Supplementary Material 1: Drivers of Change, SSP Mapping, and Key Workshop Outcomes

UK Livestock Futures

Co-designing Shared Socioeconomic Pathways

Kirsty Blair [1,2*] **Isabel Fletcher** [1,3], **Jay Burns** [1], **Peter Alexander** [1,2], **Dominic Moran** [1]

[1] *The Division of Global Agriculture and Food Systems, University of Edinburgh;*
[2] *School of GeoSciences, University of Edinburgh;* [3] *University of Edinburgh Business School*

[*] Corresponding author: Kirsty Blair, email: kirsty.blair@ed.ac.uk

THE UNIVERSITY of EDINBURGH
The Royal (Dick) School of Veterinary Studies
Global Agriculture and Food Systems

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Table 1 Drivers of Change

Workshop	*Categories*	*Theme*	*Driver*
1	UK/Devolved Government Policy and Governance	Governance	regulation of herbicides/pesticides
1	UK/Devolved Government Policy and Governance	Governance	internal market act
1	UK/Devolved Government Policy and Governance	Governance	land reform
1	UK/Devolved Government Policy and Governance	Governance	agricultural policy changes
1	UK/Devolved Government Policy and Governance	Governance	new legislation on the use of technology
1	UK/Devolved Government Policy and Governance	Governance	region 2/3 subsidy rules
1	UK/Devolved Government Policy and Governance	Governance	confidence in support
1	UK/Devolved Government Policy and Governance	Governance	slaughter regulation - private kill
1	UK/Devolved Government Policy and Governance	Governance	land reform
1	UK/Devolved Government Policy and Governance	Governance	government subsidies impact farming practices
1	UK/Devolved Government Policy and Governance	Governance	devolution and internal trade
1	UK/Devolved Government Policy and Governance	Governance	multi-polar world - conflict and impact on production
1	UK/Devolved Government Policy and Governance	Governance	uncertainty of policy landscape
1	UK/Devolved Government Policy and Governance	Governance	instability of domestic and global politics
1	UK/Devolved Government Policy and Governance	Governance	legacy of WW2 food shortage
1	UK/Devolved Government Policy and Governance	Governance	Bhutan measure happiness not GDP
1	UK/Devolved Government Policy and Governance	Governance	red tape (regulation, environmental, food safety etc.)
1	UK/Devolved Government Policy and Governance	Governance	always adding to red tape never reducing it
1	UK/Devolved Government Policy and Governance	Governance	level playing field
1	UK/Devolved Government Policy and Governance	Governance	inconsistency and uncertainty in government policy

1	UK/Devolved Government Policy and Governance	Governance	procurement
2	UK/Devolved Government Policy and Governance	Governance	unlevel playing field - same markets but different income groups
2	UK/Devolved Government Policy and Governance	Governance	upland sheep = commons
2	UK/Devolved Government Policy and Governance	Governance	19% of land affected by DEFRAs proposals to reduce amount + intensity of farmed land
2	UK/Devolved Government Policy and Governance	Governance	inheritance tax
2	UK/Devolved Government Policy and Governance	Governance	policy/attitudes to farmers focus on productivity and effects on profit
2	UK/Devolved Government Policy and Governance	Governance	policy capture and power imbalance re representation of perspectives
2	UK/Devolved Government Policy and Governance	Governance	government inefficiency re spend - paying for food 4 times (support payments, mitigating environmental damage, consumer food prices and cost to NHS of diets
2	UK/Devolved Government Policy and Governance	Governance	government pace of change and willingness to deliver ambitious/forward-looking change
2	UK/Devolved Government Policy and Governance	Governance	divergence of policy within the UK
2	UK/Devolved Government Policy and Governance	Governance	delay in developing support systems leads to early adopter fear of being penalised
2	UK/Devolved Government Policy and Governance	Governance	Scottish government listening to groups like NFU rather than others - values and culture of government
2	UK/Devolved Government Policy and Governance	Governance	government money available but admin needs improving
2	UK/Devolved Government Policy and Governance	Governance	short-term policies based on out-dated science
2	UK/Devolved Government Policy and Governance	Governance	timing for grants, hold-ups with applications - farming is seasonal
2	UK/Devolved Government Policy and Governance	Governance	policy lack local knowledge/context - not suited to my type/size of farm
2	UK/Devolved Government Policy and Governance	Governance	IMA means any food produced needs to go to all 4 UK countries despite opposition
2	UK/Devolved Government Policy and Governance	Governance	weak government levy boards - not raising the bar
2	UK/Devolved Government Policy and Governance	Governance	UK agree core food and animal welfare standards in trade policy
2	UK/Devolved Government Policy and Governance	Governance	clear government food and farming strategy
2	Other	Governance	funding for investment, particularly infrastructure e.g. slurry management, fencing
1	Other	Governance	corporate disclosure frameworks
1	Other	Governance	communication
1	International Relations	Governance	geopolitical upheaval and conflict

1	International Relations	Governance	growing protectionism, emergence of rival trade blocs (i.e. EU, BRICS etc) and reduction in free trade
1	International Relations	Governance	commodity values - grain - and tariffs
1	International Relations	Governance	trade agreements with recognition to the value of agriculture
1	International Relations	Governance	Brexit = lack of market access, expensive to trade, vulnerable to markets
1	International Relations	Governance	post-Brexit regulatory divergence (passive)
1	International Relations	Governance	international conflicts - Brexit, Ukraine
1	International Relations	Governance	international carbon policy mechanism (C BAM)
1	International Relations	Governance	cost of imports
1	International Relations	Governance	global trade (can be fast)
2	International Relations	Governance	greater alignment with EU rather than US
2	International Relations	Governance	free-trade agreements with US undercutting prices and regulation
2	International Relations	Governance	risk of export competition (sheep)
2	International Relations	Governance	less imported sheep from NZ
2	International Relations	Governance	(lack of) core environmental standards
2	International Relations	Governance	collapse of trade rules due to Trump
1	Transport and Mobility	Production Systems and Land Use	increasing cost of food distribution if carbon costs are truly accounted for
1	Transport and Mobility	Production Systems and Land Use	lack of critical infrastructure e.g. abattoirs
1	Transport and Mobility	Production Systems and Land Use	lack of processing infrastructure e.g. abattoirs leading to potential loss of 'critical mass' for livestock sector
2	Transport and Mobility	Production Systems and Land Use	AFNs need for logistical solution to achieve net zero
2	Transport and Mobility	Production Systems and Land Use	access to local abattoirs - currently long distances, bad for animals and fuel costs
2	Transport and Mobility	Production Systems and Land Use	government small abattoir grants
1	Technology	Production Systems and Land Use	precision farming
1	Technology	Production Systems and Land Use	availability and use of data
1	Technology	Production Systems and Land Use	precision breeding
1	Technology	Production Systems and Land Use	ethical constraints and consumer resistance to use of some technologies
1	Technology	Production Systems and Land Use	innovation investment across all areas of livestock (e.g. eid-management) to deliver efficiency gains
1	Technology	Production Systems and Land Use	smart data - automation, oestrus, temperature
2	Technology	Production Systems and Land Use	social media can be used to weaponise production system
2	Technology	Production Systems and Land Use	social media can create opportunities for transparency

2	Technology	Production Systems and Land Use	plant and animal breeding research to improve N and P acquisition and reduce emissions
2	Technology	Production Systems and Land Use	a lot of farmers (especially younger ones) very engaged
2	Technology	Production Systems and Land Use	need to recognise the value of particular technologies
2	Technology	Production Systems and Land Use	nature-based solutions versus tech
2	Technology	Production Systems and Land Use	technology as a band aid - risk of assumption re carbon and biodiversity
2	Technology	Production Systems and Land Use	not all farmers have connectivity - lack of time and digital skills
2	Technology	Production Systems and Land Use	admin burden, red tape
2	Technology	Production Systems and Land Use	government decision on new tech e.g. precision breeding, new protein production
2	Technology	Production Systems and Land Use	government to put money into meat alternatives e.g. fermentation, cell-based
1	Response to Global Shocks	Production Systems and Land Use	weakness of UN systems to control and mitigate effects of global shocks
1	Response to Global Shocks	Production Systems and Land Use	potential permanent loss of farmland globally due to either climate change or nuclear fallout
1	Response to Global Shocks	Production Systems and Land Use	impact of conflicts on global supply chains (e.g. Ukraine)
1	Response to Global Shocks	Production Systems and Land Use	reliance on food imports is a risk for domestic food production (animal + food in general)
1	Response to Global Shocks	Production Systems and Land Use	domestic supply chain infrastructure
1	Response to Global Shocks	Production Systems and Land Use	UK government Defence of the Realm Act powers
1	Response to Global Shocks	Production Systems and Land Use	shocks, natural disasters, war
2	Response to Global Shocks	Production Systems and Land Use	climate shocks and challenging weather patterns
2	Response to Global Shocks	Production Systems and Land Use	avian flu
2	Response to Global Shocks	Production Systems and Land Use	supporting AFNs improves resilience
2	Response to Global Shocks	Production Systems and Land Use	commodity price fluctuation e.g. fertiliser
2	Response to Global Shocks	Production Systems and Land Use	price spikes due to geopolitical events e.g. effect of war in Ukraine on food and fertiliser prices
2	Response to Global Shocks	Production Systems and Land Use	protectionist trade measures and increased focus on food security
2	Response to Global Shocks	Production Systems and Land Use	global markets e.g. fertiliser
2	Other	Production Systems and Land Use	insurance against risks in supply chain - financial institutions not willing to insure if not taking steps to mitigate risks
2	Other	Production Systems and Land Use	holistic sustainability indicators and monitoring

