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Strategies for the Prevention and Control of Infectious
Diseases (including Highly Pathogenic Avian Influenza)
in Eastern Africa

**GOOD BIOSECURITY PRACTICES
IN NON INTEGRATED COMMERCIAL AND IN SCAVENGING
PRODUCTION SYSTEMS
IN TANZANIA**

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Table of Contents

Acknowledgements.....	5
PREFACE.....	6
EXECUTIVE SUMMARY	6
1.0 Introduction	9
2.0 Poultry production farming systems in Tanzania:	9
3.0 What is biosecurity?.....	10
4.0 Ecological factors contributing to HPAI risk of outbreaks:.....	10
5.0 Feeds and Feeding.....	11
5.1. Standard Requirements/Ideal	11
5.2. Actual/Current situation in Tanzania	11
5.3. Recommendations.....	12
6.0 Biosecurity in Sector 2:	12
6.1. Source of stock:.....	12
6.2. Standard Requirement (By the farm)	12
6.3. Actual/Current situation in Tanzania	13
6.3.1. Protective clothing and footwear:.....	13
6.3.2. Limitation and control of access to poultry flocks	12
6.3.3. Pressure washers, brushes, hoses, water and disinfectant:	12
6.3.4. Cleaning and disinfection of crates, containers and other equipment before and after use:	12
6.3.5. Cleanliness of farm and surroundings:	12
6.3.6. Minimisation of contact between poultry and wild birds.	12
6.3.7. Keeping wild birds, dogs, cats, rodents or other livestock out of reach of poultry buildings and feed stores:	12
6.3.8. Supply of only clean fresh drinking (potable) water to birds:.....	13
6.3.9. Cleanliness and maintenance of feed bins, laying cages and feeding equipment:	13
6.3.10. Proper disposal of damaged eggs, dead birds, litter and manure: .	13
6.3.11. Thoroughness in cleaning buildings and all equipment:	13
6.3.12. Special consideration of Hatcheries:	13
6.3.12.1. Personal hygiene:	13
6.3.12.2. Egg handling and chicks:	13
6.4 Recommendations.....	14
6.4.1. Protective clothing and footwear:	14

6.4.2. Control of entry of Visitors and vehicles into the farm:	15
6.4.3. Provision of pressure washers, brushes, hoses, water and disinfectant:	15
6.4.4. Sanitation of farm or hired vehicles:	15
6.4.5. Restriction of movement of equipment:	15
6.4.6. Cleanliness of the farm and surroundings:	15
6.4.7. Restricted contact between poultry, wild birds and other animals: ...	15
6.4.8. Supply of clean, fresh and potable water and hygiene:	15
6.4.9. Farm wastes:	15
6.4.10. Cleaning and disinfection after depopulation:	16
6.4.11. Specific recommendations for hatcheries as per Tanzanian law	16
7.0. Biosecurity in Sector 3	17
7.1 Housing:.....	17
7.1.1 Standard Requirements/Ideal	17
7.1.2 Actual/Current situation in Tanzania: General	17
7.1.3 Recommendations	17
7.2 Husbandry (Raising and Maintenance).....	18
7.2.1. Standard requirements/Ideal.....	18
7.2.2 Actual/Current situation in Tanzania	18
7.2.3 Recommendations	18
7.3. Health Management for sector 3:.....	19
7.3.1. Standard Requirements/Ideal	19
7.3.2. Actual/Current situation.....	19
7.3.3 Recommendations	19
8.0 Biosecurity in Sector 4 (Village poultry)	20
8.1 Standard operation.	20
8.2. Identification of Biosecurity Risks: Current Situation.....	20
8.3 Recommendation.....	21
9.0 Trade and Marketing (Traders and Marketing)	22
9.1. Transport and Biosecurity risks for bothe sectors 3 and 4	22
9.1.1. Actual/Current situation in Tanzania.....	22
9.1.2 Recom mendations (Safe tansportation).....	23
9.2. Live-bird Open market	23
10.0 References	26

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PREFACE

Avian influenza, commonly known as bird flu, is one of the most serious animal and human health threats today. The disease has proved so far to be an agricultural disaster that can demolish local economies. Avian influenza can kill domesticated birds, including chickens, ducks, geese, and turkeys. Traditionally, wild waterfowl and shorebirds have been recognized as the sources for the many strains of avian influenza, but rarely succumb to the infection. The current H5N1 strain has caused mortality in domestic birds, species of wild birds and has infected and killed humans. The most ominous threat from bird flu may not have been seen yet. If the virus transforms so it can spread easily among humans, it could cause an influenza pandemic -a global problem of huge proportions. Tens of millions of people could die and billions could fall ill, creating massive economic and social disruption.

There is therefore need to do all we can to prevent such a catastrophe. To reduce the risk of the virus evolving, we must stop it from circulating in poultry. The focus should be on the way poultry is raised and slaughtered. Biosecurity consists of a set of management practices which, when followed, collectively reduces the potential for the transmission / spread of disease-causing organisms - such as the Avian Influenza virus - onto and between sites, animals and humans. The present study on biosecurity review was carried out in Tanzania, to outline strategies to minimise the occurrence of the disease at all levels of poultry production, distribution, processing and marketing, thereby reducing the risk of human infection by bird flu virus. The document therefore, seeks to draw the attention of all those handling poultry and its by-products, all along the food supply chain. That includes, but is not restricted to, managers of poultry production units, transporters, marketplace managers, municipal authorities, health workers, food inspectors, veterinarians, vendors, food handlers and consumers.

