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Capacitating One Health in Eastern and Southern Africa

Health, feed, forages through food systems

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ILRI Uganda

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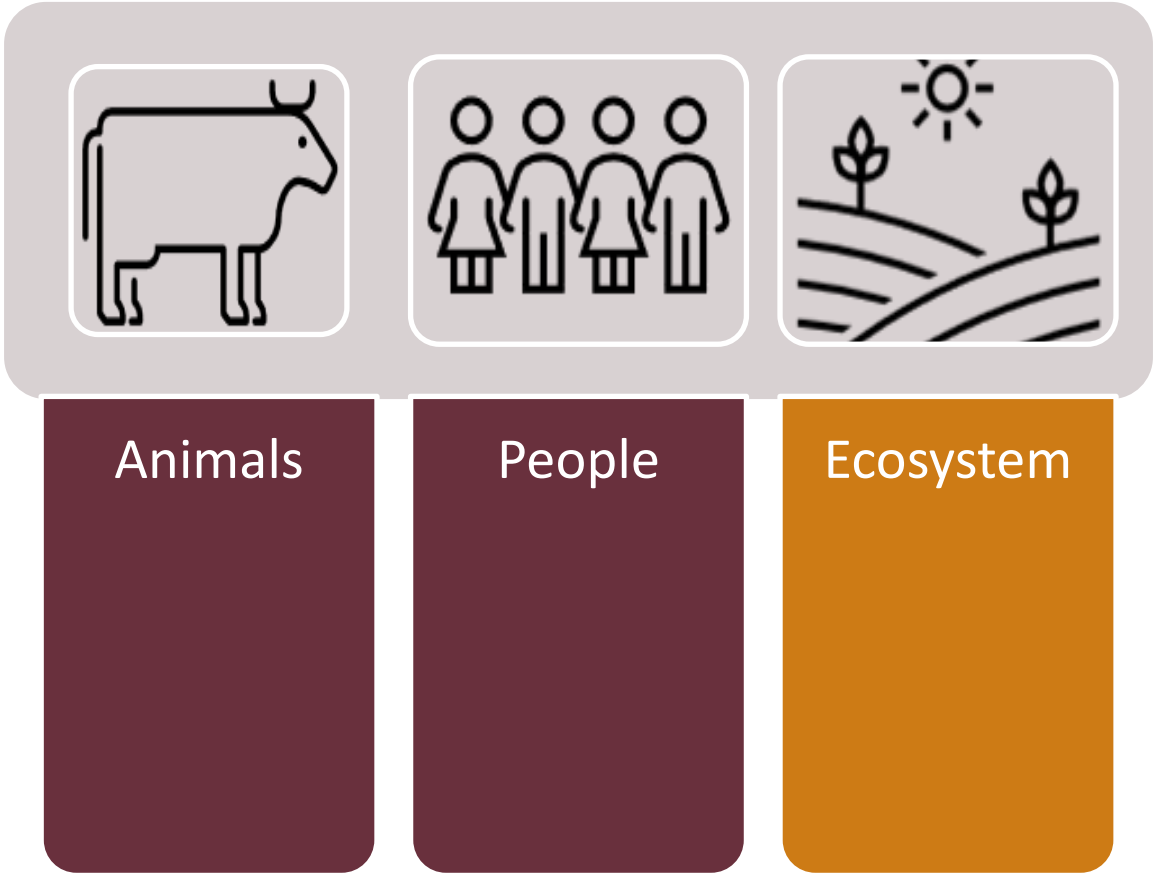
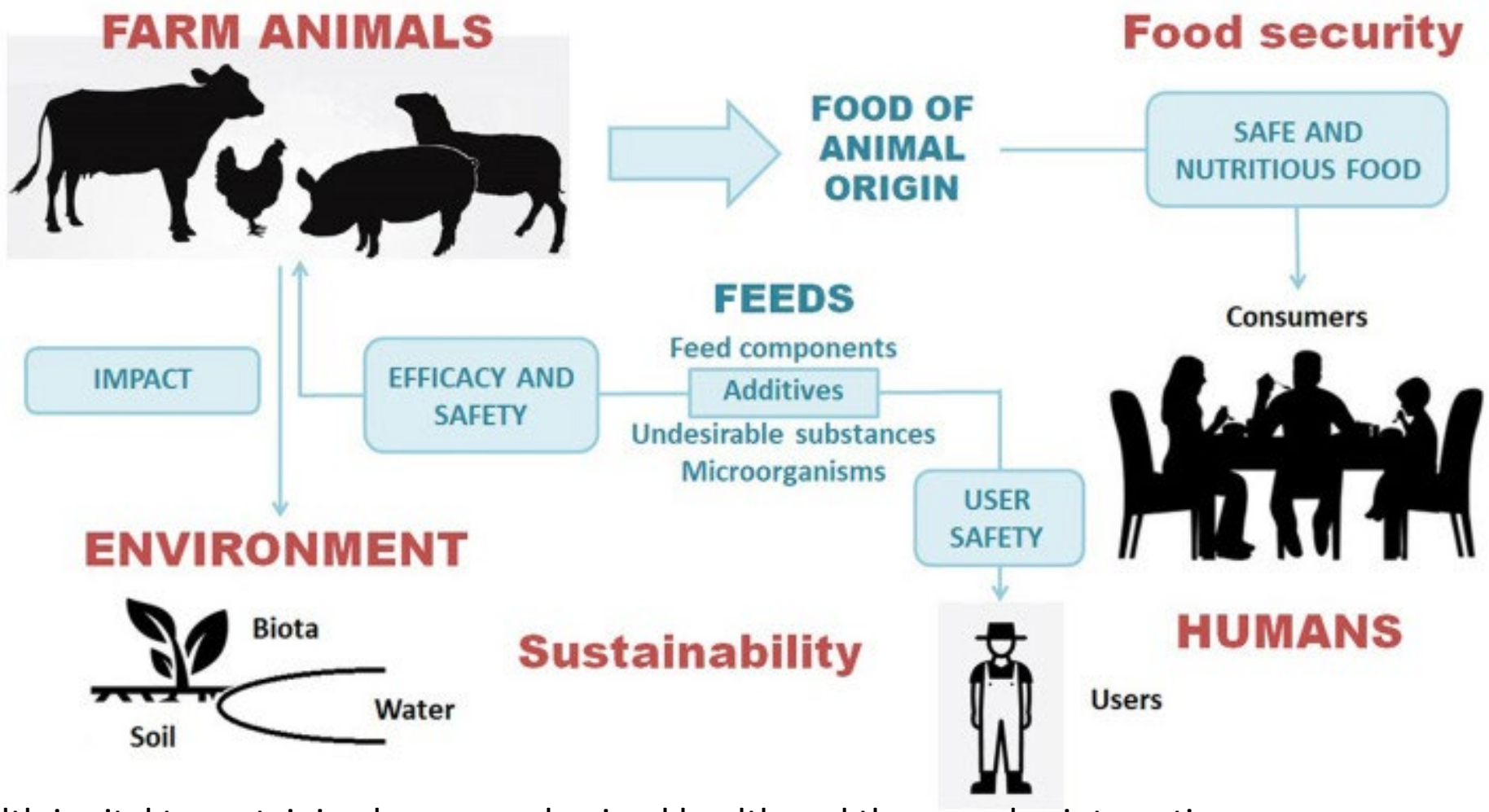
One Health: unifying approach to sustainably balance and optimize the health of



