

Innovation(s) in Primary Food Production in Scotland

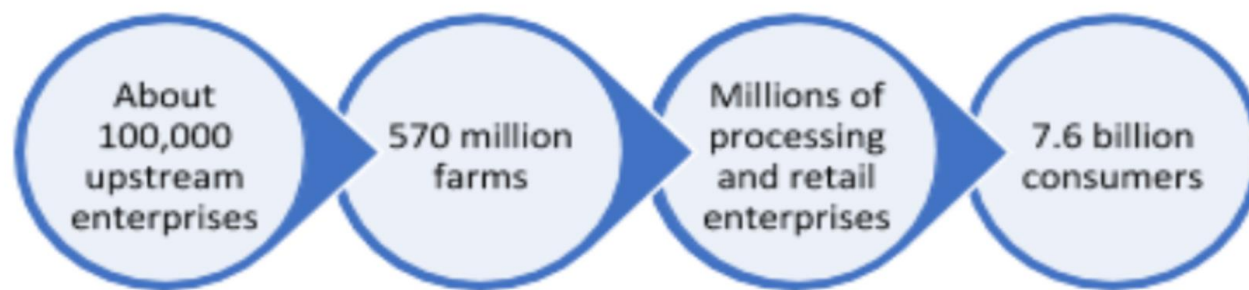
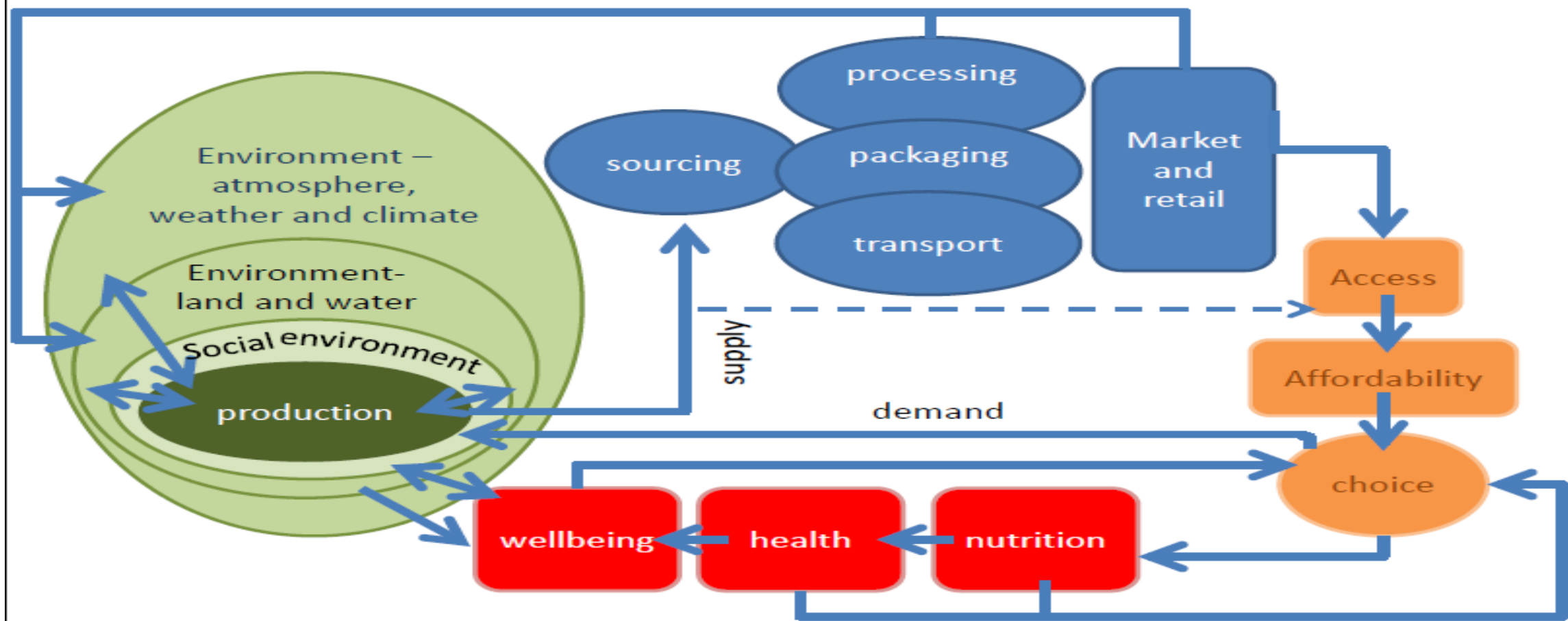
SSAC Food System Round Table

