Foot and Mouth Disease and Food Safety Risk Analysis

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SANITARY AND PHYTOSANITARY (SPS) ANNEX VIII TO THE SADC PROTOCOL ON TRADE (2014, Gaborone, Botswana)

Objectives:

- Facilitate the protection of animal health, 2) Enhance implementation of World Trade organisation agreement on Sanitary and Phytosanitary measures (3) Enhance technical capacity to implement and monitor SPS measures according to international standards
- Emphasises the importance of animal health in relation to trade

- Recognises the importance of establishing and maintaining confidence and applying SPS measures that protect animal health, businesses and consumers
- Office Internatianale des Epizooties (OIE), Codex Alimentarius, World Trade Organisation, Food and Agricultural Organisation of the Unites Nations, etc

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SANITARY AND PHYTOSANITARY (SPS) ANNEX VIII TO THE SADC PROTOCOL ON TRADE (2014 Gaborone, Botswana)

Assessment of Risk and Determination of the Appropriate Level of Sanitary or Phytosanitary Protection.

- A sanitary measure should be based on **appropriate assessment and circumstances of the risk to animal health.**
- When conducting a risk assessment and determining a sanitary each Member State shall take into account relevant:
  - Scientific evidence
  - relevant risk assessment techniques and methodologies developed by international organisations;
  - processes and production methods;
  - inspection, sampling and testing methods.

SANITARY AND PHYTOSANITARY (SPS) ANNEX VIII TO THE SADC PROTOCOL ON TRADE (2014 Gaborone, Botswana)

Assessment of Risk and Determination of the Appropriate Level of Sanitary or Phytosanitary Protection.

- inspection, sampling and testing methods;
- the prevalence a disease(s) or disease-free areas or areas of low prevalence;
- ecological and environmental conditions;
- treatments, such as quarantines;
- **economic factors:** potential **damage** in terms of **loss of production or sales** in the event of a disease; the **costs of control or eradication for the importing member country**; and the relative cost-effectiveness of alternative approaches to limiting risks.

Adaptation to Regional Conditions, Disease-Free Areas and Areas of Low Disease Prevalence

- Member States shall adapt sanitary measures in accordance with their international rights and obligations according to characteristics of the country/area and by taking into account:
  - a) the prevalence of specific disease (s)
  - b) the existence of eradication or control programmes; and
  - c) appropriate criteria or SPS guidelines developed by international organizations or by the SADC.
- In determining whether an area is disease-free area or disease prevalence Member States should base determination on factors such as geography, ecosystems, epidemiological surveillance and the effectiveness of sanitary or phytosanitary controls.

COMMODITY-BASED FOOD SAFETY RISK ANALYSIS - FOOT AND MOUTH DISEASE

- **FOOT AND MOUTH DISEASE** - Important viral disease of domestic (cattle, sheep goats and pigs) and wild (buffalo, deer, antelope and wild pigs) cloven-hoofed animals

- Cattle are the are primary hosts. Buffalo are carrier maintenance hosts. Pigs may serve as infection multipliers (not carriers). Sheep and goats may become virus carriers.

- FMD has high morbidity, low mortality. However, mortality may increase up to 20% in calves-myositis.