- Although plant health is a critical part of the definition of One Health, plants have typically not been well integrated into One Health approaches.

Safety of animal feeds and forages as a pillar of the safety of the entire food chain in a One Health perspective



Plant health is vital to sustaining human and animal health and the complex interactions among the environment, humans (consumer safety), and animals (Matovani et al,. et al 2022).

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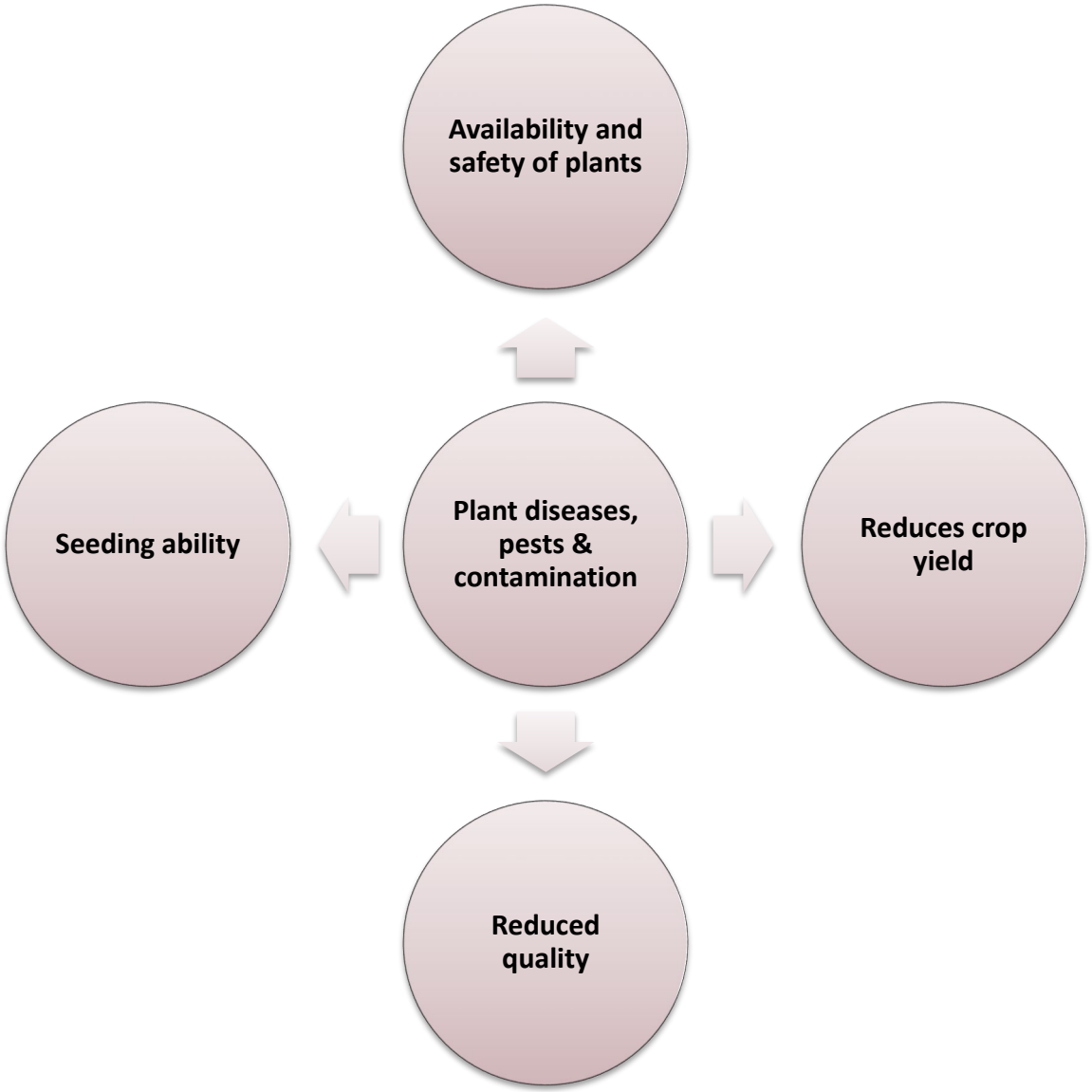
Impacts of plant diseases and contamination on plant health



