

Appendix - Draft on-farm Sustainability Assessment Framework

Notes to Framework

- Aim** - The objective of the SFT producer working group is to identify a small number of key indicators, which taken together will provide a reliable and accurate assessment of the degree of sustainability of a farming system.
- Farmer capacity to collect data** - In selecting the metrics, we have prioritised data which is practical for farmers to gather and/or is already being collected by multiple agencies, including government and certification schemes.
- Data collection methods** - Some of the measures will require field or lab testing, whereas others will be proxies, such as certain practices or measures which have been proved to have specific impacts. For example, this could include earthworm counts as a measure of soil health or planting hedgerows to increase biodiversity. Our attitude towards this is pragmatic - where possible, on-farm/in-field/lab based data collection is preferable, but where this proves unreliable or open to cheating we have reverted to proxies.
- Tiering system** - Mindful of the cost and time burden which would be imposed on farmers when collecting this data, we have divided the metrics into two categories, 'Tier 1', representing the data which we recommended for the baseline sustainability assessment, with 'Tier 2' available for a more in-depth evolution should that be required or of interest. The summary table to the right highlights the three Tier 1 indicators we have chosen for each category.
- Scoring and weighting** - We are also mindful that a sustainability assessment will require scoring and weighting, both between the 11 categories and within the categories themselves. For some farmers completing all 11 categories may also not be possible (for example an all arable farmer cannot complete the livestock section). For these cases, questions and weightings will be tailored accordingly. We envisage undertaking this work to be a second stage element of this process.
- Timeline** – Work on this is ongoing and we plan to continue to refine these categories and metrics with our producer working group and experts in the field to achieve this.

Summary of Metrics	
Category	Key metrics
Productivity	Physical output
	Financial output
	Balance sheet - true cost
Soil	Soil organic matter
	Structure and infiltration rate
	Biodiversity (earthworms)
Water	Source
	Sedimentation
	BOD/pollution load
Air	Emissions by source
	Sequestration
	Balance
Energy and resource use efficiency	Energy usage/mix
	Energy self-sufficiency
	Waste/recycled materials
Nutrient management	Inputs / outputs
	Management efficiencies
	Nutrient balance sheet
Livestock management	Management system
	Diversity, health and welfare
	Nutrition and input efficiency
Plant and crop health	Crops grown/rotation
	Pest and disease control
	Nutritional quality (Brix)
Biodiversity	Agricultural - seeds and breeds
	Natural - key indicator species
	Landscape features
Social capital	Education
	Community engagement
	Public access
Human capital	Employment
	Skills/knowledge of workers
	Health of workers

SOIL		
Tier	Indicator	Measurement Approach Guide
	Fertility	
1	Topsoil organic matter content/SOC	Soil test
1	Soil N/P/K analysis including mineralisable N and C/N ratio; pH	Soil test
2	Salinity (soil electrical conductivity)	Lab test
	Structure	
1	Water holding capacity	Standard test
1	Water infiltration rate	Infiltration/drainpipe test
2	Bulk density	Lab test
	Health/biodiversity	
1	Earthworm number	Mustard extraction/hand sorting
1	Soil microbial biomass & community structure (including bacteria an	Lab test
2	Soil respiration	Lab test
2	Microorganism analysis (methanogens/ methanotrophs)	Lab test
2	Nematode community structure	Lab test
2	Soil enzymes	Lab test
2	Heavy metals/contaminants	Lab test

WATER		
Tier	Indicator	Measurement Approach Guide
	Water management	
1	Water sourcing (mains, borehole, ground, surface)	%/litres/year
1	Water use efficiency (leakage, irrigation method, scale of use)	Farm data
1	Flood/catchment management measures	Flood defenses/farm data/evidence of participation in catchment plan
1	Presence and effectiveness of clean/waste water plan	Farm data/photo evidence of your plan (e.g. ADAS)
2	Improvement plans/capital investments	Evidence of plan
	Quality	
1	Nitrogen and phosphorus	Test kit
1	Pesticides/endocrine disrupting chemicals	Residue test/farm data
1	Other pollutants (including veterinary medicines and faecal pathoge	Lab test/farm data
1	Biological oxygen demand of key water outfalls	Lab tests
1	Other water course pollution	Water course testing
2	Sediment	Lab test