CATTLE

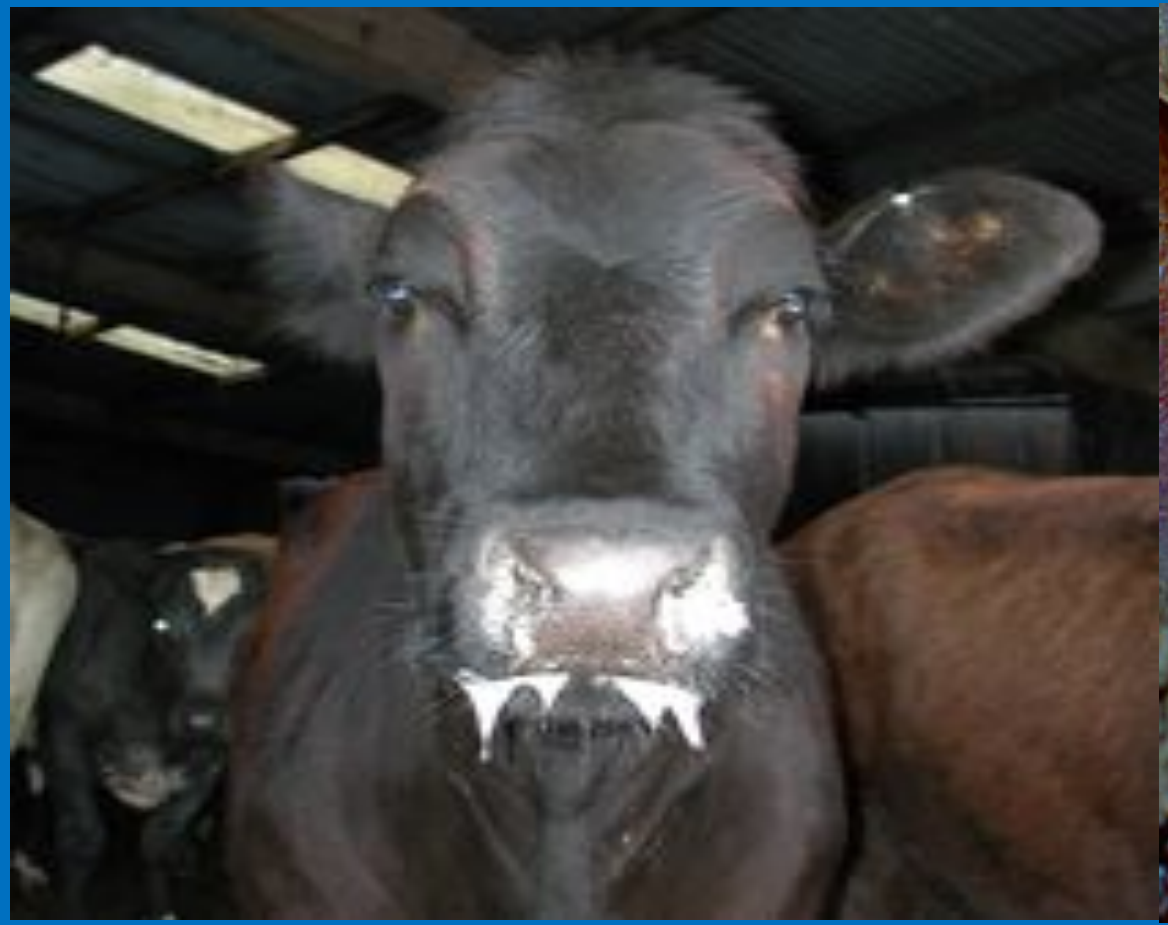
BUFFALOES

GOATS

SHEEP

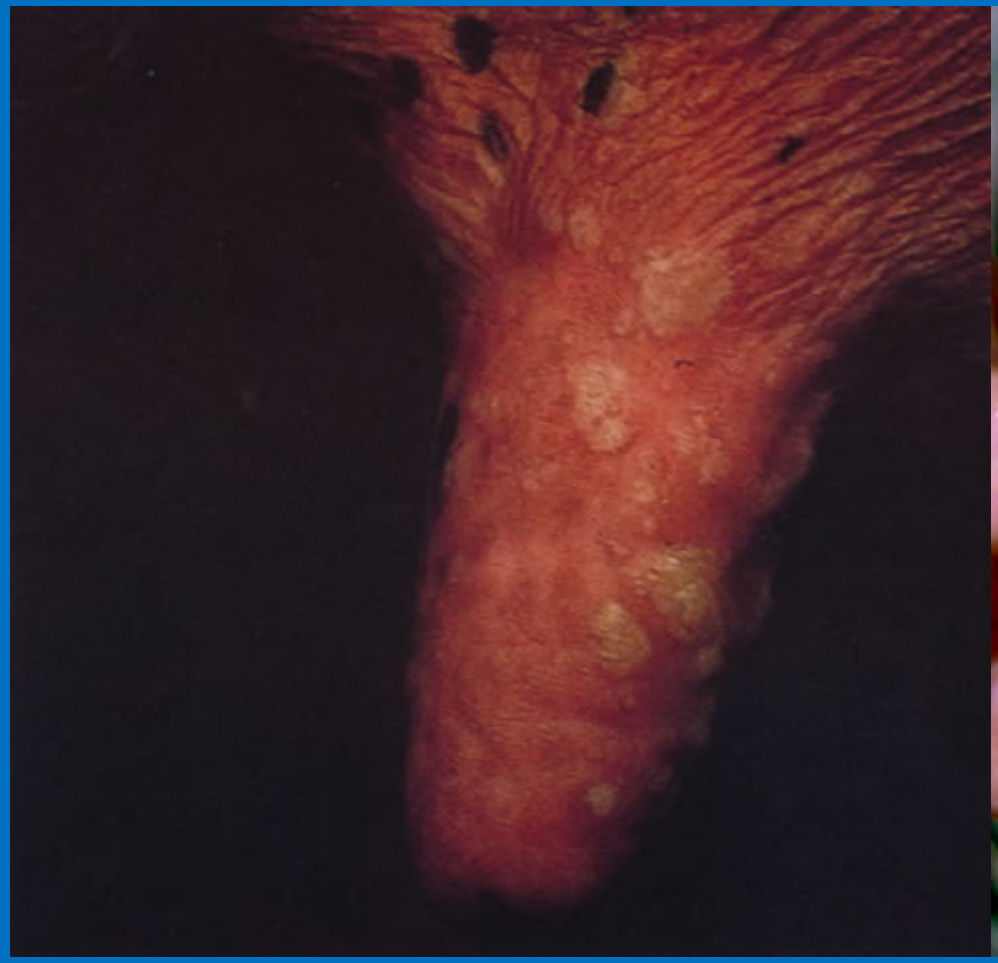
PIGS

Deers



Profuse salivation

Oral cavity ulcers



Teat Vesicles

Interdigital cleft rupture

COMMODITY FOOD SAFETY RISK ANALYSIS ON FOOT AND MOUTH DISEASE ALONG ANALYSIS

- The FMD virus is sensitive to acid and alkaline conditions outside the range of pH of 6.0 -9.0.
- Virus shedding begins during the incubation period, about 24 hrs before the appearance of clinical signs.
- Seven distinct serotypes of FMD: A, O (Japan and Korea) and , C, SAT1, SAT2, SAT3, and Asia 1

COMMODITY FOOD SAFETY RISK ANALYSIS ON FOOT AND MOUTH DISEASE ALONG ANALYSIS

- **Transmission**: direct contact, aerosols (pigs), mechanical carriage by humans or vehicles, on fomites and through animal products meat, offal, milk semen, and embryos.
- Virus may spread 10 Km over land.
- **Human infection**, usually mild, has been described on rare occasions **in laboratory personnel working with the virus and individuals handling infected animals**
- **Variable clinical presentation**: inapparent or mild to a severe form of infection characterised by by fever, lameness. Profuse salivation with characteristic drooling and lip smacking. Vesicular lesions in oral cavity-ulcers. Vesicular lesions on the tongue, snout, feet, and mammary glands (teats/udder) of lactating animals.
- **In pigs**, foot lesions are severe and the hooves may slough.

I. GENERAL OVERVIEW

Pools represent independently circulating and evolving foot-and-mouth disease virus (FMDV) *genotypes; within the pools, cycles of emergence and spread occur that usually affect multiple countries in the region. In the absence of specific reports, it should be assumed that the serotypes indicated below are continuously circulating in parts of the pool area and would be detected if sufficient surveillance was in place (Table 1).*

Table 1: List of countries representing each virus pool for the period 2011 – 2016

POOL	REGION/COUNTRIES – colour pools as in Map	SEROTYPES
1	**SOUTHEAST ASIA/CENTRAL ASIA/EAST ASIA** Cambodia, China (People's Rep. of), China (Hong Kong, SAR), China (Taiwan Province), Korea (DPR), Korea (Rep. of), Laos PDR, Malaysia, Mongolia, Myanmar, Russian Federation, Thailand, Viet Nam	**O, A and (Asia 1 not detected since 2006)**
2	**SOUTH ASIA** Bangladesh, Bhutan, India, Mauritius, Nepal, Sri Lanka	**O, A and Asia 1**
3	**WEST EURASIA & MIDDLE EAST** Afghanistan, Algeria, Armenia, Azerbaijan, Bahrain, Bulgaria, **Egypt**, Georgia, Iran, Iraq, Israel, Jordan, Kazakhstan, Kuwait, Kyrgyzstan, Lebanon, **Libya**, Morocco, Oman, Pakistan, Palestine, Qatar, Saudi Arabia, Syrian Arab Republic, Tajikistan, Tunisia, Turkey, Turkmenistan, United Arab Emirates, Uzbekistan	**O, A and Asia 1**
4	**EASTERN AFRICA** Burundi, Comoros, **Congo D. R.**, Djibouti, **Egypt**, Eritrea, Ethiopia, Kenya, **Libya**, Rwanda, Somalia, Sudan, South Sudan, Tanzania, Uganda, Yemen	**O, A, SAT 1, SAT 2 and SAT 3**
5	**WEST/CENTRAL AFRICA** Benin, Burkina Faso, Cameroon, Cape Verde, Central Afr. Rep., Chad, **Congo D. R.**, Congo, Côte d'Ivoire, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea Biss., Guinea, Liberia, Mali, Mauritania, Niger, Nigeria, Sao Tome Principe, Senegal, Sierra Leone, Togo	**O, A, SAT 1 and SAT 2**
6	**SOUTHERN AFRICA** Angola, Botswana, **Congo D. R.,** Malawi, Mozambique, Namibia, South Africa, Zambia, Zimbabwe	**{O, A}*, SAT 1, SAT 2 and SAT 3**
7	**SOUTH AMERICA** Ecuador, Paraguay, Venezuela	**O and A**

Egypt, Libya and **Congo D. R.** (highlighted in bold) are indicated as being in multiple pools, since they have evidence of FMDV originating from 2 or more pools in the past four years. * ONLY IN NORTH ZAMBIA AS SPILL-OVER FROM POOL 4

MAP 1: Foot-and-mouth disease (FMD) virus pools: world distribution by serotype in 2011-2016