- Plants provide more than 80% of the food consumed by humans
- Plants provide >86% of the primary source of nutrition for livestock

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Sources of contamination in Feeds and Forages

- Agronomic practices of forages through soil contamination
- Recycling plant-based food waste as animal feed and manure
- The use of crop residues as animal feeds

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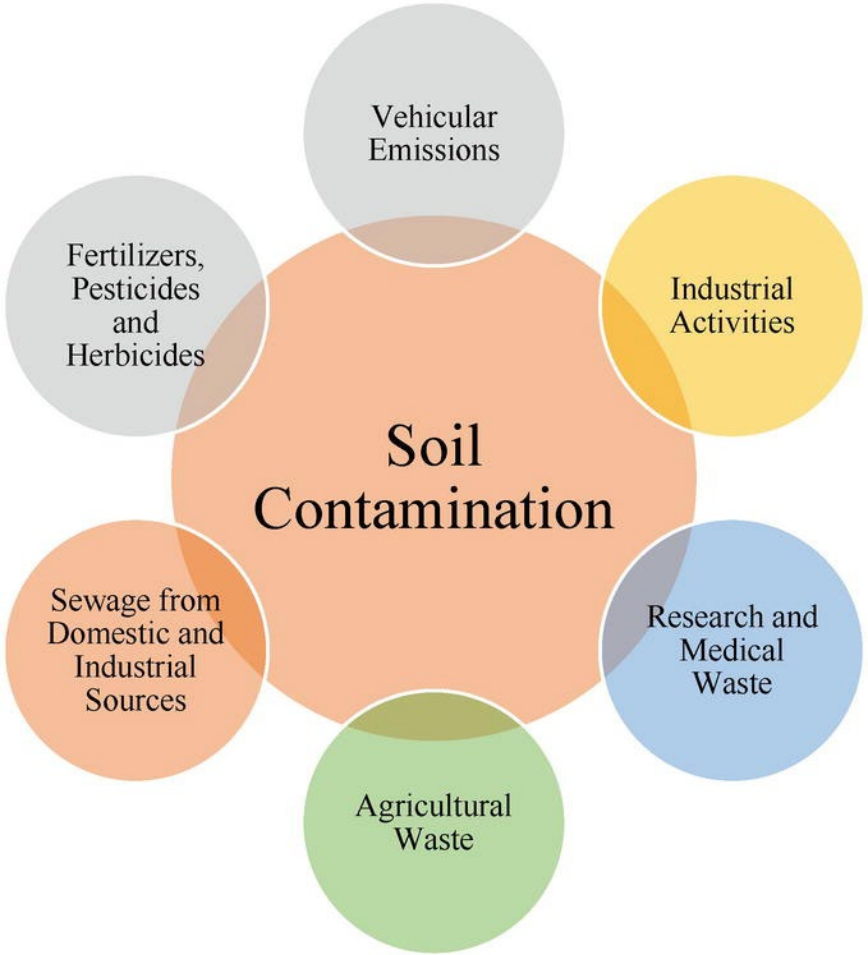
Implication of agronomic practices of feeds and forages

- Grazing on pastures or growing forages planted by the roadside accumulate carbon residues
- Growing forages in soils/ areas contaminated with sewage waste, industrial waste etc
  - due to upstream industrial activities,
  - livestock production (through use in veterinary medicine/acaricides),
  - use of certain pesticides, or waste disposal (ATSDR 2012; NASEM 2017),

  Heavy metals: can be absorbed by forages, contributing to ill-health and intellectual disability (Emiola et al 2023, Gibb et al. 2019).



