Main actors in the case study area, concerned by the services and dysservices provided by local dairy farming

- Policy makers: Defra, Natural England, Cornwall Council, Environment Agency
- Farmer organizations and associations: NFU South West, RABDF, Young Farmers of Cornwall, Women in Dairy
- AKIS: Cornwall College, AHDB, Agritech Cornwall, Free Range Dairy, specialized magazines
- Food chain organisations and milk processing industry: Cornwall Food and Drink, Taste of the West, Trewithen, Lynher dairy, Rodda's, Kelly of Cornwall, Roskillys. Dairy Crest and Arla are the major milk processors, but not specific to Cornwall. OMSCO for organic milk
- Territory or environmental actors: LEAF, FWAG, Cornwall Wildlife Trust, West Country Rivers Trust
- Other relevant actors: Lantra (training), Feed companies, farm consultants, tourist stakeholders (i.e. restaurants and accommodation), Eden Project, Farm Cornwall, Water companies, activists (Extinction Rebellion, Surfers activists), Conservation groups, Heritage trust, landowners (National Trust, Duchy of Cornwall, Cornwall council)

Description and key figures

Cornwall population at the last Census (2011) was 536,000, while the estimate in 2017 was 561,349, ca 0.85% of the UK population (1).

In the future years, the population is predicted to increase (2) and to get older: in 2015, 22% of the population is under 19, 54% is aged 20-64 and 24% is 65 or over (3). The population density is one of the lowest in the England at 1.6 persons per hectare (160/km2) (4). Cornwall has its own language, although not widely spoken, and its own independence movement. The average (median) income in 2017 (as Gross Disposable Household Income[1]) was £17,021 (ca 90% of UK average) (5), with however large variations across communities.

[1] Gross disposable household income (GDHI) is the amount of money that all individuals in the household sector have available to spend or save after direct and indirect taxes and benefits. GDHI reflects the "material welfare"

In 2018, the unemployment rate was 2.7%, lower than the UK average (6). Cornwall as a whole is not deprived but there are neighbourhoods with consistently high levels of deprivation2 (7).

Cornwall is the third largest local authority area in the South West region, covering an area of 3,559 km2 (ca 15% of the region) and has the longest coastline of all English counties at 697 km.

Much of the landscape consists of plateaus at varying levels, dissected by steep valleys, reaching the sea in cliffs, with a few areas of sand dunes as well. The highest point is Brown Willy at 420 m (1,378 ft), part of the granite Bodmin Moor.

In Cornwall various soil types can be found, the main ones are granitic soils, shillet and clay. The majority of soil types in Cornwall are at medium to high risk of erosion or run off events

The climate in Cornwall is temperate oceanic (mild winters, cool summers), dominated by the maritime winds. The average daily temperature is 10-12°C, with highest average values in July-August (17-18°C) and lowest in January-February (7.5°C) (8). Annual rainfall totals are about 850-900 mm in the Scilly Isles, most coastal areas of Cornwall have 900-1000 mm, but up to double this amount falls on upland such as Bodmin Moor (9). Cornwall can expect well over 1500 hours of sunshine annually.

It is an area with varied landscapes including remote rural, coastal and environmentally sensitive areas, interspersed with villages and historic market towns. About 30% of Cornwall is within an area of Outstanding Natural Beauty3 and 158 miles of the coastline are designated as Heritage Coast (10). Cornwall also hosts the Cornish Mining World Heritage Site (11).

The coast and seas of Cornwall host a wide range of biodiversity. The wide range of ecosystem services is of significant economic and cultural value to Cornish residents and visitors (10).

Approximately 263,00 ha (2,600 km2) is farmed as commercial holdings: 63.5% of the farmed land is owned by the farmers who manage it. The farmed land is distributed as follows: 73% grassland, 20% arable (mainly cereal crops and field vegetables especially brassicas, cut flower and bulb production and early potatoes), 3% farm woodland and 4% other uses (12).

Dairy analysis (13) (14): 320,370 live bovine animals (61% dairy cattle; breeding herd: approximately 76,000 cows), 506,630 sheep and 51,120 swine. In 2017, milk production in Cornwall was 610,000 tonnes, from approximately 500 producers. The average herd size is 150 cows.

Main economic issues in the territory

Gross Value Added (GVA4) in in 2015 was £9.9 billion. In 2014 it was £9.5 billion. GVA per capita in 2015 was £17,964, up 3.3% on 2014 (£17,383). This equals to only 70.9% of UK average productivity.

