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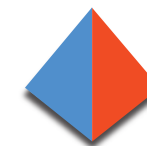


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# Joint Workshop of the GF-TADs West Eurasia for Foot and Mouth Disease and Peste des Petits Ruminants Regional Roadmaps

## Risk of FMD virus serotype SAT1/SAT2 introduction and spread in countries in the Near East and West Eurasia

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### GF-TADs

GLOBAL FRAMEWORK FOR THE  
PROGRESSIVE CONTROL OF  
TRANSBOUNDARY ANIMAL DISEASES



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## Background - SAT2

- Increase in FMD outbreaks noted in December 2022 in Iraq and Jordan
- Samples from Iraq tested in Türkiye
- SAT2 serotype reported in early Feb 2023 in both Iraq and Jordan
  - Topotype XIV, most closely related to a strain detected in Ethiopia in 2022
- Subsequent reports in other countries
- SAT2 of high concern because animals lack immunity and vaccines used in region not effective for this serotype

## Initial timeline of SAT2/topotype XIV reports



FAO ALERTS COUNTRIES IN THE MIDDLE EAST AND WEST EURASIA TO ENHANCE PREPAREDNESS FOR FOOT-AND-MOUTH DISEASE

10 February 2023

## Risk Assessment Methodology

- Risk of further spread?
  - Qualitative risk assessment performed
    - risk = likelihood + consequences
  - Qualitative versus Quantitative?
    - Qualitative is appropriate for faster analysis, lack of reliable data
  - *Steps followed:*
    1. Define the risk questions and scope
    2. Identify and draw the relevant risk pathways
    3. Collect data for the analysis
      - ✓ Questionnaire to vet services
      - ✓ Literature
      - ✓ Databases (eg FAO STAT)
    4. Conduct assessment and model economic impact using 5 scenarios



Risk of foot-and-mouth disease SAT2 introduction and spread in countries in the Near East and West Eurasia



<https://openknowledge.fao.org/server/api/core/bitstreams/5c38e3c7-5eef-4c03-8b99-2151ed9ccafe/content>

### Risk Questions:

1. What is the **likelihood** of FMD-susceptible livestock in unaffected countries being **exposed** to FMD serotype SAT2 due to its introduction from affected countries\* via the specified pathways?

*\*Affected countries at the time of the analysis: Bahrain, Iraq, Jordan, Oman and Türkiye*

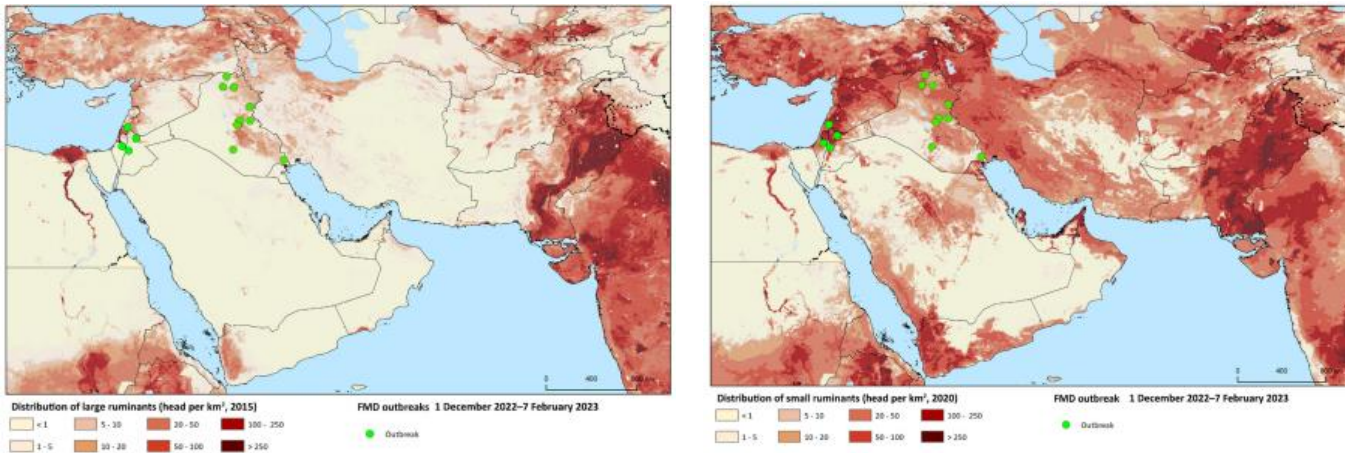
2. What is the **potential impact** of FMD-susceptible livestock being exposed to FMD serotype SAT2:
  - in unaffected countries?
  - in countries already affected?