The process of **heavy metals** accumulation in agricultural crops contribute toxic elements into the human food chain (Grytsyuk, 2006)

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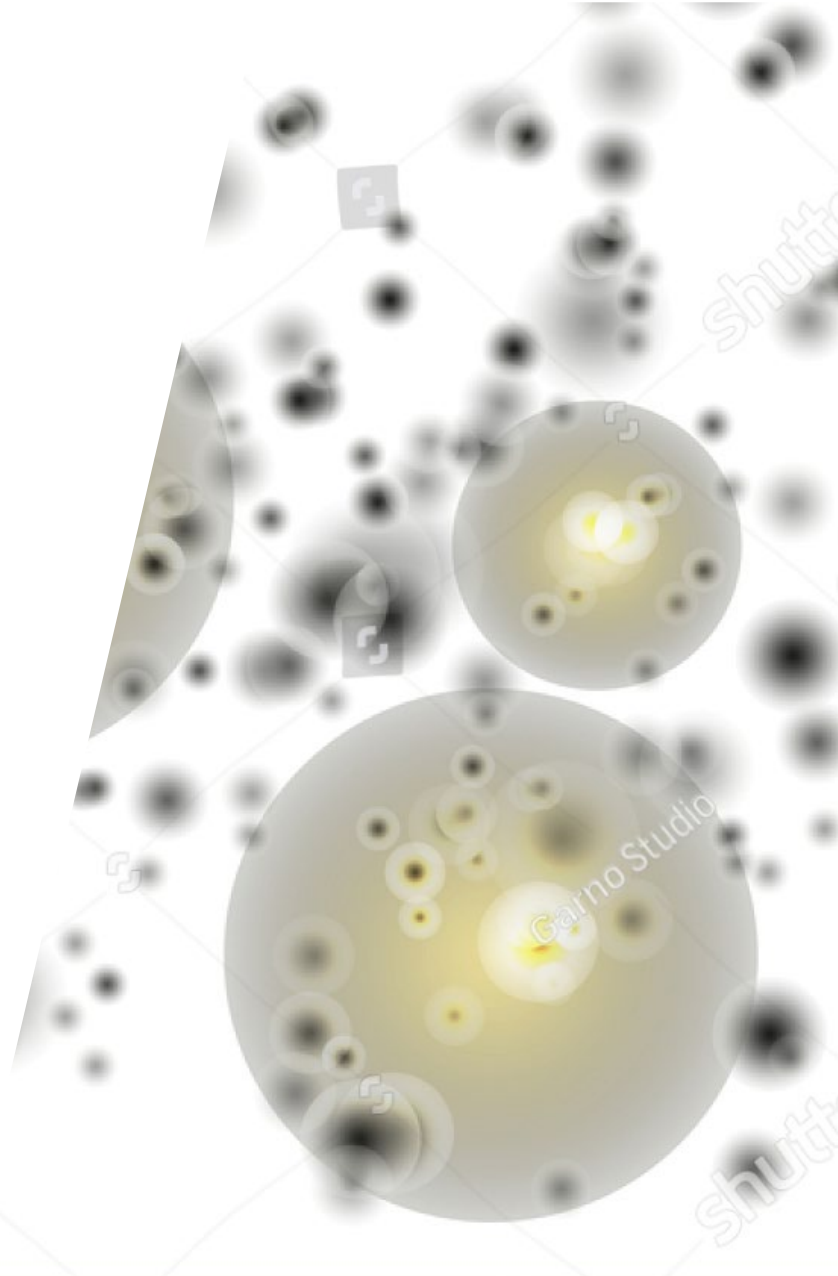
Microbial health hazards of recycling plant-based food waste as animal feed

- Heavy metals: Utilization of fruit and vegetable wastes as livestock feed and as substrates for generation of other value-added products (Harinder P.S. Makkar, 2013)

- Plant based food waste can contain various microbial and prionic agents that can cause diseases such as FMD, ASF, classical swine fever (CSF), salmonellosis, toxoplasmosis and porcine reproductive and respiratory syndrome (PRRS)



Recycling plant-based food waste as animal feed and manure

SOURCES OF CONTAMINATION IN ANIMAL FEED

- Accumulation of pesticides and insecticides residues in/on forages can affect human health by disrupting hormone and immune system function, increasing risk of cancer, and impairs brain development (Gilden et al. 2010).
- Manure as fertiliser: Pathogens and antimicrobial resistance genes present in animal manure and antimicrobials used in forage production, can be transmitted through the food chain, leading to antimicrobial-resistant infections in humans (Jiang et al. 2015; Checcucci et al. 2020).