FMD SEROTYPE DISTRIBUTION IN AFRICA

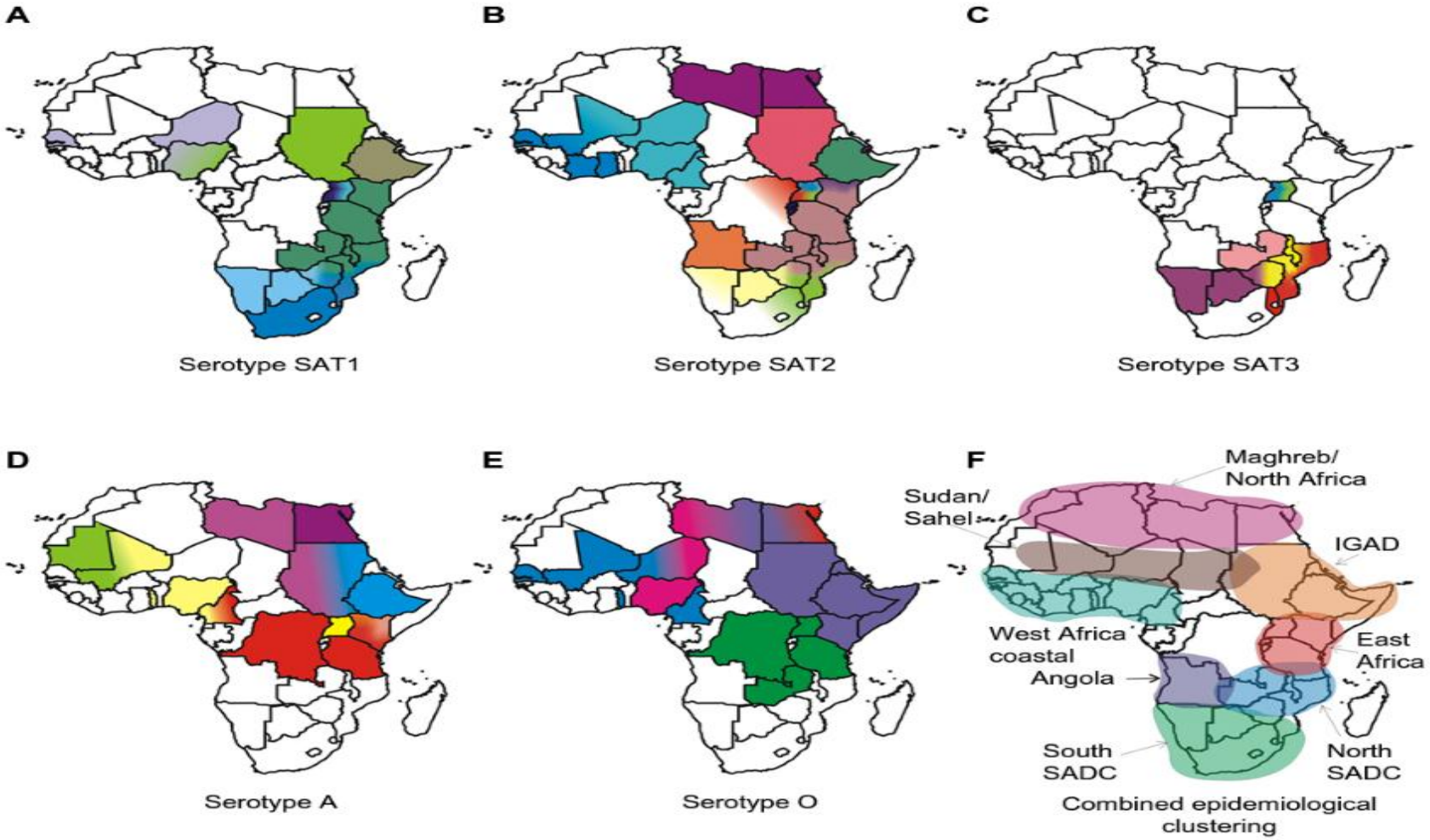
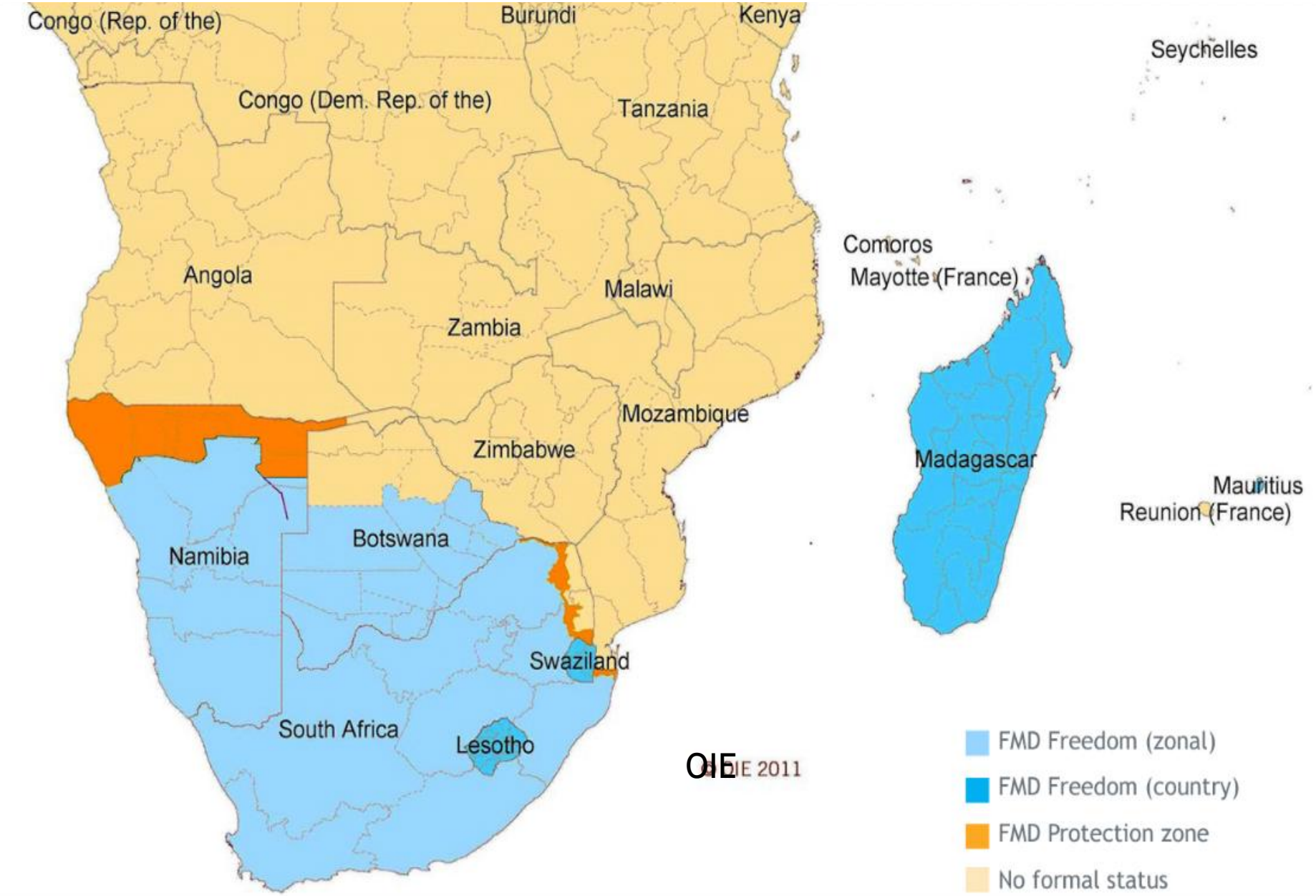


Figure 1 Maps of Africa showing the serotype and topotype distribution.
Notes: The topotypes are color coded. The epidemiological clustering is indicated. The epidemiological clusters shown in the maps (A–F) do not necessarily indicate political borders of the countries.
Abbreviations: IGAD, Intergovernmental Authority on Development; SADC, Southern African Development Community; SAT, Southern African Territories.

OVERVIEW ON FMD STATUS IN SADC

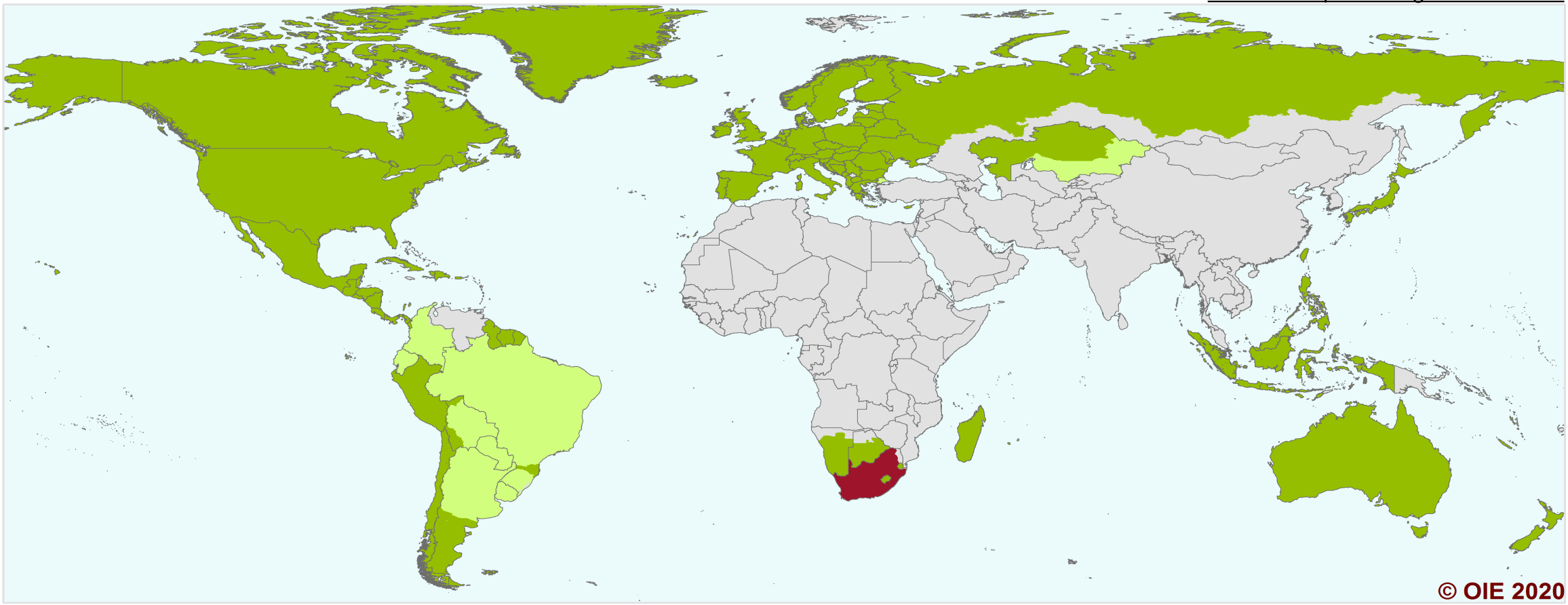


OVERVIEW ON FMD STATUS in AROUND THE WORLD

OIE Members' official FMD status map

Last update June 2020

Click on a specific region to zoom in



Members and zones recognised as free from FMD without vaccination

Members and zones recognised as free from FMD with vaccination

Suspension of FMD free status

Countries and zones without an OIE official status for FMD

- The world's veterinary organization reported earlier this month that the African country of Namibia experienced another outbreak of foot and mouth disease (FMD) in cattle.
- This, after a shipment of 25 tons of Namibian beef arrived on U.S. shores in April of this year, had at least one cattle organization upset.
- "National Cattle Breeders Association (NCBA) calls on USDA to investigate and reaffirm the efficacy of Namibia's cordon fence, security of Namibia's buffer zone and surrounding FMD protocols, and if found deficient, USDA must take immediate action to suspend imports from Namibia in order to ensure the continued safety of U.S. cattle and beef," said National Cattlemen's Beef Association Vice President of Government Affairs, Ethan Lane in a recent news release.\
- Namibia is not a FMD-free country, but the majority of the country was considered FMD-free because of a fence across the northern tier of the nation