By sector the main contributors to GVA were Real estate £2,185m, (19.2%); Wholesale, retail and motors at £1,213m, (12.2%); Health and social work £901m, (9.1%); Construction £753 m, (7.6%); and Manufacturing £745m, (7.5%). Sectors with growing GVAs include retail distribution, food and drink manufacturing, air transport, finance and social work activities (2013).

[2] The indices of multiple deprivation include Income Deprivation; Employment Deprivation; Health Deprivation and Disability; Education, Skills and Training Deprivation; Crime; Barriers to Housing and Services; and Living Environment Deprivation.

[3] An Area of Outstanding Natural Beauty (AONB) is land protected by the Countryside and Rights of Way Act 2000 (CROW Act) conserve and enhance its natural beauty.

[4] Value of goods and services minus the cost of inputs used to produce them, it’s a measure of productivity

The industry employing the highest percentage of the population is Wholesale and Retail Trade at 17%, followed by Health & Social Care (13.5%) and Education (9.7%).

There are 23,270 enterprises in Cornwall (2016) of which 88.2% were micro (0-9 employees), 10.3% small (10-49 employees), 1.2% medium (50-249 employees) and 0.2% large (250+ employees). The majority of large business is located in urban areas, while micro and small business predominate in the rural areas. Contrary to the UK figure, micro and small businesses employ more people than medium and large businesses.

Tourism accounts for 11% of Cornwall's GVA and employs 17% of the people (over 42,000 jobs). Cornwall has been consistently voted one of Britain's top tourist destinations and in 2015 attracted ca 4.5m staying visitors and 13.9m day visitors. Scenery and beaches were the top 'likes'. Cornwall attracted 1.5 million visits in 2015 (up 22% on the previous year), 70% from outside the county.

The Cornish food economy plays an integral role in the iconography of Cornwall, attracting high-profile chefs and media interest, in turn drawing food tourists and other visitors in search of the fresh, high quality produce for which the county is renowned

Cornwall has an impressive digital economy with excellent high speed broadband in some areas of the county. However, the geographic isolation, rurality and unique business profile pose challenges, in particular for deliveries, transportation and access to work e.g. there is no motor way and only one dual carriageway (A30) entering the county

There are many uncertainties surrounding Brexit and how it will impact Cornwall. Although dairying is less reliant on EU support payments than other grazing livestock enterprises.

Main social issues in the territory

Strong Cornish identity (recognised as minority in 214 under European rules for the protection of national minorities). In the 2011 Census 14% of the total population stated that they have Cornish national identity.

Cornwall has 43.7% of its population (232,416) classified as rural by Defra. By comparison, 10.5% of the total population live in predominantly rural areas in England (2011).

In some areas, 'higher earning' industries such as professional and scientific are underrepresented, while a higher proportion is employed in the primary and service industries such as agriculture, accommodation and food

There are 7 universities and colleges in Cornwall, operating across 13 campuses offering further and higher education.

Work is available, especially during the holiday season, but it is lower paid than the UK average. A large percentage of the workforce has seasonal jobs, most notably tourism and catering, many with zero-hour contracts, often with limited job security and progression. Opportunities for permanent work are more limited than in comparable areas.

Personal debt is a problem, caused mainly by low wages coupled with rises in utility bills, rents and the high cost of housing.

Average house price in Cornwall is £180,000 (11% above UK average).

The wage rate for women is lower than men, partly due to more women working part-time.

Cornwall has a high percentage of self-employed workforce: 20.7% of 16-64 year olds (13.5% for the UK). Self-employment is often seen as an indicator of entrepreneurship; however it can also be seen as the only option for employment locally.

Cornwall has a strong cultural and historic past reflected in the arts, culture and heritage scene (over 250 festivals), tin mines, museums, national gardens, heritage railways and other attractions. However, access and affordability to the attractions can be challenging for many residents.

As a rural county, some form of transport is needed to reach facilities. The road network is limited (no motorway and no dual carriageway end to end) with many minor B roads being single track, narrow and somewhat difficult to navigate

In Cornwall, the sense of community is very strong and volunteer rate is high, but the isolated geographic spread means many people are remote and lonely and do not engage with their communities.

Mental health issues are increasing.

Main environmental issues in the territory

Cornwall provides an abundance of natural conservation areas (30% of the County is AONB – Area of Outstanding Natural Beauty) and biodiversity with a wide variety of habitats and species set out in the Biodiversity Action Plan (BAP).