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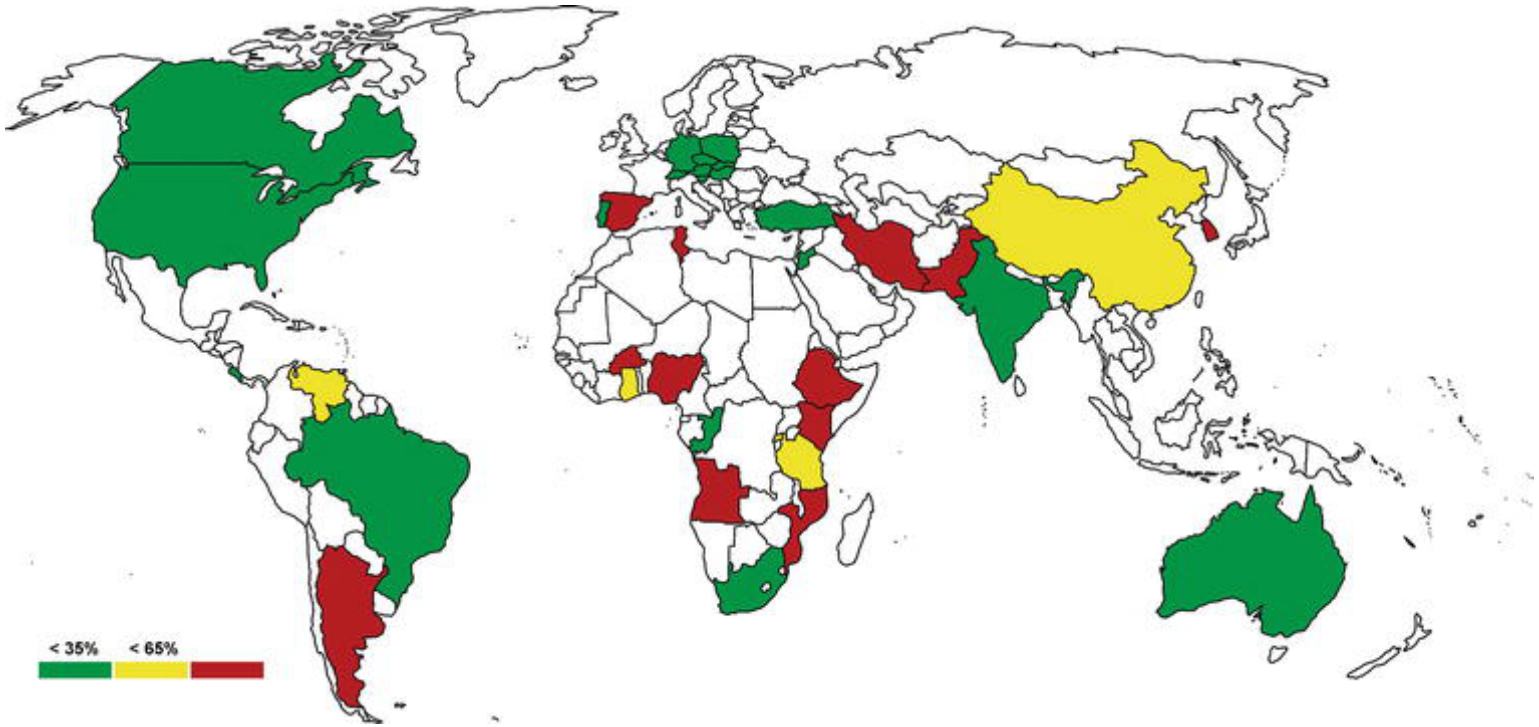
Aflatoxins prevalence in animal feed and animal feed ingredients

- Mycotoxins have a substantial economic impact because all participants of the production chain as farmers, cereals and grains producers, handlers and distributors, crop/feed processors, and consumers suffer losses.
- According to WHO, in Africa, the aflatoxins burden accounts for about 40% of daily diseases.
- Mycotoxin contamination in Sub-Saharan Africa among agriculture products accounts for more than 250,000 death occurring annually



Worldwide prevalence for aflatoxin, expressed as percentages. Based on scientific reports from each country.