EXECUTIVE SUMMARY

This report is a review of biosecurity in poultry production systems in Tanzania. It complements a primary report prepared by the National Consultant in July 2007 on the structure and importance of the commercial and village based poultry industry in Tanzania. In that report, distribution of the poultry operations in Tanzania in accordance to the FAO classification system of sectors 1 – 4 was done. The objectives of the present study were to identify areas of possible biosecurity risks in the production cycle in each of the poultry production sectors, with special emphasis on sectors 3 and 4 in Tanzania. The Report was also intended to be used by the International Poultry Biosecurity Expert in the preparation of Biosecurity Teaching Guidelines.

The methodology of the study was basically a desk top study that involved collection of data and documents from various sources and extensive consultations. Discussions were also held with assorted stakeholders including poultry feed manufacturers, veterinary inputs suppliers, policy makers within the Ministry of Livestock Development including, deputy permanent secretary. Additional information was obtained from the Director of Veterinary Services, Director of Central Veterinary Laboratory, staff involved in Transboundary Animal Diseases (TADs), Laboratory staff involved in TADs Diagnosis and surveillance. In addition, discussions were held with Chicken Traders including those from live bird open markets (selling and slaughter), Officials from the breeder farm sector 2 (Euro Poultry, Mkuza Chicks Company and Kibaha Education Centre), smallholder commercial layer farmers, Village chicken Farmers and Poultry product consumers,

The HPAI biosecurity risk points in the whole production and marketing cycle (the Value Chain) of each Sector were identified. To ensure a comprehensive coverage of the entire production cycle, a review was made of the Standard Requirements (By the farm, by the law etc), Actual/Current situation in Tanzania and based on these, recommendations were made for each of the following factors: source of stock: (Imported or local); housing (design, sanitation); husbandry (raising and maintenance); feeds and feeding (quality and quantity); health management (vaccinations, isolation, treatment, disposal of dead); trade and marketing (traders, live markets slaughter facilities); animal-human HPAI transmission, farm worker biosafety, personal hygiene; consumer (meat/egg) protection, ante- and post-mortem inspection, kitchen hygiene and sanitation as well as on the ecology and on wild birds (flyways, wetlands).

It was found out that the three major components of biosecurity (isolation, traffic control and sanitation) are highly adhered to in PS production and other Sector 2 commercial farms, but not in Sector 3 smallholder units and that biosecurity is highly deficient in Sector 4 which is found in extensive village chicken production systems. The probability of infection (with HPAI) is higher in production sector 3 than in sectors 1 and 2. The risk of infection in sector 4 however is not as high

despite the low biosecurity because of the small and isolated flocks. However, if the virus does enter farms in sectors 1 and 2, infection may have a greater impact due to the concentration of susceptible poultry in these farms. Risks also could be due to the distribution mechanisms of birds from breeding farms to production farms all over the country.

1.0 Introduction

The current poultry population is about 35 million chickens (National Sample census of Agriculture 2002/2003). Within this number are found about 33 million local village chickens kept predominantly in the rural areas and about 2 million commercial hybrid birds (broiler and layer chickens) kept by both small holder farmers and large Scale Farms. Other types of poultry kept include ducks, turkeys, guinea fowls and pigeons. According to the 2002/2003 national sample census of Agriculture, out of 4,901,837 smallholder households in Tanzania, 3,017,004 (62%) kept chickens (99% kept indigenous chickens and only 1% kept commercial birds). There is no doubt that poultry industry is very important as a business for income generation and for poverty alleviation. Poultry production in Tanzania is carried out under two major systems. These comprise of extensive Local chicken production system and intensive commercial poultry production system.

2.0 Poultry production farming systems in Tanzania:

Basing on the level of farm biosecurity, marketing system and level of integration of operations and to a less extent the size of enterprises, FAO has broadly classified poultry production into four operational systems. From the major features of the four production sectors provided by FAO, an attempt to describe distribution of the poultry operations in Tanzania in accordance to the FAO classification system of sectors 1 – 4¹ was done in an earlier study. It was found out that Sector 1 characterised by an industrial integrated system with high level of biosecurity with clearly defined and implemented standard operating procedures for biosecurity is non-existent in the country. In addition, farms with GPS operations are not found, operation flock sizes are far smaller than 500,000 birds and even though farm outputs are processed and/or packed at the farm itself none is meant for export purposes.