## Methodology

### Scope

- *Likelihood analysis*: Countries/territories with **contiguous land border** with affected countries
- *Impact analysis*: also included affected countries



Note: Small ruminant (A) and large ruminant (B) density layers adjusted according to Food and Agriculture Organization Corporate Statistical Database (FAOSTAT) 2015 (Gridded Livestock of the World [GLW] 4).

Source: United Nations Geospatial. 2020. Map of the World. In: United Nations. New York. [Cited 21 September 2023]. <https://www.un.org/geospatial/file/3420/download?token=TUP4yDmF>. Modified with GLW 4 data and Emergency Prevention System Global Animal Disease Information System (EMPRES-i) data, 2022–2023.

### 21 countries included in the analysis:

Spread West from Türkiye (FMD-free countries):

- Bulgaria, Cyprus, Greece

Spread East from Türkiye

- Armenia, Azerbaijan, Georgia, the Islamic Republic of Iran\*, Syrian Arab Republic\*

Spread from Iraq

- Kuwait, Saudi Arabia\*

Spread from Jordan:

- Israel, Lebanon, the West Bank in Palestine

Spread from Oman

- Yemen, United Arab Emirates \*

Spread from Bahrain:

- Qatar

\* Country borders more than one affected country

## Methodology

### Risk Pathways:

- 6 pathways investigated
- Based on epidemiology of FMD and previous identified routes of transboundary spread
- Major steps in each risk pathway were defined and describe
  - Entry and exposure on continuum
  - Based on questionnaire, literature and FAO STAT
- For each country and pathway, overall likelihood assessed and assigned to one of four levels

*What is the likelihood of FMD-susceptible livestock in unaffected countries being exposed to FMD serotype SAT2 due to its introduction from affected countries via the following pathways:*

Livestock movement  
(include informal and common grazing)

Legal and informal trade in animal products

Wildlife movement

Movement of people

Trade in fodder

Movement of vehicles

# Methodology

## Matrix showing country connections

Data from questionnaires (red) and FAO-STAT (black)

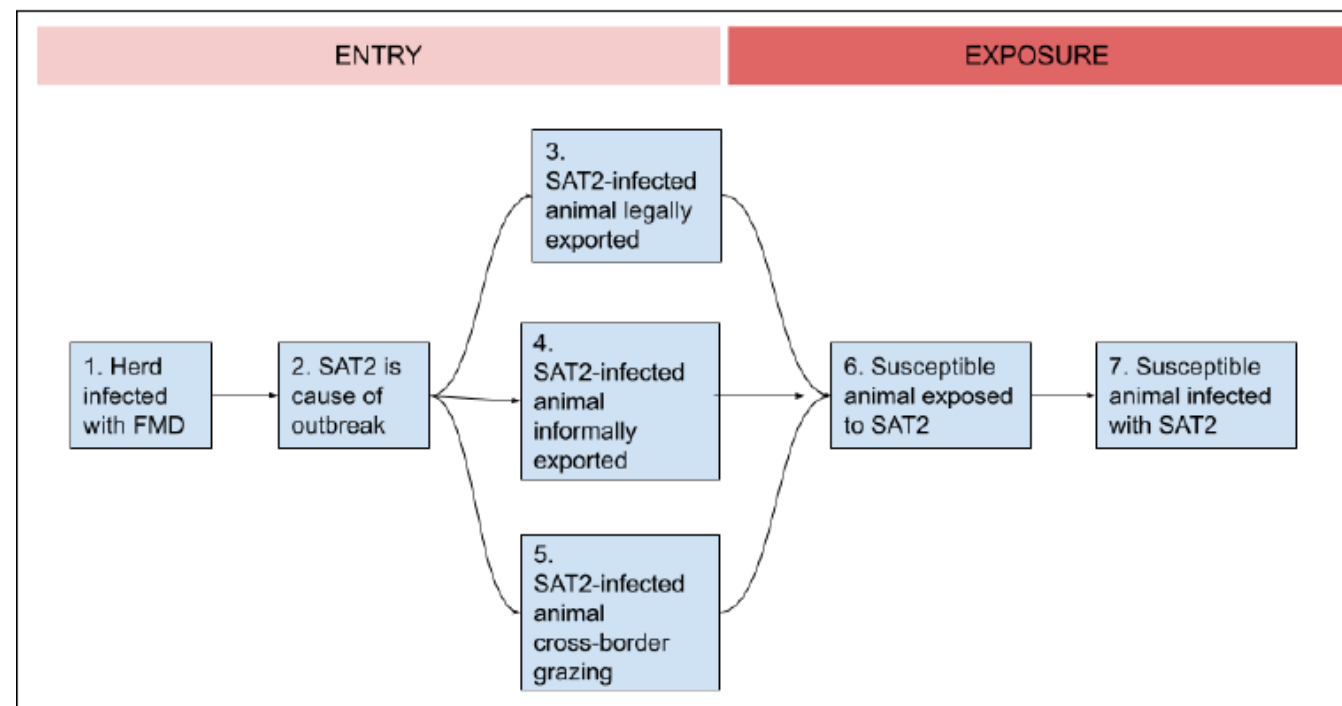
- A = live animals;
- C = common grazing;
- D = dairy products;
- F = fodder;
- M = meat products.