OVERVIEW ON FMD STATUS in SADC COUNTRIES

- **Comments by The Animal Health committee chair Dr. Max Thornsberry of Richland, R-CALF, USA.**

"They aren't FMD free. If they were, they wouldn't have had an outbreak,"

"You have to visit a third world country to understand how much different it is, their veterinary reporting, their disease control in many ways is like going back to the 1800s,"

"They will never be FMD free in Africa with the wildlife they have roaming," he added. "When you are surrounded by countries that are doing nothing about FMD, it's only a matter of time."

"If we get an outbreak, it's going to literally devastate the livestock industry in this country."

Comparing the situation to COVID, he said this could be worse for those raising and feeding cattle. "Imagine if we get FMD here and we shut down every packing plant in the U.S.," he said.

"People need to realize that if the president doesn't withdraw from the WTO, we will have to continue to abide by these rules. These standards are not set by USDA, they are set by WTO and the OIE (the World Organisation for Animal Health)," said Thornsberry.

The United States, which has not had a case of FMD since 1929, would be severely affected if FMD affects livestock here, he said.

https://www.thefencepost.com/news/foot-and-mouth-disease-in-namibia-raises-concerns/#:~:text=The%20world's%20veterinary%20organization%20reported,least%20one%20cattle%20organization%20upset.

FACTS AND/OR FICTION?????

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COMMODITY-BASED FOOD SAFETY RISK ANALYSIS ALONG VALUE CHAINS- FOOT AND MOUTH DISEASE

A value chain ‘describes the full range of activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumer, and final disposal after use’

Codex Alimentarius Principles of Risk Analysis for Food Safety

- The objective of risk analysis is to **reduce pathogens across the food chain** (farm to fork) and protect both human health, animal health and business.

- Risk analysis should be an integral part of a national **food safety** and **food trade** system

- Risk analysis should be **consistent**, **open** and **transparent**, **documented**, **evaluated** and reviewed based on scientific evidence

Codex Alimentarius Principles of Risk Analysis for Food Safety

- The objective of risk analysis is to **reduce pathogens across the food chain** (farm to fork) and protect both human health, animal health and business.

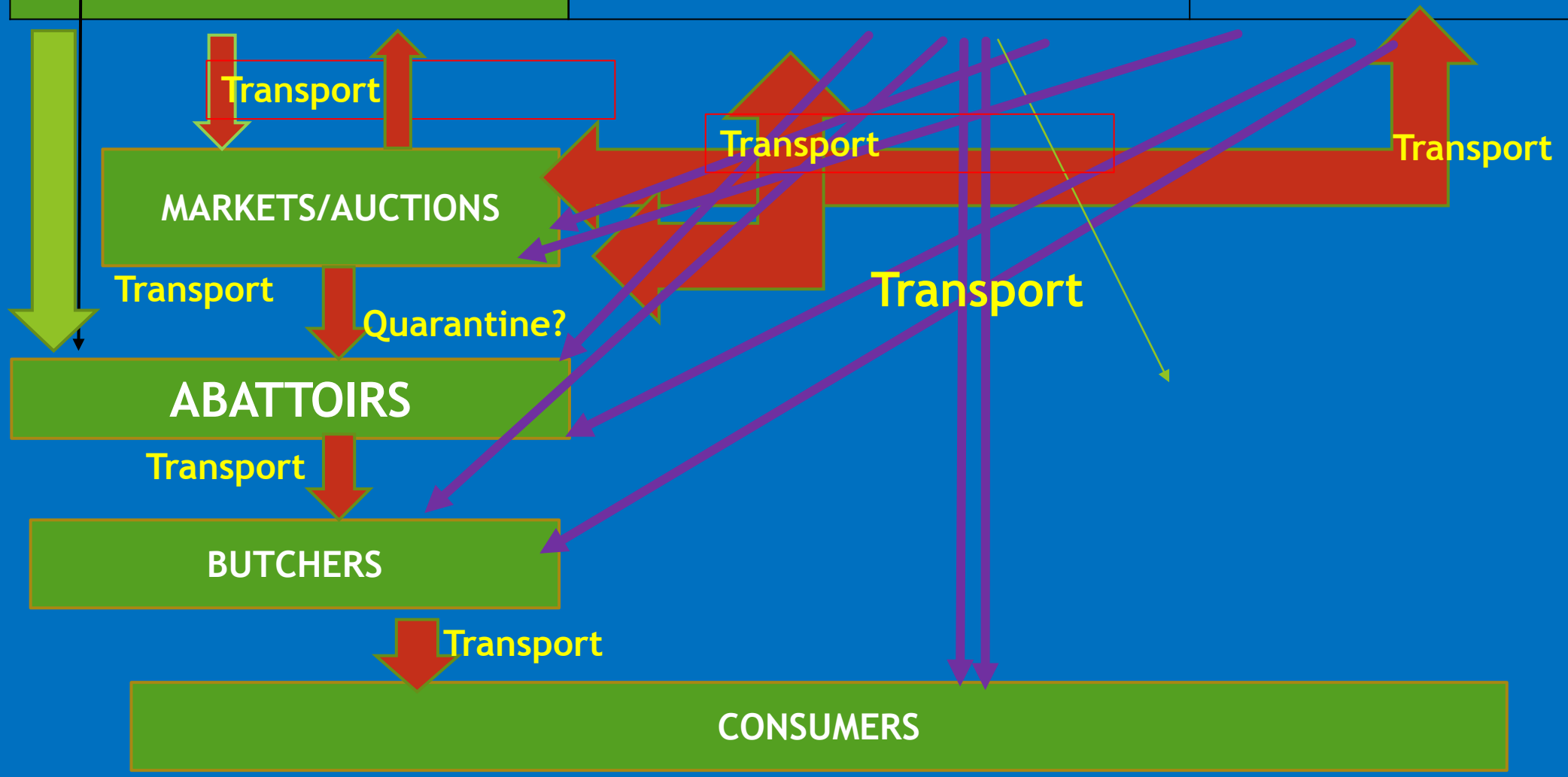
- Risk analysis activities at national level should be conducted according to guidelines of international intergovernmental organisation Codex Alimentarius, FAO, WHO and OIE.