Sector 2 represents high levels of commercial poultry production system with moderate to high biosecurity, which involve raising PS and operating Hatcheries mainly but also raise commercial poultry – layers and/or broilers. The farms have birds that are kept indoors continuously; strictly preventing contact with other poultry or wildlife. 19 farms were identified in Tanzania to fall under this category located in Regions of Pwani (6), Dar es Salaam (6), Arusha (2), Mwanza (2), Mbeya (1) and Ruvuma (2). The operations are of medium scale embracing different levels of integration and birds/products are usually marketed commercially

Sector 3 represents farms involved in intensive commercial scale of eggs and broiler production from hybrid chickens. Commercial poultry production system

¹ FAO/OIE. Global strategy for progressive control of HPAI. Anon. 1 – 95 (2005) - Report

with low to minimal biosecurity and birds/products usually enter live bird markets. 25,624 small scale commercial production farmers raising commercial layers and broilers were classified in this category.

Village, peri-urban or urban backyard production with minimal biosecurity and birds/products consumed locally is classified as FAO sector 4. This sector includes low income households wherein people live with poultry and other animals; and/or carry out unhygienic slaughtering within household premises. The Tanzanian local chicken production system fits well in Sector 4 A category of FAO classification.

3.0 What is biosecurity?

Biosecurity consists of a set of management practices which, when followed, collectively reduces the potential for the transmission / spread of disease-causing organisms - such as the Avian Influenza virus - onto and between sites, animals and humans. Biosecurity comprises two main elements - bio-containment (prevention of spread of the virus from infected premises) and bio-exclusion (measures to exclude infectious agents from uninfected ones). Biosecurity is the normal way to avoid unnecessary contact between animals and microbes, infected animals and healthy ones. Biosecurity also applies to public health measures that will reduce the contact between animals and humans.

Biosecurity has three major components:

1. Isolation
2. Traffic Control
3. Sanitation

Isolation refers to the confinement of animals within a controlled environment. A fence keeps birds in, but it also keeps other animals out. Isolation also applies to the practice of separating birds by age group. In large poultry operations, all-in/all-out management styles allow simultaneous depopulation of facilities between flocks and allow time for periodic clean-up and disinfection to break the cycle of disease. Traffic Control (human traffic as well as the vehicular traffic) includes both the traffic onto the farm and the traffic patterns within the farm. Sanitation addresses the disinfection of materials, people and equipment entering the farm and the cleanliness of the personnel on the farm.

The Avian Influenza virus is best transmitted via direct contact with sick and/or dead birds. Most human cases of AI have been related to such close contacts.

4.0 Ecological factors contributing to HPAI risk of outbreaks:

High-risk areas for HPAI transmission include all ports of entry for travellers from outside the country, all ports of entry for poultry and poultry products. Tanzania has 42 official ports of entry that include airports, seaports, lake ports and dry

land entry ports. Districts along the flyways where migratory birds mix and, all places where live domestic birds are mixed, traded and distributed to different locations. Migratory birds have a tendency to congregate around large water bodies. The high risk areas therefore include Lake Victoria basin, an area that forms an axis of lakes Natron, Manyara, Eyasi and Nyumba ya Mungu dam in the north of the country, the area that contain Lake Rukwa, Mtera dam Usangu plains in the south western area and the Indian ocean coast in the east of the country.

The period between November and March is critical for Tanzania Avian Influenza Surveillance due to migratory birds from Europe which come to winter in Tanzania. The disease is already in Africa and birds from Europe may pick HPAI virus from Egypt and Sudan on their way to Tanzania. However, the role of migratory birds in the transmission of HPAI remains unclear and needs further research. So far it appears that migratory birds are not the major source of HPAI outbreaks, but rather, the movement of domestic birds through trade is the major means of HPAI transmission.

The market areas where live domestic birds coming from different places, mix before they are taken to different places is another disease risk area. Untreated water which wild birds have accessed is a major risk especially to free-range birds where prevention of access to possible sources of standing water used by wild birds is very difficult. The majority of poultry in Tanzania are raised on free range system, with poor biosecurity and there is mingling with wild and domestic birds and human beings.

5.0 Feeds and Feeding

5.1. Standard Requirements/Ideal

- Chemical composition (crude protein, metabolisable energy and mineral content) of the feeds should meet the requirements of the chickens for optimum performance of the chickens.
- Regular monitoring of batch identification systems is needed.
- Drivers of delivery trucks should be aware of truck decontamination procedures.
- Should use new bags for transporting feeds and not used ones.

5.2. Actual/Current situation in Tanzania

Commercial farming in Tanzania is facing a problem in the quality feeds whereby the chemical composition of the feeds (metabolisable energy contents, protein, minerals and vitamins) of the feeds are not analysed and hence of uncertain quality and according to the farmers there is low performance of the chickens. Feed stores are not sealed to prevent wild birds and other animals from contaminating feed.

5.3. Recommendations

Feed producers must be required to analyse their feeds to check and to establish the quality of their feeds (crude protein and metabolisable energy and mineral content) and ensure that they meet the requirements of the chickens for optimum performance and that the feed is free from pathogen (certification).

Regular monitoring of batch identification systems must be re-enforced.

Trucks used for distributing feeds must be regularly cleaned and disinfected.

The farm ought to obtain feeds from reliable source.

Feeds must be stored properly so that they are bird-proof and rodent-proof.