2	Other	Production Systems and Land Use	support for smaller farms who can't employ specialists
2	Other	Production Systems and Land Use	staffing
2	Other	Production Systems and Land Use	high input costs
1	Other	Production Systems and Land Use	carbon markets and natural capital
1	Other	Production Systems and Land Use	complexity - unpredictability of complex systems
1	Other	Production Systems and Land Use	Climate Change Committee advice e.g. reducing livestock numbers and impact on policy
1	Other	Production Systems and Land Use	genetic suitability of livestock to resilient and profitable livestock farm systems
1	Other	Production Systems and Land Use	recognition and reward of the holistic role of livestock grazing could change the direction of travel
1	Other	Production Systems and Land Use	land use profitability - alternative uses
1	Other	Production Systems and Land Use	diversification of businesses e.g. integration of livestock in arable businesses
1	Other	Production Systems and Land Use	input costs - feed
1	Other	Production Systems and Land Use	growth of industrial agriculture and megafarms intensifying production
1	Other	Production Systems and Land Use	removal of industrial energy from food production
1	Other	Production Systems and Land Use	climate change; land use limitation; industrial energy rebalance UK
1	Other	Production Systems and Land Use	infrastructure supply chain
1	Other	Production Systems and Land Use	fear of bad outcome
1	Natural Resources	Production Systems and Land Use	climate change but specifically water availability
1	Natural Resources	Production Systems and Land Use	slower availability of technology in rural versus urban areas i.e. broadband
1	Natural Resources	Production Systems and Land Use	permanent land use change (e.g. forestry)
1	Natural Resources	Production Systems and Land Use	land use change e.g. forestry from farmland
1	Natural Resources	Production Systems and Land Use	climate (unpredictable and intense)
1	Natural Resources	Production Systems and Land Use	water availability
1	Natural Resources	Production Systems and Land Use	corporate control
1	Natural Resources	Production Systems and Land Use	climate change - scenarios for 2 degrees, 3 degrees and 4 degrees
1	Natural Resources	Production Systems and Land Use	climate
1	Natural Resources	Production Systems and Land Use	biology soil microbiome
1	Natural Resources	Production Systems and Land Use	value of natural capital
1	Natural Resources	Production Systems and Land Use	access to land/land use change availability
2	Natural Resources	Production Systems and Land Use	protection/deterioration of waterways e.g. River Wye

2	Natural Resources	Production Systems and Land Use	enforcement of planning controls and less intensive operations
2	Natural Resources	Production Systems and Land Use	EU/UK legislation on deforestation - traceability using geotag location
2	Natural Resources	Production Systems and Land Use	less land suitable for arable
2	Natural Resources	Production Systems and Land Use	some farmers feel forced to engage with natural resources via contracts, others pro-actively engaging
2	Natural Resources	Production Systems and Land Use	land-sharing versus land-sparing
2	Natural Resources	Production Systems and Land Use	land-sparing would lead to dead zones around areas of very intensive production
2	Natural Resources	Production Systems and Land Use	biodiversity loss - net zero without nature
2	Natural Resources	Production Systems and Land Use	75% of less favoured area in Scotland - less productive land
2	Natural Resources	Production Systems and Land Use	climate change and increased extreme weather events impacting land that lacks resilience
2	Natural Resources	Production Systems and Land Use	weather - water, droughts
1	Energy	Production Systems and Land Use	potential of increase in growth of biofuels
1	Energy	Production Systems and Land Use	lack of alternatives to fossil fuels for bigger power users e.g. HGV, shipping
1	Energy	Production Systems and Land Use	cost of inputs (fertiliser/fuel)
1	Energy	Production Systems and Land Use	climate changes concerns - via policy and grants
1	Energy	Production Systems and Land Use	anaerobic digestion - energy crops
1	Energy	Production Systems and Land Use	corporates operating outwith the red tape
1	Energy	Production Systems and Land Use	reclassification of livestock and meat products in relation to energy use
2	Energy	Production Systems and Land Use	land use for energy crops often not spoken about
2	Energy	Production Systems and Land Use	better data on methane oxidisation
2	Energy	Production Systems and Land Use	cost of renewables/conversion to clean power - more funding, who to trust?
2	Energy	Production Systems and Land Use	develop systems that reduce reliance on energy
1	Economic Development	Production Systems and Land Use	low returns on capital invested in production and processes
1	Economic Development	Production Systems and Land Use	critical mass of livestock sector, especially in Scotland
1	Economic Development	Production Systems and Land Use	farmer profitability
1	Economic Development	Production Systems and Land Use	producer profitability
1	Economic Development	Production Systems and Land Use	number of people working in agriculture in Scotland
1	Economic Development	Production Systems and Land Use	abattoirs
1	Economic Development	Production Systems and Land Use	inflation raising prices
1	Economic Development	Production Systems and Land Use	profitability

1	Economic Development	Production Systems and Land Use	market signals
2	Economic Development	Production Systems and Land Use	inheritance tax hinders diversification and succession
2	Economic Development	Production Systems and Land Use	inheritance tax creates opportunities for reviewing and updating businesses
2	Economic Development	Production Systems and Land Use	farmers need a reality check - their farm is a business
2	Economic Development	Production Systems and Land Use	shift in mindset
2	Economic Development	Production Systems and Land Use	financial risk preventing change - lack of support from government and private finance
2	Economic Development	Production Systems and Land Use	market changes and disadvantage - risks of being left behind
2	Economic Development	Production Systems and Land Use	making changes can be scary for farmers - low margins so cautious about risks
2	Economic Development	Production Systems and Land Use	support schemes for farmers to try changes with less risk
2	Economic Development	Production Systems and Land Use	definition of economic resilience
1	Animal Health	Production Systems and Land Use	burgeoning disease threats
1	Animal Health	Production Systems and Land Use	increased demand for higher welfare by consumers
1	Animal Health	Production Systems and Land Use	transition to higher welfare systems
1	Animal Health	Production Systems and Land Use	antimicrobial resistance
1	Animal Health	Production Systems and Land Use	changing climate and increasing risk of epidemics and our readiness e.g. BTV-3
1	Animal Health	Production Systems and Land Use	awareness of positive welfare - Five Domains rather than Five Freedoms
1	Animal Health	Production Systems and Land Use	animal health crisis
1	Animal Health	Production Systems and Land Use	cost of farm inputs - diesel concentrates
1	Animal Health	Production Systems and Land Use	requirement of positive welfare (farm insurance, policy)
1	Animal Health	Production Systems and Land Use	perpetual ill-health
1	Animal Health	Production Systems and Land Use	big pharma built on unhealthy animals
1	Animal Health	Production Systems and Land Use	disease
2	Animal Health	Production Systems and Land Use	financial challenges on farm lead to poor animal health outcomes
2	Animal Health	Production Systems and Land Use	reduced cost systems can lead to improved animal health
2	Animal Health	Production Systems and Land Use	new diseases resulting from climate change
2	Animal Health	Production Systems and Land Use	dehorning as a sociological issue - farmers like to fit into groups too, going against standard practice can be criticised

2	Animal Health	Production Systems and Land Use	keeping calf with mum cow can improve animal health but less market for it
2	Animal Health	Production Systems and Land Use	ingrained methods need to be question e.g. calf-cow contact improves health by reducing mastitis and respiratory disease
2	Animal Health	Production Systems and Land Use	overuse of antibiotics - better tech for quick diagnosis
2	Animal Health	Production Systems and Land Use	integrated pest management to reduce dependence on endo/ectoparasiticides which have impacts on soil organisms and pollinators
2	Animal Health	Production Systems and Land Use	tech can help animal health e.g. dairy
2	Animal Health	Production Systems and Land Use	climate change, new emerging diseases
2	Animal Health	Production Systems and Land Use	not currently a key stakeholder
2	Animal Health	Production Systems and Land Use	in livestock sector animal health and welfare can drive wider sustainability - should be central to conversation
2	Other	Production Systems and Land Use	increased attacks on livestock + reduction in biodiversity due to cat predation
1	Social Structure	Society and Diet	growing global urbanisation
1	Social Structure	Society and Diet	succession
1	Social Structure	Society and Diet	continued/increased polarisation or finding common ground
1	Social Structure	Society and Diet	poverty - forcing people to buy cheap (high environmental impact) food
1	Social Structure	Society and Diet	access to food
1	Social Structure	Society and Diet	subsistence farming not viable in marginal areas = unjust decline
1	Social Structure	Society and Diet	opportunities to enter farming
2	Social Structure	Society and Diet	good food choices are a privilege - inequality is linked to poor health
2	Social Structure	Society and Diet	an effective social security system and living wage
2	Social Structure	Society and Diet	impacts of food system change in line with National Food Strategy or Good Food Nation Act
2	Social Structure	Society and Diet	lack urban-rural connections
2	Social Structure	Society and Diet	lack of access to good diet for socio-economically deprived
2	Social Structure	Society and Diet	food chain inequality - retailers, farmers, society
1	Public Attitudes	Society and Diet	public becoming more interested in the provenance of their food
1	Public Attitudes	Society and Diet	growing awareness of climate change
1	Public Attitudes	Society and Diet	increasing influence of single-issue lobby groups over public policy
1	Public Attitudes	Society and Diet	changing attitudes to animals and uses of them

