# Stakeholders and systems dynamics – Group Model Building applied to AMR & waste in dairy supply chains

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**Group Model Building to reduce food waste: stakeholders (SG, ZWS, WRAP, FDF Scotland, NFUS, SEPA, AHDB, SAOS, Soil Association) collaboration to exploring how causes of food waste, e.g. through antibiotic residues in milk, can be mitigated through incentives to farmers and collaboration with others along the dairy supply chain, and in developing stronger links between research & stakeholders' interests, activities**
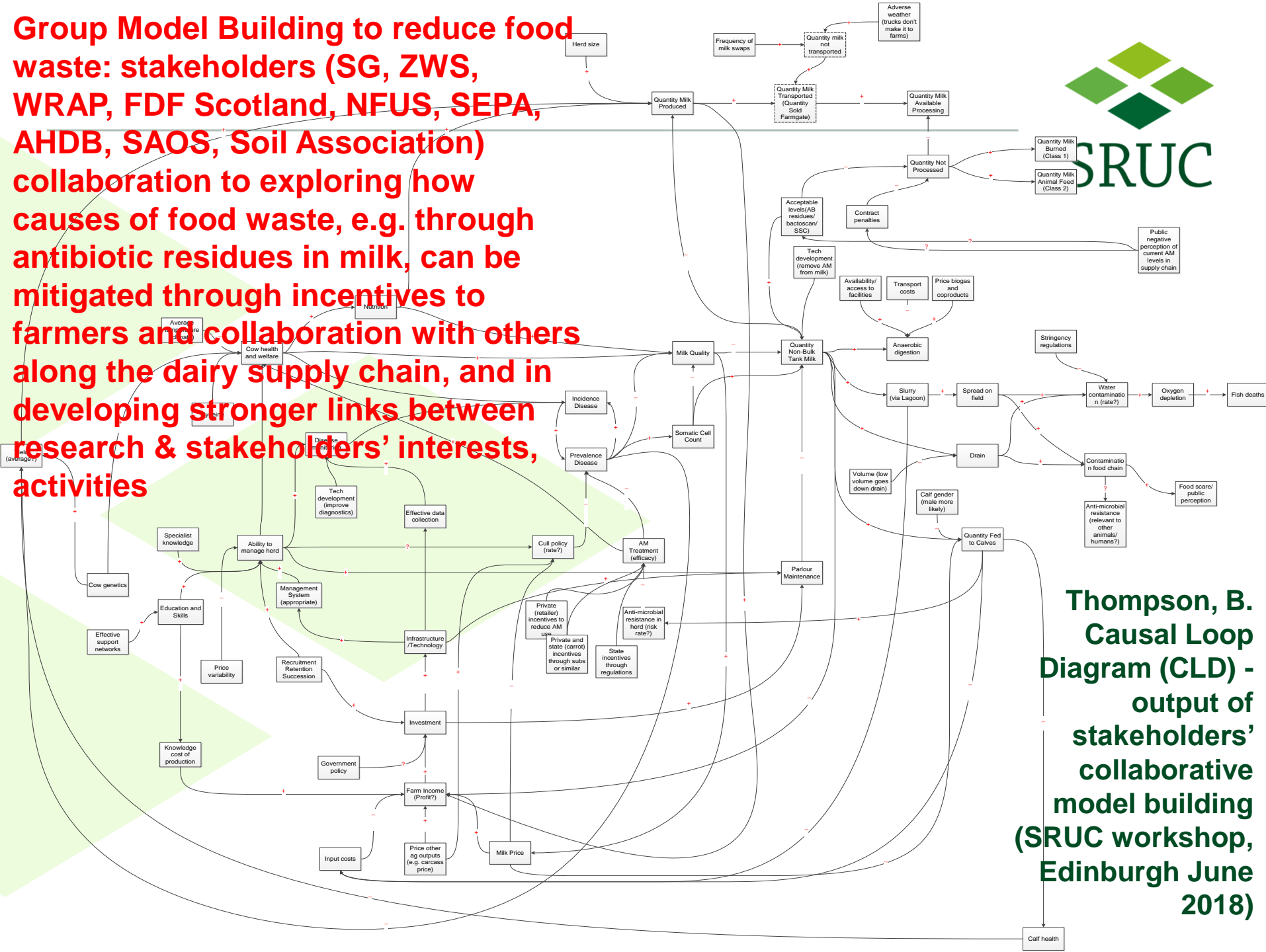
**Thompson, B. Causal Loop Diagram (CLD) - output of stakeholders' collaborative model building (SRUC workshop, Edinburgh June 2018)**

