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Tracer methodology: from health systems to food systems

Commercial broiler meat as a tracer for the South African livestock-derived food system

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Provide policymakers with novel, interdisciplinary evidence to define future food system policies, that deliver nutritious and healthy foods, that are environmentally sustainable and accessible to all

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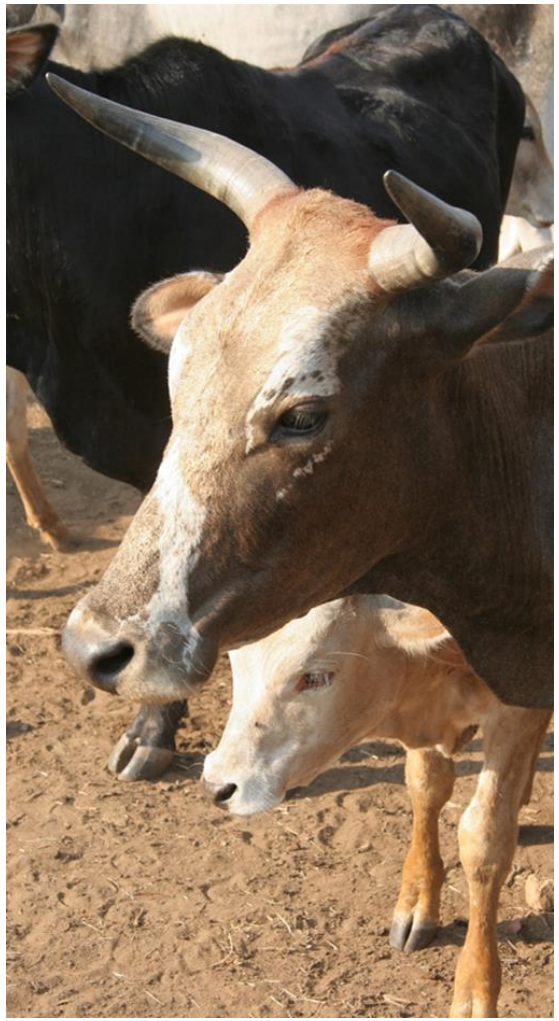
About

End hunger, achieve food security and improved nutrition and promote sustainable agriculture

Systems approach to Livestock-derived food (LDF) in South Africa

- Systems approach: applies systems thinking to develop problem-based theories that are visualised, tested, and improved using tools such as those used in System Dynamics (SD) modelling.
- Aim: to investigate the South African LDF system, and to identify areas for policymakers to consider, to align future policies with SDG targets
  - to ensure access to safe, sufficient, and nutritious food that is sustainably produced.
- Methods:
  - Literature review, stakeholder workshop, and online questionnaire
  - Problem statement and conceptual SD model