1	Public Attitudes	Society and Diet	culture war politics e.g. anti-Net Zero agenda
1	Public Attitudes	Society and Diet	consumers choosing chicken over red meat for health/climate
1	Public Attitudes	Society and Diet	influencers (social media)
1	Public Attitudes	Society and Diet	consumer preferences/pressures
1	Public Attitudes	Society and Diet	misinformation from corporates
1	Public Attitudes	Society and Diet	consumer demand
1	Public Attitudes	Society and Diet	societal value of farming
1	Public Attitudes	Society and Diet	perception that don't need farmers in 50 years
2	Public Attitudes	Society and Diet	politicisation of Bovaer
2	Public Attitudes	Society and Diet	ignorance of (largely imported) meat in frozen products
2	Public Attitudes	Society and Diet	different consumer pressures for sheep and cattle
2	Public Attitudes	Society and Diet	wilful ignorance from consumers
2	Public Attitudes	Society and Diet	animal activist protests show lack of knowledge about farm practices
2	Public Attitudes	Society and Diet	frustration around anti-meat movement - lack of understanding of the place of livestock in regenerative agriculture
2	Public Attitudes	Society and Diet	social licence - misinformation/lack of information
2	Other	Society and Diet	massive increase in pet ownership - driving increased demand for meat
1	Other	Society and Diet	alternative proteins changing options for people
1	Human Health	Society and Diet	emergence of individualised diets related to personal healthcare
1	Human Health	Society and Diet	increased focus on One Health
1	Human Health	Society and Diet	diabetes etc., grant policy
1	Human Health	Society and Diet	look at budgets/headspace to focus on prevention
1	Human Health	Society and Diet	food as medicine, medicine as food
1	Human Health	Society and Diet	climate change; deregulation (forced, no control); people power, return control to people
1	Human Health	Society and Diet	health advice
1	Human Health	Society and Diet	health/life expectancy
2	Human Health	Society and Diet	100% pasture-fed products better for human health
2	Human Health	Society and Diet	pasture-fed has lower emissions when nutrition content is part of LCA
2	Human Health	Society and Diet	research to demonstrate superior nutrient density and reward producers for it
2	Human Health	Society and Diet	biodiversity buffer zones to protect from zoonoses and prevent future pandemics

2	Human Health	Society and Diet	mental health - farmer anxiety, in a defensive position
2	Human Health	Society and Diet	bad diet leads to health issues and pressure on the NHS
1	Food	Society and Diet	increasing concentration of ownership of food system into fewer hands
1	Food	Society and Diet	supply chain disruption globally
1	Food	Society and Diet	growing population leading to growing demand
1	Food	Society and Diet	affordability of food
1	Food	Society and Diet	supermarket power/influence
1	Food	Society and Diet	supermarkets versus other retail types
1	Food	Society and Diet	measuring nutrient density of food accurately and as open source to the public
1	Food	Society and Diet	length of supply chains
1	Food	Society and Diet	organisational processing infrastructure (retaining value)
1	Food	Society and Diet	supply chain chokepoints - internationally more resilient and secure domestic production
1	Food	Society and Diet	relative cost - (meat?) alternatives
1	Food	Society and Diet	dietary change - cost, health, availability
1	Food	Society and Diet	awareness of detrimental effects of UPF
1	Food	Society and Diet	bad modelling
1	Food	Society and Diet	food labelling/traffic lights
1	Food	Society and Diet	food environment/planning retailer layout
1	Food	Society and Diet	food availability
1	Food	Society and Diet	consumer time management
1	Food	Society and Diet	supermarkets very powerful
1	Food	Society and Diet	disconnect between food and farming
2	Food	Society and Diet	low-income families cannot act on concerns about low-welfare meat
2	Food	Society and Diet	world food shortages
2	Food	Society and Diet	stability and transparency in Halal sheep markets - pro-pasture and concerned with welfare
2	Food	Society and Diet	on farm system change - whole supply chain and transparency
2	Food	Society and Diet	providing consumption choice for all household budgets
2	Food	Society and Diet	lack of contracts
2	Food	Society and Diet	managing balance between supply and demand for all
2	Food	Society and Diet	food waste is equivalent to 15 billion head of livestock a year

2	Food	Society and Diet	nutritional value and/or density
2	Food	Society and Diet	climate change 35-65% reduction target by 2025 - will consumers respond?
1	Education	Society and Diet	rising levels of further education but corresponding reduction in vocational education
1	Education	Society and Diet	increased (or decreased?) government funding for R&D within food systems
1	Education	Society and Diet	behaviour change (difficulty of)
1	Education	Society and Diet	education in agroecological application of livestock to landscapes
1	Education	Society and Diet	availability of suitably qualified persons (SQPs) (e.g. vets) to support and deliver
1	Education	Society and Diet	research
1	Education	Society and Diet	tertiary education
1	Education	Society and Diet	who teaches the people
1	Education	Society and Diet	global food commoditisation
2	Education	Society and Diet	funding for R&D often linked to commercialisation and so extractive
2	Education	Society and Diet	slow research cycles -farmers usually think7 to 10 years ahead
2	Education	Society and Diet	more education on food systems
2	Education	Society and Diet	reinstate food A Level
2	Education	Society and Diet	raise prestige of food work
2	Education	Society and Diet	more farmer discussion groups to instigate positive change
2	Education	Society and Diet	more food and farming education
2	Education	Society and Diet	misinformation is rampant
2	Education	Society and Diet	lack of effective Agricultural Knowledge and Innovation Systems to support change
2	Education	Society and Diet	lack of education on ecosystems services, soil health etc
2	Education	Society and Diet	lack of understanding of nature - put into curriculum earlier
2	Education	Society and Diet	capture indigenous knowledge - wealth of knowledge being lost
2	Education	Society and Diet	farm advisory support (used to have ADAS)
2	Education	Society and Diet	lack of farming/food system education in national curriculum
2	Education	Society and Diet	agricultural college curriculum
2	Education	Society and Diet	lack of farmer understanding of switch from productivity to public goods

2	Education	Society and Diet	farmer knowledge exchange
2	Education	Society and Diet	land stewardship
2	Education	Society and Diet	skill set change from livestock management to quite complex ecological knowledge
1	Demography	Society and Diet	reduction in domestic workforce for farming and food processing
1	Demography	Society and Diet	changes to predominant religions, changing meat consumption patterns
1	Demography	Society and Diet	religion and how it shapes food choices
1	Demography	Society and Diet	assume approximately static
1	Demography	Society and Diet	rural depopulation would detract from active workforce for food systems
1	Demography	Society and Diet	ageing population of farming/rural sectors
1	Demography	Society and Diet	labour - skills and education - livestock
1	Demography	Society and Diet	rural de-population - remote rural
1	Demography	Society and Diet	people, farmers, labour, new entrants
2	Demography	Society and Diet	Separation of people from land - opportunity for greenwash
2	Demography	Society and Diet	ageing farming population leads to problems with succession
2	Demography	Society and Diet	average age of farmers increasing
2	Demography	Society and Diet	lesson to learn from elsewhere
2	Demography	Society and Diet	loss of livestock skills - knowledge held by older generations not being passed on as too few coming into farming

Table 2 SSP1 Mapping

Driver Category	***Drivers***	***Importance (1 to 5), highest to lowest***	***Descriptive range of possible outcomes (1-5)***	***Possible outcome for your SSP***	***Outcome (based on outcome score and range, incorporating comments/notes)***	***Comments***
UK/Devolved Government Policy and Governance	Environmental legislation for livestock sector	5	Low regulation - High regulation	5	High regulation and environmental legislation for livestock sector	
UK/Devolved Government Policy and Governance	Post-Brexit Agricultural subsidies/Payment Schemes	5	Payment schemes fail - Payment schemes effectively reward sustainable farming	5	Payment schemes effectively reward sustainable farming	
UK/Devolved Government Policy and Governance	Public Spending on Agriculture and Rural Development	5	Reduced public investment - Increased targeted investment in rural economies and innovation	5	Increased targeted investment in rural economies and innovation	