Risk Assessment

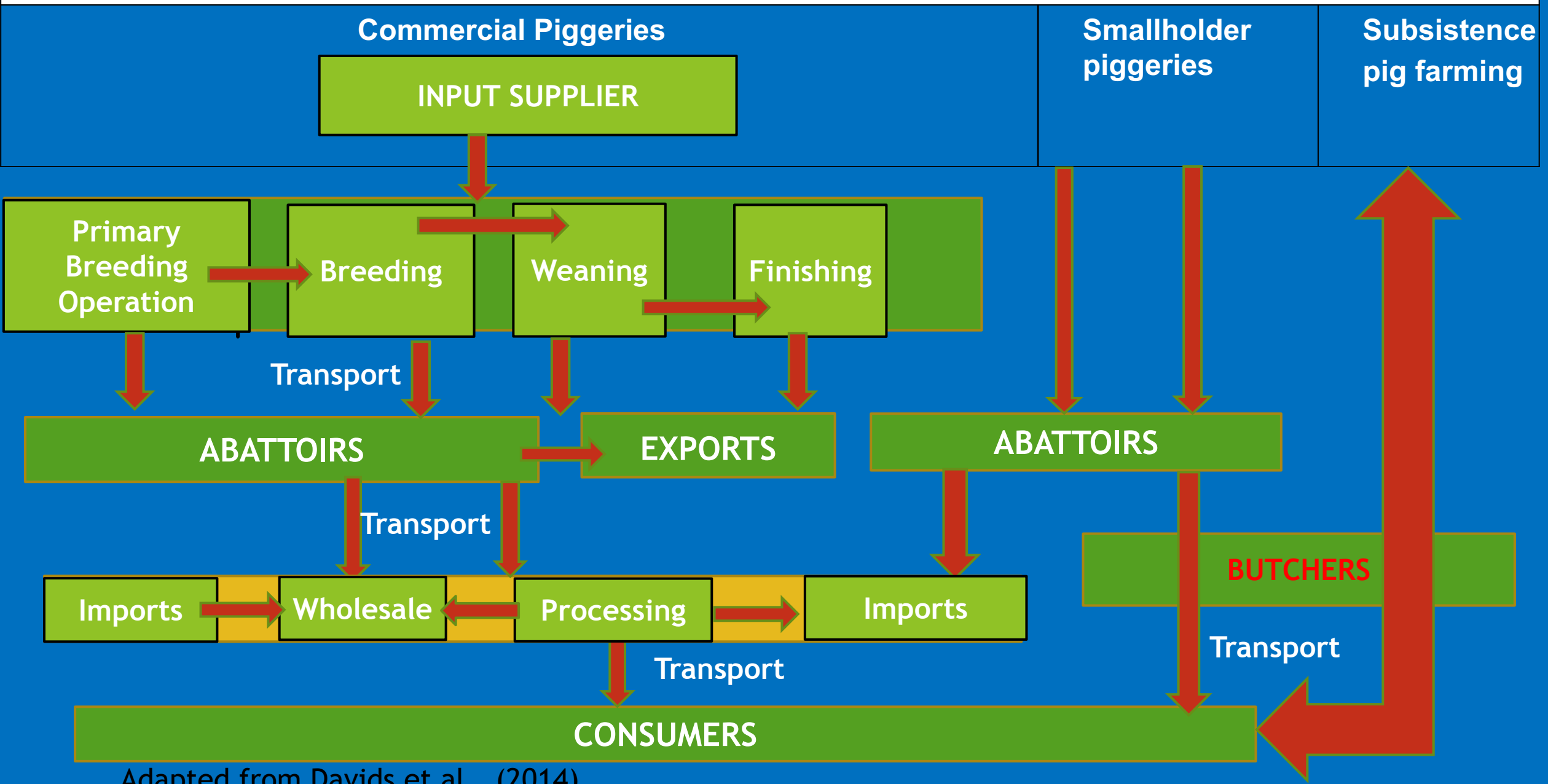
- Risk assessment policy should be a major component of risk management.
- Risk managers should design a systematic, clear and unbiased risk assessment policy in advance before initiation of risk assessment, in consultation with risk assessors and all other interested parties.
- The mandate given by risk managers to risk assessors should be as clear as possible.
- If necessary, risk managers should ask risk assessors to evaluate the potential changes in risk that may result from various risk management strategies.

BEEF PRODUCTION VALUE CHAIN

BEEF production	***Mixed production***	***Dairy cow culling***
Cattle farms/ranches/ Commercial Feedlots, Subsistence or communal farms	***Cattle farmed for*** meat & milk production (smallholder)	

