Human behavioural drivers of meat consumption: using group model building to capture lived realities

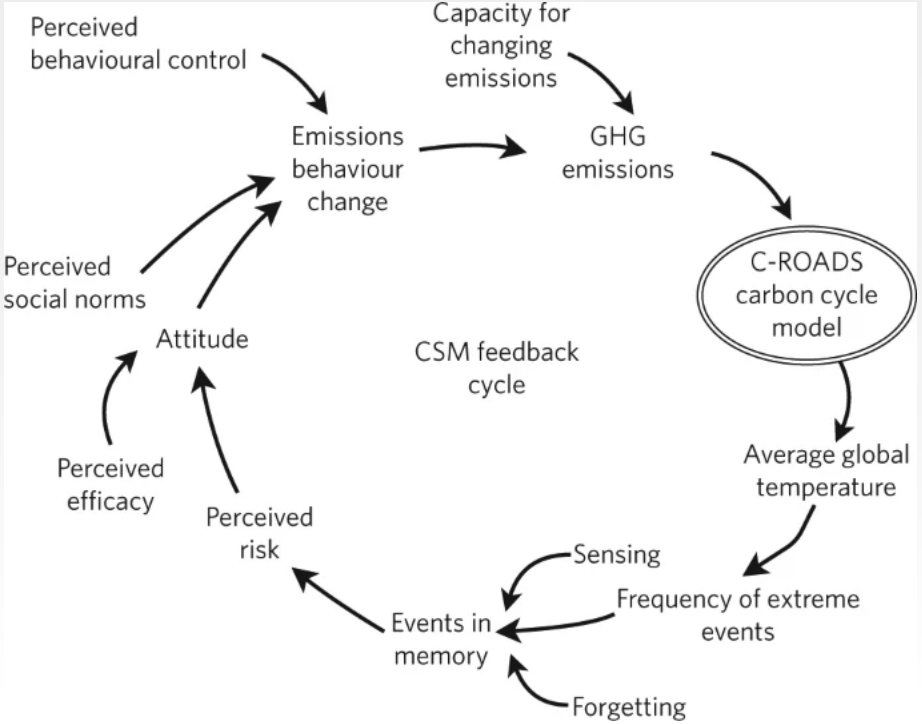
IAMs & Climate Mitigation

- Integrated Assessment Models (IAMs) are used by the science-policy nexus for predictive analysis and designing mitigation pathways
  - Models that computationally represent physical and human systems to assess climate impacts

- Criticism: Technoeconomic representations of human system (Mathias et al., 2020; Rubiano Rivadeneira & Carton, 2022)
  - Human decisions (e.g., consumption patterns) largely driven by economic indicators like GDP per capita
  - Weak representation of human behavioural changes from social, cultural, and political influences

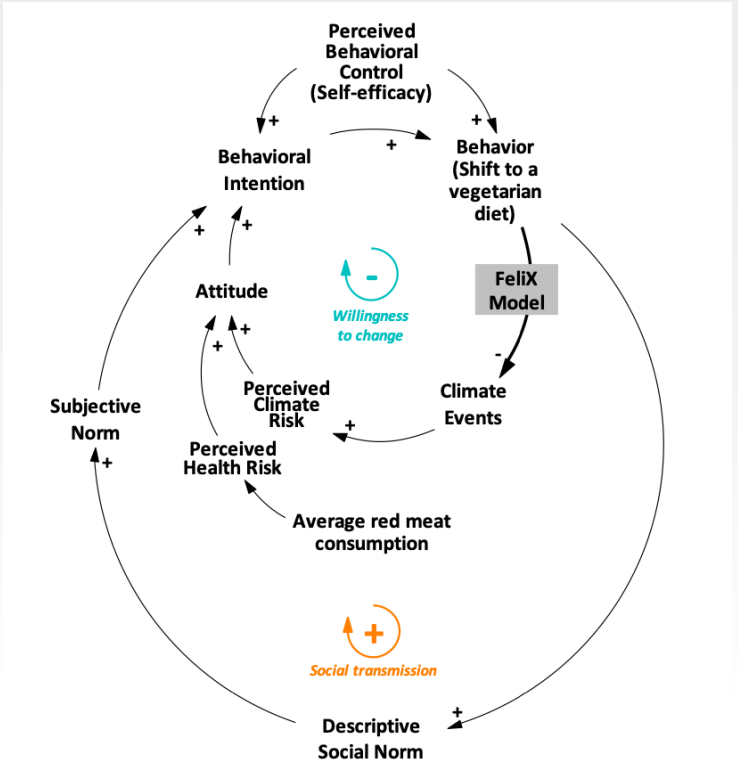
Human-Climate System Coupling

- Beckage et al. (2018)
- Dynamic feedback between perception of risk and climate change
- **Theory of planned behaviour (TPB)** as basis of the social model