UK/Devolved Government Policy and Governance	(In)consistency in Government Policy	5	Policy inconsistency created confusion and challenges for farmers - A consistent approach provides stability and a clear direction	5	A consistent approach to government policy provides stability and a clear direction
UK/Devolved Government Policy and Governance	Regulation of Agrochemicals	5	Low regulation - High regulation	5	High regulation of agrochemicals
UK/Devolved Government Policy and Governance	Devolution in Agricultural Policy	5	Distinct policies in devolved nations - Consistent UK-wide approach	5	Consistent UK-wide approach to policy and governance
Natural Resources	Biodiversity Loss	5	Declining species - Enhanced biodiversity	5	Enhanced biodiversity
Natural Resources	Water Resource Availability	5	Scarcity impacts agricultural production - Effective water management leads to sustainable farming	5	Effective water management leads to sustainable farming
Natural Resources	Land Availability	5	Limited land availability constrains production and expansion - Ample land resources support sustainable practices	5	Ample land resources support sustainable practices
Natural Resources	Soil Health	5	Declining soil quality impacts fodder yield for livestock - Improved soil health enhances fodder production for livestock	5	Improved soil health enhances fodder production for livestock
Natural Resources	Climate Resilience	5	Lack of strategies leads to vulnerabilities - Robust strategies enhance resilience to climate impacts	5	Robust strategies enhance resilience to climate impacts
Food	Changing Dietary Preferences	5	Increased meat consumption - Major shift towards meat alternatives and decline in meat consumption	4	Large shift towards meat alternatives and decline in meat consumption
Energy	Renewable Energy Adoption	5	Low adoption of renewable energy - High investment in renewable energy	5	High investment in renewable energy
Animal Health	Animal Welfare Regulations	5	Minimal welfare improvements - Strict enforcement leads to significant welfare enhancements	5	Strict enforcement leads to significant welfare enhancements
Economic Development	Rural Economics	4	Lack of investment in rural infrastructure - Targeted investment in rural areas	5	Targeted investment in rural areas
Animal Health	Zoonotic Disease Outbreaks	4	Frequent outbreaks disrupt livestock production - Rare outbreaks managed effectively with robust biosecurity	5	Rare outbreaks managed effectively with robust biosecurity
International Relations	Level Playing Field Across the Globe (e.g. fair competition and equal standards in global trade)	3	Uneven standards put UK farmers at a competitive disadvantage - Global alignment ensures fair competition and market access	5	Global alignment in trade standards ensures fair competition and market access

Economic Development	Critical Mass of Livestock Industries	3	A shock disrupts allied professions leading to industry collapse - Strong interdependence sustains the industry through challenges	5	Strong interdependence sustains the livestock industry through challenges	
Food	Affordability of Food	3	Unaffordable - Affordable	5	Affordable food	
Transport & Mobility	Transport Costs for Livestock Producers	3	Low transport costs - High costs impact business viability	3	Medium transport costs	
Transport & Mobility	Transport Infrastructure Investment	3	Poor infrastructure limits efficiency - Enhanced transport networks strengthen supply chains	3	Some progress in transport infrastructure improves supply chains	
International Relations	Trade Agreement/Barriers	2	Protectionism and trade barriers stifle exports and increase costs - Open trade agreements reduce barriers and enhance market access	5	Open trade agreements reduce barriers and enhance market access	
International Relations	Geopolitical Upheaval and Instability	2	Impact on food security due to global conflicts - Strong international alliances boosting trade	5	Strong international alliances boosting trade	
Food	Length of Supply Chains	2	Short supply chains - Long supply chains	1	Short supply chains	think scale is the wrong way round
Energy	Energy Costs	2	Rising energy costs increase production expenses - Stable energy costs reducing pressure on costs	5	Stable energy costs reducing pressure on costs	
Human Health	Diet-Related Diseases	2	Rising prevalence of diet-related disease due to high consumption of red and processed meat - Healthier diets improve public health outcomes	5	Healthier diets improve public health outcomes	
Response to Global Shocks	Climate Change Impacts	2	Severe disruption from frequent extreme weather and climatic changes - Mild impacts, limited extremes	5 (?)	Mild impacts, limited extremes	
Response to Global Shocks	Pandemic Preparedness	2	Inadequate response to global health crises - Robust systems in place for quick recovery	5	Robust systems in place for quick recovery	
Economic Development	Producer Profitability	1	Low profitability - High profitability	3	Mid profitability	
Economic Development	Poverty Levels	1	Low levels of poverty - High levels of poverty	1	Low levels of poverty	but we think scale is wrong way round
Food	Supermarket Power/Influence	1	High influence - Low influence	5	Low power/influence of supermarkets	
Food	Food Security	1	High levels of food insecurity among vulnerable populations - Improved food security through diversified supply chains	5	Improved food security through diversified supply chains	
Energy	Green Energy Subsidies	1	Low incentives for renewable investments - High subsidies encourage development of green energy	5	High subsidies encourage development of green energy	important during the transition

Human Health	Access to Healthcare	1	Disparities in healthcare access - Equal access to quality healthcare for all	5	Equal access to quality healthcare for all
Animal Health	Antimicrobial Resistance (AMR)	1	Rapid rise in AMR due to overuse of antibiotics in livestock farming - AMR controlled through alternative practices and strict regulation	5	AMR controlled through alternative practices and strict regulation
Response to Global Shocks	Price Volatility	1	High price volatility from market disruptions - Stable prices with minimal fluctuations	5	Stable prices with minimal fluctuations in response to shocks
International Relations	Global Supply Chain Resilience		Frequent disruptions - Resilient diversified supply chains	4 (localised supply chains)	Localised supply chains
International Relations	International Trade Standards		Divergence from international welfare and food standards - Alignment with international standards	5	Alignment with international standards
Economic Development	Intra-UK Trade/Internal Market Act		No barrier to trade between nations - Major obstacles due to differing policies		
Economic Development	Employment		Decline in agricultural jobs - Job growth and new opportunities		
Social Structure	Rural-Urban Income Inequality		Rising rural-urban income gap - Balanced economic development reducing inequalities		
Social Structure	Balance of Small/Large Farms		Smaller farms squeezed out by larger farms - Balanced system		
Social Structure	Concentration of Ownership in Food Production		Low concentration - High concentration		
Social Structure	Access to Services		Limited access to healthcare, education and social services in rural areas - Improved access to services for all communities		
Demography	Ageing Farming Population		Fewer young farmers, labour shortages - Increase in young farmers entering the sector		
Demography	Population Growth		Strain on resources and infrastructure - Balanced growth supports rural and urban areas		
Public Attitudes	Consumer Perception of Livestock Farming		Increased opposition to livestock farming leads to decreased consumption - Increased support for livestock farming drives demand for products		
Public Attitudes	Media Influence		Minimal impact of media on livestock consumption choices - Significant influence of media		

Public Attitudes	Messaging Targeting the Public	Minimal public messaging - Lots of campaigns influencing perspectives
Public Attitudes	Culture Around Futures	Culture war - Harmonised perspectives
Public Attitudes	Sustainability Attitudes	Limited concern for sustainable livestock farming - Strong demand for sustainable livestock practices
Public Attitudes	Willingness to Pay for Welfare	Unwillingness to pay extra for high animal welfare - Willingness to pay a premium for high animal welfare standards
Technology	Genetics/Gene Editing	Conservative genetic improvements through selective breeding - Breakthrough innovations in gene editing leading to disease-resistant, high-yield stock
Technology	Alternative Protein Technologies	Niche market with minimal impact - Rapid growth disrupting conventional livestock markets
Technology	Precision Livestock Farming	Slow adoption due to high costs/resistance to change - Widespread implementation
Education	Public R&D Funding	Insufficient funding hinders R&D innovation - Strong funding drives advancement in agri-food innovation
Education	Agri-Food Education and Training	Lack of training restricts innovation - Quality education promotes widespread innovation
Education	Climate Literacy	Limited understanding of climate interactions with agriculture - High levels of climate literacy drive sustainable practices

Table 3 SSP2 Mapping

Driver Category	*Drivers*	*Importance (1 to 5), highest to lowest*	*Descriptive range of possible outcomes (1-5)*	*Possible outcome for your SSP*	*Outcome (based on outcome score and range, incorporating comments/notes)*	*Comments*
UK/Devolved Government Policy and Governance	Environmental legislation for livestock sector	5	Low regulation - High regulation	1	Low regulation and environmental legislation for livestock sector	Difference between impact and importance
UK/Devolved Government Policy and Governance	Devolution in Agricultural Policy	5	Distinct policies in devolved nations - Consistent UK-wide approach	1	Divergent policies in devolved nations. Scottish devolved policy buffers in short-term.	Scottish devolved policy buffers in short-term
International Relations	Global Supply Chain Resilience	5	Frequent disruptions - Resilient diversified supply chains	2	Low global supply chain resilience - With increased international tensions and trade barriers, supply chains become less diversified and more reliant on domestic resources	
International Relations	International Trade Standards	5	Divergence from international welfare and food standards - Alignment with international standards	2	Divergence from international standards - The UK lifts environmental and food safety regulations to focus on domestic production and economic survival. This divergence from international welfare and food standards creates barriers to alignment, isolating the UK from global trade systems and leading to competitive disadvantages in international markets.	
International Relations	Trade Agreement/Barriers	5	Protectionism and trade barriers stifle exports and increase costs - Open trade agreements reduce barriers and enhance market access	1	Protectionism and trade barriers stifle exports and increase costs due to rising international tensions and a shift towards economic self-sufficiency. These protectionist policies, coupled with increased border controls and reduced	

					integration with international markets, exacerbate trade barriers, limiting export opportunities and driving up costs.	
International Relations	Level Playing Field Across the Globe (e.g. fair competition and equal standards in global trade)	5	Uneven standards put UK farmers at a competitive disadvantage - Global alignment ensures fair competition and market access	1	Uneven standards put UK farmers at a competitive disadvantage. Divergence in agricultural subsidies and trade policies across the four UK nations, combined with lowered environmental and food safety standards, undermines fair competition. UK farmers face uneven playing fields domestically and internationally, reducing competitiveness and exacerbating socio-economic disparities.	
Natural Resources	Biodiversity Loss	5	Declining species - Enhanced biodiversity	1	Declining species - In this theory it is rational to protect environment to ensure domestic food production is sustainable but the likeliness of this is low which is self-defeating	In this theory it is rational to protect environment to ensure domestic food production is sustainable but the likeliness of this is low which is self-defeating
Natural Resources	Water Resource Availability	5	Scarcity impacts agricultural production - Effective water management leads to sustainable farming	1	Scarcity impacts agricultural production	
Natural Resources	Land Availability	5	Limited land availability constrains production and expansion- Ample land resources support growth and sustainable practices	1	Limited land availability constrains production and expansion	
Natural Resources	Soil Health	5	Declining soil quality impacts fodder yield for livestock - Improved soil health enhances fodder production for livestock	1	Declining soil quality impacts fodder yield for livestock	