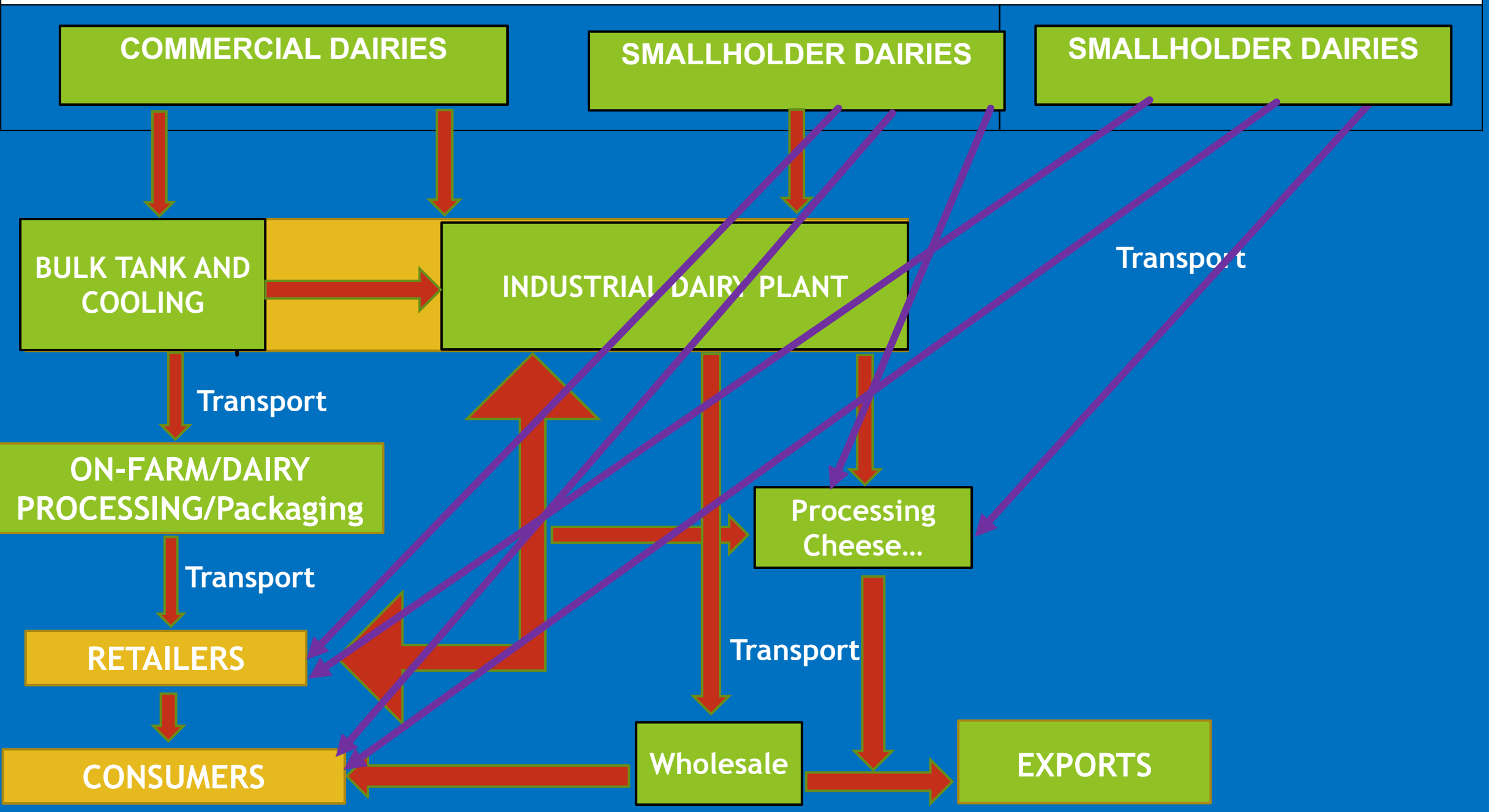


PORK PRODUCTION VALUE CHAIN

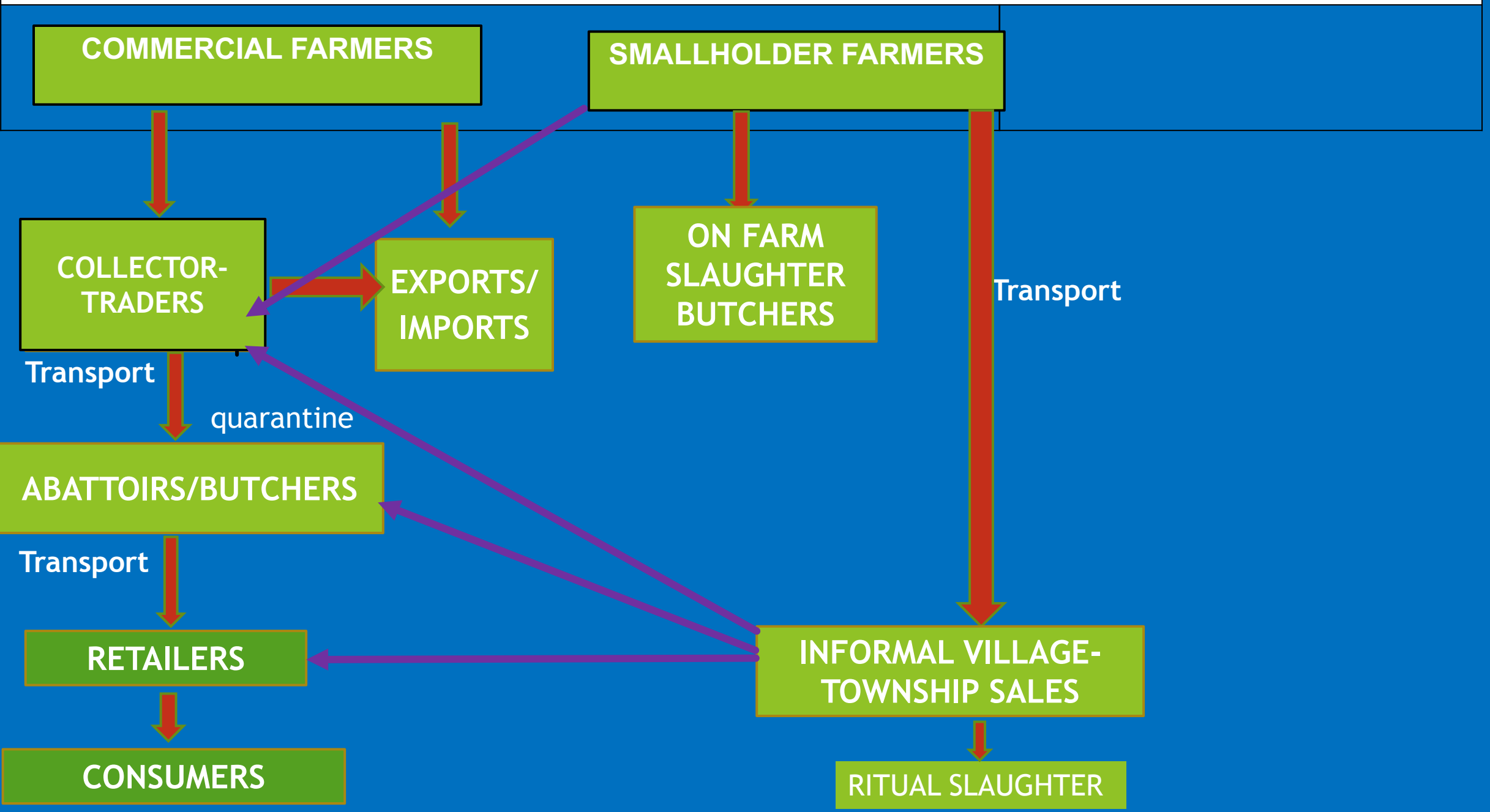


Adapted from Davids et al., (2014)

DAIRY PRODUCTION VALUE CHAINS



GOAT AND SHEEP MEAT PRODUCTION VALUE CHAINS



FOOD SAFETY MEASURES TO PREVENT FMD SADC

Slaughter MEAT

MILK AND MILK PRODUCTS

FOOD SAFETY MEASURES TO PREVENT FMD SADC

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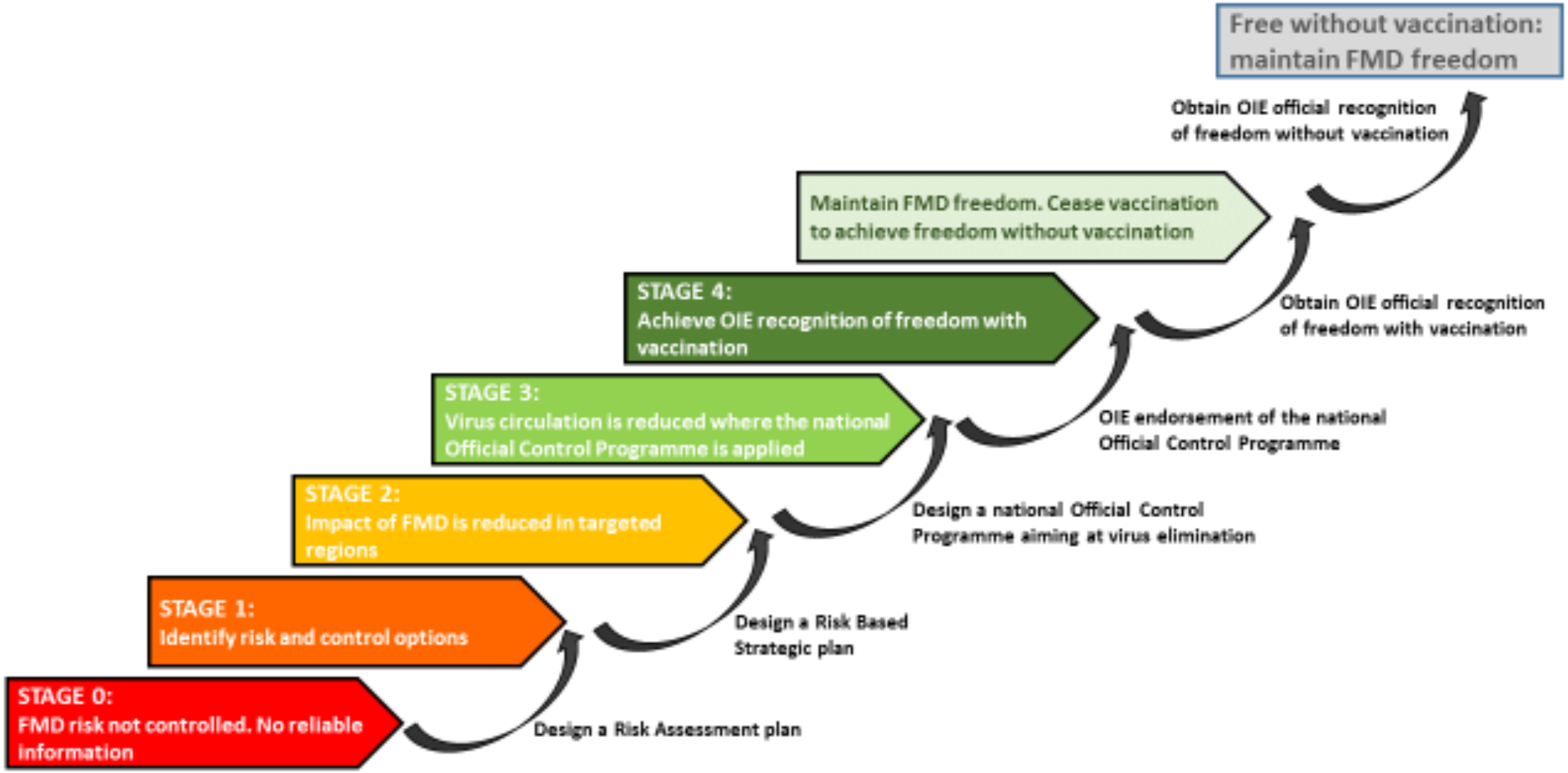
Progressive Control Pathway for FMD TO ACHIEVE OIE DISEASE-FREE STATUS



