

Food security, safety and sustainability in times of crises, getting the trade offs right

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Outline

1. Context
2. Future VPH challenges
3. Food loss and waste
4. Hierachy of food waste
5. Examples of trade offs
6. VPH challenges

Context – simplified big picture

1. Increasing population from 7 billion to 10 billion 2050
2. Limited additional land available for food production
3. Climate change – lower food production – increasing food prices
 - heat waves, drought and floods
4. Cereals production - 50% eaten, 40% fed animals, 10% NFA, biofuel & seeds
5. Food loss and waste 30-50% of food produced (feed > 1 billion people)
 - Food loss - from raw materials to edible foods - a developing countries' problem
 - Food waste – edible foods wasted – a developed country problem
6. Feed conversion - cereals to animals ~ 90% loss of energy & protein
 - Poultry > pigs > cattle
 - Insects and fish better feed conversion than poultry
7. AMR – a silent pandemic
8. Black swans – Covid-19 pandemic, war Ukraine,
 - Inflation input prices (energy, fertilizers, seeds, ..) and food
9. Animal welfare – a global concern





- EAT Lancet report (Willett, 2019)
 - double the consumption of fruits, vegetables, nuts, and legumes and to halve the consumption of red meat and sugar.
 - Adapt diet to local conditions – (Nordic diet, Mediterranean diet)
 - A diet rich in plant-based foods and with fewer animal source foods confers both health and environmental benefits.

- AT Kearney (Mgmt consultant) 2019
 - meat will be replaced by vegan or vegetarian meat replacements, insect based meat replacements, or cultured meat (produced in bioreactors).
 - Animal proteins such as milk, eggs and products thereof will be easier to replace, as the structures and biochemistry are simpler.
 - In the future animal proteins and energy i.e., meat, milk and eggs, should be produced using feed sources not suitable for human consumption e.g., pastures, grass, hay, or food by-products.



VPH challenges

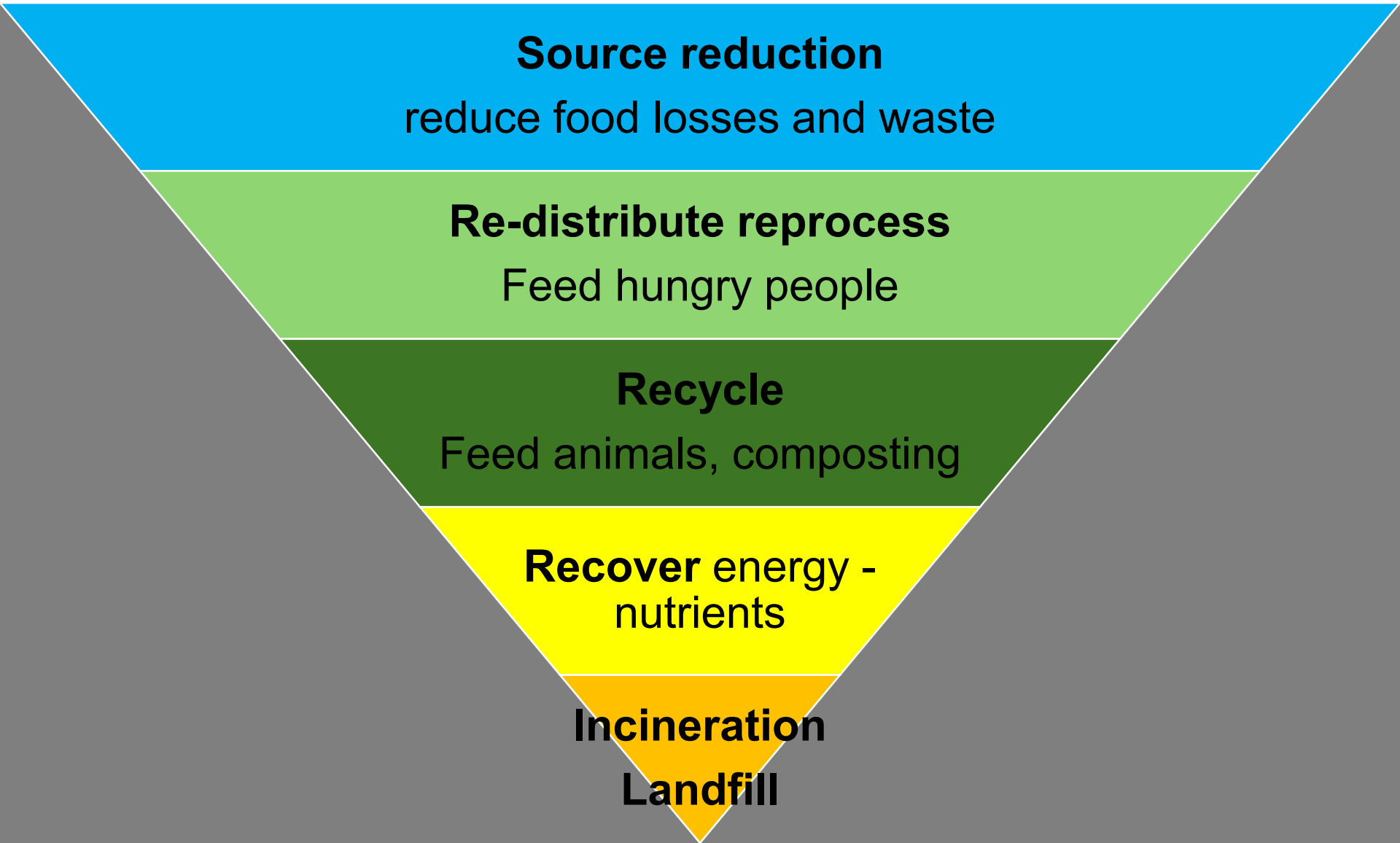
- Improve food security & sustainability of food production
 - reducing food loss and waste
 - without damage to food safety,
- Develop a veterinary medicine not reliant on antimicrobials
 - Vaccines
 - Biosecurity
- Animal production based on **feed sources not suitable for human consumption** e.g., pastures, grass, hay, or food by-products.
 - Animal nutrition vs controlled starvation – pastoral production
 - Safety of food by-products
 - Control of pasture related diseases – parasites, mineral deficiency,
- Animal welfare
 - acceptance current production,
 - novel production, novel species