Natural Resources	Climate Resilience	5	Lack of strategies leads to vulnerabilities - Robust strategies enhance resilience to climate impacts	1	Lack of strategies leads to vulnerabilities	
Animal Health	Zoonotic Disease Outbreaks	5	Frequent outbreaks disrupt livestock production - Rare outbreaks managed effectively with robust biosecurity	1	Frequent zoonotic disease outbreaks disrupt livestock production with greater impact - less contained	with greater impact - less contained
Response to Global Shocks	Climate Change Impacts	5	Severe disruption from frequent extreme weather and climatic changes - Mild impacts, limited extremes	1	Severe disruption from frequent extreme weather and climatic changes	important
Response to Global Shocks	Price Volatility	5	High price volatility from market disruptions - Stable prices with minimal fluctuations	1	High price volatility from market disruptions	
Response to Global Shocks	Pandemic Preparedness	5	Inadequate response to global health crises - Robust systems in place for quick recovery	1	Inadequate response to global health crises	
UK/Devolved Government Policy and Governance	(In)consistency in Government Policy	4	Policy inconsistency created confusion and challenges for farmers- A consistent approach provides stability and a clear direction	1	Policy inconsistency created confusion and challenges for farmers	
Technology	Alternative Protein Technologies	3	Niche market with minimal impact - Rapid growth disrupting conventional livestock markets			
Human Health	Access to Healthcare	2	Disparities in healthcare access - Equal access to quality healthcare for all			
Animal Health	Antimicrobial Resistance (AMR)	2	Rapid rise in AMR due to overuse of antibiotics in livestock farming - AMR controlled through alternative practices and strict regulation	1	Rapid rise in AMR due to overuse of antibiotics in livestock farming	
Animal Health	Animal Welfare Regulations	2	Minimal welfare improvements - Strict enforcement leads to significant welfare enhancements	1	Minimal animal welfare improvements	
UK/Devolved Government Policy and Governance	Post-Brexit Agricultural subsidies/Payment Schemes	1	Payment schemes fail - Payment schemes effectively reward sustainable farming			
UK/Devolved Government Policy and Governance	Public Spending on Agriculture and Rural Development	1	Reduced public investment - Increased targeted investment in rural economies and innovation	1	Reduced public investment	
UK/Devolved Government Policy and Governance	Regulation of Agrochemicals	1	Low regulation - High regulation	1	Low regulation of agrochemicals	
Public Attitudes	Media Influence	1	Minimal impact of media on livestock consumption choices - Significant influence of media			

Education	Public R&D Funding	1	Insufficient funding hinders R&D innovation - Strong funding drives advancement in agri-food innovation	1	Insufficient funding hinders R&D innovation
Education	Agri-Food Education and Training	1	Lack of training restricts innovation - Quality education promotes widespread innovation	1	Lack of training restricts innovation
Education	Climate Literacy	1	Limited understanding of climate interactions with agriculture - High levels of climate literacy drive sustainable practices	1	Limited understanding of climate interactions with agriculture
Human Health	Diet-Related Diseases	1	Rising prevalence of diet-related disease due to high consumption of red and processed meat - Healthier diets improve public health outcomes	1	Rising prevalence of diet-related disease due to high consumption of red and processed meat
International Relations	Geopolitical Upheaval and Instability		Impact on food security due to global conflicts - Strong international alliances boosting trade		
Economic Development	Rural Economics		Lack of investment in rural infrastructure - Targeted investment in rural areas		
Economic Development	Producer Profitability		Low profitability - High profitability		
Economic Development	Critical Mass of Livestock Industries		A shock disrupts allied professions leading to industry collapse - Strong interdependence sustains the industry through challenges		
Economic Development	Poverty Levels		Low levels of poverty - High levels of poverty		
Economic Development	Intra-UK Trade/Internal Market Act		No barrier to trade between nations - Major obstacles due to differing policies		
Economic Development	Employment		Decline in agricultural jobs - Job growth and new opportunities		
Social Structure	Rural-Urban Income Inequality		Rising rural-urban income gap - Balanced economic development reducing inequalities		
Social Structure	Balance of Small/Large Farms		Smaller farms squeezed out by larger farms - Balanced system		
Social Structure	Concentration of Ownership in Food Production		Low concentration - High concentration		
Social Structure	Access to Services		Limited access to healthcare, education and social services in rural areas - Improved access to services for all communities		
Demography	Ageing Farming Population		Fewer young farmers, labour shortages - Increase in young farmers entering the sector		
Demography	Population Growth		Strain on resources and infrastructure - Balanced growth supports rural and urban areas		

Public Attitudes	Consumer Perception of Livestock Farming	Increased opposition to livestock farming leads to decreased consumption - Increased support for livestock farming drives demand for products	
Public Attitudes	Messaging Targeting the Public	Minimal public messaging - Lots of campaigns influencing perspectives	
Public Attitudes	Culture Around Futures	Culture war - Harmonised perspectives	
Public Attitudes	Sustainability Attitudes	Limited concern for sustainable livestock farming - Strong demand for sustainable livestock practices	
Public Attitudes	Willingness to Pay for Welfare	Unwillingness to pay extra for high animal welfare - Willingness to pay a premium for high animal welfare standards	
Technology	Genetics/Gene Editing	Conservative genetic improvements through selective breeding - Breakthrough innovations in gene editing leading to disease-resistant, high-yield stock	
Technology	Precision Livestock Farming	Slow adoption due to high costs/resistance to change - Widespread implementation	
Food	Changing Dietary Preferences	Increased meat consumption - Major shift towards meat alternatives and decline in meat consumption	Diets at the mercy of free markets
Food	Affordability of Food	Unaffordable - Affordable	
Food	Length of Supply Chains	Short supply chains - Long supply chains	
Food	Supermarket Power/Influence	High influence - Low influence	
Food	Food Security	High levels of food insecurity among vulnerable populations - Improved food security through diversified supply chains	
Energy	Energy Costs	Rising energy costs increase production expenses - Stable energy costs reducing pressure on costs	
Energy	Green Energy Subsidies	Low incentives for renewable investments - High subsidies encourage development of green energy	
Energy	Renewable Energy Adoption	Low adoption of renewable energy - High investment in renewable energy	

Transport & Mobility	Transport Costs for Livestock Producers	Low transport costs - High costs impact business viability
Transport & Mobility	Transport Infrastructure Investment	Poor infrastructure limits efficiency - Enhanced transport networks strengthen supply chains

Table 4 SSP3 Mapping

Driver Category	*Drivers*	*Importance (1 to 5), highest to lowest*	*Descriptive range of possible outcomes (1-5)*	*Possible outcome for your SSP*	*Outcome (based on outcome score and range, incorporating comments/notes)*	*Comments*
UK/Devolved Government Policy and Governance	Environmental legislation for livestock sector	5	Low regulation - High regulation	1	Low regulation and environmental legislation for livestock sector	Difference between impact and importance
UK/Devolved Government Policy and Governance	Devolution in Agricultural Policy	5	Distinct policies in devolved nations - Consistent UK-wide approach	1	Divergent policies in devolved nations. Scottish devolved policy buffers in short-term.	Scottish devolved policy buffers in short-term
International Relations	Global Supply Chain Resilience	5	Frequent disruptions - Resilient diversified supply chains	2	Low global supply chain resilience - With increased international tensions and trade barriers, supply chains become less diversified and more reliant on domestic resources	
International Relations	International Trade Standards	5	Divergence from international welfare and food standards - Alignment with international standards	2	Divergence from international standards - The UK lifts environmental and food safety regulations to focus on domestic production and economic survival. This divergence from international welfare and food standards creates barriers to alignment, isolating the UK from global trade systems and leading to competitive disadvantages in international markets.	
International Relations	Trade Agreement/Barriers	5	Protectionism and trade barriers stifle exports and increase costs - Open trade agreements reduce barriers and enhance market access	1	Protectionism and trade barriers stifle exports and increase costs due to rising international tensions and a shift towards economic self-sufficiency. These protectionist policies, coupled with increased border controls and reduced	

					integration with international markets, exacerbate trade barriers, limiting export opportunities and driving up costs.	
International Relations	Level Playing Field Across the Globe (e.g. fair competition and equal standards in global trade)	5	Uneven standards put UK farmers at a competitive disadvantage - Global alignment ensures fair competition and market access	1	Uneven standards put UK farmers at a competitive disadvantage. Divergence in agricultural subsidies and trade policies across the four UK nations, combined with lowered environmental and food safety standards, undermines fair competition. UK farmers face uneven playing fields domestically and internationally, reducing competitiveness and exacerbating socio-economic disparities.	
Natural Resources	Biodiversity Loss	5	Declining species - Enhanced biodiversity	1	Declining species - In this theory it is rational to protect environment to ensure domestic food production is sustainable but the likeliness of this is low which is self-defeating	In this theory it is rational to protect environment to ensure domestic food production is sustainable but the likeliness of this is low which is self-defeating
Natural Resources	Water Resource Availability	5	Scarcity impacts agricultural production - Effective water management leads to sustainable farming	1	Scarcity impacts agricultural production	
Natural Resources	Land Availability	5	Limited land availability constrains production and expansion- Ample land resources support growth and sustainable practices	1	Limited land availability constrains production and expansion	
Natural Resources	Soil Health	5	Declining soil quality impacts fodder yield for livestock - Improved soil health enhances fodder production for livestock	1	Declining soil quality impacts fodder yield for livestock	