Human-Climate System Coupling

- Eker et al. (2019)
- Diet shift dynamics as feedbacks between physical and human system
- **Theory of planned behaviour (TPB)** and **Protection motivation theory (PMT)** as basis of the social model

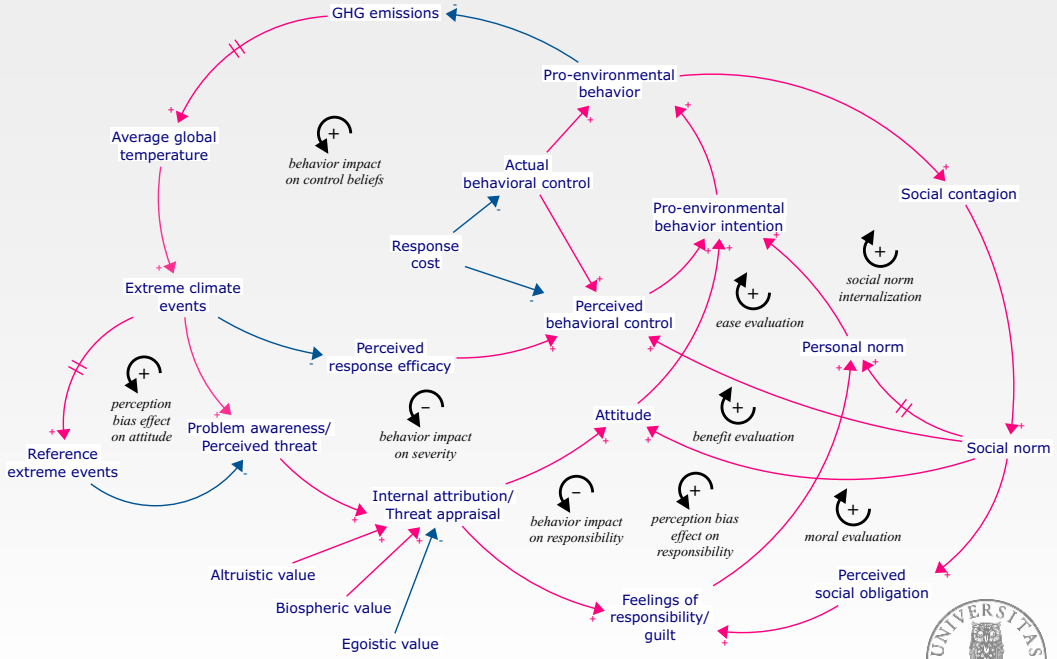


Human-Climate System Coupling

- Existing work has focused on behavioural theories that have become widely accepted in environmental psychology
- TPB and PMT, however, are not the only theoretical frameworks
  - Rational choice theories where humans make behavioural choices based on self-interest (maximize rewards and avoid risks)
  - The other tradition: prosocial view of humans
    - People are also guided by their values and concern for others

Human-Climate System Coupling

- Previously, we integrated the key behavioural theories (both rational choice and prosocial) into a single causal loop diagram from a feedback perspective
  - Theory of Planned Behaviour (Ajzen, 1991)
  - Protection Motivation Thoery (Rogers, 1975)
  - Value-Belief-Norm Theory (Stern et al., 1995)
  - Social Cognitive Theory (Bandura, 2001)



Human-Climate System Coupling

Behavioural Theory Model

- Based on abstract generalizable theories
- May not resonate with people's lived experiences
  - Real people don't think on those terms when reflecting on their behavioural choices

Group Model Building

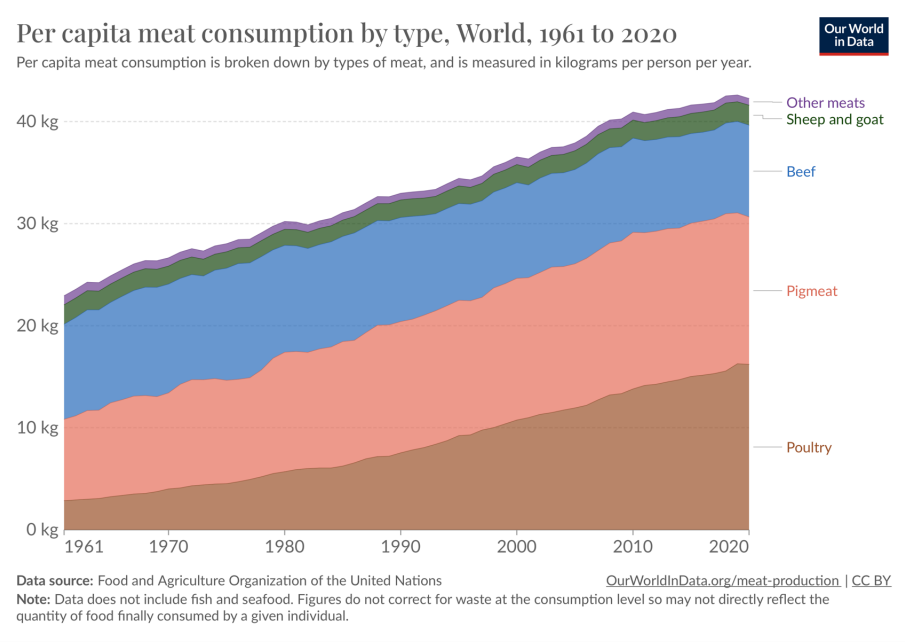
- Co-production: people and their lived experiences as a knowledge source
- Mapping the drivers of meat consumption
  - Concrete and relatable
- Outcomes can be abstracted mapped back to behavioural theories