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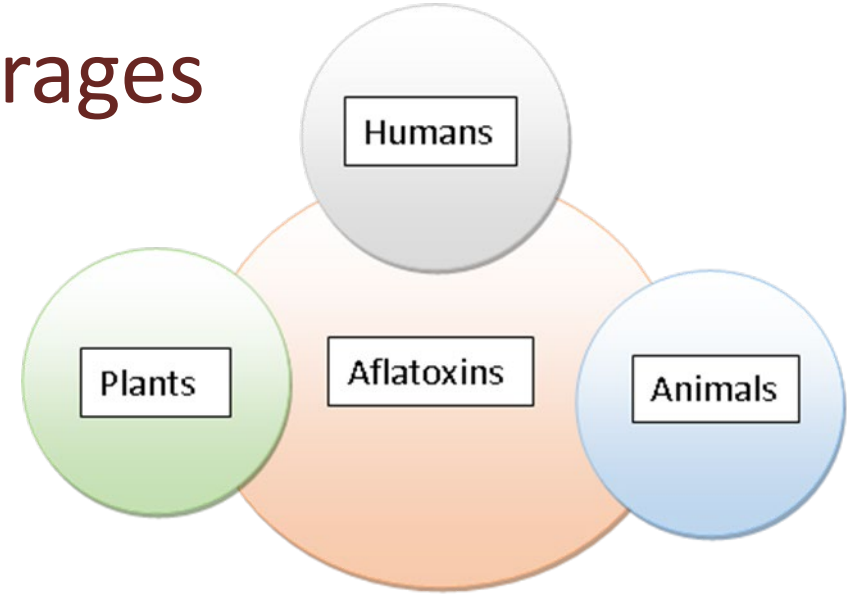
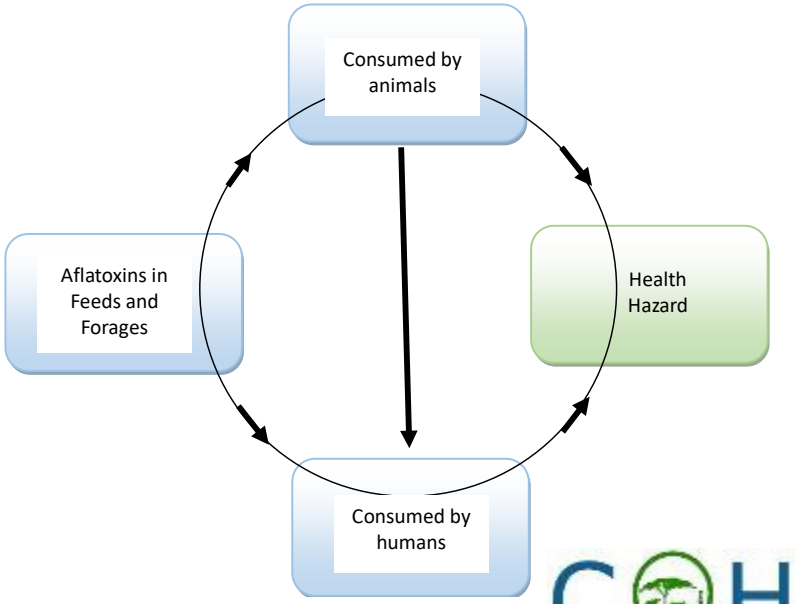
Aflatoxins in Animal Feed and Forages