Natural Resources	Climate Resilience	5	Lack of strategies leads to vulnerabilities - Robust strategies enhance resilience to climate impacts	1	Lack of strategies leads to vulnerabilities	
Animal Health	Zoonotic Disease Outbreaks	5	Frequent outbreaks disrupt livestock production - Rare outbreaks managed effectively with robust biosecurity	1	Frequent zoonotic disease outbreaks disrupt livestock production with greater impact - less contained	with greater impact - less contained
Response to Global Shocks	Climate Change Impacts	5	Severe disruption from frequent extreme weather and climatic changes - Mild impacts, limited extremes	1	Severe disruption from frequent extreme weather and climatic changes	important
Response to Global Shocks	Price Volatility	5	High price volatility from market disruptions - Stable prices with minimal fluctuations	1	High price volatility from market disruptions	
Response to Global Shocks	Pandemic Preparedness	5	Inadequate response to global health crises - Robust systems in place for quick recovery	1	Inadequate response to global health crises	
UK/Devolved Government Policy and Governance	(In)consistency in Government Policy	4	Policy inconsistency created confusion and challenges for farmers- A consistent approach provides stability and a clear direction	1	Policy inconsistency created confusion and challenges for farmers	
Technology	Alternative Protein Technologies	3	Niche market with minimal impact - Rapid growth disrupting conventional livestock markets			
Human Health	Access to Healthcare	2	Disparities in healthcare access - Equal access to quality healthcare for all			
Animal Health	Antimicrobial Resistance (AMR)	2	Rapid rise in AMR due to overuse of antibiotics in livestock farming - AMR controlled through alternative practices and strict regulation	1	Rapid rise in AMR due to overuse of antibiotics in livestock farming	
Animal Health	Animal Welfare Regulations	2	Minimal welfare improvements - Strict enforcement leads to significant welfare enhancements	1	Minimal animal welfare improvements	
UK/Devolved Government Policy and Governance	Post-Brexit Agricultural subsidies/Payment Schemes	1	Payment schemes fail - Payment schemes effectively reward sustainable farming			
UK/Devolved Government Policy and Governance	Public Spending on Agriculture and Rural Development	1	Reduced public investment - Increased targeted investment in rural economies and innovation	1	Reduced public investment	
UK/Devolved Government Policy and Governance	Regulation of Agrochemicals	1	Low regulation - High regulation	1	Low regulation of agrochemicals	
Public Attitudes	Media Influence	1	Minimal impact of media on livestock consumption choices - Significant influence of media			

Education	Public R&D Funding	1	Insufficient funding hinders R&D innovation - Strong funding drives advancement in agri-food innovation	1	Insufficient funding hinders R&D innovation
Education	Agri-Food Education and Training	1	Lack of training restricts innovation - Quality education promotes widespread innovation	1	Lack of training restricts innovation
Education	Climate Literacy	1	Limited understanding of climate interactions with agriculture - High levels of climate literacy drive sustainable practices	1	Limited understanding of climate interactions with agriculture
Human Health	Diet-Related Diseases	1	Rising prevalence of diet-related disease due to high consumption of red and processed meat - Healthier diets improve public health outcomes	1	Rising prevalence of diet-related disease due to high consumption of red and processed meat
International Relations	Geopolitical Upheaval and Instability		Impact on food security due to global conflicts - Strong international alliances boosting trade		
Economic Development	Rural Economics		Lack of investment in rural infrastructure - Targeted investment in rural areas		
Economic Development	Producer Profitability		Low profitability - High profitability		
Economic Development	Critical Mass of Livestock Industries		A shock disrupts allied professions leading to industry collapse - Strong interdependence sustains the industry through challenges		
Economic Development	Poverty Levels		Low levels of poverty - High levels of poverty		
Economic Development	Intra-UK Trade/Internal Market Act		No barrier to trade between nations - Major obstacles due to differing policies		
Economic Development	Employment		Decline in agricultural jobs - Job growth and new opportunities		
Social Structure	Rural-Urban Income Inequality		Rising rural-urban income gap - Balanced economic development reducing inequalities		
Social Structure	Balance of Small/Large Farms		Smaller farms squeezed out by larger farms - Balanced system		
Social Structure	Concentration of Ownership in Food Production		Low concentration - High concentration		
Social Structure	Access to Services		Limited access to healthcare, education and social services in rural areas - Improved access to services for all communities		
Demography	Ageing Farming Population		Fewer young farmers, labour shortages - Increase in young farmers entering the sector		
Demography	Population Growth		Strain on resources and infrastructure - Balanced growth supports rural and urban areas		

Public Attitudes	Consumer Perception of Livestock Farming	Increased opposition to livestock farming leads to decreased consumption - Increased support for livestock farming drives demand for products	
Public Attitudes	Messaging Targeting the Public	Minimal public messaging - Lots of campaigns influencing perspectives	
Public Attitudes	Culture Around Futures	Culture war - Harmonised perspectives	
Public Attitudes	Sustainability Attitudes	Limited concern for sustainable livestock farming - Strong demand for sustainable livestock practices	
Public Attitudes	Willingness to Pay for Welfare	Unwillingness to pay extra for high animal welfare - Willingness to pay a premium for high animal welfare standards	
Technology	Genetics/Gene Editing	Conservative genetic improvements through selective breeding - Breakthrough innovations in gene editing leading to disease-resistant, high-yield stock	
Technology	Precision Livestock Farming	Slow adoption due to high costs/resistance to change - Widespread implementation	
Food	Changing Dietary Preferences	Increased meat consumption - Major shift towards meat alternatives and decline in meat consumption	Diets at the mercy of free markets
Food	Affordability of Food	Unaffordable - Affordable	
Food	Length of Supply Chains	Short supply chains - Long supply chains	
Food	Supermarket Power/Influence	High influence - Low influence	
Food	Food Security	High levels of food insecurity among vulnerable populations - Improved food security through diversified supply chains	
Energy	Energy Costs	Rising energy costs increase production expenses - Stable energy costs reducing pressure on costs	
Energy	Green Energy Subsidies	Low incentives for renewable investments - High subsidies encourage development of green energy	
Energy	Renewable Energy Adoption	Low adoption of renewable energy - High investment in renewable energy	

Transport & Mobility	Transport Costs for Livestock Producers	Low transport costs - High costs impact business viability
Transport & Mobility	Transport Infrastructure Investment	Poor infrastructure limits efficiency - Enhanced transport networks strengthen supply chains

Table 5 SSP4 Mapping

Driver Category	*Drivers*	*Importance (1 to 5), highest to lowest*	*Descriptive range of possible outcomes (1-5)*	*Possible outcome for your SSP*	*Outcome (based on outcome score and range, incorporating comments/notes)*	*Comments*
UK/Devolved Government Policy and Governance	Environmental legislation for livestock sector	5	Low regulation - High regulation	1	Low regulation for technology and land use	low regulation for tech and land use
UK/Devolved Government Policy and Governance	Post-Brexit Agricultural subsidies/Payment Schemes	5	Payment schemes fail - Payment schemes effectively reward sustainable farming	1	Removal of subsidies	removal of subsidies
UK/Devolved Government Policy and Governance	Public Spending on Agriculture and Rural Development	5	Reduced public investment - Increased targeted investment in rural economies and innovation	5	Increased targeted investment in rural economies and innovation	targeted investment
UK/Devolved Government Policy and Governance	(In)consistency in Government Policy	5	Policy inconsistency created confusion and challenges for farmers- A consistent approach provides stability and a clear direction	1	Policy inconsistency creates confusion and challenges for farmer	
UK/Devolved Government Policy and Governance	Devolution in Agricultural Policy	5	Distinct policies in devolved nations - Consistent UK-wide approach	1	Distinct policies in devolved nations	
Economic Development	Rural Economics	5	Lack of investment in rural infrastructure - Targeted investment in rural areas	4	Some targeted investment in rural areas e.g. in infrastructure and farm extension services	e.g. in infrastructure and farm extension services
Economic Development	Producer Profitability	5	Low profitability - High profitability	5	High profitability	
Economic Development	Critical Mass of Livestock Industries	5	A shock disrupts allied professions leading to industry collapse - Strong interdependence sustains the industry through challenges	4	Sector is not fully cohesive. Some actors are powerful and resilient. There is also a divergence of livestock types - more intensive systems prosper.	not cohesive but some actors resilient and powerful
Economic Development	Poverty Levels	5	Low levels of poverty - High levels of poverty	5	Increasing inequities	increasing inequities
Economic Development	Intra-UK Trade/Internal Market Act	5	No barrier to trade between nations - Major obstacles due to differing policies	2	No new barriers to Intra-UK Trade/Internal Market Act	no new barriers
Economic Development	Employment	5	Decline in agricultural jobs - Job growth and new opportunities	1	Decline in agricultural jobs due to efficiency improvements & automation	efficiency improvements & automation

