



SUMMARY PAPER

Food safety, antimicrobial use, and animal welfare in the Nairobi pork value chain



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Research themes and study partners

The International Livestock Research Institute (ILRI), University of Liverpool, University of Nairobi, and World Animal Protection collaborated to study the following themes along the pig value chain in Nairobi: animal welfare, food safety, antimicrobial residues and zoonotic diseases.

Ndumbu-ini slaughterhouse, one of the largest independent abattoirs supplying Nairobi and its environments, was chosen as a study site.

How was the study conducted?

The abattoir was visited between 5th January and 4th March 2021 to collect blood and tissue samples from pigs slaughtered during this period. The team collected information on the pigs' origin, method of transportation and observational data on gross lesions present on the animal and in the carcass. The samples were taken for laboratory analysis at the ILRI and the University of Nairobi.



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Pigs comfortably resting on straw beddings



What did we find?

Animal Welfare

Animal welfare is defined by the World Organization of Animal Health (OIE) as the physical and mental state of an animal in relation to the conditions in which it lives and dies.

Just like humans, animals can suffer and feel pain, and do have five freedoms which include:

| Animal welfare freedom | Minimum requirements (based on FARMS* guidelines) |
|--|--|
| Freedom from hunger and thirst | Animals must have access to fresh water and wholesome diet for the animals age and physiological status. |
| Freedom from discomfort | Provide animals with good housing that protects them from elements of weather and any discomfort. |
| Freedom from pain, injury, and disease | When animals are sick undertake a rapid diagnosis and treatment as well prevent and control diseases. |
| Freedom to express natural behaviour | Provide sufficient space, proper facilities, and company of the animals' kind. |
| Freedom from fear and distress | Minimize conditions and treatment that lead to stress and mental suffering. |

*FARMS - Farm Animal Responsible Minimum Standards guidelines on how farm animals are raised, transported, and slaughtered

A pig inhumanely strapped on a motorbike during transportation



@Katie Hamilton, ZED Group

Animal Welfare Observations During the Study Period

Animal welfare concern during transport:

- Pigs strapped onto motorbikes
- Overloading of pigs in the transport vessel
- Mixing of pigs from different farms in one vehicle
- Pigs kept for more than 24hours in the lairage

Why does this matter?

- Overcrowding and strapping pigs onto motorbikes causes injuries, such as lacerations, bruises and fractures. These types of injuries lead to down grading of the meat, which translates to reduced income/profit to the farmer or trader.
- Pigs should not be kept for more than 18 hours without food and water. Keeping animals for a longer time than that leads to the animal utilizing its energy reserves to sustain normal body functions causing weight loss hence reduced meat to sell.
- Meat obtained from a stressed pig tends to lose excess water as compared to non-stressed pigs. This meat weighs less leading to less income/profit.

Animal welfare concern during identification of live pigs

Most live pigs were painfully marked on the ears with sharp objects such as nails for purposes of identification at the lairage and after slaughter.

Why does this matter?

This process causes intense pain, causing physical injury and subsequent fear to the pigs. The identification lacerations (cuts) create avenues for entry of pathogens such as bacteria. Nevertheless, this is a key source of stress to the animal and as the animal fights back it becomes difficult to handle it.

What can we do to improve?

We recommend finding alternative non-invasive methods of marking pigs such as with paint or markers.



@Nicholas Bor, (LR)

A pig painfully marked on the ear using sharp object for identification.

Animal welfare concern during stunning

- The electrodes of the stunning device were dirty, old, and corroded.
- The stunning current was 0.3A, which is below the recommended current of 1.3A.
- Nearly all pigs were incorrectly restrained and stunned e.g., some were stunned as they moved

Why does this matter?

- Stunning is purposed to render the animal unconscious before slitting the neck.
- Improperly stunned animals end up being bled when still alive, able to feel pain and struggle. As the animal is still conscious and normally breathing, it inhales blood from the cut site (throat region) into the lungs. This scenario lowers the meat quality, gives a poor aesthetic appearance and shortens the shelf life of the meat.
- Proper restraining of pigs during stunning process ensures the rods are placed on the right site and also prevents electric shock to humans.



Electrode position observed



The right electrode position for pigs

What can we do to improve?

- Pigs should be properly restrained before stunning.
- The stunning device should be well positioned on the neck at the base of the ears.
- Stunning should be done with a clean and well-maintained stunning device with a current of 1.3A.
- The electrodes on the stunning gun have to be cleaned daily for effective transmission of current.
- Pigs that are not effectively stunned will be seen kicking, blinking, heavy breathing, and making sounds, and that must be always avoided. This is not only painful to the pig but also risks injury to the slaughter workers.

Antimicrobial residues

Antimicrobials are drugs that are used to treat a wide range of microbes such as bacterial (antibiotics), helminths (anthelmintics), viruses (antivirals), fungi (antifungals), and parasites (antiparasitics).

In farms, antimicrobials are used to treat and prevent infections in food and non-food animals. Food animals which are under treatment with antimicrobials should not be slaughtered nor their products consumed (by humans or other animals) before the recommended drug withdrawal period is over. This is because before the withdrawal period is over, traces of antimicrobials can still be found in the carcass, or other animal products (such as milk, eggs etc.) and subsequently passed to humans if consumed.

Findings

A considerable number of pigs slaughtered at the abattoir had antimicrobial residues in meat.

Why does this matter?

Consuming meat with antimicrobial residues, can result in toxicity, potential allergic reactions and chronic health impacts in humans. It also means exposing consumers to small quantities of that drug, which are not able to kill or stop growth of pathogens such as bacteria. This gives the bacteria an opportunity to develop resistance to the drug (Antimicrobial Resistance - AMR).