In Cornwall, water flows are generally good, but water abstraction can affect the flow, the security of public water supply, maintenance of river water quality and the protection of important water dependent species and habitats. Cornwall has 10 NVZs.

In the South West river basin district 41 % do not meet good status (449 water bodies). The main reason for failure is eutrophication.

Risk of soil erosion and run off.

Risk of winter flooding is also high in several coastal areas, which experience high water levels on a regular basis; fluvial flooding is also an issue in some areas with poor drainage.

With a rural road network, local airports and many, large open spaces (moorland and coastal) the air quality is good and safety levels high. For 4 air pollutants (nitrogen dioxide, benzene, sulphur dioxide and particulates PM10), Cornwall is well below the national average.

The limited public transport and the large rural areas makes car usage a necessity, increasing the carbon footprint of the area compared to other regions. This is even worse during holiday season, with increased road traffic, poorer air quality and increased demand on utility services such as water.

Cornwall has the highest total capacity of solar power production in England. Despite the numerous wind turbines, Cornwall is not in the top 10 counties for energy produced by wind: this is because the area available for wind turbines is limited due to landscape restrictions (AONB, AGLV – Area of Great Landscape Value- and military and civil flying zones)

Recycling can be challenging in some areas, especially where there are no kerbside collections.

Main agricultural issues in the territory

Agriculture is responsible for about three times as much employment in Cornwall as it is generally in Great Britain. Cornwall's contribution to UK agriculture is nearly 2% of GVA.

There is a large extent of agricultural land. However, the high-grade agricultural land is limited (the proportion of agricultural land in Cornwall within the category 'Best and Most Versatile' is a quarter of that in England as a whole - respectively 10% and 40%).

The County estate extends to approximately 4525.4 hectares and is split in 104 tenanted holdings equipped as farms. Holdings prior to 1995 were let on a mixture of lifetime and working life tenancies. All holdings let since 1995 are let on fixed term farm business tenancies.

The Agri-food sector is diverse and there is a close link between food producers and processors.

Long distances to larger markets which can limit the distribution outside the county.

Cornwall is the second most important area in the UK for quality pasture land, and in the top ten in Europe.

Livestock production in Cornwall is the second largest contributor to overall agricultural output, after dairying, and is associated with significant post farmgate activity within meat processing businesses. Beef production alone accounts for an estimated 23% of the total farmgate value of Cornish agricultural production.

Whilst there is a good availability of abattoirs (except for pigs, which is a small size sector anyway), there is an intense price pressure from retail customers who are seeking to limit price rises and maintain their margins. Also, less than 50% of Cornwall's annual production of prime lambs are slaughtered within the county, with the majority being purchased by other retail supply abattoirs based outside the county.

The growing conditions for horticultural production in particular are excellent. The growing season is longer and earlier than many parts of the UK. Within the South West, Cornwall is the largest producer of potatoes and brassicas, predominantly cauliflowers. Early season Cornish potatoes account also for the great majority of the national domestic supply of early potatoes. However, the main focus of horticulture is on supplying the Cornish market.

There is an excellent agricultural education and knowledge exchange

There are increasing concerns regarding the impact of agriculture on the environment, with an increasing number of NGOs and activists.

Main dairy farming systems in the territory

Approximately 76,000 cows in the breeding herd. In 2017, milk production in Cornwall was 610,000 tonnes, from approximately 500 producers. The average size is 150 cows. The average milk production per cow is 7,000 lt.

The dominant breed is the Holstein, especially in high input/high output systems, but with other breeds used, particularly for the grazing-based systems.

The majority of herds would be milked through herringbone parlours, with an increasing number of robotic systems (mainly smaller herds) and rotary parlours (larger herds). Despite the good grass-growing conditions, a significant proportion are housed all the year round

Approximately 45% are tenanted farms

The large majority of the managers is male; approximately half of the managers are >55 years old.

The Cornwall dairy farmers are diverse in terms of calving pattern and grazing period. The majority of herds are AYR calving with medium yields and traditional 6/7 month grazing period, but with significant numbers of seasonal calving herds with high input/ higher output systems and grazing systems, just about always on a seasonal calving system.

The climate with mild conditions, few frost days and an extended growing season compared to most other areas of Britain makes grazing a key practice for Cornish dairy farmers.

Other than grazed grass and grass silage, winter wheat, barley and maize are grown as well.