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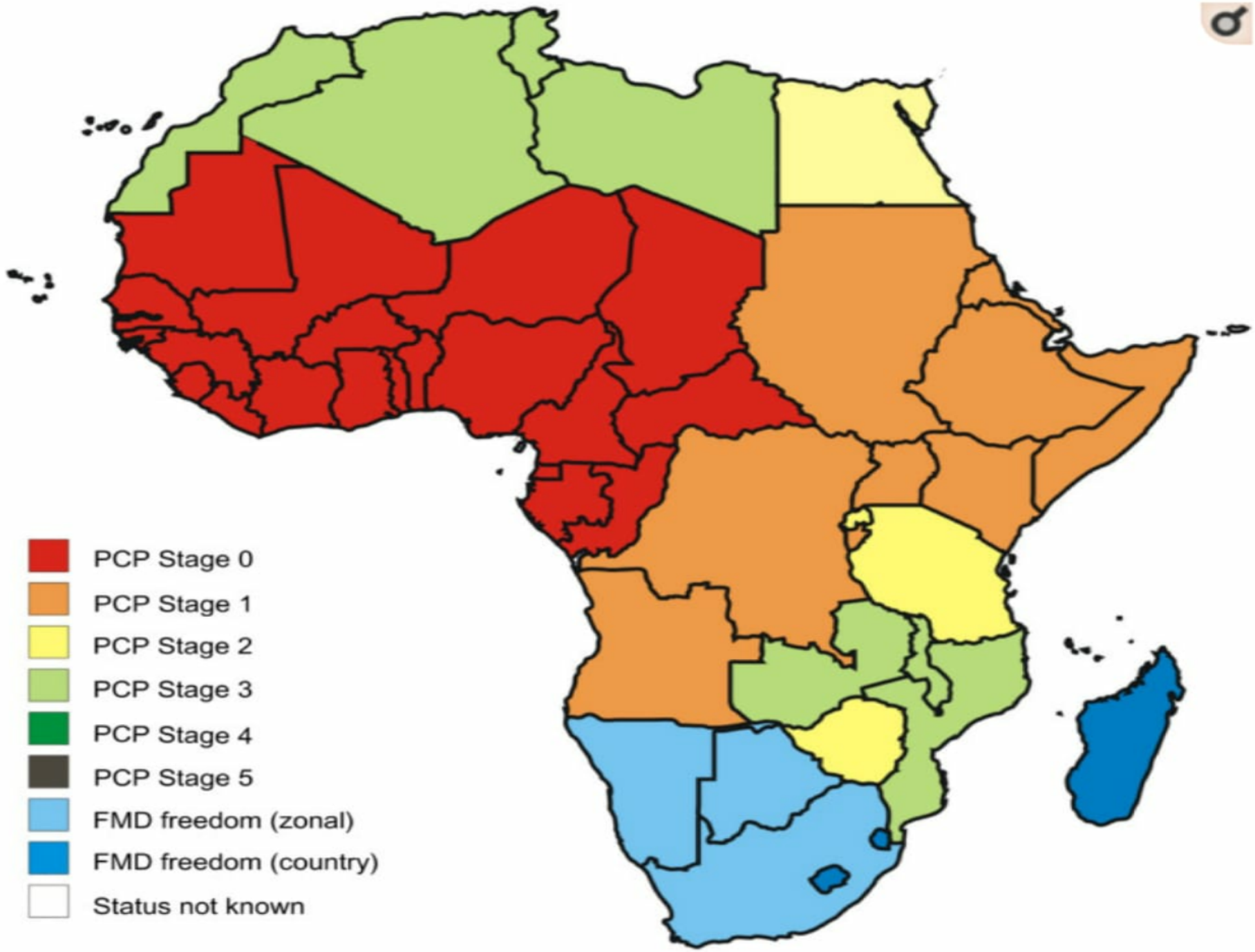
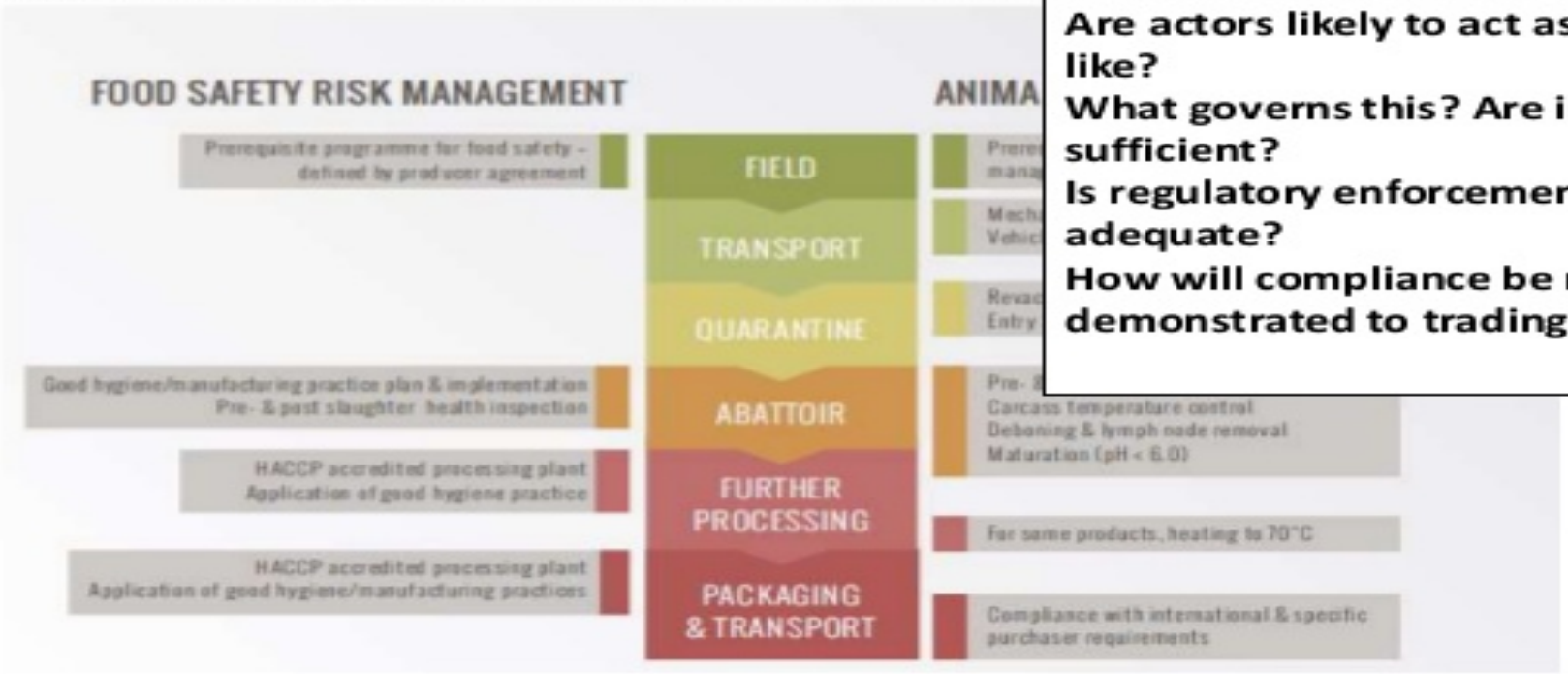

PCP Stage 0
PCP Stage 1
PCP Stage 2
PCP Stage 3
PCP Stage 4
PCP Stage 5
FMD freedom (zonal)
FMD freedom (country)
Status not known

OIE/WTO COMMODITY/FOOD SAFETY STANDARDS
RISK-BASED/VALUE CHAIN APPROACH
FMD CONTEXT

Commodity based trade

Food safety and animal disease risk management along beef value chain



Are actors likely to act as you would like?
What governs this? Are incentives sufficient?
Is regulatory enforcement adequate?
How will compliance be recorded & demonstrated to trading partners?

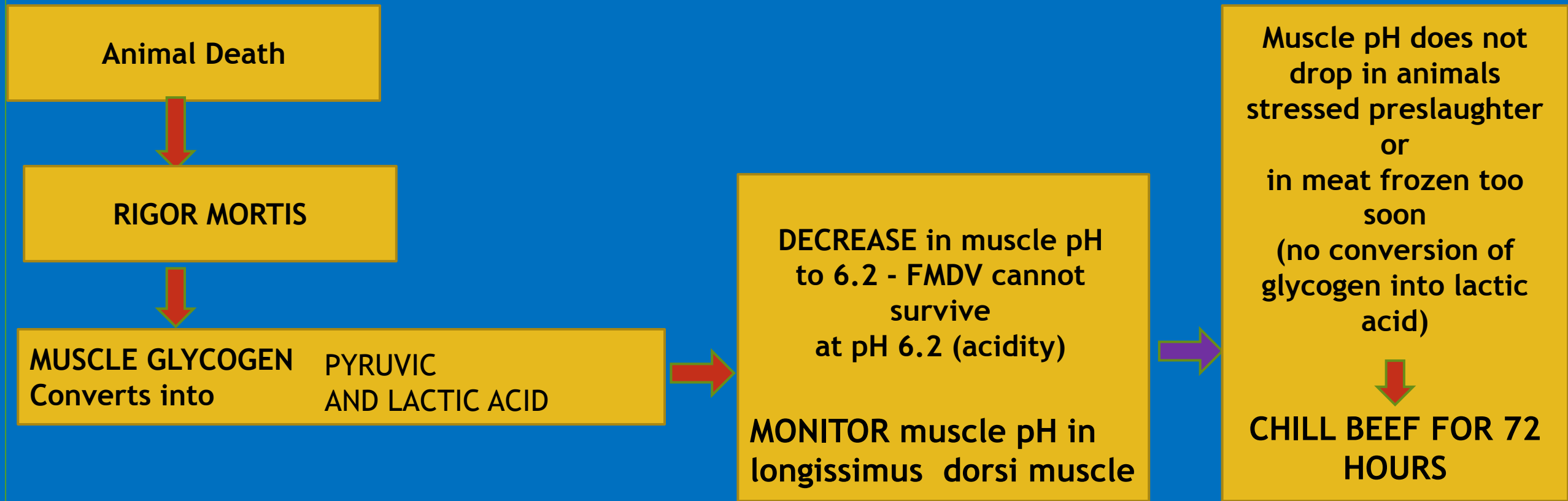
Thomson & Penrith, 2015, Guidelines for implementation of a value chain approach to management of FMD risk for beef export enterprises in Southern Africa. WCS-AHEAD