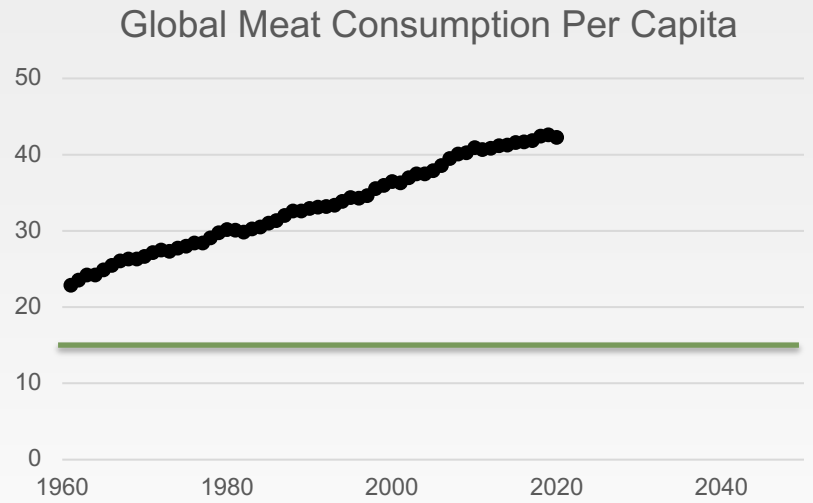
Methods

Data Collection: GMB Workshop

- Two separate 3-hour facilitated modelling workshops with graduate students from University of Bergen
  - 25 participants from Master's in System Dynamics (4 groups)
  - 13 participants from Master's in Sustainability (2 groups)
- Participants were first presented with the problem behaviour over time to be explained with their model: global meat consumption per capita
  - Encouraged to reflect on express the drivers of meat consumption based on their own choices, experiences, and knowledge
- Discussions were audio recorded with informed consent

Problem Behaviour over Time



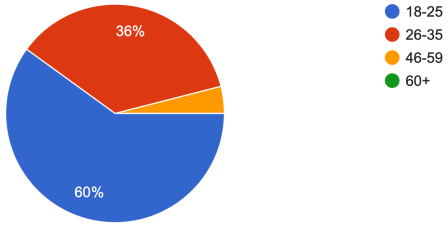


Reference mode with desired consumption level based on planetary health diet

Participant Demography

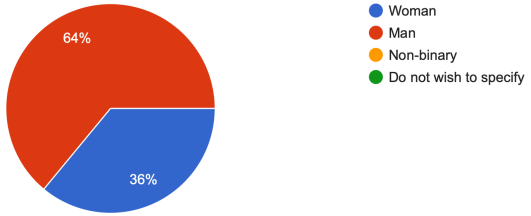
Which age group do you belong in?

25 responses



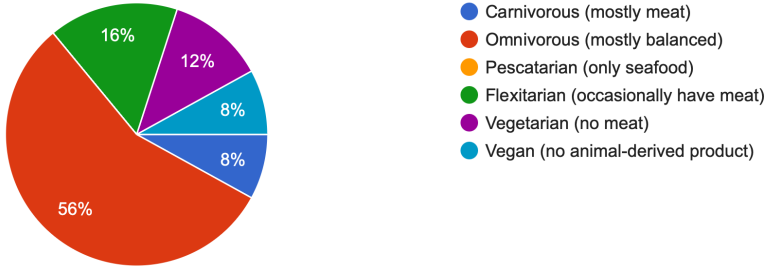
What is your gender?

25 responses



Which dietary pattern do you identify with?