Causes food loss and waste

- Spoilage in the agricultural process, harvest, storage, processing, packaging, and marketing;
- Reduction of quality such as bruising of packages, fruits or vegetables;
- Quality flaws—e.g., fresh produce that deviates from what is considered optimal in terms of shape, size, and color such as curved cucumbers, wrong sized apples; being discarded;
- Foods that are close to, at or beyond the “best-before” dates are discarded by retailers and consumers;
- Large quantities of wholesome edible food are often left over and discarded from households and catering establishments;
- Producer or retailer recalls of foods.

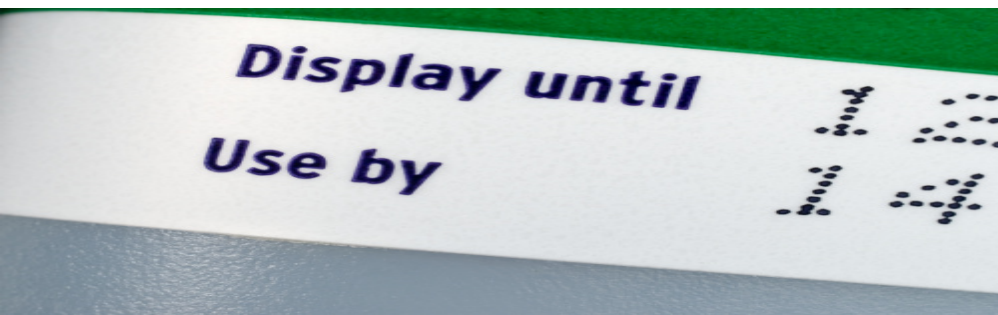
Hierarchy of strategies reducing food loss and waste (US, EPA)



Source reduction – less food waste and loss

Novel ways of thinking

- Aim of food production – sustainable nutrition and zero hunger
 - Not producing more food
 - Investment in source reduction (less food waste and loss) preferable to increase food production
- Options/ideas e.g.,:
- Use of big data, sensors and AI to predict food demand and supply
 - Avoid stock outs or food wasted
 - Include safety and quality data in the models
- Intelligent labelling instead of best before dates
 - Based on cheap sensors
- Using apps for vulnerable groups instead of recalls – e.g., listeria
 - Use by dates replaced by sensors and mobil phone apps
 - Food is safe for other groups,



Source reduction – sustainable intensification?


- A tricky idea – possible with smart intensification?
- **Old idea - Antimicrobials in feed for improving feed conversion**
 - a case of unsustainable intensification
 - Food excellent vehicle for spreading AMR bacteria
- But possible to:
 - Reduce losses in current production – 50% loss from field to shop for vegetables
 - Shifting to novel productions with better feed conversion – insect farming
 - Eating the cereals intended for animal feed

Redistribute or reprocess foods

- Food donations and food banks
 - Only 1-10% of foods discarded are donated to food banks
 - Concern - liability when donating perishable foods
 - EU has implemented good Samaritan laws – donate in good faith without liability
- Food donations and safety/quality – a tricky issue with susceptible groups
 - Need for food safety training of those handling donated foods
 - Need for fit for purpose food controls of food banks
- Food reprocessing – risks of bacterial growth (clostridia perfr., bac cereus,..)
 - Reheat of freeze foods before best before or use by dates
 - Make salmon filets into salmon pies
 - Use food leftovers as raw materials for next days warm meals

Recycle – reprocess foods to feed animals

Avoid cycle of nutrients become cycle for pathogens

- Good idea – but:
- Complex EU legislation due to BSE, classical swine fever and FMD
- Plant based food stuffs and by products – easy
 - Moulds one risk (peanuts, almonds, ...)
 - Nutritional value sometimes uncertain
- Animal by products - tricky
 - EFSA identified 24 hazards (FMD, Q-fever, salmonella, brucella) when looking at dairy by-products used as feed
 - Need processing steps to stop pathogens spreading
- **BSE – an animal epidemic due to failed recycling** 
 - A cycle of nutrients became a cycle of pathogens – R_0 around 14
 - Tragedy for farmers
 - Tragedy for those catching nv CJD

VPH challenges

- Avoid better food security and sustainability means less food safety
 - assess & manage the risks of a sustainable food production
 - Manage the trade-offs
- BSE epidemic and AMR pandemic examples of getting it wrong
- Thank you for your attention
- Questions?