Social Structure	Concentration of Ownership in Food Production	5	Low concentration - High concentration	5	Increased concentration of ownership leads to reduced competition, lower prices for producers, and potentially lower food quality.	
Technology	Genetics/Gene Editing	5	Conservative genetic improvements through selective breeding - Breakthrough innovations in gene editing leading to disease-resistant, high-yield stock	5	Decreased regulation allows for new innovations to emerge in gene editing leading to disease-resistant, high-yield stock	decreased regulation allows for innovation to emerge
Technology	Alternative Protein Technologies	5	Niche market with minimal impact - Rapid growth disrupting conventional livestock markets	2	Low demand for alternative protein technologies limits sector	low demand limits sector
Technology	Precision Livestock Farming	5	Slow adoption due to high costs/resistance to change - Widespread implementation	5	Widespread implementation of Precision Livestock Farming	deteriorating outcomes across all environmental indicators
Energy	Energy Costs	5	Rising energy costs increase production expenses - Stable energy costs reducing pressure on costs	4	Reasonably stable energy costs, maybe even cheaper costs but unequally distributed	maybe even cheaper costs but unequal distributed
Energy	Renewable Energy Adoption	5	Low adoption of renewable energy - High investment in renewable energy	5	lots of investment in renewable energy; decentralised network	lots of investment; decentralised network
Social Structure	Rural-Urban Income Inequality	4	Rising rural-urban income gap - Balanced economic development reducing inequalities	1	Rising rural-urban income gap	
Social Structure	Balance of Small/Large Farms	4	Smaller farms squeezed out by larger farms - Balanced system	1	Smaller farms squeezed out by larger farms	
Social Structure	Access to Services	4	Limited access to healthcare, education and social services in rural areas - Improved access to services for all communities	1	increased inequities in access to healthcare, education and social services in rural areas	increased inequities in access
Public Attitudes	Consumer Perception of Livestock Farming	4	Increased opposition to livestock farming leads to decreased consumption - Increased support for livestock farming drives demand for products	4	Reasonably strong support for livestock farming drives demand for products	
Public Attitudes	Media Influence	4	Minimal impact of media on livestock consumption choices - Significant influence of media	2	Some influence of media on livestock consumption choices	some influence

Public Attitudes	Messaging Targeting the Public	4	Minimal public messaging - Lots of campaigns influencing perspectives	1	Minimal public messaging	minimal public messaging
Public Attitudes	Culture Around Futures	4	Culture war - Harmonised perspectives	2	conflict and polarisation in attitudes / perspectives on future	conflict and polarisation
UK/Devolved Government Policy and Governance	Regulation of Agrochemicals	3	Low regulation - High regulation	1	Low regulation of agrichemical and less monitoring of pollution	less monitoring of pollution
International Relations	International Trade Standards	3	Divergence from international welfare and food standards - Alignment with international standards	1	The focus on economic growth and the weakening of environmental regulations may lead to divergence from international standards for animal welfare/ food safety.	
Food	Changing Dietary Preferences	3	Increased meat consumption - Major shift towards meat alternatives and decline in meat consumption	3	No change in meat consumption	no change
Food	Affordability of Food	3	Unaffordable - Affordable	1	Food more expensive	food more expensive
Food	Supermarket Power/Influence	3	High influence - Low influence	1	High Supermarket Power/Influence	
Food	Food Security	3	High levels of food insecurity among vulnerable populations - Improved food security through diversified supply chains	1	High levels of food insecurity among vulnerable populations	food insecurity increases
Education	Public R&D Funding	3	Insufficient funding hinders R&D innovation - Strong funding drives advancement in agri-food innovation	5	Strong funding drives advancement in agri-food innovation	
Natural Resources	Biodiversity Loss	2	Declining species - Enhanced biodiversity	1	Declining species and Biodiversity loss	
Natural Resources	Water Resource Availability	2	Scarcity impacts agricultural production - Effective water management leads to sustainable farming	1	Scarcity of Water Resource Availability impacts agricultural production	
Natural Resources	Land Availability	2	Limited land availability constrains production and expansion- Ample land resources support growth and sustainable practices		Some limits on land availability constrains production and expansion due to high land use for energy	used for energy?
Natural Resources	Soil Health	2	Declining soil quality impacts fodder yield for livestock - Improved soil health enhances fodder production for livestock	1	Declining soil quality impacts fodder yield for livestock	

Natural Resources	Climate Resilience	2	Lack of strategies leads to vulnerabilities - Robust strategies enhance resilience to climate impacts	1	Some are left exposed to climate effects, others are resilient through high tech solutions	increased inequity - 5 for of population 1 for others
Response to Global Shocks	Price Volatility	2	High price volatility from market disruptions - Stable prices with minimal fluctuations	1	High price volatility from market disruptions	bad outcomes include increased price volatility

Table 6 SSP5 Mapping

Driver Category	***Drivers***	***Importance (1 to 5), highest to lowest***	***Descriptive range of possible outcomes (1-5)***	***Possible outcome for your SSP***	***Outcome (based on outcome score and range, incorporating comments/notes)***	***Comments***
Economic Development	Rural Economics	5	Lack of investment in rural infrastructure - Targeted investment in rural areas	5	Targeted investment in rural areas in intensified agriculture	investment in intensified ag
Social Structure	Balance of Small/Large Farms	5	Smaller farms squeezed out by larger farms - Balanced system	1	Smaller farms squeezed out by larger farms	larger farms
Social Structure	Concentration of Ownership in Food Production	5	Low concentration - High concentration	5	High concentration of ownership in food production that is large and intensive	high - large and intensive
Technology	Genetics/Gene Editing	5	Conservative genetic improvements through selective breeding - Breakthrough innovations in gene editing leading to disease-resistant, high-yield stock	5	Breakthrough innovations in gene editing leading to disease-resistant, high-yield stock	intensive farming = gene editing
Technology	Precision Livestock Farming	5	Slow adoption due to high costs/resistance to change - Widespread implementation	5	Widespread implementation of precision livestock farming	
Natural Resources	Climate Resilience	5	Lack of strategies leads to vulnerabilities - Robust strategies enhance resilience to climate impacts	1	Very poor climate resilience and lack of strategies leads to vulnerabilities	very poor
Energy	Energy Costs	5	Rising energy costs increase production expenses - Stable energy costs reducing pressure on costs	5	Cheap and stable domestic energy costs reduce cost pressure on farmers and increases profitability	cheap domestic energy = more profitability for livestock
Human Health	Diet-Related Diseases	5	Rising prevalence of diet-related disease due to high consumption of red and processed meat - Healthier diets improve public health outcomes	1	Rising prevalence of diet-related disease due to high consumption of red and processed meat	high red meat consumption

Animal Health	Antimicrobial Resistance (AMR)	5	Rapid rise in AMR due to overuse of antibiotics in livestock farming - AMR controlled through alternative practices and strict regulation	1	Rapid rise in AMR due to overuse of antibiotics in intensive livestock farming	higher medication under intensification
Transport & Mobility	Transport Costs for Livestock Producers	5	Low transport costs - High costs impact business viability	1	Low transport costs with high efficiency	low transport costs + high efficiency
Response to Global Shocks	Climate Change Impacts	5	Severe disruption from frequent extreme weather and climatic changes - Mild impacts, limited extremes	1	Very severe disruption from frequent extreme weather and climatic changes	very severe disruption in longer term
Other	Mental Health & wellbeing	5			Poor mental health under climate change and horrible intensive systems	poor mental health under climate change and horrible intensive systems
Education	Climate Literacy	4	Limited understanding of climate interactions with agriculture - High levels of climate literacy drive sustainable practices	1	Limited understanding of climate interactions with agriculture	low climate literacy = bad effects, very limited climate literacy
UK/Devolved Government Policy and Governance	Public Spending on Agriculture and Rural Development	3	Reduced public investment - Increased targeted investment in rural economies and innovation	3	Some public investment, particularly targeted investment in intensification innovations	support for intensification
International Relations	Global Supply Chain Resilience	3	Frequent disruptions - Resilient diversified supply chains	1	Frequent disruptions to global supply chains and low resilience due to climate change	low resilience due to climate change
International Relations	Geopolitical Upheaval and Instability	3	Impact on food security due to global conflicts - Strong international alliances boosting trade	3	Some geopolitical upheaval and instability due to conflict over climate change	conflict from climate change
Education	Public R&D Funding	2	Insufficient funding hinders R&D innovation - Strong funding drives advancement in agri-food innovation	3	Some R&D funding for intensive farming innovations	innovation for intensive farms
UK/Devolved Government Policy and Governance	Environmental legislation for livestock sector	1	Low regulation - High regulation	1	Low regulation and environmental legislation for livestock sector	low regulation
UK/Devolved Government Policy and Governance	Post-Brexit Agricultural subsidies/Payment Schemes	1	Payment schemes fail - Payment schemes effectively reward sustainable farming	1 or 3	Low environmental regulation with direct subsidies instead	low regulation/ direct subsidies