May 2023

Wayne Powell



SRUC



Fourth Industrial Revolution & the Food System

Changing the shape of demand

ALTERNATIVE PROTEINS



FOOD SENSING TECHNOLOGIES FOR FOOD SAFETY, QUALITY, AND TRACEABILITY



NUTRIGENETICS FOR PERSONALIZED NUTRITION

Promoting value chain linkages

BIG DATA AND ADVANCED ANALYTICS FOR INSURANCE



BLOCKCHAIN ENABLED TRACEABILITY



MOBILE SERVICE DELIVERY



IOT FOR SUPPLY CHAIN TRANSPARENCY AND TRACEABILITY



Creating effective production systems



PRECISION AGRICULTURE FOR INPUT AND WATER USE OPTIMIZATION



GENE-EDITING FOR MULTI-TRAIT SEED IMPROVEMENTS



MICROBIOME TECHNOLOGIES TO ENHANCE CROP RESILIENCE



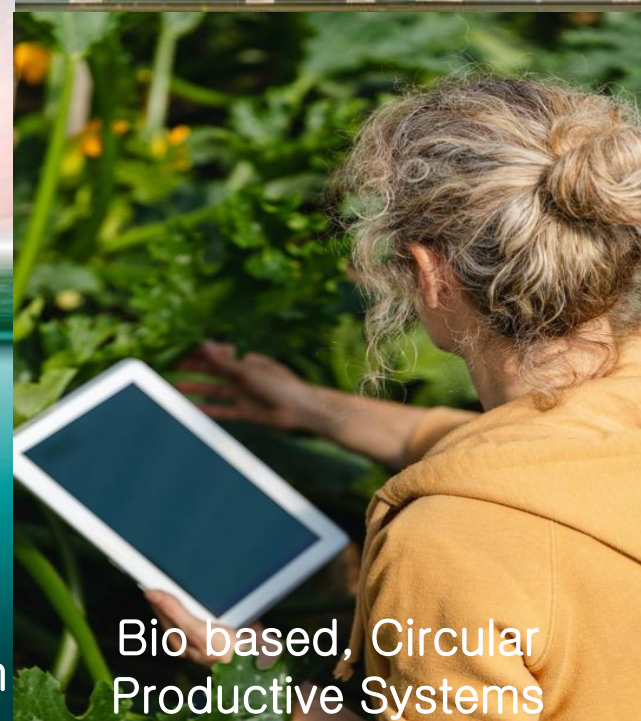
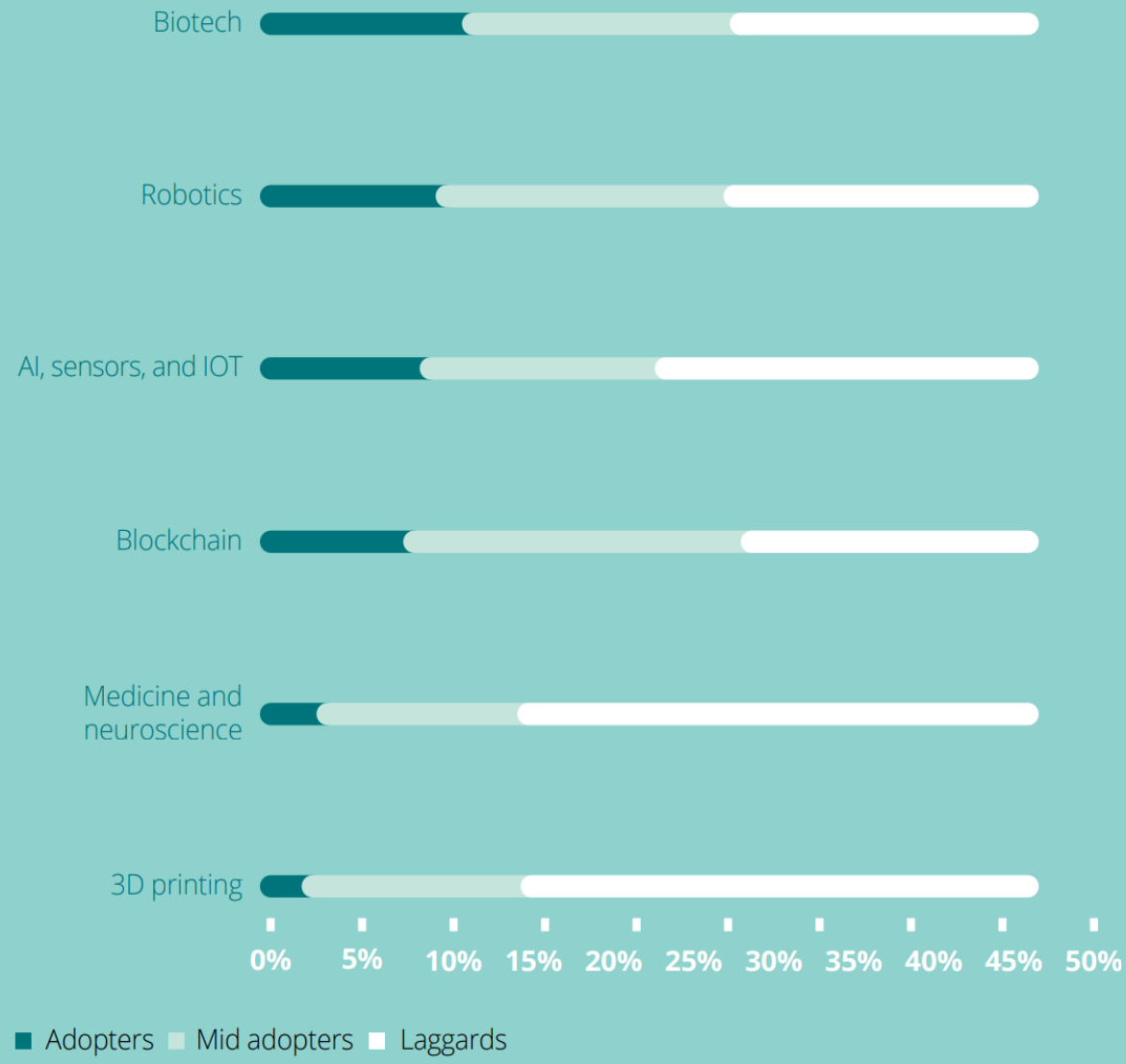
BIOLOGICAL-BASED CROP PROTECTION AND MICRONUTRIENTS FOR SOIL MANAGEMENT