25 responses



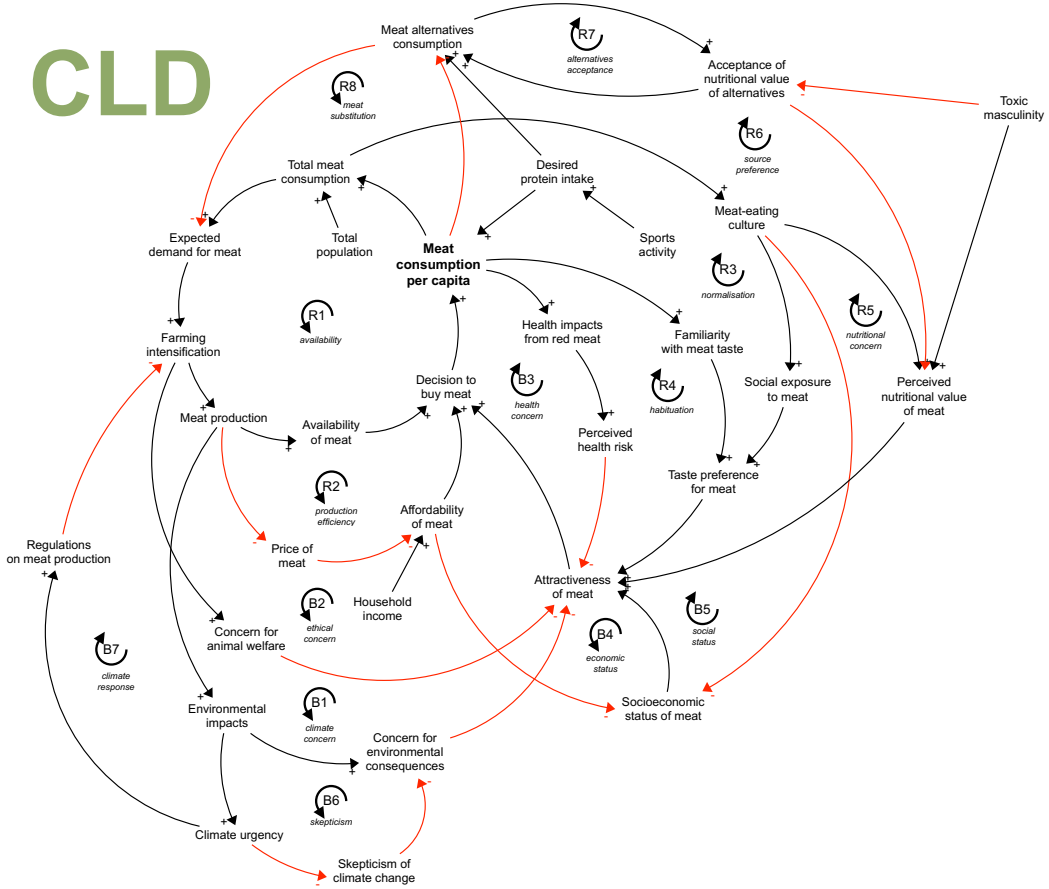
What is your home country (culture you identify most with)?

Data Analysis

- Audio recording of each group were coded in NVivo
  - Codes capture the feedback stories articulated during the systems mapping process
  - Categories, representing a certain feedback loop or process, were identified by connecting the codes
- The systems map were integrated into a single causal loop diagram
  - Each feedback loop reflected an indentified category
  - The selected causal mechanisms in the loop reflects the level of detail or abstraction necessary to capture the range of identified feedback stories

