitis

This is the inflammation of the oviduct. It is a reproductive form of colibacillosis in laying hens, called ascending colibacillosis. In early stages the disease, birds are dull, lose appetite and there is marked drop in egg production. The content of the oviduct is first soft or fluidy fibrin before it becomes solid and organized in layers. Those hens with solid materials often have firm, distended abdomen, prominent keel bone and sometimes pasty vent with gritty feeling of urates at the vent. Treatment of the birds in this stage is not effective, should be culled.

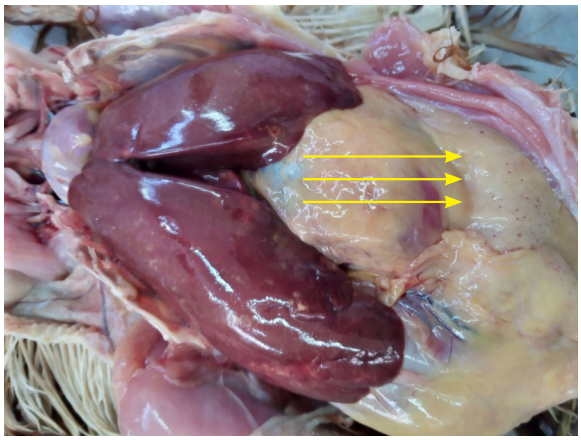
Solid whitish organized fibrin filling the oviduct (egg tract)



Semi-solid/ solid fibrin arranged in concentric layers

e. Coli septicemia

Septicemia refers to bacteria in blood. It is often associated with systemic signs including general dullness, loss of appetite, laboured breathing, high morbidity and mortality. In dead birds, features of pinpoint hemorrhages (also called petechiae) can be seen on serous surfaces and adipose tissue. Also, fibrin deposition in body cavities can be seen, in addition to ovarian follicle degeneration in laying birds.



Liver enlargement, fibrin in peritoneum and pinpoint bleeding spots (arrows) on fat tissues in the abdomen and surface of the heart

Swollen Joints in a bird

The content from the right image was caseous and E. coli was isolated from the joint swabs as well as other organs of the same bird. Antibiotic penetration into joints of such birds is poor and so such lame birds should be culled.

f. Coligranuloma

Coligranuloma, also called Hjarre's disease is a chronic form of colibacillosis in adult birds. Granulomas are firm nodules that develop on surface of intestines, mesenteries and liver. Birds with such lesions are unresponsive to antibiotic treatment. Dull, weak, emaciated birds often with distended abdomen from a previous colibacillosis outbreak should be culled.

The chronic form of colibacillosis lesions

Infectious Coryza

Definition

This is a respiratory infectious disease caused by Avibacterium (Hemophilus) paragallinarum that primarily occurs in laying chickens characterized by high rate of spread resulting in swelling of infraorbital sinuses and face containing foul smelling exudate.

Pre-disposing factors

- The organism survives only for short period in the environment
- Carrier birds or chronically infected chicken are the main source.
- Age (above three months)
- Mixing birds from different pens or age groups on the same farm.
- High stocking density
- Poor sanitation and hygiene
- Poor Biosecurity

Farmers Complaint

Diagnosis

- The chicken have swollen heads and drop in egg production Flu-like signs in the flock affecting many birds.

Clinical signs

- Eye and nasal discharges with swollen head due to edema of face and eyelids. Conjunctivitis, teary eyes, reduced egg production and reduced feed consumption.

Further testing

Postmortem & Laboratory test

- Examine at least 5-10 freshly dead chicks (see photos)

Major lesions

- One or both infraorbital sinuses filled with yellow,
- cheesy exudate, eyelids may be swollen or adhered by exudate,
- facial edema/swelling

Microbiology:

- Submit freshly dead or sick birds to the laboratory for bacterial culture.

Differential diagnosis

- Fowl cholera due to septicemic form
- Salmonellosis due to liver and spleen lesions
- Staphylococcus due to necrotic skin wounds
- Mycoplasmosis due to airsaculitis
- Collibacillosis because of the cheesy white material in the eyes

Case Management

Supportive care (Husbandry practices)

- Provide adequate ventilation to allow in fresh air
- Observe stocking density in the house as recommendation in the MAAIF poultry production manual.

Treatment

Treatment is best after culture and susceptibility testing

- **First choice:** Oxytetracycline 250-400mg in drinking water at 100gram per 200 litres 3-5 days.
- **Second choice:** Sulphamethoxazole 10.0%/ trimethoprim 2.0% at 5gram per 5 litres of water for 5 days. 60mg/kg live weight in drinking water for 5-7 days
- Erythromycin 10-20mg in drinking water at 100gram per 200 litres in water for 3-5 days
- **Or** Chlortetracycline 2500mg/L drinking water for 5 days

Prevention and control

- Practice all-in, all-out system of production to eliminate carriers from farm and break transmission cycle
- Vaccinate with coryza bacterins to prevent the disease in production

A hen with swollen infaorbital sinus from a flock with acute respiratory signs

Semisolid caseous exudate in the infraorbital sinuses

A hen with swollen infraorbital sinus

Mycoplasmosis (chronic respiratory disease)

Definition

This is a chronic respiratory disease caused by mycoplasma bacteria in a variety of birds, especially chickens and turkeys, characterized by nasal exudate, coughing and debilitation.

Pre-disposing factors

- Vertical transmission from parents to off-springs
- Horizontal transmission in house through aerosols
- Severe disease is seen in co-infection by E. coli and other respiratory viruses.

Diagnosis

Farmers Complaint

Persistent cough, nasal discharge, sneezing, snoring, drop in egg production, Increased morbidity and chicken appear weak.

Clinical signs

In laying hens: signs are rare, however, respiratory noises, Laboured breathing seen as gaping while breathing, decreased feed intake, drop in egg production with sometimes abnormal discolouration of eggs may be seen.

In broiler chickens: Chronic respiratory disease with coughing, sneezing (snicks), discharges from the eyes and nasal passages occur, poor feed conversion and condemnations at slaughter due to air sac infections.

Differential diagnosis

- Colibacillosis
- Chronic fowl cholera
- New castle diseases

Treatment

Supportive care (Husbandry practices)

- Mycoplasma alone produces mild respiratory signs. Severe conditions are often associated with E. coli infection.
- See supportive care for colibacillosis
- Provide adequate ventilation to allow in fresh air

Prevention and control

Treatment does not eliminate infection and does not prevent egg transmission of infection

- **First choice:** Oxytetracycline 250-400mg in drinking water at 100gram per 200 litres 3-5 days
- **Second choice:** Tylosin tartrate at 100g/200 litres of drinking water for 3-6 days depending on the severity of the disease.
- **Or** Tiamulin 10% feed premix at 25-50mg/kg body weight for 3-5 days depending on the severity. The dose is achieved through mixing 2.5-5kg premix per ton of feed.
- **Treatment is not recommended in parent stock.**

Further testing

Postmortem & Laboratory test

- Examine at least 5-10 freshly dead chicks (see photos)

Major lesions

- In chickens, fibrinous pericarditis, fibrinous perihepatitis and airsaculitis are seen.
- In turkeys, swollen sinuses containing clear fluid is seen in MG alone, but caseous when coinfection with E. coli exists

Microbiology:

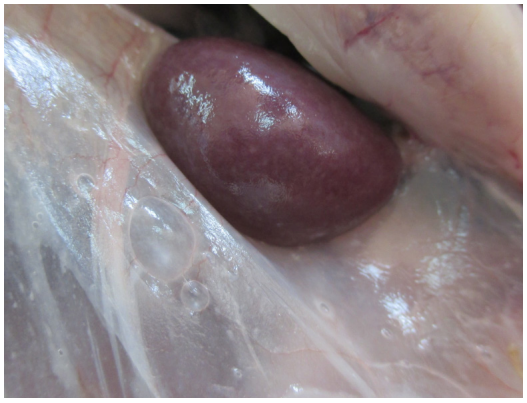
- serum plate agglutination test, culture or polymerase chain reaction

Prevention and control

- Practice all-in, all-out system of production to eliminate carriers from farm.
- Purchase chicks from reputable hatcheries
- Vaccines available elsewhere and can be introduced for disease prevention.