Scientific Guiding Principles for FOOT AND MOUTH DISEASE Food Safety Risk Analysis and Management

- Recommendation for treating animal products from countries or zones infected with FMD are found in the **OIE Terrestrial Animal Health Code**.
- OIE-recommends Treatments that are designed to decrease the risk of FMD (virus) and allow **international trade but not necessarily a ZERO risk** of FMD transmission level
- OIE aim is to promote trade from developing countries with FMD using a **commodity-based approach** and support certification of livestock products (Thomson et al., 2004, 2006).
- **In terms of FMD, a distinction must be made between transmission and spread of FMDV through imported animal products and live animals.**

Scientific Guiding Principles for FOOT AND MOUTH DISEASE Food Safety Risk Analysis and Management

- FMD introduction in a disease free area depends on the concentration of the FMD Virus in animal tissues or products during the viraemic stage of the disease.
- Example: an FMD infected animal destined for slaughter may not be detected at meat inspection at an abattoir while having high and titres of FMDV in its tissues.
- BEEF: Inactivation of FMDV depends on <u>temperature and pH and animal stress.</u>



Scientific Guiding Principles for FOOT AND MOUTH DISEASE Food Safety Risk Analysis and Management

❖OTHER RISK FACTORS AND CRITICAL CONTROL POINTS for BEEF

- ❖ DEBONING MEAT – Prolonged survival of FMDV in BONE MARROW
- ❖REMOVE LYMPH NODES AND BLOOD
- ❖HEATING MEAT AND LYMPH NODES @ 78°C for 20 minutes (reviewed by Ryan e al, 2008)
- ❖ pH reduction below 6 in pork meat is not a reliable criteria for reduction of FMDV in pork meat.

Scientific Guiding Principles for FOOT AND MOUTH DISEASE Food Safety Risk Analysis and Management

❖OTHER RISK FACTORS AND CRITICAL CONTROL POINTS for BEEF

- ❖ FMDV was inactivated in pig and sheep intestines used a sausage casings tha sodium chloride or phosphate salts/sodium chloride.

- ❖ FMDV levels are similar in goats and sheep

- ❖ RISKS/PROBABILITY OF IMPORTING FMD INTO THE EU (Gallagher et al., 2002).

  - ILLEGAL LIVESTOCK IMPORT - 21%
  - ILLEGAL ANIMAL PRODUCTS - 15%
  - FOODSTUFF - 11%
  - LEGAL ANIMAL PRODUCTS – 6%. MEAT - 5%

Scientific Guiding Principles for FOOT AND MOUTH DISEASE Food Safety Risk Analysis and Management

DAIRY PRODUCTS

- Pasteurisation at 61.7° C for 30 minutes inactivates FMDV– This temperature is used for Long Time Low Temperature milk (LTLT).
- **Pasteurisation at 71.7° C** for 15 seconds inactivates FMDV - High Temperature Short Time (HTST).
- **Pasteurisation at 135° C** for 1 second inactivates FMDV – Ultra High Temperature pasteurisation
- **FMDV survived in CREAM heated at 93 ° C for 16s**. Fat globules in milk can protect FMDV
- **FMDV has can survive in CHEESE made from heated milk (67 °C for 60s)**. However, survival in cheese depends on the manufacturing process. Therefore, data for one type of cheese may not be extrapolated to another.

❖ **RISKS/PROBABILITY OF IMPORTING FMD INTO THE EU (Gallagher et al., 2002).**

- ILLEGAL LIVESTOCK IMPORT - 21%
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INTEGRATING **FOOD SAFETY** AND **ANIMAL DISEASE RISK MITIGATION** STRATEGIES TO PREVENT FMD ALONG VALUE CHAINS

- Two main approaches are used to prevent reduce the risk of FMD across the food chain.

- 1. **OIE Approach** through the **Terrestrial Animal Health Code** – using the geographical approach to achieve freedom from FMD in an area. This system relies on the use of cordon fencing to livestock from maintenance wildlife – the geographical approach is mainly used in South Africa

Who is involved: Veterinarians, Animal Health Officers, Farmers, Traditional Chiefs, municipal authorities etc.

INTEGRATING **FOOD SAFETY** AND **ANIMAL DISEASE RISK MITIGATION** STRATEGIES TO PREVENT FMD ALONG VALUE CHAINS

2. **Codex Alimentarius Approach** – which is based of the risk mitigation approached for foodborne disease (public health). **FARM TO FORK, STABLE TO TABLE, FARM GATE TO PLATE using a VALUE CHAIN APPROACH along the FOOD CHAIN.**

- **HAZARD ANALYSIS CRITICAL CONTROL POINTS (HACCP)**
- **GOOD MANUFACTURING PRACTICES**
- **GOOD AGRICULTURAL PRACTICES**

❖**Who is involved**: Farmers? Animal transporters, Veterinary Meat Inspectors, Meat Inspectors and Meat Examiners, Food manufacturers, processors, Accreditation and certification bodies and companies, food safety auditors, import and export companies

Challenges: convincing stakeholders about their role in preventing and controlling a

FOOD SAFETY GUIDELINES AND INTERVENTIONS FMD RISK MITIGATION - DEBONED BEEF

1. ON-FARM/RANCH/COMMUNAL GRAZING

- Keeping records and ensuring that an animal **identification** and **traceability** system exists

- **Prevent risky feeding practices**: no feeding meat/bone meal.

- **Strict adherence to disease prevention measures**: deworming, tick and other parasites control and vaccination and treatment against infectious diseases.

2. Transport

- **Prevent STRESS during animal transport: loading ramps, truck design, adhere strictly to animal welfare guidelines**

FOOD SAFETY GUIDELINES AND INTERVENTIONS FMD RISK MITIGATION - DEBONED BEEF

3. Quarantine (21 days?)

- Feed and water animals adequately, abide to drug withdrawal period to avoid residues in meat

4. Abattoir

- Traceability, adequate lairaging (resting), ensure clean animals are slaughtered (washing), antemortem inspection.

- Adequate stunning and Bleeding, carcass/meat inspection, adequate chilling/refrigeration (temperature) and pH (6.0) control during carcass refrigeration, microbiological and residue monitoring. Debone and remove lymph nodes

5. Further processing – apply HACCP and Good Hygiene Practices: wearing clean clothing, knife sterilisation at adequate temperature, heating some products at ≥ 70ºC and above, etc.

6. Packaging and Transport – Apply HACCP and Good Manufacturing practices

ALWAYS COMPLY WITH INTERNATIONAL STANDARDS: OIE, CODEX, ISO, etc.

PROCEDURES FOR THE INACTIVATION OF FMDV

- **CANNING MEAT AND MEAT PRODUCTS** – use sealed containers and heat meat at minimum 70° C for 30 minutes C for 30 minutes or any equivalent treatment that kills FMDV
- **Thorough cooking of meat** – minimum 70° C core temperature for 30 minutes
- **Drying and salting** – ensure *rigor mortis* is complete, debone meat, salt and completely dry before deterioration (moisture protein ration of 2.25:1 or water activity not greater than 0.85.
- **Saussage (salami) Casings of ruminants and pigs**: treat for 30 days with dry salt, or saturate salt, phosphate supplemented with salt (86.5% of NaCl + Na_2HPO_4

TRADING AMONG REGIONAL COUNTRIES

ALWAYS COMPLY WITH INTERNATIONAL STANDARDS: OIE, CODEX, ISO, etc.

However, since FMD is endemic in the SADC region, TRADE between can be based on negotiated bilateral agreement approaches between the exporting and importing country. Negotiated approaches and/or agreements should be based on risk assessment (qualitative of quantitative) performed by experts and involving competent authorities.

Thank You