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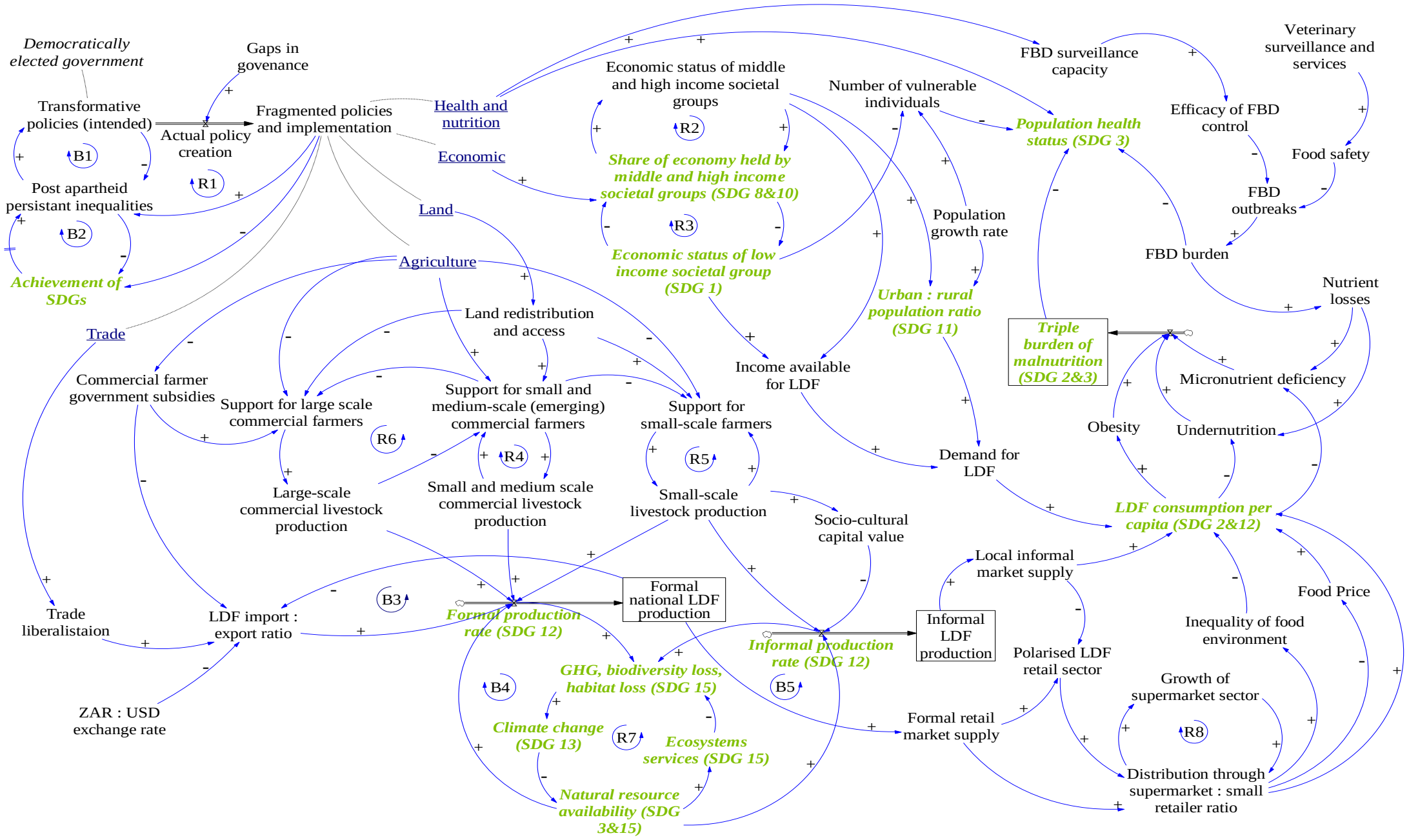
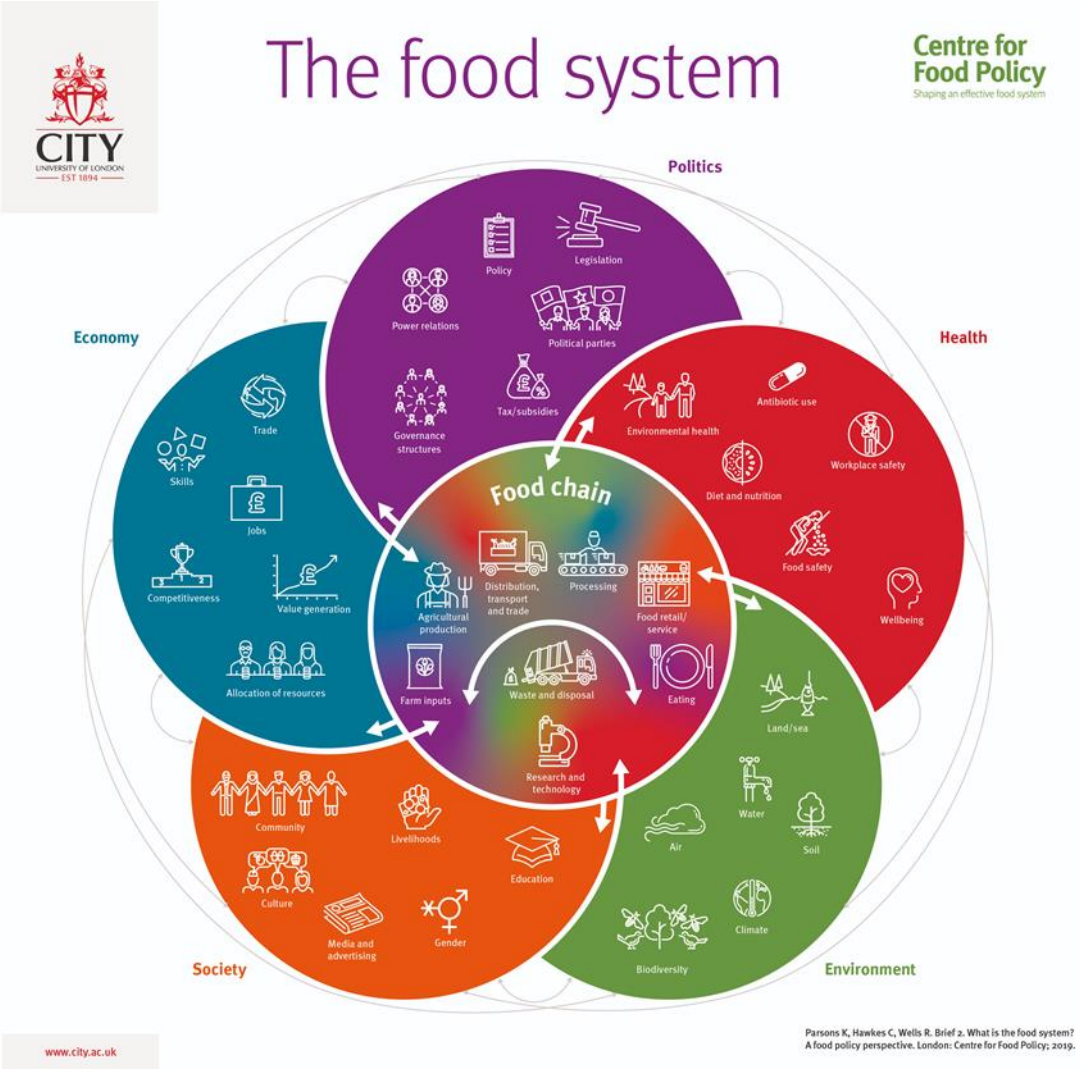