Cloudy air sacs with fibrin deposition due E. coli makes it cloudier and thicker with fibrin deposition

Egg apex abnormalities, including discolourations, wrinkles and blood spots in Mycoplasma synoviae



Moderate cloudiness of the air sacs with foamy material due to inflammation of the air sacs

Fowl Cholera (Pasteurellosis)

Definition

Infectious disease of birds caused by Pasteurella bacteria and often characterized by an acute septicemia with sudden deaths in individual birds, high morbidity and mortality. It is primarily a disease of growers and mature birds rather than young chicks.

Pre-disposing factors

- Stressful conditions such as overstocking, changes in house temperature and wet litter
- Pecking and cannibalism
- Previous outbreak where older birds can be carriers
- Rodents can transmit disease between houses
- Poor hygiene

Diagnosis

Farmers Complaint

High mortality in flocks (above 3 months old), some die suddenly without signs noticed, respiratory noises and diarrhea

Clinical signs

The disease is severe in turkeys (up to 50% mortality) and chicken (up to 10% mortality)

Two forms exist, acute and chronic.

- **Acute form:** sudden deaths with rapid increase in mortality, hens often found dead in nests. Greenish-yellow diarrhea, decreased feed consumption, weight loss, lameness, swollen wattles or combs decreased egg production
- **Chronic form:** more in older chickens, presenting with swollen joints, wattle or comb. Head tilt from infection of inner ear may be seen. Swollen wattles have cheesy material when cut.

Further testing

Postmortem & Laboratory test

- Examine at least 5-10 freshly dead birds (see photos)

Major lesions

- Diffuse fibrin deposits on air sacs and peritoneum. The lung has yellowish surface and is firm (fibrinous pleuropneumonia), pinpoint hemorrhages on abdominal fat, heart surface and on liver. Yolk deposits in the peritoneum.
- Chronic form has caseous material in wattles, joints and sometimes in abdomen.

Microbiology:

- Submit freshly dead or sick birds to the laboratory for bacterial culture.

Differential diagnosis

- Colibacillosis
- Salmonellosis
- Staphylococcus (bumble foot) may be confused with chronic pasteurellosis

Case Management

Supportive care (Husbandry practices)

- Prompt removal of carcasses

Treatment

- **Caution:** Treatment is only for a short-term relief, carrier states occur, disease often reappears after discontinuation of antibiotics.
- **First Choice:** Oxytetracycline 250-400mg in drinking water at 100gram per 200 litres 3-5 days.

Or Sulphadiazine 400mg and trimethoprim 80mg in water at 100grams in 500 litres of water for 5 days.

- **Second Choice:** Erythromycin 10-20mg in drinking water at 100gram per 200 litres in water for 5 days

Or Neomycin 100mg in water at 100g per 200 litres of water for 5 days.

Note: Sulfa drugs should not be used in hens laying eggs for human consumption.

Prevention and control

- Cull off birds with swollen wattles or combs after an outbreak to remove carriers.
- Thoroughly disinfect a premises that had the disease and control rodents.
- Practice all-in, all-out management
- Depopulate older flocks, rest the house for 4-6 weeks before restocking.

Swollen wattles (L) in a breeder cock and the wattle contains caseous (White cheesy) material (R)

Newcastle Disease (ND)

Definition

ND is an acute, rapidly spreading, viral disease of birds of all ages characterized by lesions in the respiratory tract, visceral organs, and brain resulting in high mortality in susceptible flocks.

Pre-disposing factors

- Poor biosecurity, allowing easy access to birds by infected birds or contaminated equipment and workers
- Birds without immunity due to no vaccination or vaccination failure (from improper vaccination methods)

Farmers Complaint

Diagnosis

Many birds in a flock affected by cough, loss of appetite, greenish diarrhea, drop in production and high mortalities.

Clinical signs

The signs depend on the strain of virus infecting the chicken.

- Lentogenic and mesogenic strains mainly cause mild to moderate respiratory diseases and drop in production. However, secondary infections by E. coli make the mild infections severe and cause deaths of birds.
- Velogenic strains cause severe dullness, loss in appetite, respiratory signs, greenish diarrhea with white urates, drop in production and high mortality.

Differential diagnosis

- Colisepticemia
- Avian influenza
- Fowl cholera

Case Management

Supportive care (Husbandry practices)

- Provide ambient temperature and avoid stressful handling of affected flocks
- Support birds with vitamins
- Support birds with a decongestant.

Treatment

- **First Choice:** There is no effective treatment for Newcastle disease.
- **Second Choice:** No effective antimicrobial for treating Newcastle disease. Infections by mild strains without secondary infection recover in 3-6 weeks.

Further testing

Postmortem & Laboratory test

Major lesions

- Velogenic strains cause hemorrhages in proventriculus, intestines, cecum and trachea.
- Mesogenic strain may only cause
- hemorrhages of proventriculus without the Peyer's patches in intestines.
- Lentogenic strain causes mild tracheitis in early stages of the disease.

Microbiology/Serology:

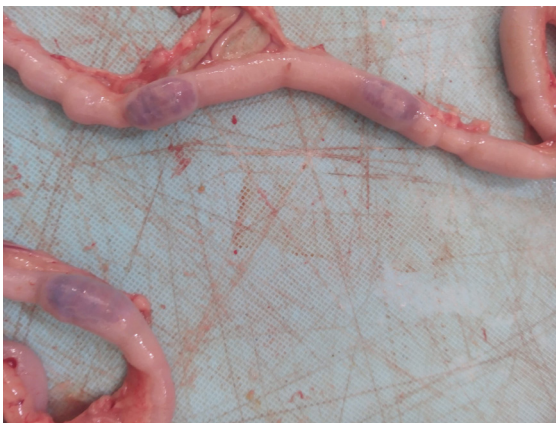
- Rapid test kits, serological tests (ELISA,
- HA/HI test) and agent detection by
- isolation and/or PCR test.

Prevention and control

- Prevention requires strict quarantine and biosecurity measures and an effective vaccination program.
- Keep unauthorized personnel out of the poultry house, clean and disinfect equipment entering poultry house.
- Follow strict vaccination schedules to prevent the disease.
- Control requires breaking the transmission cycle by vaccinating nearby healthy flocks and repeating the vaccination in 10-14 days when outbreak is in the area.