6.0 Biosecurity in Sector 2:

6.1. Source of stock:

The operators of farms in sector 2 mostly embrace different levels of integration with rearing of PS and Hatchery; they own feed mills and slaughtering and processing plants. The replacement stock is usually imported from abroad supposedly a disease-free source. The importer has to get a veterinary import permit with a certificate that the importation is from disease free source. The farms are informed about the history of the flock through inquiring about past diseases in the parent flock and also the vaccination history of both the parents and newly hatched birds. Sector 2 can be major sources of infectious diseases such as HPAI on account of the large numbers of birds which are sold and distributed to many sector 3 smallholder farmers. Similarly, the large numbers kept in sector 2 means that the farms are likely to suffer the greatest loss in case of HPAI outbreaks.

6.2. Standard Requirement (By the farm)

- In-coming stock should be isolated from the rest of the flock. During the period of isolation a testing and monitoring programme should be instituted.
- New stock should only be placed in facilities which have been de-stocked and thoroughly cleaned and disinfected.
- Isolation facilities should be placed as near as possible to the farm entrance, and separate from other poultry buildings.
- Use of separate equipment when handling isolated stock is needed. Enough staff should be employed at the farm so that some of them are allocated to deal only with isolated stock. If not, the isolated stock should be handled last.
- Attendants should always wash and change into clean overalls and boots before and when moving between flock buildings

6.3. Actual/Current situation in Tanzania

Management standards and Biosecurity levels in farms of sector 2 in Tanzania vary from moderate to high and an intensive system of husbandry is practiced that keeps chickens indoors thereby avoiding contact with other domestic and wild animals. Only one sector 2 farm which rears PS and has a Hatchery implements higher level of management and other operational procedures than the rest in the sector 2. The sector 2 should be given particular attention by the authorities, because if the sector is infected and DOC are distributed widely, this will represent an ideal way of spreading the disease over the entire country. Biosecurity risk points identifiable in this category include:

6.3.1. Protective clothing and footwear:

Clean overalls and footwear are not always worn when entering poultry farms. Thus, introduction of infection onto the farm, or spread around the farm could occur through personnel or visitors' clothes, footwear or hands.

6.3.2. Limitation and control of access to poultry flocks:

Not all the poultry sites are fenced with a controlled entry point. In some farms visitors and their vehicles are not limited and gain access to poultry buildings and territory.

6.3.3. Pressure washers, brushes, hoses, water and disinfectant:

In several farms the tap water, brushes, disinfectants may be available for cleaning visitor's attire but not their vehicles. These facilities are for use by visitors to clean vehicles, equipment and boots both before entry and on leaving. The equipment is also useful for cleaning in hatchery operations.

6.3.4. Cleaning and disinfection of crates, containers and other equipment before and after use:

In Tanzania plastic equipments are normally washed but wooden and paper equipments like egg trays are not cleaned

6.3.5. Cleanliness of farm and surroundings:

Not all sector 2 farms in Tanzania maintain tidy and clean surroundings.

6.3.6. Minimisation of contact between poultry and wild birds.

Neither is accumulation of standing water very well prevented nor removal of spilled feed that could attract wild birds done regularly in Tanzania. Maintenance of buildings to ensure that wild birds do not nest or roost in them is also not well instituted.

6.3.7. Keeping wild birds, dogs, cats, rodents or other livestock out of reach of poultry buildings and feed stores:

Not all the farms have an active rodent and pest control system in place. Vigilance for detecting presence of vermin is lacking and monitoring of vermin activity by baiting and trapping is not practiced

6.3.8. Supply of only clean fresh drinking (potable) water to birds:

Water lines and drinkers are not flushed through and cleaned regularly. Sources of standing water used by wild birds do exist on the farms or their neighbourhood.

6.3.9. Cleanliness and maintenance of feed bins, laying cages and feeding equipment:

The practice is variable in Tanzania; with some sector 2 farms keeping dirty and dilapidated equipment. Most farms utilise feeds stored in plastic bags and do not have feed silos. Feed stores and containers are not sealed to prevent animals and wild birds contaminating feed.

6.3.10. Proper disposal of damaged eggs, dead birds, litter and manure:

Not all farms dispose of them promptly and properly.

6.3.11. Thoroughness in cleaning buildings and all equipment:

In Tanzania, disinfection of the premises and all equipment is not done by all sector 2 farms and rodent and other pest control programmes are usually not carried out. Equipment and protective clothing is usually cleaned/washed but not disinfected. All farms however remove all dead birds and litter. Surplus feed may sometimes be carried over to the new batch of birds.

6.3.12. Special consideration of Hatcheries:

6.3.12.1. Personal hygiene:

It is not ensured that all personnel wash their hands when entering or leaving the production area, and before chick and egg handling operations (traying up, setting, transfer, candling, take-off, sexing, vaccinating and packing).

6.3.12.2. Egg handling and chicks:

Divided attention is accorded to cleaning, disinfection and egg handling procedures such as during transportation, egg reception and storage in the setters, hatchers, hatchery rooms and take off areas. Hygiene is not thoroughly observed also during chick sexing and at holding areas.

6.4 Recommendations

6.4.1. Protective clothing and footwear:

It is important that workers or any visitor must shower and change into clean overalls and footwear when entering a poultry building. Protective clothing and footwear should be removed and either cleaned and disinfected, laundered or disposed of after use.