		To																					
Country		Armenia	Azerbaijan	Bahrain	Bulgaria	Cyprus	Georgia	Greece	Iran (Islamic)	Iraq	Israel	Jordan	Kuwait	Lebanon	Oman	Qatar	Saudi Arabia	Syrian Arab	Türkiye	United Arab	West Bank	Yemen	
From	Armenia	-					A, M, D					M	A, M, F	A, M		A, M					A, M, D		
	Azerbaijan		-				A, C, M, D, F						F			F			F		M, D, F		
	Bahrain			-								D	M, D, F	D, F	M, D		M, D		D		A, M, D, F		D
	Bulgaria		A, D	D, F	-	M, D	A, M, D, F	A, M, D, F		F	D	D, F	D, F	D, F	D	M, D, F	D, F		A, D, F		A, M, D, F		
	Cyprus		D	D	M, D	-	M	M, D			D	M, D	D	A, M	M, D	A, D	D		M, D		A, M, D		
	Georgia	D	A*, M, D	A, M			-		D	F	M	F	A, M	A, F	A	A, M	A, F		F		A, M, D, F		
	Greece	A, M, D, F		M, D	A*, M, D, F	A, M, D, F	M, D	-			D	D	M, D	A, D, F	M	M, D	D		M, D, F		M, D, F		
	Iran (Islamic Republic of)	M, D	D	M, D			A, D		-			F	A, M, D, F	D	A, M, D, F	A, F			M, D, F		A*, M, D, F		
	Iraq			M			A		C	-		F							A*, C	M, D	A, M, D, F		
	Israel					D		M			-	F	A						D		D	A, M, D, F	
	Jordan		M	A, M, D								-	M, D	M, D	M, D	M, D	A, M, D, F	D			A*, M, D, F	D	M, D, F

## Results: Likelihood of spread

- **15/21 (71%) countries/territories** completed the questionnaire
- **Informal movements** of livestock and **common grazing** are most likely pathway for SAT2 spread
  - High: 3 countries/territories
  - Moderate: 3 countries/territories
  - Effective mode of transmission
  - Absence of sanitary measures
  - Peaks in seasonal risk (eg Eid al-Adha (qurban))
- **High level of uncertainty**

## Live Animal Movement Risk Pathway



## Results

### Likelihood of spread

- Other pathways are possible in some cases, but less likely:
  - Less effective transmission routes (indirect, via fomites)
  - Involve many more steps – the more steps are involved the less likely the event will occur
- Several data gaps, therefore high uncertainty in the analysis