AIR		
Tier	Indicator	Measurement Approach Guidance
	Emissions / pollution	
1	Energy source/use/mix (coal, gas, hydro, wind, solar, other)	KW / % of each energy source per unit of output/land
1	Fertiliser related emissions	Farm data/standard calculation
1	Livestock related emissions (excluding manure)	Farm data (No. of animals, stocking density, housing)/standard calculation
1	FYM emissions, including application and storage	Application (ha), storage facilities
1	Net reduction of emissions through on-farm energy schemes (e.g. m	≥Total emissions avoided
1	Carbon sequestration 'balance sheet' e.g. soils, plant biomass, bioma	Farm data
2	Use of peat	Farm data
2	Burning of plant matter	Farm data
2	Waste/residue incineration	Farm data/method of disposal

BIODIVERSITY		
Tier	Indicator	Measurement Approach Guidance
	Agricultural biodiversity	
1	Agricultural biodiversity index - no./diversity of farmed animal and cr	Species/volume /area
1	Local/farm adapted breeds/species - plants and animals (e.g. area of	Species/volume/area
1	Rare/native breeds	Type/no. of animals
1	Crop rotations	Rotation type/duration
	Natural biodiversity	
1	Biodiversity co-existing within farming system (species within crops i	Quantrant analysis
1	Area under trees/woodland/plantations	% of land
1	Type of trees, number, species, age	Survey
1	Hedgerows length, width, species, age	Total area (Km2)
1	Conservation area of farm	% of total area
1	Biodiversity management program participation / agri-environment s	Evidence (list of schemes)
1	Land use/habitat change - deforestation/loss of soil/waterlogged are	Farm data/% of land area/type of change
1	Other environmental restoration activity/participation/on farm/off-f	Farm data/evidence
2	Timing of mowing or grazing	Farm data
2	Uncultivated/unmown land	% of total area
2	Non use of chemical fertilisers	Farm data
2	Use of non-chemical pest control	Farm data

DIRECT ENERGY USE/GENERATION & RESOURCE USE		
Tier	Indicator	Measurement Approach Guide
	Energy usage	
1	Electricity use	Kwh/area (total and by category)
1	Diesel, Petrol, Gas and Oil use	Usage per unit of output
	Energy mix	
1	Energy source/supplier	Green/brown energy usage by %
2	Breakdown of use by machines used (energy use efficiency)	(size/age/hours/maintenance practices)
2	Energy saving measures (e.g. thermal insulation of buildings, low irrig	Energy saved through insulation
2	Use of low energy irrigation methods	Farm Data
2	Energy saving potential audit	Evidence of audit/plan
	Energy self-sufficiency	
1	Energy generated on farm (including biocrops)	Method/kwh
2	Cogeneration use	Method/kwh
	Fuel/material recycling	
1	Category/volume of recycled materials (organic matter, plastic, meta	Weight
1	Use of recycled materials (from on and off farm)	Type/weight

PLANT AND CROP HEALTH		
Tier	Indicator	Measurement Approach Guide
	Crops grown/rotation	
1	Use of rotation	Farm data
1	Crop diversity, duration of rotation	Type/years
1	Tillage practices used	Type/timing
2	Presence of legumes in rotation	% of land area/time in rotation
2	Use of green manures	% of land area/time in rotation
2	Length of time of fertility building phase in rotation	years of % of full rotation
2	Soil and root stock left	% of land area in rotation
2	Crop residues left	% of land area in rotation
	Diversity	
1	Crop diversity	No of different species
1	Seed type and diversity	Qty/acre
1	Plant nutrient density	BRIX test
2	Seed treatment chemicals	Qty/acre
2	Source of seed	UK, Europe, Worldwide
2	Seed saving	% of seed use
	Pest and disease management	
1	Pesticide, herbicide, fungicide, insecticide use	Type, crop wise, qty/acre, timing
1	Biological control use	Type/% of land area/timing
1	Application of FYM	Mass/area
	Nutritional quality	
2	Nutrition per acre (trace elements, omega 3 fatty acid) ratios	More info needed (future research)