6.4.2. Control of entry of Visitors and vehicles into the farm:

There must be strict control of access to a poultry farm. Visitors and their vehicles should be limited and as far as possible kept away from poultry buildings and the farm premises.

6.4.3. Provision of pressure washers, brushes, hoses, water and disinfectant:

Must ensure farms are equipped with potable water and that there is in place, pressure washers, brushes, hoses and disinfectants for cleaning and disinfection of equipment and vehicles.

6.4.4. Sanitation of farm or hired vehicles:

All vehicles used for transporting birds, feed, manure or other wastes must be thoroughly cleaned and disinfected when entering and leaving the farm.

6.4.5. Restriction of movement of equipment:

No equipment should be moved into different poultry buildings without cleaning and disinfecting first.

6.4.6. Cleanliness of the farm and surroundings:

The farm and its surroundings, including access routes, parking areas, yards, areas around buildings and storage areas should be kept clean and tidy and well maintained so as to avoid wild birds and animals being attracted onto the site and entering farm buildings and stores.

6.4.7. Restricted contact between poultry, wild birds and other animals:

Restriction of contact between poultry and wild birds, other livestock, dogs, cats and rodents should be strictly observed by avoiding accumulation of standing water, removal of spilled feed and maintenance of buildings to ensure that wild birds do not nest or roost in them. Feed stores and containers must be sealed to prevent animals and wild birds contaminating feed. Livestock and pets should not be kept at or near the farm. Workers should not raise poultry at their homes.

6.4.8. Supply of clean, fresh and potable water and hygiene:

Only potable water should be used as drinking water for the birds. Water pipes must be flushed through. All equipment such as feeders, laying cages and the drinkers must be cleaned regularly. Standing water in and around farm buildings must be drained.

6.4.9. Farm wastes:

Damaged eggs and dead birds should be disposed of promptly and properly. Litter and manure must be composted first before disposal.

6.4.10. Cleaning and disinfection after depopulation:

Following depopulation at the end of a production cycle, all litter must be removed and poultry buildings/houses must be thoroughly cleaned and disinfected. It is important that all equipment, drains, pipes and fans are thoroughly cleaned and disinfected. All surplus feed must be removed. The farm must apply rodent and other pest control measures before re-stocking.

6.4.11. Specific recommendations for hatcheries as per Tanzanian law

Specific regulations have been made, but they need to be enforced, thus there is the Animal Diseases Act, 2003 Part V - Powers of Inspectors Section 38 (1), (2), (3a, b, c, d, e, f, g, h) and (4) stipulate powers to ensure compliance in hatcheries, thus:

Section 38.-

(1) An Inspector shall have the duty to ensure that, regulations and appropriate measures to limit the spread of disease are applied in hatcheries within his area of jurisdiction.

2) No person, group of persons or company may keep or use premises for hatching an egg for sale of a chicken unless the person, group of persons or company holds a licence issued by the Minister in respect of the premises for that purpose.

(3) No licence shall be issued by the Minister unless he is satisfied that proper facilities and adequate resources are available for:

- (a) the maintenance of the premises in a state of hygiene to the satisfaction of the Minister;
- (b) the regular cleansing, disinfecting and fumigating of incubators and equipment used in connection with the hatching of chickens;
- (c) the recording of all eggs used for hatching to enable the farm of origin of the eggs to be identified;
- (d) the recording in respect of all chickens hatched:
 - (i) of particulars of the property of origin of eggs used for hatching;
 - (ii) of the date of hatching;
 - (iii) of particulars of the name and address of the person to whom the chickens are dispatched;
 - (iv) the date of the dispatches.

(4) No person, group of persons or company may sell or use any egg for hatching for sale unless the egg is a product of a domesticated fowl which has been tested for notifiable or scheduled diseases, as listed by the Minister, at a veterinary diagnostic laboratory appointed for that purpose by the Minister.

It is assumed that if the hatcheries adhere to the regulations, the biosecurity will have been ensured including adherence to personal hygiene and proper egg handling.

7. Biosecurity in Sector 3

This sector represents small scale farms which undertake intensive commercial eggs and broiler production from hybrid chickens.

7.1 Housing:

7.1.1 Standard Requirements/Ideal

The walls should be constructed taking into account the weather conditions and comfort of birds. The floors should be made of smooth plastering to allow easy cleansing. The distance between chicken houses within a single age farm should usually be about 20–25 metres. Human and animal movement must be controlled.

7.1.2 Actual/Current situation in Tanzania: General

Housing in sector 3 is highly variable depending on the type and financial ability of the farmer. The walls are half raised made of corrugated iron sheets, bricks or mud and upper parts remaining open but covered with chicken wire-mesh. The floor will be made with rough concrete but could also be earth floor. The size of the house depends on the number of birds being kept. Walls of some of the houses are constructed undesirably using corrugated iron sheets which transmit a considerable amount of the incoming solar radiation to the birds. This is especially critical in hot weather. Management standards and biosecurity levels are low. Chicken houses are normally located very near the living house or even attached to it. The site is usually not fenced and there is no control of human and animal movement.