OFF-GRID RENEWABLE ENERGY GENERATION AND STORAGE FOR ACCESS TO ELECTRICITY

Ecosystem orchestration

Adoption of Industry 4.0 technologies in addressing the future of food trends





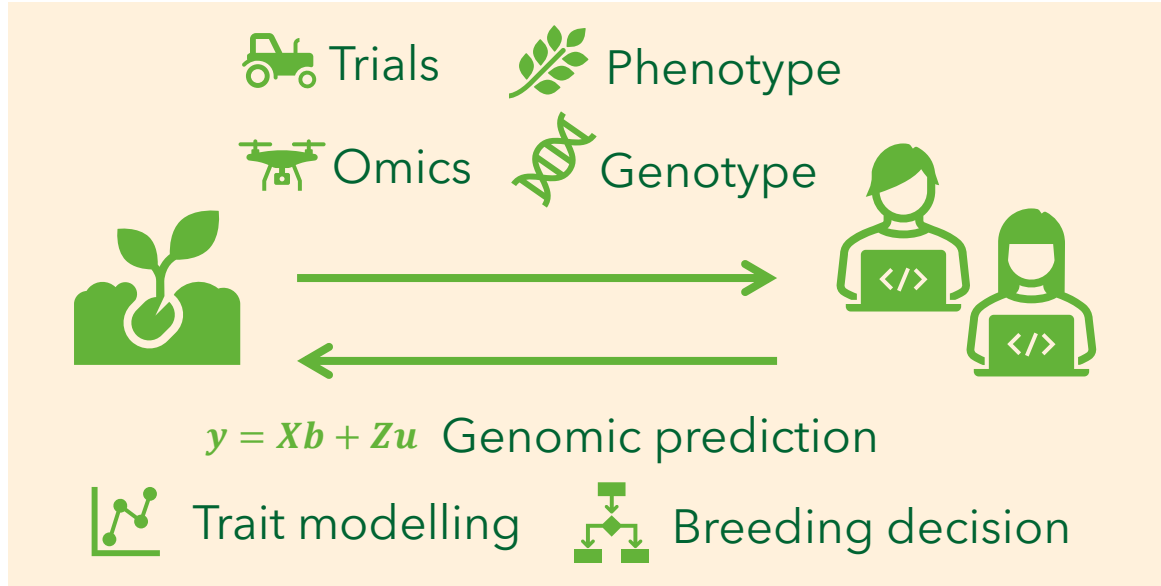
The Fourth Industrial Revolution

The story of growth is a story with two 'is' – ideas and institutions.

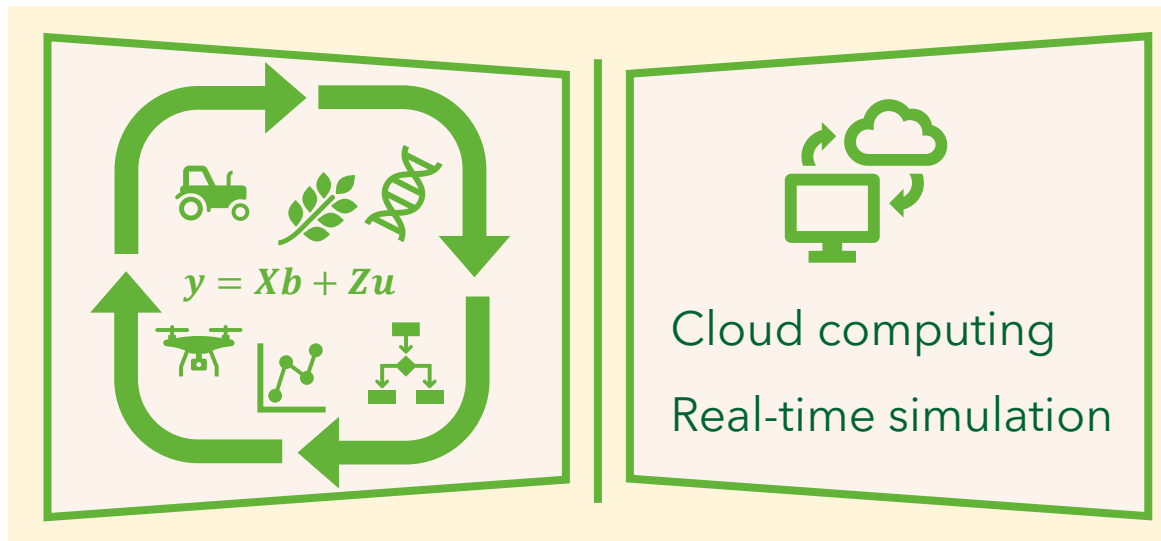
'In future, institutional innovation will be every bit as important as technological innovation if that gift of growth is to keep on giving'.