Democratically elected government
Gaps in govenance
Transformative policies (intended)
Actual policy creation
Fragmented policies and implementation
Health and nutrition
Economic
Land
Agriculture
Trade
B1
R1
Post apartheid persistant inequalities
B2
Achievement of SDGs
Economic status of middle and high income societal groups
R2
Share of economy held by middle and high income societal groups (SDG 8&10)
R3
Economic status of low income societal group (SDG 1)
Number of vulnerable individuals
Population growth rate
Urban : rural population ratio (SDG 11)
Income available for LDF
Demand for LDF
FBD surveillance capacity
Veterinary surveillance and services
Efficacy of FBD control
Food safety
FBD outbreaks
FBD burden
Population health status (SDG 3)
Nutrient losses
Triple burden of malnutrition (SDG 2&3)
Micronutrient deficiency
Obesity
Undernutrition
LDF consumption per capita (SDG 2&12)
Land redistribution and access
Commercial farmer government subsidies
Support for large scale commercial farmers
R6
Support for small and medium-scale (emerging) commercial farmers
R4
Support for small-scale farmers
R5
Large-scale commercial livestock production
Small and medium scale commercial livestock production
Small-scale livestock production
Socio-cultural capital value
Trade liberalistaion
LDF import : export ratio
ZAR : USD exchange rate
B3
Formal production rate (SDG 12)
Formal national LDF production
Informal production rate (SDG 12)
Informal LDF production
Local informal market supply
Polarised LDF retail sector
Formal retail market supply
Food Price
Inequality of food environment
Growth of supermarket sector
R8
Distribution through supermarket : small retailer ratio
GHG, biodiversity loss, habitat loss (SDG 15)
B4
B5
Climate change (SDG 13)
R7
Ecosystems services (SDG 15)
Natural resource availability (SDG 3&15)

Challenges in food systems research

- Foods systems by nature have wide boundaries
- Complexity can overwhelm policymakers (and researchers)
  - Increase sense of intractability of problem

- How to conduct a food systems analysis that is functional without losing the integrity of a food systems approach?



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Tracer medicines

- WHO Essential Medicine surveys
- Essential Medicine list contains almost 300 items
- Data collection challenging in resource poor settings
- Identify subset of tracer medicines to monitor
- Characteristics:
  - Important to patients' health
  - High volume of use
  - Represented at various levels in system
  - Conclusions reached are transferable to other Essential Medicines
- Could we identify a LDF product, with similar characteristics, and conduct a deeper analysis whilst retaining the breadth of a food systems approach?