7.1.3 Recommendations

- The sector 3 chicken house must be located away from the living house. Ideally, poultry house should be located at the backyard and fenced.
- The design of the chicken house must be such that it will keep the wild birds away from the chicken flocks
- The house should be constructed with easily cleanable materials and design should consider prevailing weather conditions

7.2 Husbandry (Raising and Maintenance)

7.2.1. Standard requirements/Ideal

Layer farms and broiler farms must be single age operations and practice all-in-all-out husbandry system. Sick birds must be isolated and reported to veterinary authorities. Records must be kept of the operation.

7.2.2 Actual/Current situation in Tanzania

Management standards and biosecurity levels are generally low.

All-in and all-out management styles that allow simultaneous depopulation of facilities between flocks and allow time for periodic clean-up and disinfection to break the cycle of disease is not practiced for both the egg production and broiler farm operations.

There is strict restriction of movement of humans and animals including birds such as ducks, turkeys and guinea fowls.

The farm yard is not cleaned every day.

Cleaning all equipment i.e. feeders, drinkers is not done on a regular basis.

Feed storage is not sealed to prevent wild birds and other animals contaminating feed.

There is lack of efforts to eliminate vermins such as rats.

Not all used equipment is cleaned before re-use.

Sharing of equipment (e.g. de-beaking scissors) with other poultry producers or bird-keepers does occur.

Dead birds (even where the cause of death is uncertain) are usually fed to dogs and cats. Dead birds are not reported to the animal health authorities to establish cause of death. Litter is usually left to accumulate to be used later as garden fertilizer without composting.

7.2.3 Recommendations

- a. All-in and all-out management styles should be introduced so as to ensure that all birds from a shed / pen are sent to the abattoir or market. The premises should then be cleaned and disinfected effectively before the arrival of a new flock. This practice would contribute immensely to the prevention of disease outbreaks.
- b. Chickens should be kept separately from other water fowl such as ducks, turkeys and guinea fowls
- c. The farm yard and all equipment i.e. feeders, drinkers should be cleaned every day
- d. Feed storage should be sealed so as to prevent wild birds and other animals contaminating feed.
- e. Efforts to eliminate rats through use of appropriate means should be instituted.
- f. All used equipment are a potential source of contamination and therefore cleaning before re-use is essential

- g. Sharing of equipment (e.g. de-beaking scissors) with other poultry producers or bird-keepers should be avoided, disinfection should be applied before transiting to the next farm.
- h. There should be proper disposal of dead birds, litter and reject eggs. Dead birds (especially where the cause of death is uncertain) should be reported to a veterinarian and never fed to pets. Litter must be composted before disposal as it may be a potential source of contamination.

7.3. Health Management for sector 3:

7.3.1. Standard Requirements/Ideal

Poultry must be regularly vaccinated against diseases prevalent in the area. Facility for keeping sick birds in isolated and closed rooms and cages should be made available.

7.3.2. Actual/Current situation

In layer and broiler production operations vaccination is usually carried out against Newcastle disease (ND), Infectious Bursal disease (IBD) and sometimes Fowl pox and Marek's disease (MD) (for pullets only). In Tanzania, vaccination against ND in commercial poultry has been sustained with a lot of success such that outbreaks of ND are very rare. ND has now turned out to be a disease of village chickens mainly. There have been reports of vaccination failures particularly against IBD and MD. MD is the commonest disease confirmed at CVL and the increased incidence is suspected to be due to super infection from highly contaminated poultry rearing premises, early exposure or vaccine failure. Usually the personnel are not provided with protective gear and the house is not animal or other birds proof therefore contact with other domestic and wild animals does occur. Hygienic practices are minimal. Only few farms perform thorough cleaning of the building and all equipment. All farms remove all dead birds (but feed them to dogs and cats).

7.3.3 Recommendations

Sector 3 farmers do not strictly limit and control access to their poultry flocks, therefore it is recommended that:

- Must ensure that birds are regularly vaccinated against the most prevalent diseases in the area.
- Premises and farm equipment must be kept clean and disinfected. –There must be a disinfectant foot bath at entrance to each poultry shelter.
- Must provide hand-washing facilities which must be changed on a daily basis.
- Must change and wear protective clothing when working in a poultry house.
- Sick birds must be kept away from the healthy flock and kept in an isolation room or cage.
- Must report promptly every dead birds to the district authority (Veterinary District Officer) and dead birds must be disposed appropriately.
- All contaminated objects (for instance: faeces, blood, feathers) must be destroyed properly..

- If dead birds have to be buried, then, should be ensured that - a deep hole is dug (far from the poultry sheds) put some quicklime at the bottom and on the borders of the hole; put all the birds and objects in the hole; cover with quicklime and finally covered with earth.

8. Biosecurity in Sector 4 (Village poultry)

8.1 Standard operation.

Initiating and maintaining a biosecurity program as an important aspect of a poultry health maintenance program is almost impossible with the extensive management system and the type of housing involved. Simple housing is usually provided at night to majority of the households keeping village chickens. The birds are let out to scavenge for their feed during the day thereby getting exposed to pathogens, various predators, other birds and people. It is thus hard to prescribe workable standard biosecurity operating procedures for sector 4.