### Likelihood estimates per country/territory and risk pathway addressed

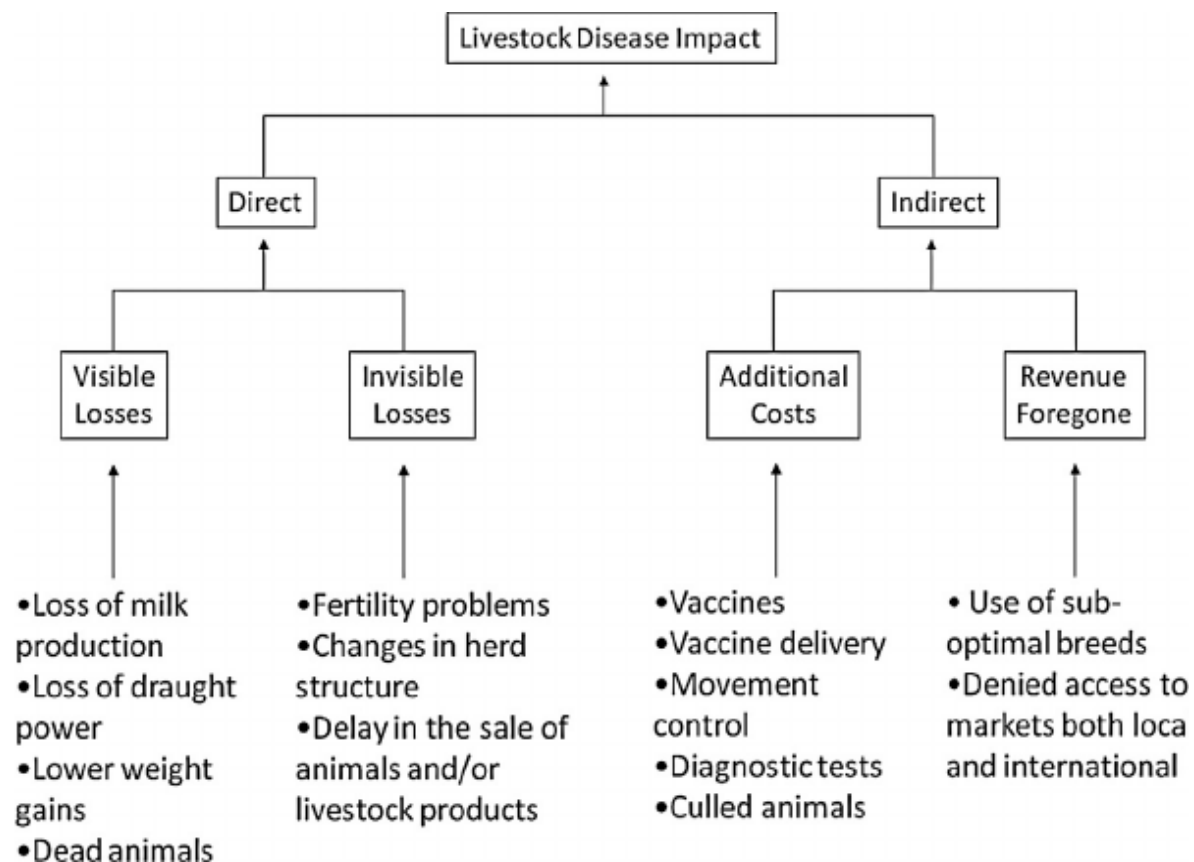
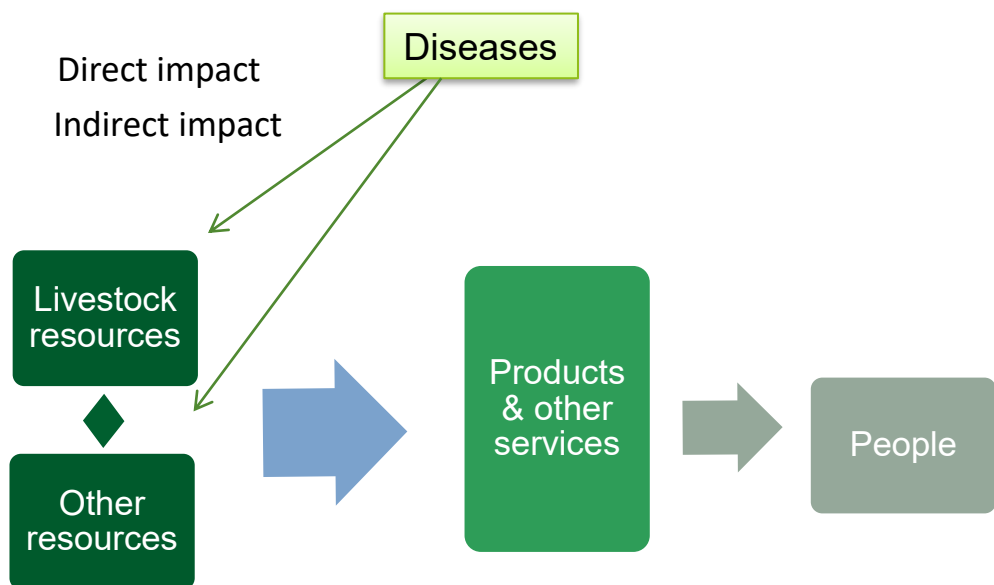
Country/ Territory	Live animals			POAO	Wildlife (boar)	Fodder	People	Vehicles
	Official trade	Informal trade	Common grazing	Official trade		Official trade		
Armenia	N	N	N	N	L	N	N	N
Azerbaijan	L	M	N	L	L-N	N	N	L
Bahrain	L	NA	NA	N	N	N	NA	L
Bulgaria	N	L	N	N	L-N	L-N	L	L
Cyprus	N	N	N	N	N	N	N	N
Georgia	N	N	M	L	L	N	L	L
Greece	N	N	N	N	L-N	N	L	N
Iran (the Islamic Republic of)	L	NA	H	N	L	N	NA	L
Iraq								
Israel	N	N	N	L	L	N	N	N
Jordan								
Kuwait	N	N	N	N	N	L-N	N	L
Lebanon	N	N	N	L	L-N	L-N	N	L
Oman								
Qatar	L	NA	NA	N	N	L-N	NA	L
Saudi Arabia	L	NA	NA	N	N	L-N	NA	L
Syrian Arab Republic	N	H	N	L	L	N	L	L
Türkiye								
UAE	L	M	N	N	N	L-N	L	L
West Bank	N	N	N	L	L	N	L	N
Yemen	N	N	H	N	N	L-N	N	L