Signs and gross lesions of Newcastle disease in chicken and with such severity, the immune system of the chicken is affected and recovery is unlikely.

Twisting of the neck in the severe nervous form of Newcastle disease. Birds with such signs of brain injury have no hope of recovery



Hemorrhages in Peyer's patches visible from the serosal surface of the intestines in the severe (velogenic viscerotropic form of Newcastle disease)

The mucosal surface of the intestines with necrosis and hemorrhages of the Peyer's patches and proventriculus

Infectious Bronchitis

Definition

Infectious bronchitis is an acute, contagious viral disease of chickens caused by avian corona viruses that primarily manifests with respiratory disease.

Pre-disposing factors

- Poor biosecurity, allowing easy access to birds by infected birds or contaminated equipment and workers
- Birds without immunity due to no vaccination or vaccination failure (from improper vaccination methods)

Diagnosis

Farmers Complaint

Many birds have mild to moderate cough, drop in production, abnormal egg shape or loss of shell colour.

Clinical signs

Mild respiratory symptoms, such as sneezing, snicks, mild nasal discharges and moist rales. Gasping is seen when much exudate is in the airways

- Older birds may only show mild cough while younger birds may be depressed with severe disease.
- Drop in egg production is accompanied by wrinkled, thin-shelled or misshapen eggs. There is often watery diarrhea with excess urates in the droppings.
- Birds affected with nephrotropic strains of IB appear depressed, dehydrated, and have ruffled feathers. Dehydration may lead to visceral gout at some in severe cases.

Further testing

Major lesions

- Serous or caseous exudate in the trachea, reddening of the tracheal mucosa, mucosa, nasal passages and sinuses.
- Often, a cheesy plaque may be found in the lower trachea or at the bifurcation of the bronchi.
- Abrupt drop in egg production and there are soft-shelled or misshapen eggs with wrinkled shells.
- Egg albumin can be watery (low viscosity).

Microbiology/Serology:

- Serological tests (ELISA) to monitor the antibody titre levels.
- PCR or virus isolation from tracheal swabs.

Differential diagnosis

- Newcastle disease
- Infectious laryngotracheitis

Case Management

Supportive care (Husbandry practices)

- Provide ambient temperature and avoid stressful handling of affected flocks
- Provide good ventilation in the house
- Support birds with vitamins
- Support birds with a decongestant.
- Isolate sick birds
- Reduce on the stocking density

Treatment

- **First Choice:** There is no effective treatment for Infectious bronchitis.
- **Second Choice:** No effective antimicrobial for Infectious bronchitis. In complication by bacterial infections as shown by severe depression, thick oro-nasal discharges and marked respiratory distress, Oxytetracycline 250-400mg in drinking water at 100gram per 200 litres 3-5 days may be administered.

Prevention and control

- Practice all-in, all-out system of production to eliminate carriers from farm.
- Purchase chicks from reputable hatcheries
- Vaccines available elsewhere and can be introduced for disease prevention.

Fibrinous exudate in the upper trachea. Similar exudates can be seen in the tracheal bifurcation, obstruction airflow to the lungs

Aspergillosis

Definition

This is a fungal infection of the respiratory system chicken, that mainly affects chicks in the brooder. This is an environmental disease. Not transmitted from bird to bird.

Pre-disposing factors

- Contaminated incubators/hatchers or
- In the brooder that has high fungal spores from litter or feed and
- Ventilation is poor (concentration of spores in the house due limited air flow)

Farmers Complaint

Diagnosis

- Dullness among chicks, poor appetite, unthriftiness and deaths

Clinical signs

- Laboured breathing often with gasping, loss of appetite, dullness and relatively high mortality among chicks.

Postmortem & Laboratory test

- Examine at least 5-10 freshly dead chicks (see photos)

Major lesions

- Whitish nodules on the lungs and air sacs
- Some of the nodules may extend to adjacent tissue like intestines

Microbiology:

- Fungal culture (optional)

Differential diagnosis

- Infectious bronchitis
- Mycoplasmosis
- Pneumonia from bacteria
- Gapeworm
- Heat stress

Case Management

Supportive care (Husbandry practices)

- Provide adequate ventilation to allow in fresh air
- Cull-off severely affected chicks

Treatment

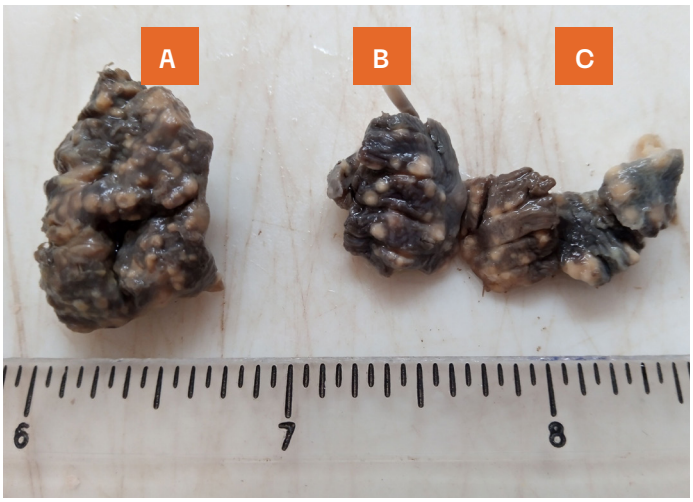
- **First Choice:** No effective treatment.
- **Second Choice:** No effective treatment

Prevention and control

If chicks die from aspergillosis at less than seven days a contaminated

- hatcher is prime suspect.
- Provide feedback to the supplier for future prevention
- Provide adequate air flow into the brooder
- Use dry clean litter during brooding
- Recommend culling the gasping chicks

Lungs with aspergillosis



Lungs from chicks with aspergillosis. Whitish nodules are visible on the lungs that are fixed in formatin after postmortem examination. A) lung from 4- week-old bird, B) lung from 1 week old chick and c) is a lung from 3-day old chicks.
Chicks with lungs B and C were likely affected from the hatchery

Fowl pox

Definition

Fowl Pox is a slow-spreading viral disease of chickens, turkeys and pigeons characterized by eruptions and scab-like skin lesions on the head and wattles. Diphtheritic plaques may also be found in the mouth, esophagus and laryngeal area.

Pre-disposing factors

- Exposure of naïve chicken to infected bird, directly or indirectly through equipment and personnel.
- The disease more severe in young to semi-mature birds.
- Heat stress increases mortality in birds with wet pox.

Farmers Complaint

Diagnosis

Swellings on the head, loss of appetite.

Clinical signs

Fowl pox has two forms: cutaneous (dry) and membranous (wet).

- Cutaneous form has nodules or scabs on the head (comb, wattle, eyelids) and other unfeathered parts of the body. The scabs may close the eyelids and prevents vision in the birds. Such birds starve.
- The wet pox has raised fibrinous plaques on the mucosa of the mouth, esophagus, or tracheal inlet. Obstruction of airways leads to gasping and suffocation.

Differential diagnosis

- Traumatic wounds on the comb
- Periorbital skin scabs due to conjunctivitis and scratching

Case Management

Supportive care (Husbandry practices)

- Avoid heat stress and excitatory activities in flocks with wet pox
- Control cannibalism to limit transmission rate

Treatment

There is no effective treatment for fowl pox.