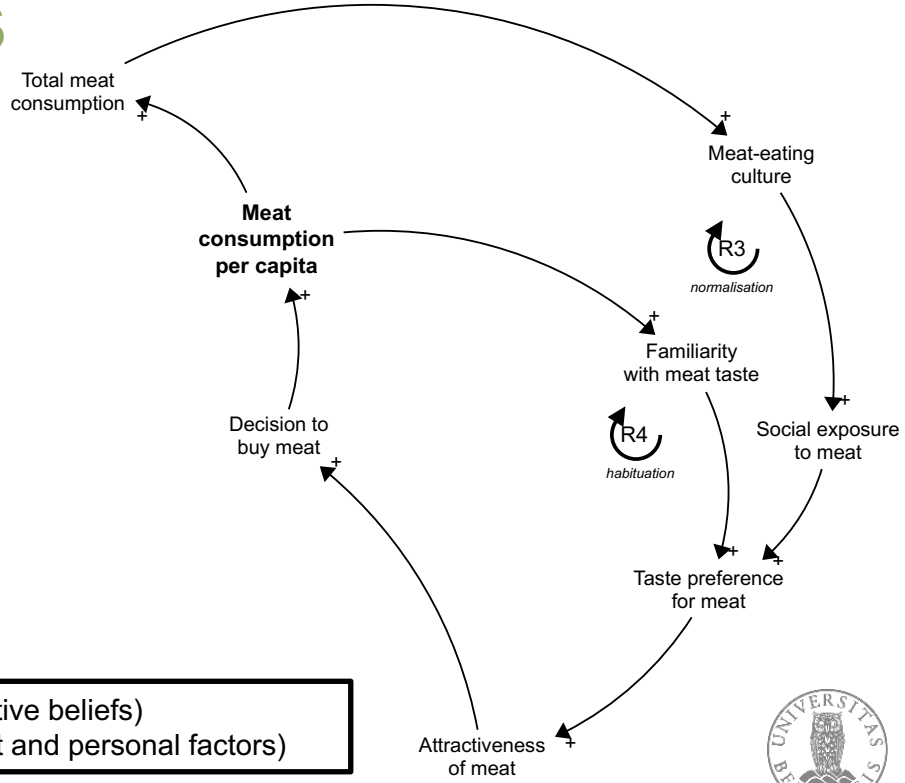
Results

Integrated CLD



Feedback Stories

- **Normalisation**
  - Taste preferences are shaped by social norms over the long terms
  - Bases of social exposure includes, cultural upbringing, traditions, religious customs
  - Captures the process of social pressure
- **Habituation**
  - Normalisation loop feeds into taste familiarity
  - Over time, individual taste is driven by familiarity and habituation

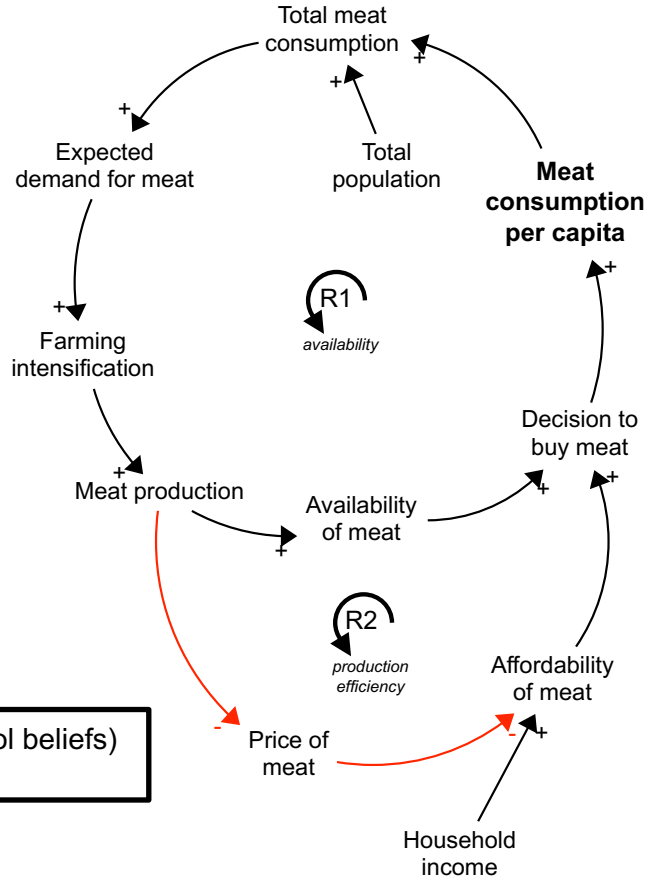


- Theory of Planned Behaviour (normative beliefs)
- Social Cognitive Theory (environment and personal factors)

Feedback Stories

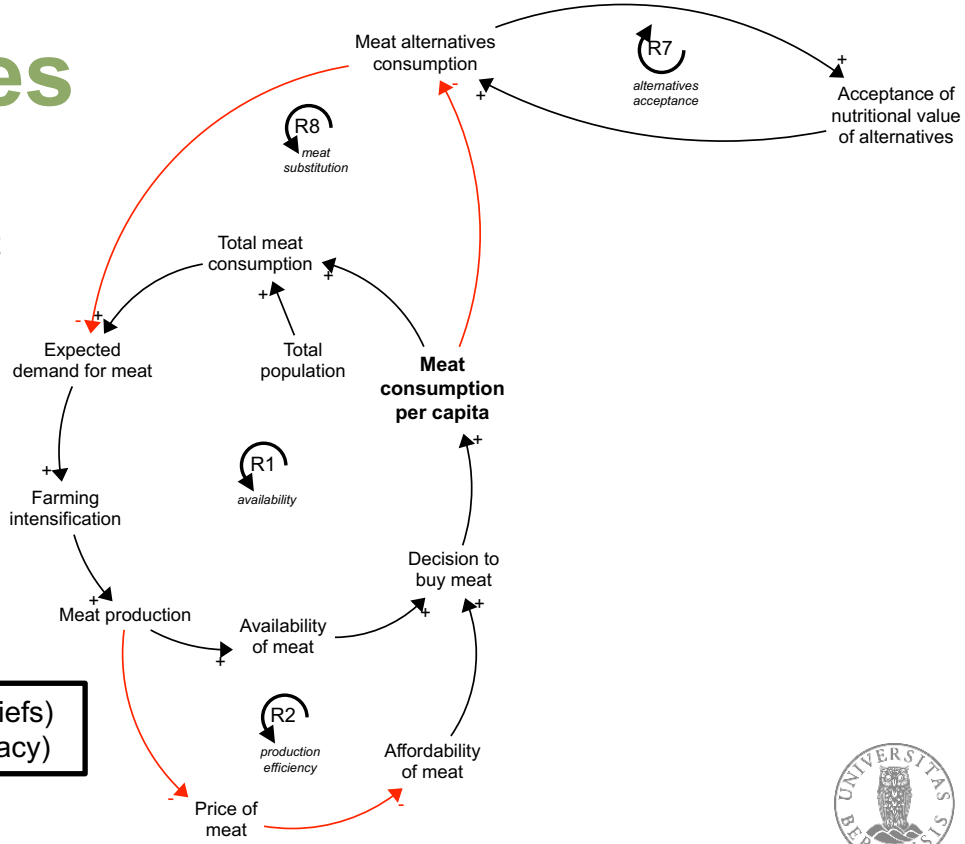
- **Availability**
  - Prevalence and ease of access of meat as key factors for decision
  - Reinforced by demand-induced meat production
- **Affordability**
  - Price and household income also mediates decision
  - Expectation of economies of scale that makes it more affordable
    - Especially relative to alternatives