LIVESTOCK MANAGEMENT		
Tier	Indicator	Measurement Approach Guide
	Management system	
1	Livestock numbers/species	Numbers of each category (including temporary livestock)
1	Grazing management	System/farm data
1	Stocking density	Farm data (calculation per head)
1	Housing area per animal	Farm data (m2 per head)
1	Number of days on pasture	Farm data
	Diversity	
1	No of species	Breeds/varieties
1	Closed herd	
2	Locality of species	County, regional, national, international
2	Rare/native breeds	No/type
	Health/welfare	
1	Veterinary bills	Evidence
1	Lameness rates	% of herd
1	Lactations	Average number per animal (if applicable)
1	Access to open air	Farm data
1	Lighting, air quality, noise levels	Farm data
1	Mortality	% per year
2	Cleanliness of housing	Evidence
2	Disease prevention practices	Cleaning regime, disinfection, evidence of biosecurity plan
2	Slaughter location	Miles travelled by animal once left farm
	Nutrition and input Efficiency	
1	Feed type	Farm data
1	Feed source	Distance travelled from origin to farm (regional, UK, International)
2	Animal feed use	Animal/area/year
2	Forage source	% of total forage grown on land/otherwise distance travelled
2	Bedding	Source (on farm, local, further away)

NUTRIENT MANAGEMENT		
Tier	Indicator	Measurement Approach Guide
	Inputs	
1	Amount/type of input (listed by product)	Weight/type
2	Footprint of source (to include fertilisers, feed, manure)	On farm and off farm (process and distance)
	Outputs	
1	Amount of output (listed by type)	(including manures, compost etc)
2	Footprint (e.g. CH4 from livestock)	Footprint calculation
	Management efficiencies	
1	Manure storage	Calculation based on facility and capacity (in months)
1	Manure application	Method, total amount, timing
1	Compost	% of total manures composted, method, timing
1	Use of green manures	Contribution towards nutrient retention
1	Infrastructure improvements	Evidence
	Nutrient balance sheet	
1	Calculated from info above	

PRODUCTIVITY		
Tier	Indicator	Measurement approach guide
	Physical output	
1	Total product yield (per commodity and/or on-farm processed produ	Volume of outputs
	Financial ouputs	
1	Gross profit	Farm financial data
	Balance sheet/efficiency - true farm productivity measure (yield and impact)	
1	Adjusted impact (according to impact on natural and social capital)	Calculated from above - either monetised value (p&l) or measure

SOCIAL, CULTURAL, LANDSCAPE		
Tier	Indicator	Measurement approach guide
	Employment	
1	No. of workers (FTE and casual workers)	Farm data
1	Average salary per job level (comparative regional norms)	Farm data
1	Staff training, apprenticeships	Amount and variety of courses
1	Average employment length	Staff turnover/years of employment
2	Skillssets - human capital	Farm/employee data
2	Health and safety (days of sick leave, accidents/incidents on farm)	Farm/employee data
2	Gender/age/diversity	Farm/employee data
	Education and Public access	
1	Outside visitors on farm tours (including schools)	No of days/visitors
1	Rights of way	Km, evidence of upkeep
2	Participation in accountability/networks/institutions	Evidence
2	Participation in industry/certifiers/government groups etc	Evidence
2	Public engagement/participation in research/conferences	Evidence
2	Distance travelled by farm visitors	Average km
	Contribution to community	
1	Products sold to local area	% of total sales
1	Traceability of products	Evidence
2	Market access through cooperatives	% of total sales
	Nutrition and health*	
1	Nutrient density	Brix test
2	Trace elements	Lab test
2	Genetic and crop diversity	Fed in from info above
2	Nutrition per area	*more research needed
	Landscape/heritage	
1	Ancient monuments e.g. churches/stonewalls	Magicmaps data