Andy Haldane Ideas and Institutions – A Growth Story 2018

Conventional breeding practice

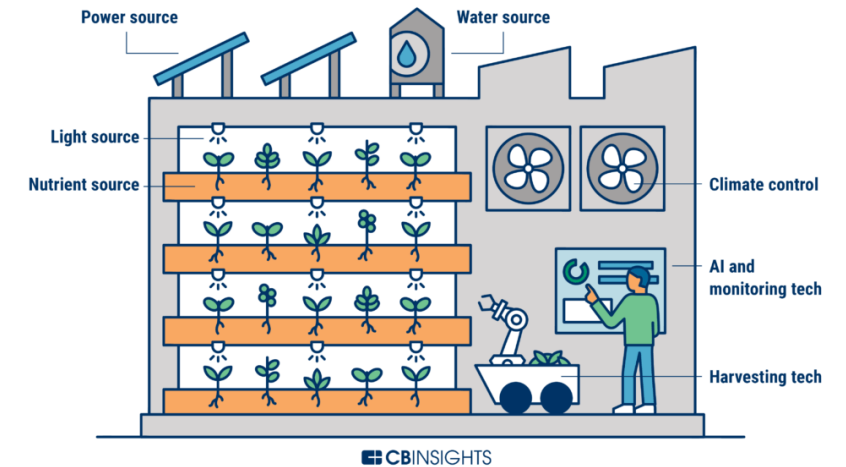


Breeding with digital twinning



<https://www.cbinsights.com/research/what-is-vertical-farming/>

Main components of a vertical farm



Use of the state-of-the-art technology in targeted breeding for local production

Agri-Food & Circular Economy



BALANCE
PRODUCTION / CONSUMPTION
Animal farming for Humans'
wellbeing and Planetary health