Further testing	Postmortem & Laboratory test	Prevention and control
	▪ Lesions enough for presumptive diagnosis **Major lesions** ▪ Cutaneous form has nodular scabs on the comb, wattle and eyelids ▪ Wet pox has fibrin plaques in the buccal cavity and tracheal inlet. **Microbiology/Serology:** ▪ Confirmation is by histopathology or virus isolation.	▪ Vaccination is the only effective method of preventing/controlling fowl pox. As the disease is relatively slow-spreading, vaccination may be done in a flock where some lesions already exist, provided the sick are few and can be isolated.

Pox lesions in a 3 month - old backyard (above) and a layer pullet below . The head nodular swellings

Digestive system diseases

The health of the digestive system is very important for the survival, growth and production of the birds. It is the route of entry and absorption of nutrients into the body. The digestive system comprises of different organs/parts. Each body part, from the buccal cavity to the cloaca performs a specific function. Thus, any problem with food entry, absorption and waste exit can affect the health, welfare and behaviour of the birds. The veterinary practitioner ought to be knowledgeable and conversant with the anatomy and physiology of the parts of the digestive system to be able to detect the slightest gross alteration that may interfere with digestion. In investigating digestive diseases, follow the general approach described above in addition to the following features:

Check the general behaviour of the birds: Birds with digestive disorders tend to be dull and have arched backs with ruffled feathers.

For the litter materials: Check for the consistency and colour of the droppings for a number of birds in a given flock. Wet droppings may be due to digestive or urinary tract problems, differentiate the two. Soft droppings may be due to mal-digestion (due to stomach problems) or mwwwal-absorption (due to intestinal problems) or sudden recent change of feed. Presence of undigested food particles in droppings is an indicator of digestive problem. The yellow, brown, orange or red colour of droppings indicate coccidiosis or other bacterial infections. The colour of droppings should be compared with the flock behaviour and age. Though, not all brown fecal matter means coccidiosis. For adult birds, dietary factors may be the most common cause of fecal colour change.
Generally, interest in litter materials include wet litter, hemorrhagic droppings, by-pass feeds (undigested feeds) in droppings, presence of worms or their segments and a white urate component.
In individual sick birds: Check for crop fill, muscle mass of the chest and colour of droppings stains of the vent.

The common digestive system diseases of poultry recognized in Uganda are indicated in bold in the list below:

- **Coccidiosis**
- **Necrotic enteritis**
- **Salmonellosis**
- **Intestinal worms**
- Dysbacteriosis
- Fatty liver disease
- Avian intestinal spirochaetosis
- Histomoniasis

Coccidiosis

Definition

This is an intestinal tract infection of poultry caused by a protozoan parasite. It is mainly characterized by poor weight gain, sleepiness, diarrhea and deaths in flocks.

Pre-disposing factors

- Rearing on the floor and moist litter
- High stocking density
- Heavy contamination of litter, feed and water

Diagnosis

Farmers Complaint

Orange, yellow, red, black, brown diarrhea, dullness of chicken, prominent keel bone and persistent mortalities

Clinical signs

Dehydration, ruffled feathers, pale to white mucous membranes, listlessness, bloody diarrhea, drooping of wings weakness, retraction of the head and neck. Reduced growth rate

Further testing

Postmortem & Laboratory test

- Examine at least 5-10 freshly dead or sick chicken (see photos)Major lesions

Major lesions

- Lesions vary according to Eimeria species involved

Microbiology

- Intestinal mucosal scrapping with cover slides and view on microscope

Differential diagnosis

- Colibacillosis
- Nutritional deficiencies
- Salmonellosis
- Mycotoxins

Case Management

Supportive care (Husbandry practices)

- Remove the contaminated litter from the house after treatment of birds and replace litter with a depth of about 10cm -15 cm.
- Follow recommended husbandry practices

Treatment

No anticoccidial is highly effective against all species of coccidia although some are effective against multiple species. In case of severe the intestinal damage, there is poor treatment outcome.

- **First Choice:** Amprolium us at 250mg/L of drinking water for 5-7 days.
- **Second Choice:** Toltrazuril 25mg solution mixed at 200ml per 200 litres of water for 2 consecutive days. Repeat after 5 days of rest in severe cases. Withdrawal period is 14 days for meat. Do not use in egg laying birds.
- **Or** Diclazuril 25mg mixed in at 200ml per 200 litres (1ml/1litre) for 3-5 days. Withdrawal period for meat and eggs: nil
- **Or** Amprolium 200m/Sulfaquinoxaline 150mg at 20 g per 20 - 40 litres of drinking water for 5 - 7 days. Withdrawal period: meat- 14 days, eggs- do not give to egg laying birds
- **Or** Salinomycin 12% granules in feed at a rate of 0.5 kg per ton of feed.

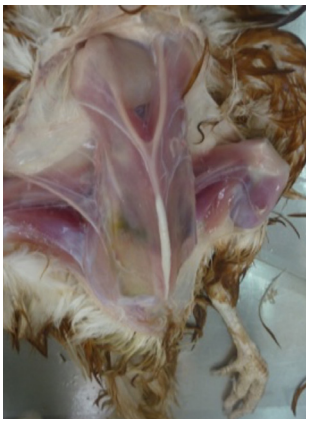
Note: Sulfonamides are not recommended in laying stock as it can significantly affect egg production and those intending to lay.

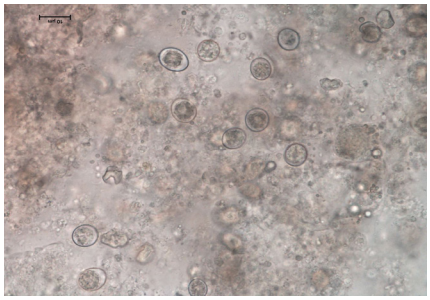
Salinomycin is toxic at high doses, so proper feed mixing and observance of dose rate is required. Withdrawal period for meat is 5 days.

Prevention and control

- Good management practices including use of dry, clean and sufficient litter during brooding and all through the rearing cycle.
- Ionophores (e.g.. Salinomycin) in feeds for 7 days
- Vaccination with live attenuated vaccines







Coccidia oocysts (Eimeria tenellla) lesions from the cecal mucosal scraping from hemorrhagic cecum

Necrotic Enteritis

Definition	This an infection of the intestines caused by **Clostridium perfringens** resulting in depression and sudden deaths in chicken. It is often secondary to coccidiosis infection or ascariasis in poultry.
Pre-disposing factors	▪ Coccidiosis outbreak ▪ Ingestion of rough items such as rice husks in litter and rough feed that damage intestines. ▪ Dietary change with alteration of gut pH.
Farmers Complaint	Brown diarrhea, dullness of chicken or sudden deaths in the flock
Clinical signs	More in young birds 3-16 weeks, sudden deaths, history of coccidiosis, weakness and depression with head held down
Further testing	**Postmortem & Laboratory test** ▪ Examine at least 5-10 freshly dead chicks (see photos) **Major lesions** ▪ Swollen small intestine filled with brown to orange thick debris or yellowish pseudomembrane, distended crop with water, marked dehydration **Microscopy:** ▪ Bacterial culture of intestinal necrotic debris for clostridium

Differential diagnosis

- Coccidiosis
- Fowl cholera

Case Management

Supportive care (Husbandry practices)

- Control coccidiosis by maintaining litter hygiene and treating with anticoccidials

Treatment

- First Choice: Oxytetracycline 25% orally at rate of 100g in 200 litres of drinking water for 5 days.
- Second Choice: Zinc bacitracin 150g/Kg- Thoroughly mix 1.33kg of Zinc bacitracin per ton of feed to produce a concentration of 200g bacitracin/ton in the finished feed. Feed for 5-7 days.