H = high, M = Moderate; L = Low; N = Negligible; NA = Not assessed. **Blue cells: high uncertainty.** Green cells: moderate uncertainty. The red font indicates that countries did not respond to the questionnaire survey.

## Consequences of SAT2 incursion

### Impacts of animal diseases

**Objective:** Assessing likelihood of further spread of SAT2 in the region via key risk pathways, and the potential consequences



Source: Rushton, 2009

## Consequences of SAT2 incursion

### Impacts & data used in this analysis

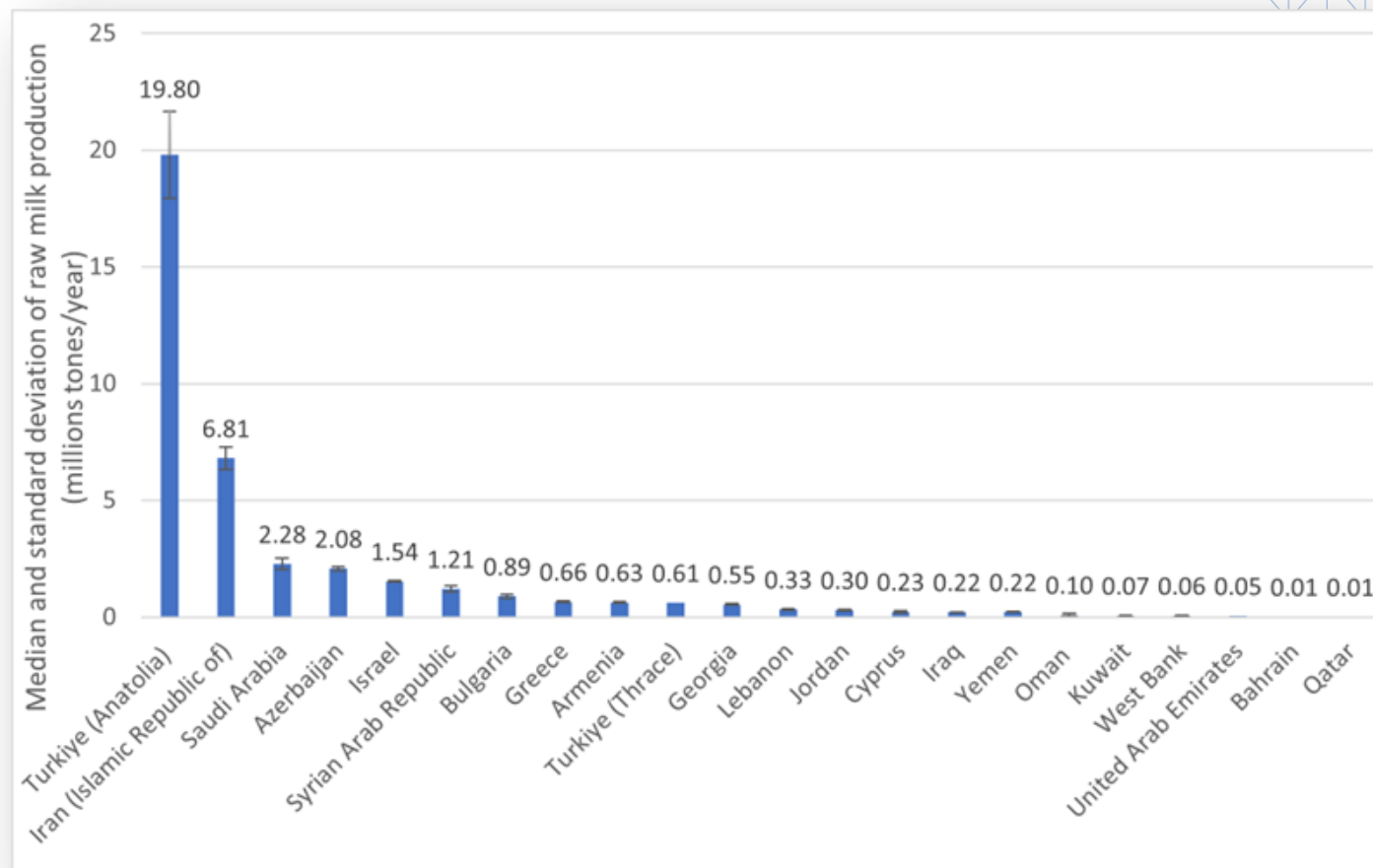
#### Direct impacts

- **Mortality**
- **Reduced productivity (meat, milk and hide)**
- Herd structure
- Fertility
- Delay in selling products

#### Indirect impacts

- Control measures
- Vet, lab, diagnostics, surveillance
- Compensations
- Trade
- Consumer demand/trust