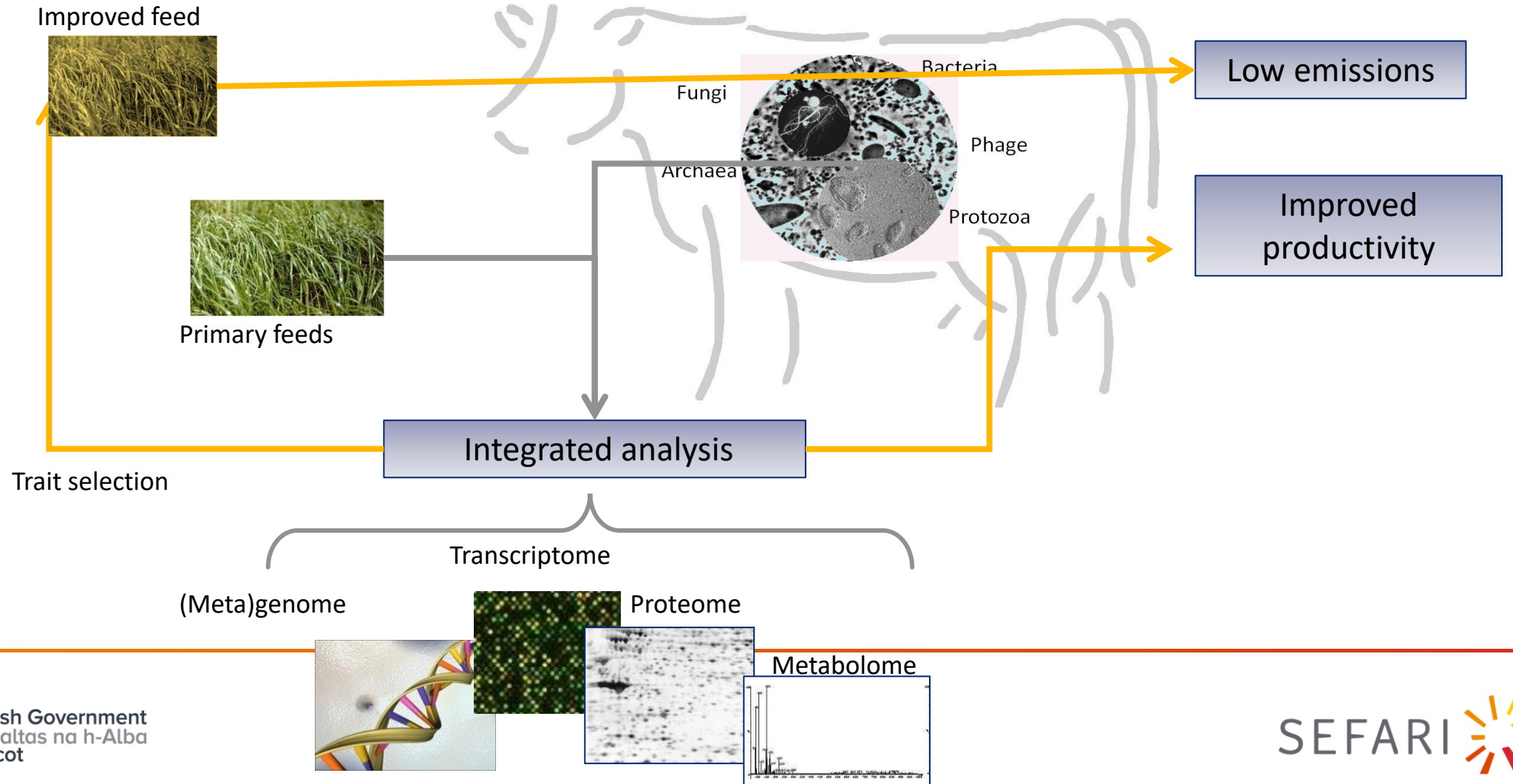


Food integrity

How can the animal production sector contribute?



Biological systems approach



The Methane Opportunity



Circular farming system



Captures methane from housed cattle



Utilises outputs from combustion of methane



Integrated cattle and vertical farming production system



Yielding low carbon produce



Optimise resource efficiency

GGR/DAC PHASE 1:



GGR/DAC PHASE 2:



N2 — Applied





Circular production



Low carbon



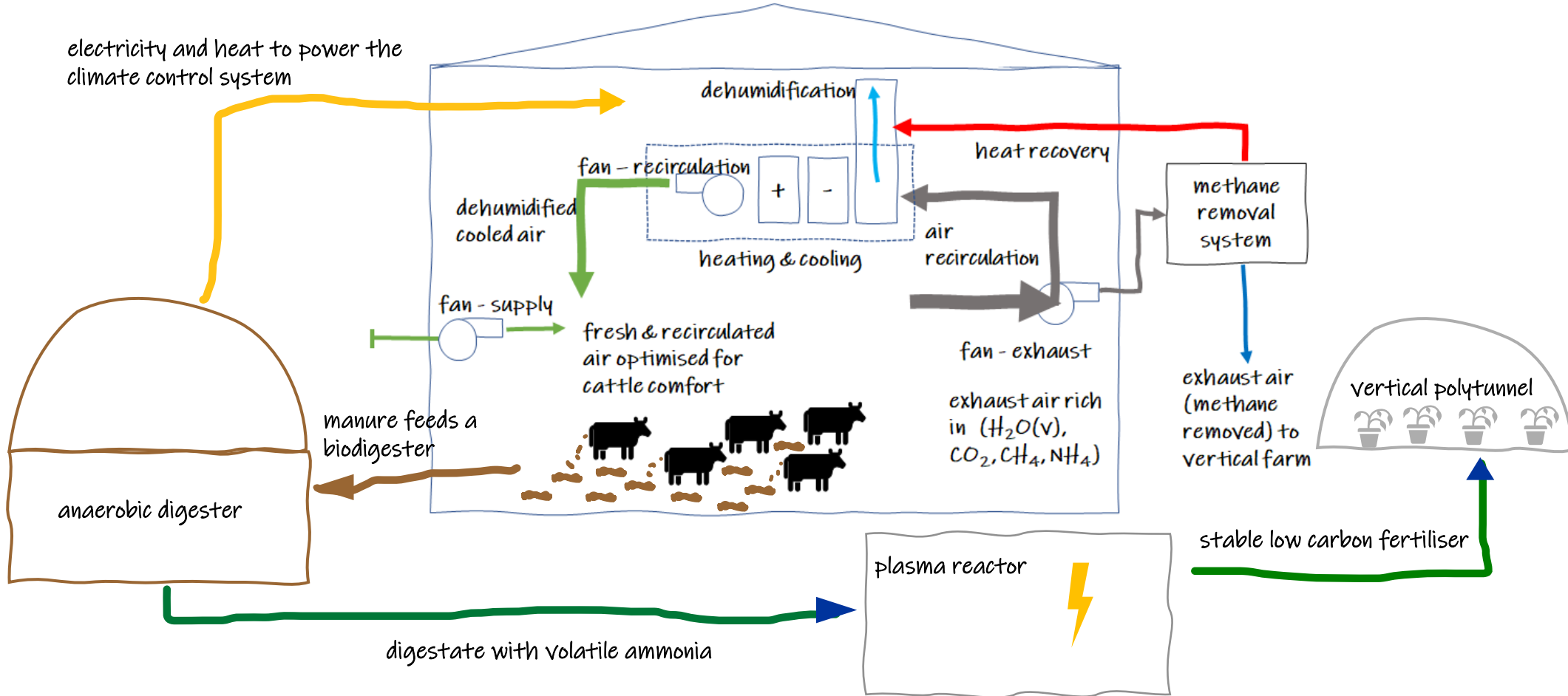
Health and welfare



Low ammonia



Skills diversification



Drivers needed to embed innovation in local food production

- Place & Community based approach to innovation
- Regional Tertiary Research, Innovation & Skills Ecosystem
- Wider business development and consultancy support for SMEs.
- Inspire & support young people to engage in Entrepreneurial thinking through social and impact led activities



Prioritising Local Communities

Outer Hebrides Food and Drink Programme: support specific capital investments agreed as priorities with community landowners, aquaculture and fishing industry representatives

Net Zero Arran: a farmer led climate change group. Supporting collective action and incremental change to meet net zero and resilience

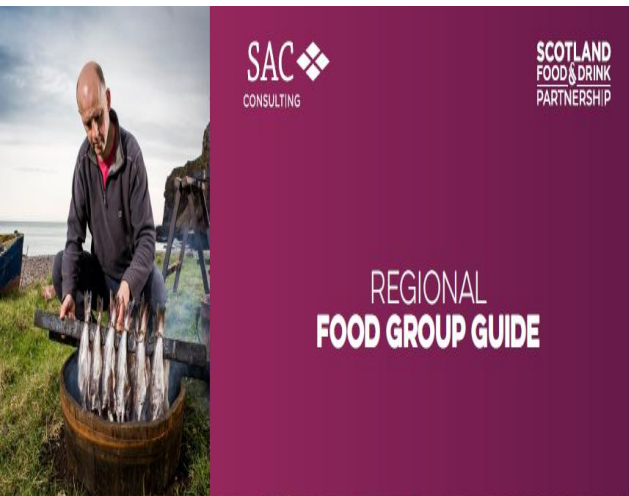
Regions are hubs of innovation which can foster development of local solutions

A range of innovations occur at different scales and these needs to be mobilised to support local food economies

Economic Resilience

Rapid diffusion of Research & Innovation to communities, industry locally and globally to improve productivity, quality of life and health

Tensions and trade offs are navigated responsibly and equitably with people, planet and place in mind



Shell-volution project

New and innovative technical programme enabling future growth in the low-carbon and sustainable mussel farming sector in Shetland,

Raising productivity and resilience within existing farm sites



Dandelion–National Celebration of Sowing, Growing & Sharing Food