- Aflatoxin B1 is a type of mycotoxin produced by *Aspergillus flavus* and *A. parasiticus* - (they are toxic to humans and animals – food and feed safety)
- Aflatoxins are found in a variety of food-feed crops such as cereals, roots, nuts, and pulses
- Occur in the field, during storage, transportation at almost all stages of the production chain
- Aflatoxins can contaminate foods and feeds e.g. cereals, roots, nuts, and pulses under favourable conditions(high temperatures, high moisture, and drought stress).
- Effects of aflatoxins
  - ✓ In humans affect the liver, and kidneys, cause spleen enlargement, decrease protein and fats digestion as well as absorption, cause impaired carbohydrate breakdown, cause reduced sperm count and infertility, birth defects, higher incidence of cancer, decreased resistance and increased susceptibility to infections.
  - ✓ In ruminant animals, aflatoxins consumption cause reproductive problems, immune suppression, decrease on milk, beef or wool yield, and reduced feed utilization.
  - ✓ Aflatoxins have been shown reduced feed efficiency in cattle; growth can be altered when ruminants consume contaminated feed for extended periods of time.



Aflatoxins a One Health issue affecting plants, humans, Animals



Aflatoxins flow along the feeding cycle leading to health

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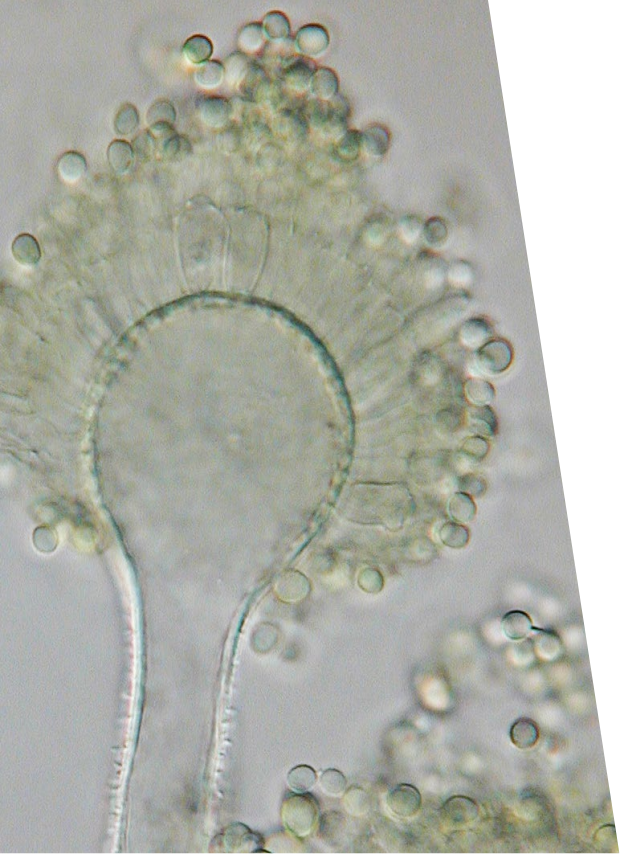

Potential One Health strategies to overcome effects of plant health risks on humans and animals

- Informing farmers about these health risks while improving access to technologies to manage them has proven effective, as have market incentives for safer food (Hofmann and Jones 2021; Magnan et al. 2021).
- Consider policy options that restrict access to inputs that pose One Health risks, rewarding value chain actors for responsible practices, and designing and enforcing appropriate environmental and food safety regulations.
- Capacity building along the value chain to ensure safe agricultural practices, safe handling and use of available agrochemicals,

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Take aways

- These examples demonstrate how protecting health and safety of feeds and forages requires employing a One Health approach to
  - Safeguard human and animal health due to plant health risks that flow to humans through feeds and forages and animal sourced foods
  - Promoting management practices aimed at reducing crop losses and ensuring food-feed safety.
  - Plant, animal, and public health research and practice is necessary to address the gaps in knowledge, technology and education to ensure the balance between food-feed safety; and food security.

Acknowledgements

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