- Impacts on other industries

- Livestock production data from FAOSTAT 2016-2021 for 21 countries used
- Magnitude of impacts from the literature



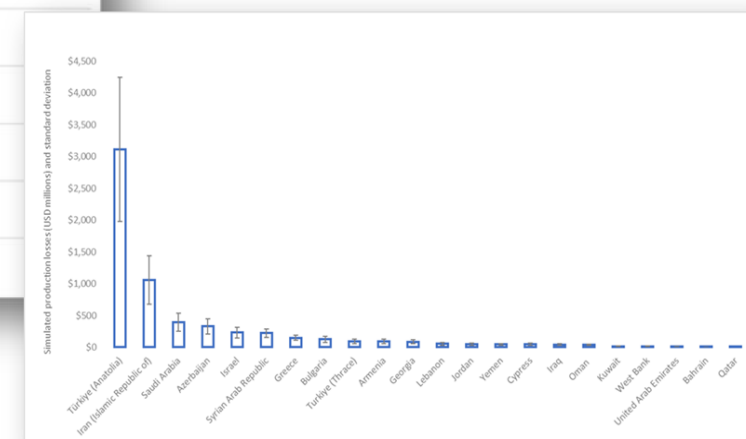
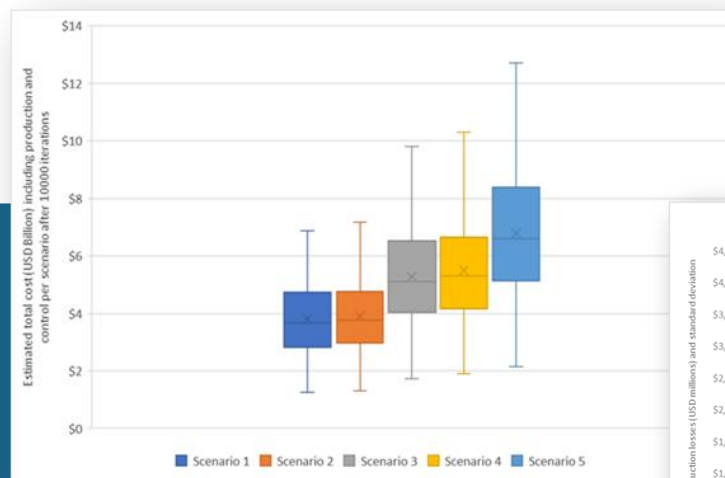
*Median and standard deviation of cattle raw milk produced in 2016-2021 in millions of tons per year*

## Consequences of SAT2 incursion

### Scenarios and simulations

Analysis conducted under **five main** scenarios representing different potential spread direction patterns from the known affected countries

1. No further spread; known affected countries only: Jordan, Iraq, Oman, Türkiye
2. Westward spread to FMD-free countries
3. Eastward spread to countries neighbouring Anatolia
4. Spread to countries neighbouring Iraq
5. Widespread in all 21 countries: worst-case scenario.