Aimed to make growing food as easy and accessible as possible for people of all ages and backgrounds

- 500 harvest festivals around the country.
- Schools Programme Dandelion Growing Initiative – cubes experiments (100 secondary schools) – largest ever citizen science growing project in Scotland
- 160 Mini vertical farm cubes were built to showcase alternative production methods.
- Pupils around Scotland were citizen scientists, working with the cubes and an Internet of Things (IoT) node





The Future For Small Abattoirs In The UK:

REPORT ON AN INQUIRY INTO SMALL RED MEAT ABATTOIR PROVISION



An economic analysis of the role and viability of small abattoirs in the red meat supply chain.

Dr Jeremy R. Franks and Dr Rachel Peden

Benefits of small, local abattoirs



Animal welfare



Environment



Local food



Marketing advantage



Thriving rural communities



School of Veterinary Medicine

There is opportunity and a case for change

Plurality of Innovation—the '2Is'

Ideas/technology-based innovation is not enough needs to be coupled with Institutional Innovation

Inclusive research and innovation culture

Need Wisdom & Connection of Place Based Innovation

Greater engagement with local citizens, communities & business

Better Education—Skills first approach

Our model of education needs to be capable of building and updating skills throughout our working lives— Tertiary

Balancing National Economic Growth (NSET) with Regional Economic Diversity

National Innovation Strategy

Scottish Tech Ecosystem Report (STER)

Entrepreneurial Campus



To do this requires new ways of working and the focused mobilisation of resources across the Scottish and International Food system,

It requires...