Dairying is the most important form of primary food production in the county. Other than liquid milk, the main routes to market are cheese and other dairy products such as ice-cream and clotted cream (Rodda's Clotted Cream is a DPO since 1998).

the percentage of organic milk produced in Cornwall is higher than average figures for the UK, but other counties in the South West (Devon) have the highest proportion of organic land in the country. The income of South-West dairy farmers in 2016/2017 has decreased compared to the past years, mostly due to a lower value of milk output (price decreased by 6%) and lower yield per cow. Milk price has since then increased again.

New challenges for dairy sector sustainability in Cornwall

Date of the Workshop: 20 June 2019

Type of participants	Number of participants
Farmers	2
Technicians/technical support	2
Agrifood industry	1
Municipalities/local communities and administrations	1
Parks/natural official office	0
Universities/agricultural high schools	3
NGO	0
Others (precise)	/
TOTAL	9

Analysis

STRENGTHS	WEAKNESSES
Economic • Tourism • Public perception of the Cornish brand Social • Tourism • Public perception of the Cornish brand/brand loyalty • Dairy tradition Environmental • Mild climate • Biodiversity • Conservation areas Agricultural/dairy • Ability to grow grass all year round • Milk buyers and processing capacity • Family-owned farms • Resilience of dairy production systems (some) • Lower dependence on subsidies than other sectors	Economic • Labour shortage • Isolation • Lack of political clout Social • Isolation Environmental • Conservation areas Agricultural/dairy • Labour shortage • Lack of succession and aging • Milk price • Hard to get new entrants • Lack of political clout • High input costs (i.e. feeds)
OPPORTUNITIES	**THREATS**
Economic • Low cost of finance • No-deal Brexit • Brand/marketing Social • Various public needs • Global increase in demand for dairy products, also new dairy products • Improvement in animal welfare and health • Consumer education on health benefits of dairy (One health) Environmental • Environmental policies (ELMs) Agricultural/dairy • Increasing agritechnologies and genomics • Wider range of production systems • Reaching productivity gains • Improvement in animal welfare and health • Exploiting the variety of different production systems • Grass-based production • Collaborations between farms but also with other sectors	Economic • Level of indebtedness • Brexit • Supermarket dominance • Lack of effective marketing in the future Social • Climate change – public perception • Worsening of public negative perception of dairy farms and products • Further increase in education financial cuts Environmental • AONB/National Trust • Climate change-physical element • NVZ • Policy (e.g. Carbon Net Zero) • NH3 Agricultural/dairy • Increased input costs • Competition for land, especially horticulture • Diseases • Unsustainable milk price

List of issues

Strengths

1. Ability to grow good grass all year round due to mild maritime climate and sunlight
2. Milk buyers and strong milk processing capacity
3. Presence of family-owned dairy farms that are generally (not always) resilient to external issues (see low milk price in 2016)
4. The presence of the Cornish brand is quite strong locally and nationally as well, with a positive public perception of it and brand loyalty
5. Tourism is a very strong sector in Cornwall (millions of tourists through the holiday season)

Weaknesses

1. Instability of milk price/price takers. This has been ranked as the major weakness and it is linked to various other issues, such the milk treated as a commodity and by a loss leader by retailers, and by the lack of leverage (also political) of the sector
2. Labour, especially skilled labour, is hard to find locally (lack of local employment opportunities)
3. Isolation and distance from the main markets (road infrastructure)
4. Lack of succession and aging are another important weakness, especially because of the financial inability of the sector to attract new entrants.
5. The lack of cooperation at a wide scale between farmers (both formal and informal) weakens the strength of the sector

Opportunities

1. Increasing global demand for dairy products to strengthen the offer also providing innovative dairy products and market strategies
2. Marketing of the Cornish brand
3. Potential gains in productivity which can increase the resilience of the dairy farming sector. This can be helped by the use of technologies such as genomics.
4. Possibility to run successfully different dairy systems (i.e. high yielding vs lower yielding) still maximising milk from grass/forage
5. Education of the consumer/increasing awareness
6. Maximize the ability to grow grass and protein forage crops

Notes: there was some disagreement on the no-deal Brexit as an opportunity but it was mitigated by the inclusion of the same issue as a threat. The other opportunities listed in the SWOT were ranked lower.

Another opportunity was identified after the meeting in monopolising Cornwall as a foody destination, with "A" list Chef's - this would be a good way of promoting Cornish dairy products.