8.2. Identification of Biosecurity Risks: Current Situation

8.2.1. Housing:

Housing for sector 4 poultry varies from none to simple structures which may or not be attached to the main living house of the owner. In many cases owners share the same house with chickens such that at night chickens may sleep under the bed of the owner. This would expose the owner to infection.

8.2.2. Husbandry:

The flocks are multi-aged and there is a mixture of various species of poultry such as chickens reared together with ducks, geese, turkeys and guinea fowls. The poultry are usually on free range with very little if any supplementary feeding. Water is not normally provided. Subsequently birds drink dirty water which is also drunk by wild birds and other animals. All these practices predispose birds to infection. Lack of confinement allows direct contact between poultry and wild birds and chicken houses are not wild bird proof and rodent control programs are non existent in all villages.

8.2.3. Health management:

The commonest and the most serious disease among village poultry, particularly the chicken, is Newcastle disease which causes up to 100% mortality. The chickens are normally not vaccinated against ND or any other disease in spite of their exposure to many pathogens. Sick birds are not separated from the healthy ones and owners use local medicinal plants for treatment which may or may not be effective. Whenever there is threat of disease, the owners normally sell most of their flock including the sick birds. Sick birds may be salvaged by cooking and eating them or feeding them to the pets. Dead birds are either cooked and eaten or thrown away or given to the dogs. The litter from the shelters is swept away in

the compound. The chicken shelters are not cleaned regularly if at all. Therefore health management is thus very poor.

8.2.4. Marketing and Slaughtering of birds without appropriate precautions:

One use of local chickens is to meet expenses of attending a traditional healer. In such cases only black, red or white coloured chickens may be used. Traditional healer slaughters such chickens in special style by chopping off the head and let the bird to die unrestrained while jumping around. This is risky because blood splashes all over and thus contaminating the surrounding. Normally however, poultry are slaughtered at home with restraint but still blood is spilt all over the place.

Local birds for sale are sold live at the gate and/or subsequently to a live bird market. All these practices predispose both the birds and humans to HPAI infection and other diseases.

8.2.5. Traditional therapies: Some ethnic groups in Tanzania employ parts of the chicken often mixed with medicinal plants as traditional therapy against human diseases particularly children illnesses, female infertilities, abnormally prolonged menstrual periods; and simple fractures. Such meals are often not well cooked and hence a risk to the humans.

8.2.6. Introduction of new stock: Purchase or gift of poultry and animals (including pigs) from farms with unknown history is common. Newly introduced birds are not kept separately for 2 weeks – 1 month before being introduced to flock and these can cause transmission of the disease.

8.2.7. Contacts with chickens: Children do play with chickens and other poultry which is dangerous to their health, when the chickens are sick or when HPAI infection is present.

8.3 Recommendation

8.3.1 Housing:

Separate shelter should be provided for the night at least. If the owner can afford, village poultry should be housed but with a run for the day and should be given supplementary feeds.

8.3.2. Husbandry:

Keeping together poultry of different ages cannot be avoided but keeping different species of birds can be avoided and hence it is recommended that farmers raise only one type of birds. Free range practices cannot be avoided, but farmers must improve feeding of the poultry by providing supplementary feeds and clean water in containers.

8.3.3. Health management:

Farmers must be advised to vaccinate against economically important diseases, particularly ND. Vaccination against ND must be done on a regularly basis. Vaccination against ND will not only protect birds against ND but also will assist in differential diagnosis of HPAI. Sick birds must be isolated and treated and not sold or eaten. Dead birds must be disposed of properly and not eaten. Litter must be composted if in large amounts before using it as a fertiliser. The population must be educated about the advantages of kitchen hygiene and thorough cooking of meals.

8.3.4. Marketing and slaughter of birds:

The sale of live birds cannot be stopped without putting in place proper marketing channels. Therefore live birds whenever possible must be inspected before and after slaughter. Slaughter facilities must be provided at live markets and customers sensitised regarding the advantages of taking home slaughtered rather than live birds. The birds must be slaughtered humanely and blood properly disposed of.

8.3.5. Introduction of new stock:

Farmers must be educated about the dangers of introducing new stock to a healthy flock. Farmers must be advised to confine the new birds for at least 2 weeks and observe for any sickness before mixing with owner flock.

8.3.6. Contact with humans:

In as much as village poultry may be on free range, children and other people ought to be discouraged from playing with poultry especially now that HPAI is a threat.

9. Trade and Marketing (Transportation and Live markets,)

9.1. Transportation and Biosecurity risks for both sectors 3 and 4 poultry

9.1.1. Actual/Current situation in Tanzania

- The motor vehicles, tricycles and bicycles move to and from poultry farms and in and around open markets without being cleaned and disinfected. The manner in which chickens are carried, particularly the local chickens (sector 4) is not always humane, for instance in an open carriage and/or with heads down. In many cases, birds are carried on passenger vehicles and thus posing health threat to humans.
- There is re-usage of dirty wooden cages, woven baskets for transportation of poultry without cleaning and disinfection is carried out in Tanzania. Plastic cages are not used but instead wooden cages are used which cannot be cleaned effectively.