Prevention and control

- Control coccidiosis in the flock
- Avoid conditions that would force birds to eat litter such as rice husks
- Do not include wheat middlings in the diet above the recommended inclusion rates.

Small intestines from birds that had coccidiosis complicated by necrotic enteritis. On the left, the intestinal content in blood and thick with necrotic debris of intestines (jam-like) from a dead bird while the right is in the early stages of necrotic enteritis in a live bird that had Eimeria necatrix infection

Salmonellosis

Several forms of salmonellosis exist in poultry. In Uganda, the confirmed infections in poultry are Pullorum disease (Salmonella pullorum) in chicks, Fowl typhoid (Salmonella gallinarum) in mature and semi-mature chicken and paratyphoid (S. enteridis) in all ages but more often in adult chicken. Peak mortality at 2-3 weeks after hatch. High mortality in chicks less than 10 days-old. Dead chicks may be seen in hatcher. Pasty white vent (cloaca); birds don't eat and huddle near heat source.

Pullorum Disease (Bacillary white diarrhea)

Definition	It is an infectious, egg-transmitted disease of chicks and turkey poults, characterized by white diarrhea and high mortality in young birds while adults are sub clinical carriers of infection.
Pre-disposing factors	▪ Adult hens are the carriers ▪ from Contaminated breeders and hatcheries ▪ Contaminated workers or rodents. ▪ Poor biosecurity measures
Farmers Complaint	Some dead chicks seen on arrival, dullness, high death that is rising each day after stocking.
Clinical signs	Dead chicks may be seen on arrival. High mortality in chicks less than 10 days old. Mortality peaks at 2 to 3 weeks old. Pasty white vent; anorexia, huddling near heat source.
Further testing	**Postmortem & Laboratory test** ▪ Examine at least 5-10 freshly dead chicks (see photos) Major lesions ▪ White urates at cloaca, retained yolk sac, swollen liver with white necrotic spots, swollen spleen **Microbiology:** ▪ Submit freshly dead or sick birds to the laboratory for bacterial culture and confirmation.

Differential diagnosis

- Omphalitis and colibacillosis
- Chilling or over heating then dehydration
- Staphylococcosis
- Wet form of fowl typhoid

Case Management

Supportive care (Husbandry practices)

- Provide adequate warmth to the chicks
- Provide uniform light and heat source

Treatment

Caution: Antibiotics cannot eliminate the disease, either at the flock level or individual bird level leading to carrier status.

- **First Choice:** Trimethoprim 2.0% w/w & Sulphamethoxazole 10% w/w at 5g in 5 litre of drinking water for 5 days.
- **Second Choice:** Neomycin 100mg in drinking water for 5 days at 100g in 200litres of water.
- **Or** Enrofloxacin 10% in drinking water for 5 days at a starting dosage of 5g/litre.
- **Note:** Resistance to Enrofloxacin is quick and should not be prescribed routinely on farms. Treatment is not recommended in parent stock.

Prevention and control

- In ideal situations, this is a disease controlled by test and slaughter. However, lack of compensation regime does not favour this method.
- Pullorum disease is not easily eliminated by treatment. This is entirely a breeder problem. Avoid sourcing chicks from non-certified hatcheries is the best prevention method.

	▪ Thoroughly disinfect a premises that had the disease and control rodents. ▪ Ensure proper biosecurity and maximum hygiene

Several dead chicks at hatching. Some of the chicks were sleepy in the hatcher trays on the day of removal from the hatcher

A 5-day-old chick with swollen liver having diffuse whitish spots. Significant amount of yolk sac found in the bird

Fowl Typhoid (*Salmonella gallinarum*)

Definition	It is an infectious disease of chicken and turkeys characterized by high mortality in semi-mature and adult birds with many features similar to pullorum disease. It occasionally affects chicks and poults.
Pre-disposing factors	▪ It is vertically transmitted like pullorum disease ▪ Adult hens are the carriers ▪ Sourcing chicks from contaminated breeders and hatcheries ▪ Maintenance of disease on farm may be by workers or rodents and migratory birds. ▪ Weak biosecurity measures and poor hygiene

Differential diagnosis

- Colibacillosis
- Fowl cholera

Case Management

Supportive care (Husbandry practices)

- Regularly clean drinkers and give clean water.

Treatment

Treatment is best after culture and sensitivity. Treatment is only for a short-term relief.

- First Choice: Oxytetracycline 250-400mg in drinking water at 100gram per 200 litres 3-5 days.
- Or Sulphadiazine 400mg and trimethoprime 80mg in water at 100grams in 500 litres of water for 5 days.
- **Second Choice:** Gentamicin 100mg in water at 100g per 200 litres of water for 5 days.

	Diagnosis
Farmers Complaint	High mortality in flocks (above 3 months old), many are dull with no appetite, white or greenish diarrhea seen.
Clinical signs	Dehydration, anorexia, marked depression, diarrhea, drop in egg production and high mortality.
Further testing	**Postmortem & Laboratory test** ▪ Examine at least 5-10 freshly dead chicks (see photos) **Major lesions** ▪ White urates at cloaca, swollen liver with white necrotic spots, swollen spleen and kidneys Enteritis **Microscopy:** ▪ Submit freshly dead or sick birds to the laboratory for bacterial culture and confirmation.

- **Or** Neomycin 100mg in water at 100g per 200 litres of water for 5 days.
- **Or** Enrofloxacin 10% at 100 ml per 200 liters of drinking water for 3 - 5 days.

Note: Sulfa drugs should not be used in hens laying eggs for human consumption.

Prevention and control

- Fowl typhoid is not easily eliminated by treatment. This is entirely a breeder problem. Avoiding chicks from non-certified hatcheries/breeders is the best prevention method.
- Strict biosecurity measures
- Thoroughly disinfect the premises and equipment that had the disease and control rodents.
- Depopulation is the best control method

Fowl typhoid, swollen liver with diffuse white necrotic foci. The birds at this stage damage to the ovary and often spillage of yolk into the pretoneal cavity

Helminthiasis

Definition

This is an intestinal tract infection of poultry by worms, characterized by poor weight gain and diarrhea in flocks. The common cause is nematodes and less commonly cestodes.

Pre-disposing factors

- Rearing poultry on the floor and moist/ damp litter
- High stocking density
- Heavy contamination of litter, feed and water by worm eggs.
- Age of the birds with the young ones most affected.

Farmers Complaint

Diagnosis

- Poor growth rate or low production, diarrhea with foamy content, sometimes worms seen in the diarrhea as white slender threads.

Clinical signs

- Depression, weight loss, diarrhea, reduced growth, reduced egg production in heavy infestation.