- Theory of Planned Behaviour (behavioural and control beliefs)
- Social Cognitive Theory (environment factors)



Feedback Stories

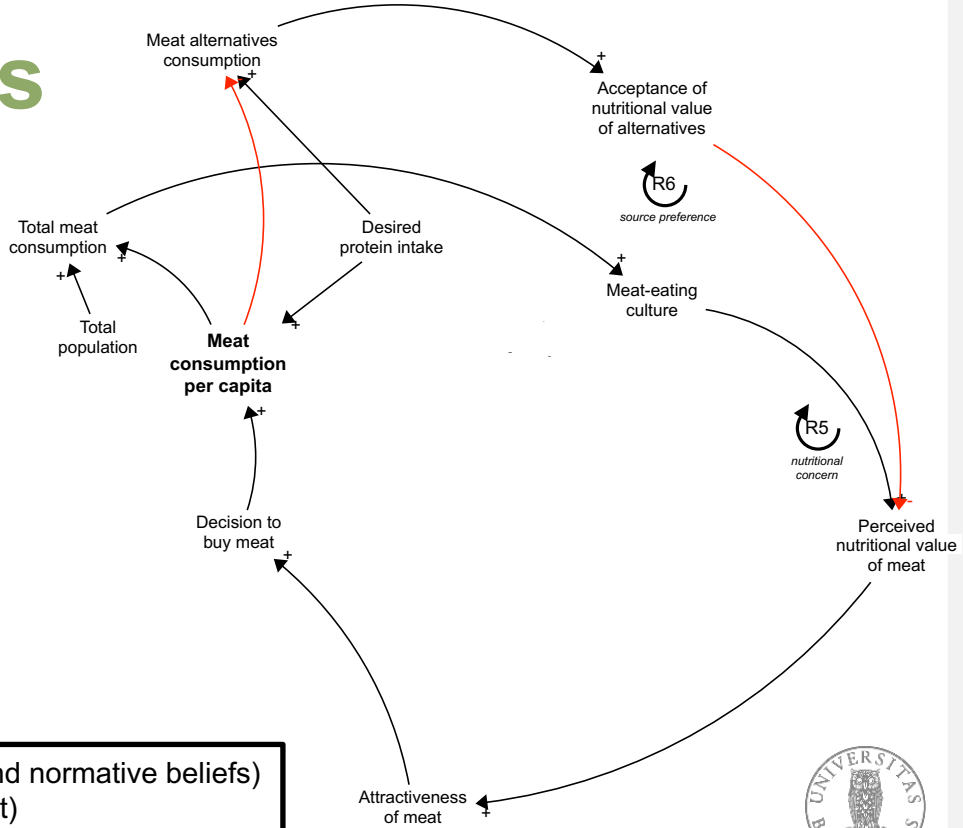
- **Meat Substitution**
  - Meat alternatives as competition that shifts the system from one regime to the other
- **Alternatives Acceptance**
  - Simplified loop to represent the normalization of meat alternatives
  - Also encompasses acceptance of vegetarian/vegan diets



- Theory of Planned Behaviour (behavioural and control beliefs)
- Protection Motivation Theory (response cost and self-efficacy)