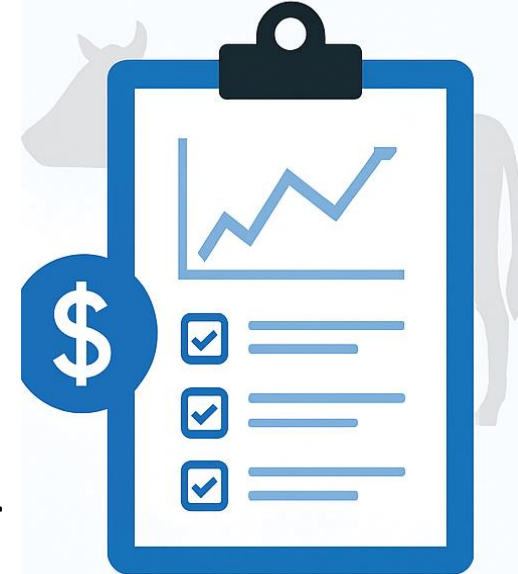


*Simulated median and standard deviation of the production losses (USD Millions)*

- Estimated costs varied from USD 3.6 – 6.5 billion
- Production losses are 95% of total costs
- 4 countries with highest level of production represent ~80% of losses
- Additional impacts related to food and nutrition security

## Challenges, limitations and broader application

- **Simplified cost calculations** – excludes many direct/indirect factors beyond mortality and production.
- **Epidemiological-economic models** not used due to lack of data in endemic regions.
- **Assumptions** - heavy reliance on valid data, mainly from FAO-STAT and generic epidemiological assumptions; lacks country-specific detail.
- **Prevention/control costs not included**; future models should consider indirect costs.
- **Adaptability** – Current model is FMD-focused but can be expanded for other TADs.
- **Market Impact Analysis** – Only supply side assessed; demand and price effects missing.



## Conclusions and recommendations

- Outbreak impacts vary by country and sector, but are **substantial** across all assessed regions.
- Exposure and spread likelihood can change **seasonally** (e.g., Eid al-Adha, winter/spring).
- **Prevention** should be risk-based and targeted to high-risk areas and pathways.
- **Movement** of only healthy, FMD-free animals is crucial to prevent spread.
- **Safer trade** requires compliance with official regulations and sanitary measures.
- Raising stakeholder **awareness** is key to protecting livestock and livelihoods.

Transaction in a livestock market – how can they be sure the cattle are healthy?



## Conclusions and recommendations

All countries **should have an emergency response plan** for FMD that details how to manage a sudden increase in cases, such as would be expected with the introduction of a novel serotype such as SAT2.

The response plan needs to be:

- **realistic** for the country
- **supported with adequate resources** for implementation when needed,
- **should be tested** through regular and realistic simulation exercises.



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### Good emergency management practice: The essentials

A guide to preparing for animal health emergencies  
Third edition

FAO ANIMAL PRODUCTION AND HEALTH / MANUAL 25



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**alert**

**FAO ALERTS COUNTRIES IN THE MEDITERRANEAN  
REGION TO ENHANCE PREPAREDNESS FOR  
FOOT-AND-MOUTH DISEASE**

16 February 2024

Available at:

<https://web.archive.org/web/20210610105243/http://www.fao.org/3/cb3833en/cb3833en.pdf>

Available at:

<https://openknowledge.fao.org/server/api/core/bitstreams/6af6fb17-3f8c-4909-8256-a06fba162bf/content>

## Conclusions and recommendations

- Implement an **early warning system** based on reports of increased mortalities (particularly young stock) and observations at slaughterhouses or panic sales, using information from farmers, traders, para-veterinary workers, inspectors and relevant social media sites.
- Support and **improve the performance and infrastructure of veterinary services**
- **Adopt public-private partnership** approaches when appropriate
- Analysis of which groups are impacted and which benefit to determine how to fund control measures