UK/Devolved Government Policy and Governance	(In)consistency in Government Policy	1		Policy inconsistency creates confusion and challenges for farmers- A consistent approach provides stability and a clear direction	1	Policy inconsistency creates confusion and challenges for farmers	
UK/Devolved Government Policy and Governance	Devolution in Agricultural Policy	1		Distinct policies in devolved nations - Consistent UK-wide approach	1	Distinct policies in devolved nations	
International Relations	International Trade Standards	1		Divergence from international welfare and food standards - Alignment with international standards	1	Divergence from international welfare and food standards	low commodity standard
International Relations	Trade Agreement/Barriers	1		Protectionism and trade barriers stifle exports and increase costs - Open trade agreements reduce barriers and enhance market access			
International Relations	Level Playing Field Across the Globe (e.g. fair competition and equal standards in global trade)	1		Uneven standards put UK farmers at a competitive disadvantage - Global alignment ensures fair competition and market access	1		
Food	Changing Dietary Preferences	1		Increased meat consumption - Major shift towards meat alternatives and decline in meat consumption		Increased meat consumption	increased meat
Energy	Renewable Energy Adoption	1		Low adoption of renewable energy - High investment in renewable energy		Low adoption of renewables for energy	low adoption of renewables
UK/Devolved Government Policy and Governance	Regulation of Agrochemicals			Low regulation - High regulation			
Economic Development	Producer Profitability			Low profitability - High profitability	5	High profitability due to cheap energy initially, but then low profitability eventually due to climate change	cheap energy = profitable but then low profitability in later years due to climate change
Economic Development	Critical Mass of Livestock Industries			A shock disrupts allied professions leading to industry collapse - Strong interdependence sustains the industry through challenges			
Economic Development	Poverty Levels			Low levels of poverty - High levels of poverty	1	Low levels of poverty	low levels = more meat consumed
Economic Development	Intra-UK Trade/Internal Market Act			No barrier to trade between nations - Major obstacles due to differing policies			

Economic Development	Employment	Decline in agricultural jobs - Job growth and new opportunities			
Social Structure	Rural-Urban Income Inequality	Rising rural-urban income gap - Balanced economic development reducing inequalities			
Social Structure	Access to Services	Limited access to healthcare, education and social services in rural areas - Improved access to services for all communities			
Demography	Ageing Farming Population	Fewer young farmers, labour shortages - Increase in young farmers entering the sector			
	Population Growth	Strain on resources and infrastructure - Balanced growth supports rural and urban areas			
Public Attitudes	Consumer Perception of Livestock Farming	Increased opposition to livestock farming leads to decreased consumption - Increased support for livestock farming drives demand for products			
Public Attitudes	Media Influence	Minimal impact of media on livestock consumption choices - Significant influence of media			
Public Attitudes	Messaging Targeting the Public	Minimal public messaging - Lots of campaigns influencing perspectives			
Public Attitudes	Culture Around Futures	Culture war - Harmonised perspectives			
Public Attitudes	Sustainability Attitudes	Limited concern for sustainable livestock farming - Strong demand for sustainable livestock practices			
Public Attitudes	Willingness to Pay for Welfare	Unwillingness to pay extra for high animal welfare - Willingness to pay a premium for high animal welfare standards			
Technology	Alternative Protein Technologies	Niche market with minimal impact - Rapid growth disrupting conventional livestock markets	1	Niche market for alternative protein technologies with minimal impact	cheap enough would stifle innovation
Natural Resources	Biodiversity Loss	Declining species - Enhanced biodiversity	1	Declining species across the UK	declining species across the UK
Natural Resources	Water Resource Availability	Scarcity impacts agricultural production - Effective water management leads to sustainable farming			
Natural Resources	Land Availability	Limited land availability constrains production and expansion- Ample land resources support growth and sustainable practices	1	Limited land availability constrains production and expansion	limited land

Natural Resources	Soil Health	Declining soil quality impacts fodder yield for livestock - Improved soil health enhances fodder production for livestock	1	Very poor, declining soil quality impacts fodder yield for livestock	very poor
Food	Affordability of Food	Unaffordable - Affordable			
Food	Length of Supply Chains	Short supply chains - Long supply chains			
Food	Supermarket Power/Influence	High influence - Low influence			
Food	Food Security	High levels of food insecurity among vulnerable populations - Improved food security through diversified supply chains			
Energy	Green Energy Subsidies	Low incentives for renewable investments - High subsidies encourage development of green energy			
Education	Agri-Food Education and Training	Lack of training restricts innovation - Quality education promotes widespread innovation			
Human Health	Access to Healthcare	Disparities in healthcare access - Equal access to quality healthcare for all			
Animal Health	Animal Welfare Regulations	Minimal welfare improvements - Strict enforcement leads to significant welfare enhancements			
Animal Health	Zoonotic Disease Outbreaks	Frequent outbreaks disrupt livestock production - Rare outbreaks managed effectively with robust biosecurity			
Transport & Mobility	Transport Infrastructure Investment	Poor infrastructure limits efficiency - Enhanced transport networks strengthen supply chains			
Response to Global Shocks	Price Volatility	High price volatility from market disruptions - Stable prices with minimal fluctuations			
Response to Global Shocks	Pandemic Preparedness	Inadequate response to global health crises - Robust systems in place for quick recovery			
Other	Intensification		5	High intensification	
Other	Imported fertilisers				increasing negative
Other	Innovation				low innovation (cheap energy)
Other	(Tech) new feed innovation				
Other	Chemical fertilisers & pesticides				

Table 7 Key outcomes and suggestions from Workshop 1 and 2

SSP	*Workshop 1 Key Outcomes*	*Workshop 2 Key Suggestions*
SSP1	"High regulation and environmental legislation", payments "reward[ing] sustainable farming", "decline in meat consumption", "welfare enhancements", "investment in rural economies and innovation", "renewable[s]", "improved soil", "biodiversity", "water management" and "resilience"	"Nothing transformative enough … it should do more", citing "35% less meat consumption" by 2050 and asking, "Who has the power in this scenario?" Called for links between "human-animal interaction" and farmer well-being; "pasture-fed [and] correct stocking density brings grassland structural diversity". "Change in funding will change the life of upland farmers"; "ultra-processed food – needs pressure from government to reduce."
SSP2	"Some policy inconsistency", payment schemes "only relatively successful at rewarding sustainable farming", "alternative proteins experience moderate growth, but with some resistance", "rural-urban income gap", and "public-private partnerships" investing in technology and renewables.	Highlighted "mental health among farmers" and clearer "distinction between 'traditional' and 'conventional' farming". Suggested additions "marketing … influence on children's food preferences", "inequality in access to healthier food options", and "large corporations … perpetuating profit-driven, unsustainable food systems".
SSP3	"Divergent policies in devolved nations", "international tensions", "trade barriers", "low regulation and environmental legislation", "self-sufficiency", "declining soil quality", "limited land availability constrains production and expansion", and "frequent zoonotic disease outbreaks".	Asked for more "geographical specificity" and sector differentiation. Noted the impact of reduced imports, and suggested "dry and store" methods, e.g. "turn milk into powder". Questioned, "Is making the UK more self-reliant … actually good?" Some saw "short term pain … long term gain … resilient farmers thrived"; others warned of "lack of discussion between countries" on zoonoses.
SSP4	"Increasing inequities", "increased concentration of ownership", "low regulation for technology and land use", "removal of subsidies", "high profitability", "more intensive systems", "decline in agricultural jobs due to … automation", and "investment in renewable energy".	Proposed "intensive and extensive systems [would] operate together", raising "where would the feed come from?" Rather than small farms being pushed out, suggested "operations will become bigger" and some "cooperation between family farms". Suggested precision care could help but "so much depends on stewardship … empathy with animals". Warned of "very poor low-quality meat", e.g. "mechanically recovered meat" in this future.
SSP5	"Cheap and stable domestic energy costs", investment in "intensified agriculture", "overuse of antibiotics", "breakthrough innovations", "high-yield stock", "diet-related disease due to high consumption of red and processed meat", and "poor mental health".	"Automation can be useful … doesn't necessarily improve animal welfare"; "having a farmer present… remains more valuable". "Precision farming and genetics" could "breed disease-resistant animals", but "high-tech, high-input farming" risks "environmental degradation". "Ultra-processed diets contribute to a health crisis"; fish would "sharply decline … due to depletion of fish stocks". Inequality was "underplayed", with "concentration of wealth and corporate power."