Further testing

Postmortem & Laboratory test

- Examine at least 5-10 freshly dead chicks (see photos)

Major lesions

- Thin birds, presence of worms in the intestinal lumen

Microscopy (optional):

- Intestinal content scrapping with cover slides and view on microscope

Differential diagnosis

- Coccidiosis due to diarrhea
- Nutritional deficiencies

Case Management

Supportive care (Husbandry practices)

- No specific symptomatic care other than routine maintenance of litter thickness and de-worming

Treatment

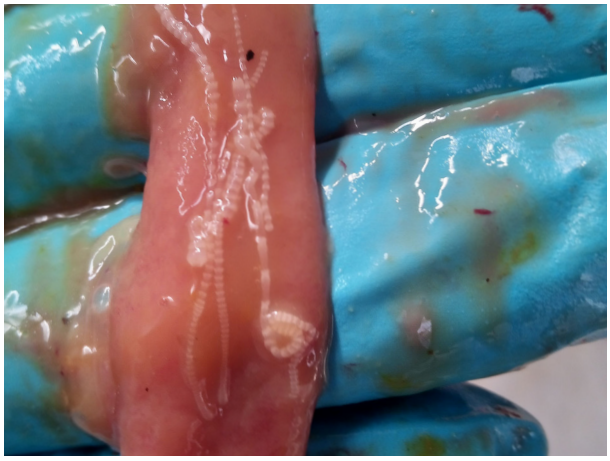
No antibiotic required.

- **First Choice:** Piperazine citrate dosage of 25g/20 litres
- **Or** Levamisole 200mg in drinking water at 100g per 200 litres of water.
- **Second Choice:** Fenbendazole 10% orally at 1ml per 2 kg body weight, or 5 mg/kg body weight. This should be when tape worms are present in the flock.

Prevention and control

- Thick litter (4-6 inches) to reduce exposure to parasite eggs
- Proper clean up between flocks
- Practice routine deworming (once every 2 to 3 months) while alternating between dewormers.

Ascaridia gali in the small intestinal lumen of a chicken



Tapeworms in the lumen of small intestines of a chicken

The images show intestinal segments with worms in the lumen. The chicken with Ascaridia galli was weak, thin and dull at the time of submission for postmortem examination. The worms are grossly visible when the intestine is opened with scissors. However, other worms like capillaria are tiny and can easily be seen with a magnifying lens. Cecal worms (Heterakis) are small and can be seen at closed (blind) end of the cecal lumen. Tapeworms are readily seen in the intestinal lumen.

Diseases of the immune system

Damage to the lymphoid tissues of poultry can have severe effect on immunity of birds. Diseases of the immune system include Infectious bursal disease, Newcastle disease among others.

Infectious Bursal Disease (Gumboro disease)

Definition

Gumboro disease is a highly contagious viral disease of young chickens characterized by severe depression, anorexia, diarrhea and high mortality.

Pre-disposing factors

- Naive flock without antibodies to protect against the virus
- Houses that are difficult to thoroughly disinfect and fumigate reservoirs (dung beetle)

Farmers Complaint

Diagnosis

Many dull chicks in the flock and high death rate in a short time (ranging from hours to few days).

Clinical signs

The disease has sudden onset in the flock, with severe depression, whitish diarrhoea, vent picking, reluctance to move, rapid spread in flock and high mortality. Mortality rises from onset and peaks in about 3 days.

Further testing

Postmortem & Laboratory test

Lesions enough for presumptive diagnosis

Major lesions

Marked dehydration, pasty vent, hemorrhages of skeletal muscles, pale kidneys, swollen and edematous bursa of Fabricius or the bursa is hemorrhagic.

Microbiology/Serology:

Confirmation is by histopathology or virus isolation.

Differential diagnosis

- Coccidiosis
- Fowl cholera

Case Management

Supportive care (Husbandry practices)

- Provide warmth to the affected flock to minimize hypothermia
- Non-nephrotoxic antibiotic may be given in short term to control secondary bacterial infections.
- Provide glucose, vitamins and electrolytes in drinking water

Treatment

- **First Choice:** There is no effective treatment for Gumboro disease.
- **Second Choice:** No effective antimicrobial for Gumboro disease.

Prevention and control

- Vaccination is the only effective method of preventing/controlling Gumboro disease.
- Effect of immunosuppression from infections before 3 weeks of age can result in low immunity and multiple vaccination failures. Frequent infections from other bacterial diseases may occur.

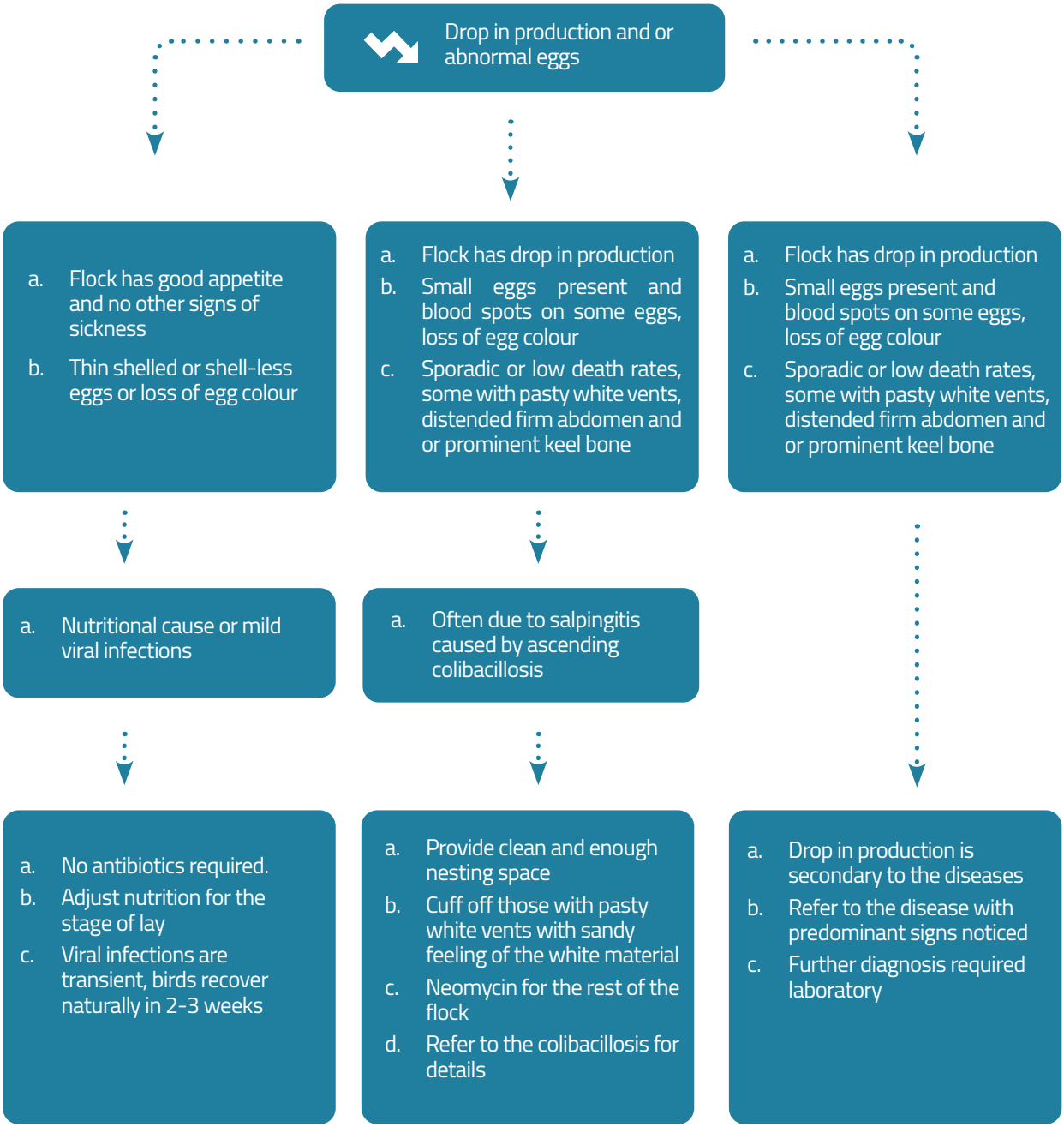
The birds are depressed and sleepy even in a noisy, new environment