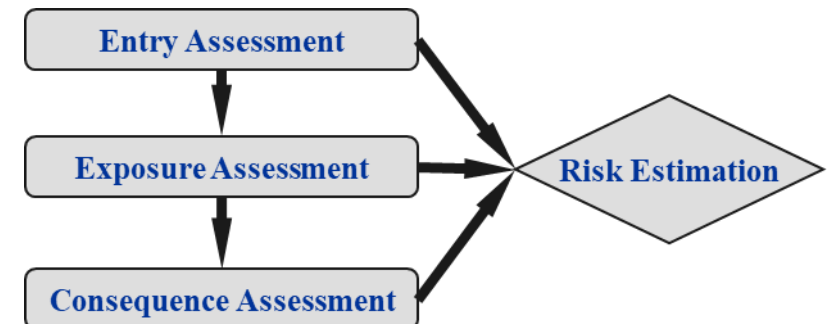
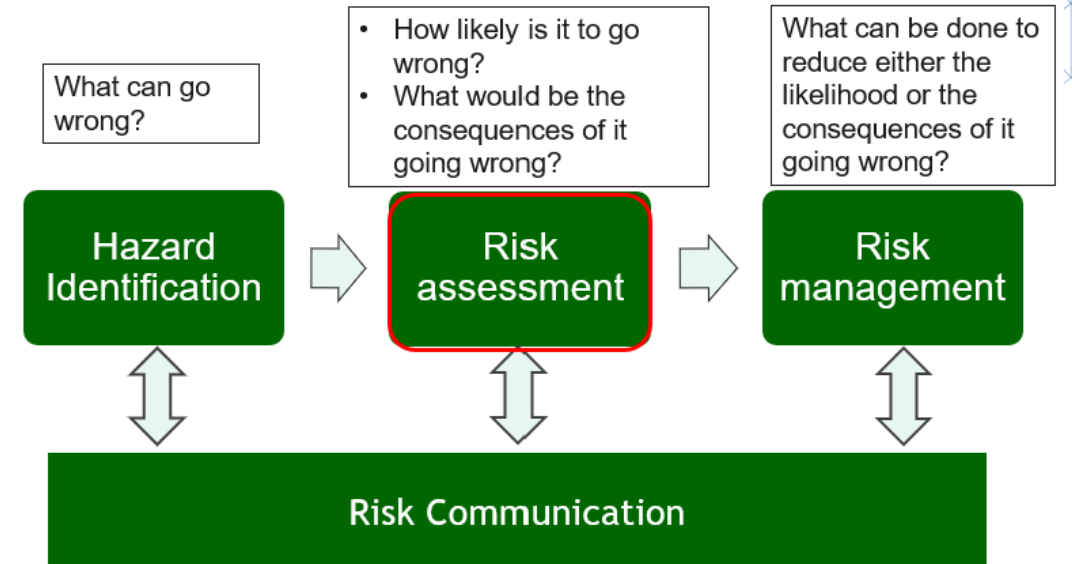


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## Conclusions and recommendations

### Qualitative risk assessment useful framework to guide prevention and response activities

- Adapt WOA framework for safe trade
- Challenge to do a truly rapid assessment
- Define the risk question is a key step
  - Risk (probability & impact) of future incursions of exotic serotypes from different regions would be another interesting question
- Need feedback from risk managers to know how to make the results most relevant



## How about SAT1?

- Its still FMD virus, so the risk pathways are the same, both into and within the region
- Field reports suggest this is more severe so we can expect the consequences to be higher
- The information from the SAT2 assessment, and TAD other assessments can be used as a basis for an updated assessment



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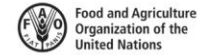
FAO ALERTS COUNTRIES IN THE **NEAR EAST**  
AND **WEST EURASIA** TO ENHANCE PREPAREDNESS  
FOR **FOOT-AND-MOUTH DISEASE**

14 April 2025

**Key facts:**

1. Foot-and-mouth disease (FMD) is a highly contagious viral disease affecting cattle, sheep, goats, pigs and other cloven-hoofed

The Food and Agriculture Organization of the United Nations (FAO) recommends enhanced surveillance and biosecurity measures in the Near East and West Eurasia regions following the recent detection of foot-and-mouth disease (FMD) virus serotype SAT1 in Iraq with reports in both cattle and water buffaloes. This serotype has also been detected among cattle



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Risk of foot-and-mouth disease SAT2  
introduction and spread in countries in the  
Near East and West Eurasia



Food and Agriculture  
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Introduction and spread of  
lumpy skin disease in  
South, East and Southeast Asia

Qualitative risk assessment and management



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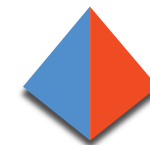


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