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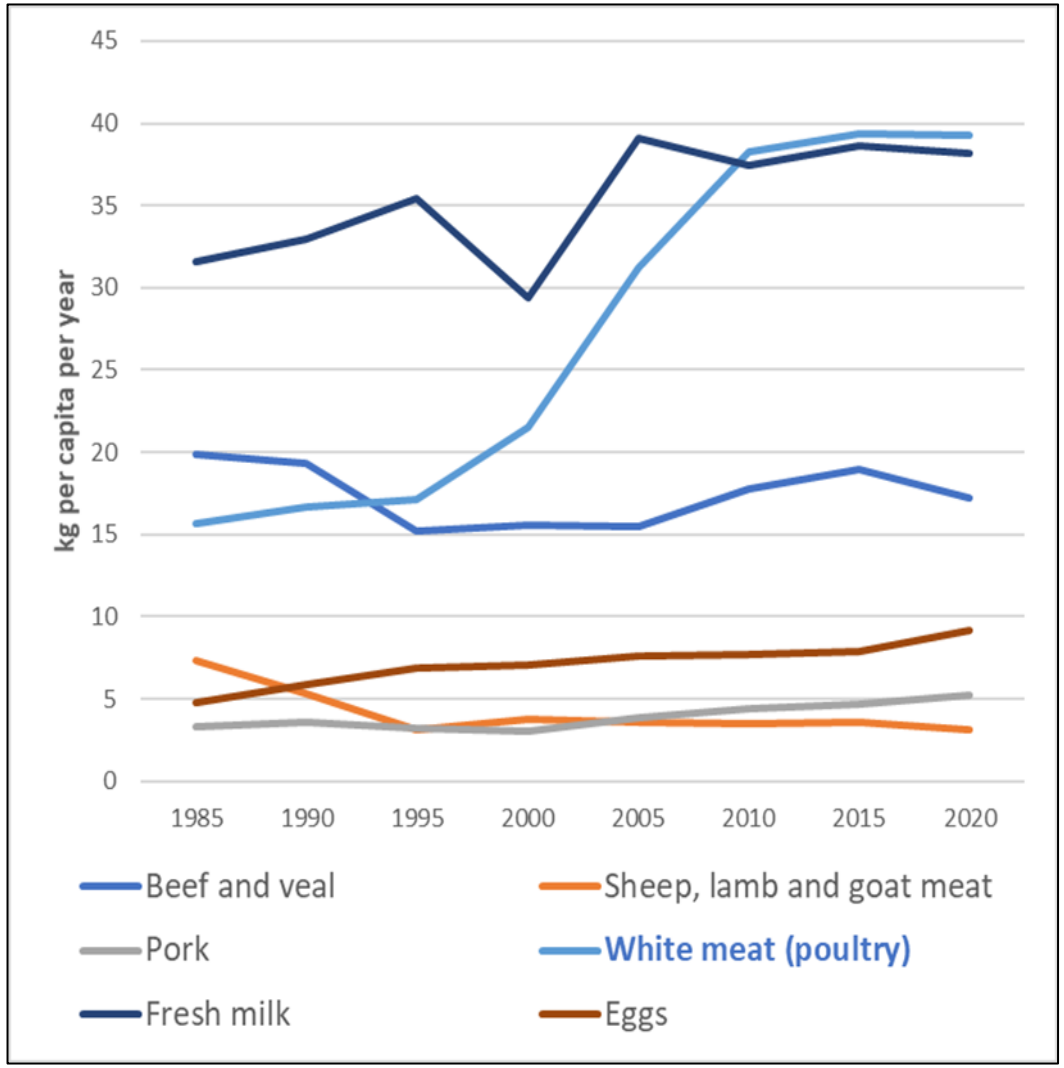
Commercially produced Broiler meat as a Tracer LDF

- Broiler meat: highest per capita consumption LDF product, doubling in past 20 years
- Makes up 60% of average per capita meat consumption
- >95% of local production is from commercial producers
- Imports add 14% of total meat marketed
- Production dependent on cereal-based feed from intensive crop farming systems (local and imported)
- Only 14% of agricultural land is arable, mostly rainfall dependent, and threatened by climate change



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Systems analysis of the commercial broiler system

- Qualitative System Dynamics model based on stakeholder interviews and an online questionnaire
- 4 interconnected modules
  - Production and Imports
  - Distribution and Consumption
  - Feed and Environment
  - Food Safety and Foodborne disease
- Model presented back to broiler stakeholders for feedback, validation and identification of areas of policy concern

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Photo credit: USDAgov on Visualhunt.com

Findings of broiler tracer analysis

- Systemic inequality:
  - dominance of large-scale producers and formal retail giants, barriers to entry for smaller-scale actors
- Nutritional inequality:
  - Cheaper broiler products have lower nutritional value, and a greater risk of NCD and foodborne disease
- Food safety governance:
  - fragmented and lacks coherence
- Environmental costs:
  - hidden yet unsustainable in South African context

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Transferable to the LDF system

- Systemic inequality:
  - dominance of large-scale producers and formal retail giants, barriers to entry for smaller-scale actors Including land access, significant for beef and dairy
- Nutritional inequality:
  - Beef is 75% more expensive than broiler meat. Low-income consumers go without or consume cheapest cuts, lower in protein and higher in fat, adding to burden of malnutrition and risk of NCD
- Food safety governance:
  - fragmented and lacks coherence, also impacts beef and dairy although imports less of a concern
- Environmental costs:
  - Less hidden for beef and dairy, but 80% of land is suited to extensive grazing, latter should be explored as alternative

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Conclusions

The tracer concept facilitated a focused analysis of a LDF within broad food systems boundaries.

Policy related findings from the tracer analysis were largely transferable to the Beef and Dairy systems, and the LDF system as a whole.

The tracer concept provides an innovative option to gain insights within complex food systems.

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