**Summarised Causal Loop Diagram (CLD)**
**(Stella Architect software)**

# Examples of behavioural loops in CLD

**Health impact of unsold milk containing AM residues being fed to calves**

➢ **which may trigger further research on identifying the impact of AM-resistant bacteria transmitted into the human food supply chain;**

➢ **this either directly (direct link not included below) or indirectly through public perceptions may lead to technological development,**

➢ **which will affect the use of AM for animal treatment on farm and subsequently the quantity of milk containing (>MAL) AM residues.**

technology = filters to remove AM residues from milk
assumed effect of technology on AM use = positive
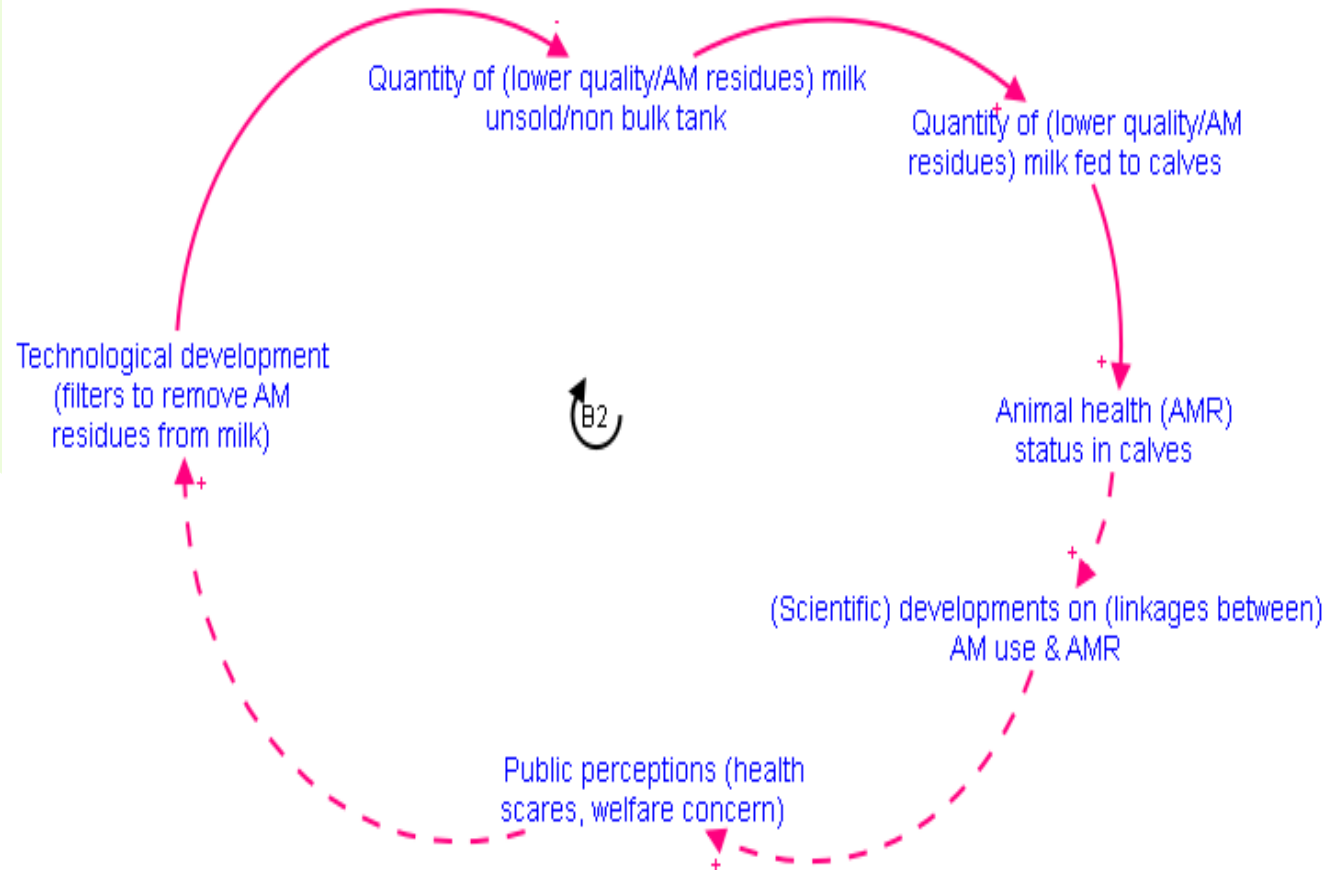(availability of AM filters might encourage/not
constrain AM use)
behavioural loop = reinforcing (and potentially leading
to a vicious cycle)
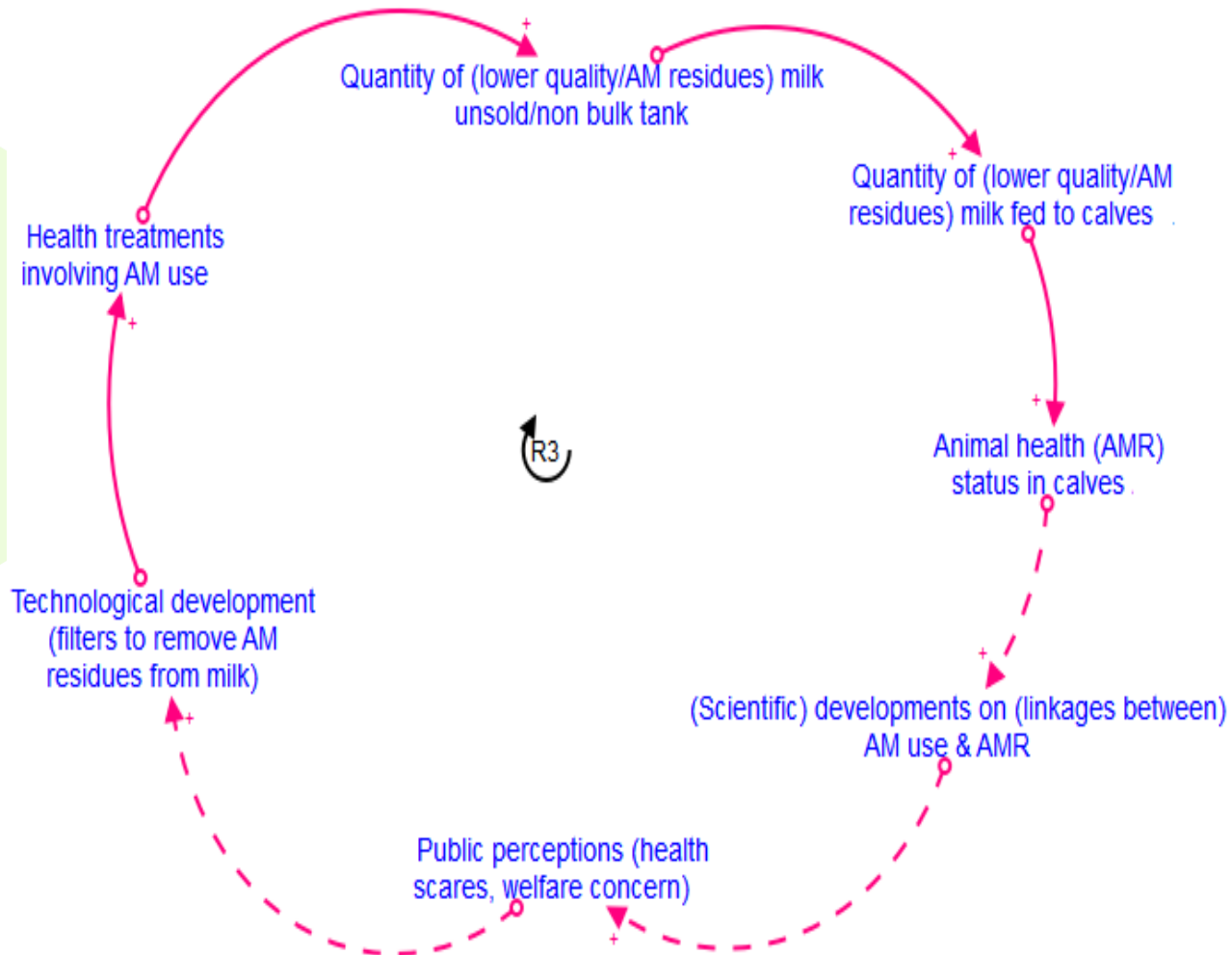
technology = filters to remove AM residues from milk
assumed effect of technology on AM use = negative
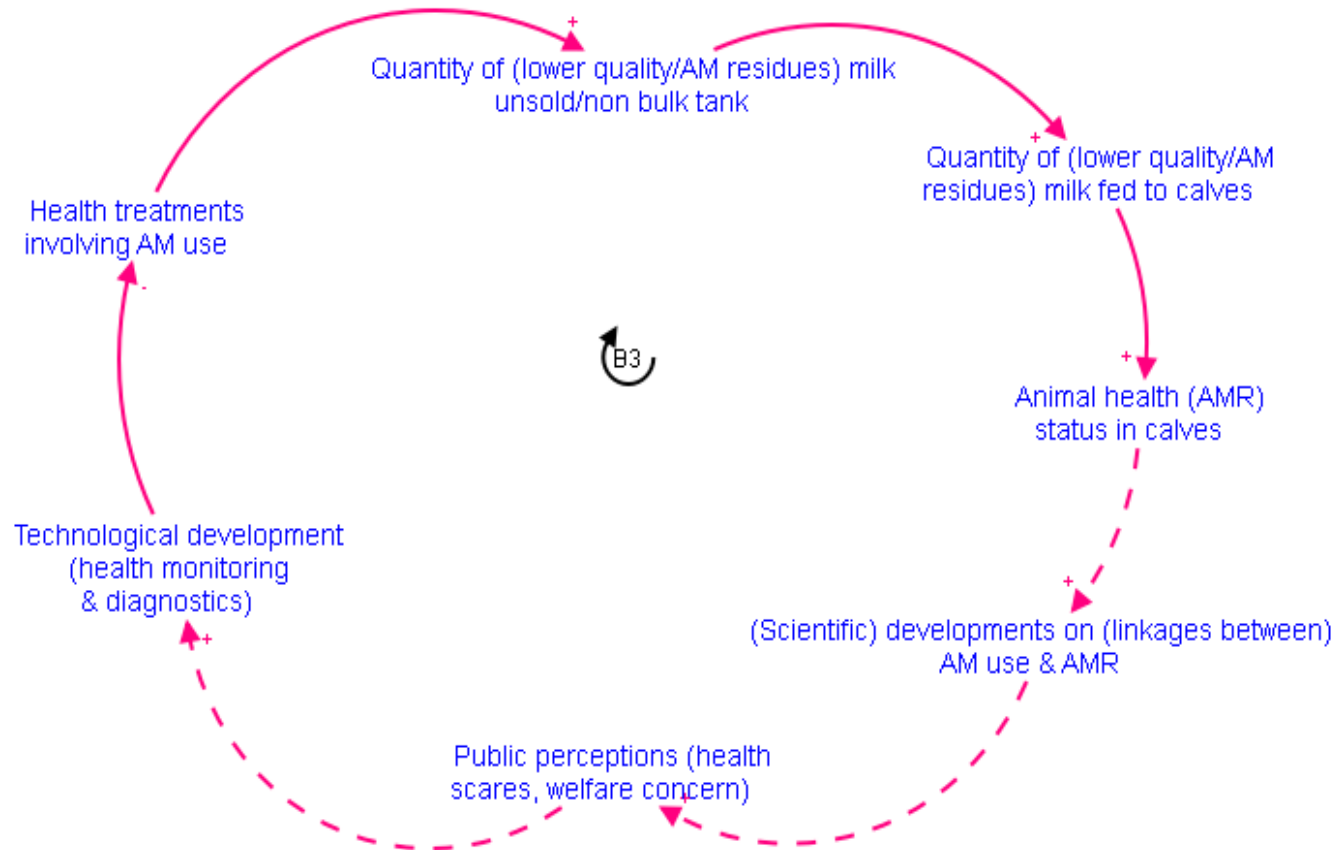(impact of AM filters on quantity of milk containing
AM residues)
behavioural loop = balancing (with the system
converging on a target i.e. lower milk waste due to
reduction of AM residues in milk)

Quantity of (lower quality/AM residues) milk
unsold/non bulk tank

Quantity of (lower quality/AM
residues) milk fed to calves

Technological development
(filters to remove AM
residues from milk)

B2

Animal health (AMR)
status in calves

(Scientific) developments on (linkages between)
AM use & AMR

Public perceptions (health
scares, welfare concern)

technology = improved health monitoring and diagnostics
assumed effect of technology on AM use = negative
(preventing the need for AM use through better
monitoring/diagnostics)
behavioural loop = balancing (with the system converging
on a target i.e. lower milk waste due to reduction of AM
residues in milk).

# Acknowledgements