- Cages with birds are usually stack on top of each other without waste trays underneath the cages. The faecal droppings of birds contaminate the cages and the vehicle and if infected could transmit infection to the other birds and to the surrounding areas where the vehicle passes.
- Birds are stack in cages far in excess of carrying capacity or over stacking on a bicycle causes the birds to get distressed and defecate, and thus contaminating the cages and feathers with faeces.

9.1.2 Recommendations (Safe transportation)

- Transportation of people and live birds in the same vehicle should be avoided
- Only clean transport vehicles and bicycles should be used for transportation of poultry and eggs. This may be difficult to implement but with education to the traders, they should be able to comply.
- Birds should not be carried in excess of the cage capacity. The recommended size of the cage capacity should not be less than 300 cm² per kg, with a height of not less than 30 cm
- Cages with two or more floors should have waste trays below each floor - If birds with cages are stacked on top of each other
- Collecting birds from one farm to another in the same vehicle should be avoided. Best if instead there was common collection point where all the farmers would bring their birds for sale on an agreed date.
- Should use washable and re-useable cages, such as those made of plastic, metal or bamboo material. This will require prior education of the traders.
- Poultry should be carried in a humane manner by taking into account the welfare of the birds.

9.2. Live-bird Open market for sector 3 and 4 chickens:

9.2.1. Standard Requirements

Live birds should be purchased by traders who will slaughter the birds and process them in properly designed slaughter facility before selling poultry meat and products. The staff responsible for ante mortem inspection as well as post-mortem inspection at the processing plant should be well trained in recognising abnormality.

High level of hygiene, cleaning and disinfection of facility, equipment and personnel garments.

- Slaughtering should be separated from meat selling stalls.
- Slaughter facilities should be protected so that it may not release contaminated faeces or blood.
- Different species should not be kept together in confined spaces. Some bird species may be infected without showing signs. Allowing different species to mix is risky.

- Poultry brought to the market should never be returned back to farms
- There should be pre-marketing health checks of poultry birds.
- Manual de-feathering is a risky operation and should be avoided
- Food safety procedures should be observed by the slaughtering staff.
- Complete personal protective equipment for slaughtering staff should be provided.
- Proper disposal of carcasses, feathers and other hazardous wastes (liquid and solid) should be ensured

9.2.2. Current Situation in Tanzania

Live-bird markets operate in many major towns of Tanzania. Open market is a place where members of the public go to buy all sorts of foods including grains, fruits and vegetables and meat. Poultry are also sold and are available as: live birds and are usually slaughtered there, or bought live and taken home, bars and business places to be slaughtered. The slaughter facilities attached to the markets are not well constructed. Killing of the poultry, de-feathering and, dressing of the carcass is all done in the same area. and may be returned to farms for further rearing if they do not fetch desirable price.

Personnel handling birds are not well protected (with appropriate gears) from potentially infected birds and inedible by-products are disposed in the same system with other domestic solid wastes. The open markets provide conditions for the zoonotic disease transmission and evolution of infectious disease agents. At a live market, there is poor hygiene; there is lack of cleaning and disinfection of facilities, equipment and personal protective garments.

It is common practice to hold poultry over several nights until they fetch a buyer. Live markets may also be a source of infection to farm poultry if the farmer takes back to the farm, the unsold poultry which would have mixed with others in the live market. At live markets, multiple species of birds are kept together and in confined spaces. It is quite common that ducks are kept together with local chickens, layers or broiler birds.

Open markets could be considered as one of the biosecurity risk areas as sick or disease incubating birds bought and slaughtered at home could transmit infection to other farm birds and/or humans.

9.2.3 Recommendations

To prevent a possible transmission of Avian Influenza or other highly contagious disease, poultry producers and dealers must also use biosecurity precautions at live-bird markets.

The following biosecurity measures should be taken at live-bird markets to prevent the possible spread of disease, thus:

- The hygiene must be improved, first by educating live market workers to adhere to personal hygiene and that slaughter facilities, equipment and personnel garments should be cleaned and disinfected.
- Different species should not be kept together in confined spaces
- Stacking of cages on top of one another, without waste trays should be avoided.
- There should be requirements for issuance of animal movement permits before birds are allowed to be transported and that the health of the birds be ascertained before permits are issued. The practice so far seems to be confined to large animals and not birds.
- Complete personal protective equipment for slaughtering staff should be provided.
- There must be proper disposal of carcasses, feathers and other hazardous wastes (liquid and solid) should be ensured.
- The current practice of traders moving from one farm to another to buy chickens should be stopped.
- Different bird species ought to be segregated and kept in different cages and not mixed.
- The incoming poultry must be kept separate from unsold birds, especially if birds are from different locations.
- Unsold birds must not be returned to the farm and that live birds at the market should be allowed to leave the live bird market without slaughtering.
- Drivers and bicycle riders should be educated and advised to clean all equipment, crates, and vehicles before returning them to the farm
- Must ensure that slaughter areas are always separate from live bird stalls and from other market food items and that the surfaces are made of impervious materials.
- Must ensure that proper scalding of poultry before de-feathering. Must use clean hot water for scalding and that the water shall be changed frequently.

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