Globally, scientists have estimated that 700,000 people die every year due to AMR and this is projected to reach 10 million annual deaths by the year 2050. This results to high cost of treatment, severe illnesses, and reduced treatment options. Additionally, low and middle income countries are projected to be affected adversely.

What can be done?

As a farmer you need to treat animals only when sick which should be done by a registered animal health practitioner. Do not self-prescribe drugs or give drugs to animals when not sick.

As a trader/buyer, ensure you get the treatment history of the pigs before you buy. Only buy pigs who are not under treatment and where you know that the correct drug withdrawal period has passed since the last treatment.

Zoonotic Infections: Toxoplasmosis

Toxoplasmosis is a zoonotic disease (a disease transmitted from animals to humans and vice versa) caused by a parasite called *Toxoplasma gondii*. The parasite is passed to humans and animals (such as pigs) when an infected cat defecates on the environment. Food animals (sheep, goats, cattle, pigs) are infected when they pick/acquire these eggs during feeding, for example when grazing or the feed is contaminated.

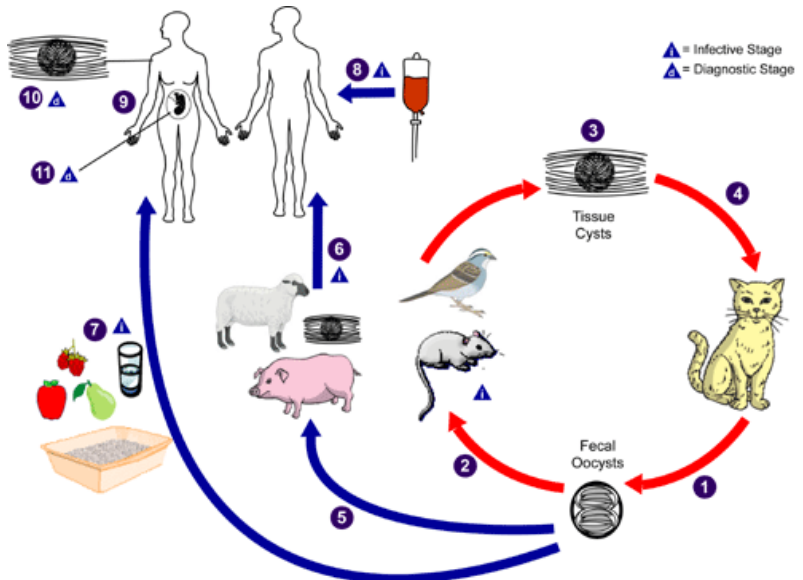
Humans can become infected by eating raw or undercooked meat from these animals, or by eating unwashed fruits and vegetables contaminated by the parasite eggs. Particularly, pregnant women are at high risk as infection can cause abortion and may also lead to developmental problems of the foetus.

Workers in slaughterhouses can be exposed to the parasite through contact or ingestion of raw meat or blood from infected animals. Infection with *T. gondii* has the greatest impact on those with low immunity (such as the very young/elderly, HIV/AIDS patients, cancer patients).

Life cycle of Toxoplasmosis

Causal Agent:

Toxoplasma gondii is a protozoan parasite that infects most species of warm-blooded animals, including humans, and causes the disease toxoplasmosis.



The only known definitive hosts for *Toxoplasma gondii* are members of family Felidae (domestic cats and their relatives).

1. Unsporulated oocysts are shed in the cat's feces.
2. Although oocysts are usually only shed for 1–3 weeks, large numbers may be shed. Oocysts take 1–5 days to sporulate in the environment and become infective. Intermediate hosts in nature (including birds and rodents) become infected after ingesting soil, water or plant material contaminated with oocysts.
3. Oocysts transform into tachyzoites shortly after ingestion. These tachyzoites localize in neural and muscle tissue and develop into tissue cyst bradyzoites.
4. Cats become infected after consuming intermediate hosts harboring tissue cysts.
5. Cats may also become infected directly by ingestion of sporulated oocysts. Animals bred for human consumption and wild game may also become in-

fectured with tissue cysts after ingestion of sporulated oocysts in the environment.

Humans can become infected by any of several routes:

6. Eating undercooked meat of animals harboring tissue cysts .
7. Consuming food or water contaminated with cat feces or by contaminated environmental samples (such as fecal-contaminated soil or changing the litter box of a pet cat).
8. Blood transfusion or organ transplantation.
9. Transplacentally from mother to fetus.
10. In the human host, the parasites form tissue cysts, most commonly in skeletal muscle, myocardium, brain, and eyes; these cysts may remain throughout the life of the host. Diagnosis is usually achieved by serology, although tissue cysts may be observed in stained biopsy specimens
11. Diagnosis of congenital infections can be achieved by detecting *T. gondii* DNA in amniotic fluid using molecular methods such as PCR .

Findings

Many practises were observed in the slaughterhouse which could expose workers to infection with the parasite causing Toxoplasmosis and other zoonotic infections. Some of these practises were:

- Insufficient washing of hands
- Insufficient washing of slaughterhouse working tools
- Slaughterhouse workers eating food inside and within the slaughterhouse facility
- Slaughterhouse workers with inadequate personal protective equipment e.g., gloves, worn out lab coats/overalls.

How can we keep ourselves safe?

- We should limit direct contact with raw meat by properly wearing protective equipment such as gumboots, overalls, gloves, head covers, and masks.
- We should wash our hands before and after handling meat
- We should frequently wash our working tools (knives and chopping boards) between carcasses and preferably using hot running water
- Never eat within the slaughterhouse facility where raw meat is handled.

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Pigs expressing their natural
behavior by rooting





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