Feedback Stories

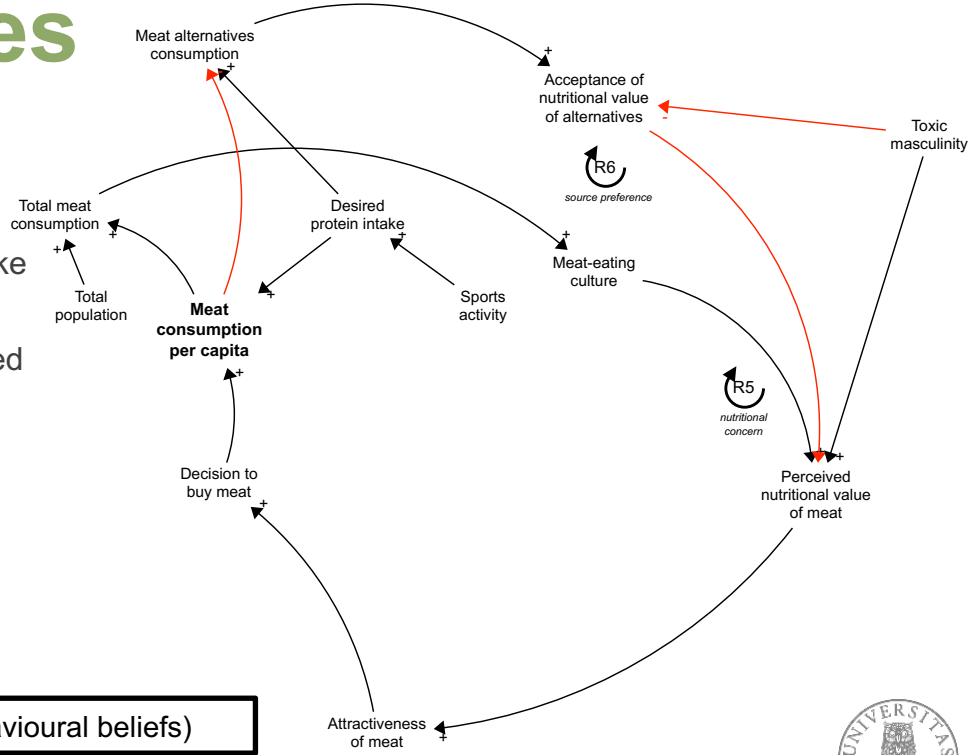
- **Nutritional Concern**
  - Attractiveness of meat is also driven by the perception of the nutritional value for meeting daily protein requirements
  - Reinforced by meat-eating culture that places emphasis on meat for protein
- **Source Preference**
  - Preference for meat vs. alternatives as source of protein
  - Awareness and acceptance of alternatives' nutritional value required to compete with meat



- Theory of Planned Behaviour (behavioral and normative beliefs)
- Value-Beliefs-Norm Theory (obligation to act)
- Social Cognitive Theory (environment and personal factors)

Feedback Stories

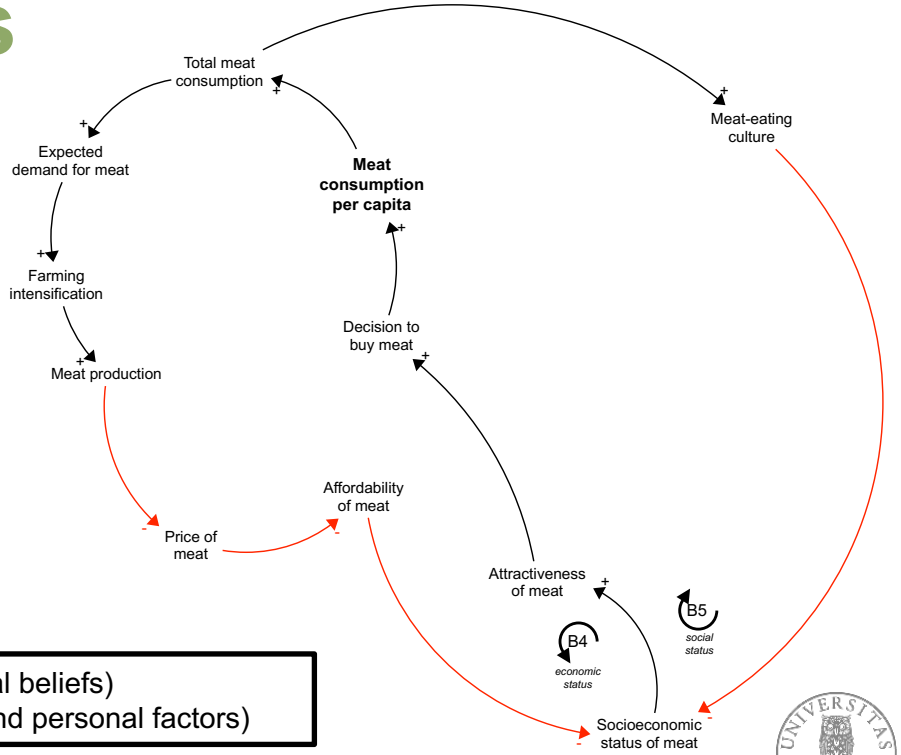
- **Sports**
  - Emphasis of sports and muscle-building activities contribute to increase in daily desired protein intake
- **Masculinity**
  - Toxic masculinity brings in a gendered dimension
    - Glorifies meat-eating and thus boosts the perceived nutritional value of meat
    - Stigmatizes vegetarianism or veganism as “weak”, making it harder for it to be normalized