Haemorrhages into muscles

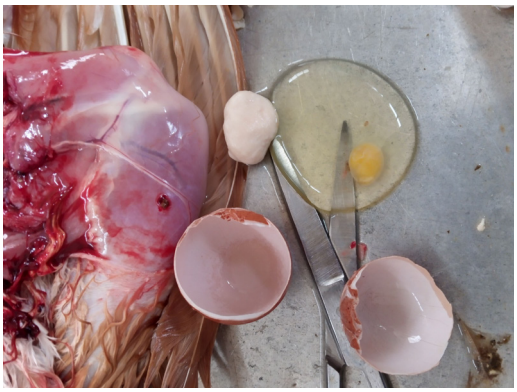
The images show intestinal segments with worms in the lumen. The chicken with Ascaridia galli was weak, thin and dull at the time of submission for postmortem examination. The worms are grossly visible when the intestine is opened with scissors. However, other worms like capillaria are tiny and can easily be seen with a magnifying lens. Cecal worms (Heterakis) are small and can be seen at closed (blind) end of the cecal lumen. Tapeworms are readily seen in the intestinal lumen.

Reproductive system diseases

The reproductive system diseases are conditions that affect reproductive organs, causing a drop in egg production change in shell quality in terms of thickness and colour, and internal quality (consistency of albumen). Dietary, environmental and infectious conditions have significant effect on reproductive performance and so all drops in production do not necessarily require antimicrobial treatment. To investigate reproductive diseases, follow the general principles of disease investigation described earlier in this guide. Here is a guide to aid in differential diagnosis of reproductive diseases. Some of the diseases also affect other systems under which they are discussed.



Effects from chicken with salpingitis; Tiny eggs laid among normal eggs



Tiny eggs are yolk-less, instead contain fragments of fibrin. The birds often suffer other systemic diseases after ascending salpingitis colibacillosis

The prevention of salpingitis involves provision of clean (litter in) nesting area, ensuring adequate vitamin and mineral balance (calcium, phosphorus) in diet for appropriate oviductal contractility and retraction after egg lay. Then controlling cannibalism. Further information can be seen under colibacillosis (particularly, salpingitis).

Nutritional and Metabolic diseases

The essential nutrients in the diet of poultry in the order of amounts needed include: **Water, Energy, Proteins, Minerals and Vitamins.** Lack of water causes significant effect on metabolism of the birds and so, their survival, growth rates and production will be adversely affected. **Energy** and **protein** deficiency affect survival, growth rates and productivity of the birds. Protein deficiencies have also been associated with increased cannibalism. If the demands of these base nutrients are not met, production will be low to none. Antimicrobials cannot reverse it.

Some **minerals** like calcium are needed in large amounts for growth of bones and production of eggs. Phosphorus is needed for calcium absorption and usage by the body. An interaction between these minerals is intricate that deficiency of one affects the metabolism of the other. Some minerals like selenium interact with vitamins to make them useful to birds. In this guide, deficiencies of calcium or its metabolism is stated.

Vitamins are needed by the body in trace amounts for the normal function of different tissues of the body. Their deficiencies may cause non-specific to obvious signs in birds. The vitamin deficiencies with fairly specific clinical signs in chicken are described in this guide.

Vitamin Deficiencies

Definition	Deficiencies range from non-specific signs associated with production losses to characteristic recognizable abnormalities.
Pre-disposing factors	▪ Low dietary levels of specific vitamins for the birds eating the feed. Poor feed storage conditions can affect vitamins in feed, especially fat-soluble vitamins (A, D, E and K). ▪ Primary disease-causing loss of appetite. ▪ Low amounts in yolk for young chicks for fat soluble vitamins
Farmers Complaint	**Diagnosis** ▪ Non-specific, but dullness, poor gait, reluctance to walk.

Differential diagnosis

- Vitamin A from oral candidiasis, visceral gout from dehydration and nephritic IB infection
- Vitamin E from avian encephalomyelitis and colisepticemia in young birds
- Vitamin D from Calcium and phosphorus deficiencies

Case Management

Supportive care (Husbandry practices)

- Provide feeds with balanced nutrients for the age groups
- Increase access to feeders and drinkers
- Isolate the weak and lame, feed them separately

Clinical signs

Diagnosis

- **Vitamin A:** low growth rate, rise in mortalities, blindness due to dry eyes, kidney failures and deaths, reduced egg production, dullness and loss of appetite due to dry esophagus.
- **Vitamin B2:** Curl toe paralysis, reluctant to move
- **Vitamin D:** Bone deformities particularly thick joints (rickets) and osteoporosis (weakness of long bones leading to fractures) in adults
- **Vitamin E/Selenium:** Causes crazy chick disease (encephalomalacia), reduced hatch-ability of eggs
- **Vitamin K:** haemorrhages occur in legs, breasts and wings. Important in treating coccidia with bleeding disorders.

Further testing

Postmortem & Laboratory test

Postmortem:

- Lesions are non-specific for most vitamin deficiencies except for a few. Most signs are seen in live affected birds.

Major lesions

- **Vitamin A** deficiency leads to white nodules in the esophagus, kidney failure with visceral gout formation
- **Vitamin E:** signs are seen in brain with cerebella conning and hemorrhages. White necrotic foci on muscles may be seen.
- **Vitamin D:** swollen joints and rickettic-beads are visible on cartilages of ribs.

Microbiology/Serology:

- Difficult to test in laboratory.

Case Management

Supportive care (Husbandry practices)

- Provide feeds with balanced nutrients for the age groups
- Increase access to feeders and drinkers
- Isolate the weak and lame, feed them separately

Treatment

- **First Choice:** Multivitamins with high amounts of deficient Vitamin in drinking water (for short term use). Response to treatment in mild to moderate signs are impressive.
- **Second Choice:** Balance the diets with adequate amounts of vitamin premixes in feeds for long term treatment and prevention.

Prevention and control

- Feed nutrient-balanced diets for the age groups
- Store feeds in cool dry places to prevent loss of vitamins through rancidity
- Mix feeds that can be completed in short period (Maximum 2 weeks) unless preservatives are used in the feeds.
- Providing sufficient vitamin supplementation in diet or drinking water.

I. Vitamin B2 (Riboflavin) deficiency (Curled-toe paralysis)

Alert chicks with curled toes. The chicks are unable to walk , eat and often starve

ii. Avitaminosis A

White nodular plagues (hyperkertinisation) of esophageal mucosa

iii. Crazy chick disease (Encephalomalacia)

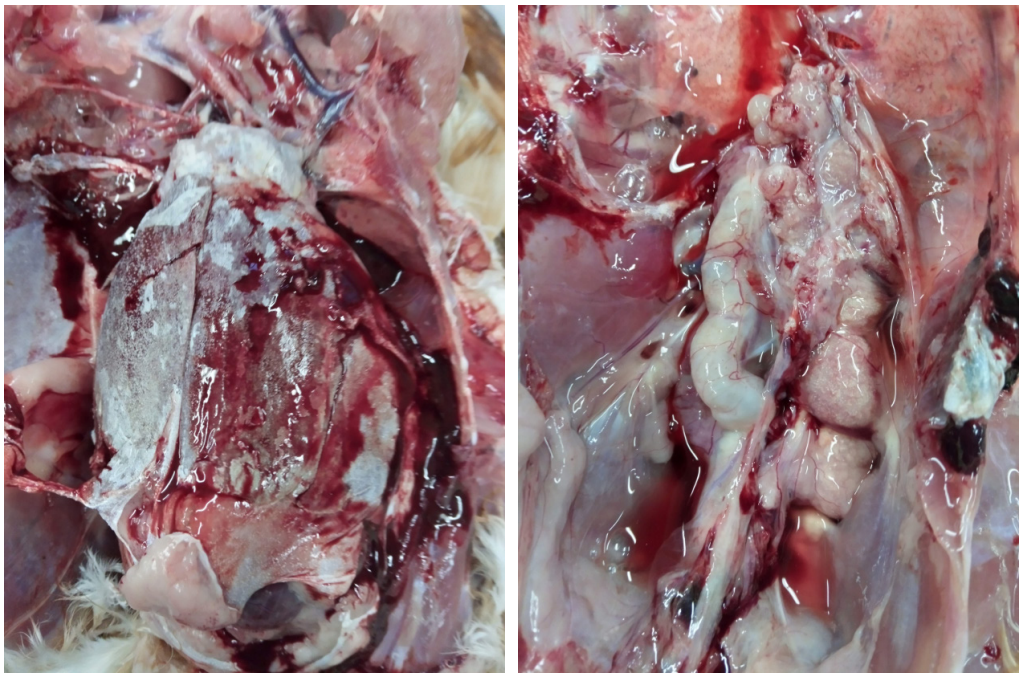
Response to high amounts of riboflavin in diet is impressive in few days.
Due to vitamin E deficiency. However, clinically in young birds below 3 weeks of age, this should be differentiated from Avian encephalomyelitis and encephalitis due to septicemia.

iv. Osteoporosis

The bones are weak, easily cut with minimal force using ordinary necropsy scissors (not shears) and there are no medullary bone deposits. Eggs from such birds often have multiple external abnormalities including thin shelled or shell-less eggs.
Twisted bone in 18-month-old bird with from a flock with persistently low production and fractures on the farm. Interestingly, this was from a deep litter system where calcium deficiencies are expected to be low.

Birds with fractures as shown by lameness and paralysis. Greenish discolouration of the wing at fracture point, egg abnormalities, kinking of the keel bone

v. Visceral gout



Pale kidneys with marked urate accumulation and urate deposition in the egg tracts

References

1. Boilianne M et al (eds) (2013). Avian Disease Manual. 7th edn. American Association of Avian Pathologists.

2. Gray P., Jenner R., Norris J., Page S., and Browning G., 2021. Antimicrobial prescribing guidelines for poultry. Australian veterinary journal 99 (6), 181.

3. MAAIF 2019. Poultry Training Manual for Extension Workers in Uganda. Available at https://www.agriculture.go.ug/wp-content/uploads/2020/07/MAAIF-Poultry-Manual.pdf

4. Merck Veterinary Manual, 11th edn. (2016). Merck & Co., Inc., Kenilworth, NJ, USA. Available at https://www.merckvetmanual.com/poultry

5. Monnier AA, Eisenstein BI, Hulscher ME, Gyssens IC, Drive-AB. WP1 Group. Towards a global definition of responsible antibiotic use: results of an international multidisciplinary consensus procedure. Journal of Antimicrobial Chemotherapy 2018; 73:3-16.

6. Porter R., 2006. Poultry Diseases. C.L. Davis S & E Africa Divisions, Wisconsin Veterinary Diagnostic Laboratory, 445 Easterday Lane, Madison, WI 53706.

7. Saif YM et al (eds) (2008). Diseases of poultry, 12th edn. Blackwell, Ames, USA.

8. Uganda Bureau of Statistics 2024. National Livestock Census 2021 Report, Kampala, Uganda. Available at https://www.ubos.org/wp-content/uploads/publications/National-Livestock-Census-Report-2021.pdf

9. The WHO AWaRe (Access, Watch, Reserve) antibiotic book. Geneva: World Health Organization; 2022. Licence: CC BY-NC-SA 3.0 IGO. Available at https://www.who.int/publications/i/item/WHO-MHP-HPS-EML-2023.04

10. WHO's List of Medically Important Antimicrobials: a risk management tool for mitigating antimicrobial resistance due to non-human use. Geneva: World Health Organization; 2024. Licence: CC BY-NC-SA 3.0 IGO. Available at https://cdn.who.int/media/docs/default-source/gcp/who-mia-list-2024-lv.pdf

ANNEX 1:
AWaRe classification of antibiotics

Access antibiotics have a narrow spectrum of activity, a good safety profile and generally low resistance potential. They are often recommended as empiric first or second-choice treatment options for common infections.
Watch antibiotics are broader-spectrum antibiotics, and are recommended only as first-choice options for severe clinical presentations or for infections where the causative pathogens are more likely to be resistant to Access antibiotics.
Reserve antibiotics are last-choice antibiotics used to treat multi drug-resistant infections.
Categorization of poultry antibiotics in NDA register for Uganda according to AWaRe criteria

Access

Aminoglycosides
Gentamicin
Penicillins
Ampicillin
Sulfonamides
Sulfadiazine
Sulfadimethoxine
Sulfadimidine
Sulfamerazine
Sulfamethizole
Sulfamethoxazole
Sulfaquinoxaline
Sulfonamide-trimethoprim-combinations
Sulfadiazine/trimethoprim
Sulfadimidine/trimethoprim
Sulfamethoxazole/trimethoprim
Tetracyclines
Doxycycline
Oxytetracycline
Tetracycline
Trimethoprim-derivatives
Trimethoprim

Watch

Aminoglycosides
Neomycin
Streptomycin
Fluoroquinolones
Enrofloxacin
Norfloxacin
Macrolides
Erythromycin
Tylosin

Reserve

Polymyxins
Colistin

Our Partners

The Fleming Fund

P.O Box 102, Entebbe Plot 16-18,
Lugard Avenue, Entebbe Uganda.
Tel: 041 4320004

REPUBLIC OF UGANDA

MAAIF
Ministry of Agriculture,
Animal Industry and Fisheries