- Theory of Planned Behaviour (behavioural beliefs)

Feedback Stories

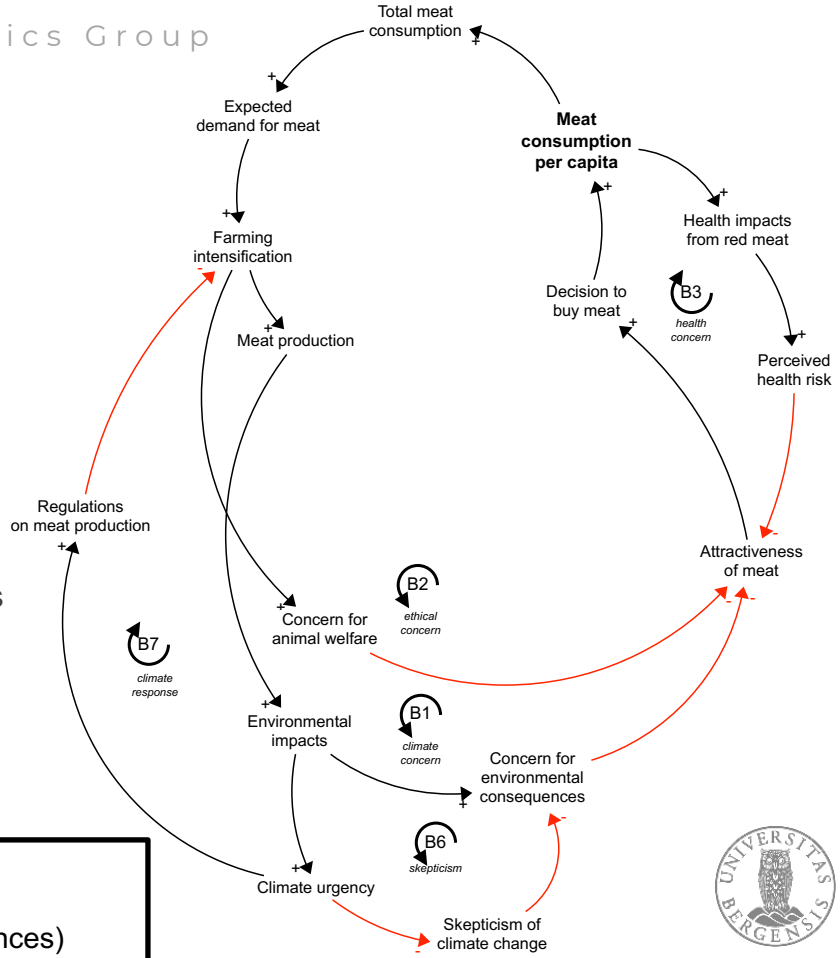
- **Economic Status**
  - Meat as indicator of socio-economic status, increasing its attractiveness
  - However, as meat becomes more affordable it loses its class status
- **Social Status**
  - Socioeconomic status of meat is dependent on how normal it is in society
  - Similarly, when there is a meat-eating culture, it loses its privileged status



- Theory of Planned Behaviour (behavioral beliefs)
- Social Cognitive Theory (environment and personal factors)

Feedback Stories

- **Health Concern**
  - Perception of red meat as a health risk reduces its consumption
- **Ethical Concern**
  - Animal welfare concerns from farming intensification reduces meat attractiveness
- **Climate Concern**
  - Environmental effects and sustainability concerns from farming intensification reduces attractiveness
- **Climate Urgency**
  - As climate impacts become more and more apparent it reduces skepticism and encourages regulations on meat production



- Theory of Planned Behaviour (behavioral beliefs)
- Protection Motivation Theory (threat assessment)
- Value-Beliefs-Norm Theory (awareness of consequences)
- Social Cognitive Theory (environment and personal factors)

Implications of Work

- By focusing on feedback stories based on lived realities, we are better able to understand how human behavioural choices play out in action
  - Drivers of human behaviour is complex, and the weight placed on certain loops are different for different people
  - This CLD can be used explain various types of individuals, leading to varying behaviour
- By mapping the variables and loops back to behavioural theories, we make the abstract more concrete
  - CLD as basis for conceptualizing a quantitative simulation model that can be included in integrated assessment models

Further Work

- More data collection
  - Iterations to integrate more perspectives and refine the results
- Triangulation
  - With empirical and literature support
- Individual Archetypes
  - Construction of fictional individual archetypes to narrate the causal loop diagram according to different lived realities
- Abstraction
  - Towards a more generalizable, yet concrete, feedback perspective to human behaviour in other environmental contexts (e.g., energy consumption)

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