Threats

1. Unsustainable milk price
2. The worsening of the public perception on dairy farms and products coupled with the increase in dietary changes (i.e. milk alternative)
3. Brexit and its uncertainties (political leadership, tariffs, labour, Basic Payment Schemes, EU becoming a competitor)
4. Level of debt
5. Climate change
6. The lack of effective marketing

Notes: The other threats listed in the SWOT were ranked lower

Services and dysservices and indicators used to measure them

Category	Description	Indicators	Specific dairy farming systems (if relevant)
Provisioning of resources	Services "Public goods" provider Secure source of dairy products (not just milk) Healthy and balanced food Safe, traceable and with high standards of production Added value products (Cornish brand) Meat and offal production Leather Slurry/manure (fertiliser) Energy (AD) Public rights of way – mental and physical health and well-being Less use of resources with modern farming techniques Challenges Negative health and safety claims (i.e. antibiotics) – perceived, not evidence based Animal welfare allegations – generally perceived Cost of maintaining and improving public goods Soil health deterioration/erosion	Production levels Proportion slurry/mineral fertiliser Number of farms with AD Media presence Media presence	For all but more important for mixed systems Farm with AD All but especially high inputs/high outputs, indoors High input farms/high pasture stocking rates
Rural/regional vitality	Services Employment Economy (upstream and downstream) Land management Maintenance of an appealing landscape for tourists Young farmers movement Countryside access Challenges Reducing employment/wages if not profitable – less attractive to jobseekers and young farmers Tighter margins – less benefits to overall economy	Dairy farming employment rate Average household income Average household income/wages	All – especially those with non-family employees All – especially those with non-family employees
Environment	Services Maintaining environment landscapes Land, soil and water management Carbon sequestration Renewable energy generation Hedgerow management Biodiversity Pollinators Challenges GHGs and ammonia emissions C footprint/water footprint Water pollution/bathing water Loss of biodiversity Intensification of land use	Number of farms using renewable energy Biodiversity indicators	Those using renewable energy sources NVZ

Cultural heritage and quality of life	Services Sense of farming community – public service, community spirit, parish, council, school governors, church Visible connection farm to market Health and well-being to the community (i.e. footpaths and hedgerow management) Big reservoir of knowledge and expertise/experience Challenges There is less and less people and less time to connect as people are more spread out If farms don't look good, there is a visibility issue/perception Mental health issues due to financial problems and feeling of not being valued	NHS farmers access for mental health conditions?	
Provisioning of resources	Services "Public goods" provider Secure source of dairy products (not just milk) Healthy and balanced food Safe, traceable and with high standards of production Added value products (Cornish brand) Meat and offal production Leather Slurry/manure (fertiliser) Energy (AD) Public rights of way – mental and physical health and well-being Less use of resources with modern farming techniques Challenges Negative health and safety claims (i.e. antibiotics) – perceived, not evidence based Animal welfare allegations – generally perceived Cost of maintaining and improving public goods Soil health deterioration/erosion	Production levels Proportion slurry/mineral fertiliser Number of farms with AD Media presence	For all but more important for mixed systems Farms with AD All but especially high inputs/high outputs, indoors High input farms/high pasture stocking rates

List of Innovative practices likely to improve sustainability and competitiveness of dairy farming

Innovation title	Factors that prevent the adoption	Types of farms that have developed these practices or that are interesting regarding these innovative practices
Enhancing services		
Use proactively tourism as a channel to deliver education and promotion/marketing	Funding, need to cooperate more with tourism sectors	All – especially those in high tourist areas
Stimulate more cooperation among farmers – reach retailers with more clout	Time and engagement; competition among farmers; price takers	All
Effective integration of technology to increase productivity	Financial resources; ability to choose the appropriate technology for the farm; need for a more detailed cost/benefit analysis	All
Let farmers tell what they need from the other key players	Reduced leverage	All
Reducing dysservices		
Increase awareness and support for mental health issues	Funding, lack of a strong network of people Farmers feel disconnected with the society/consumer and not valued enough	All – especially farms who suffered from serious financial problems and struggled to cope
Education of the consumer/citizen/public – open farm days; presence in schools Provide facts and evidence	Funding, time, engagement, need for more evidence or applicability of the research results (i.e. C sequestration)	All
Media training to some key farmer to be appointed as spokesperson for the sector Trained farmers to engage with media	Funding, time, engagement Unbalanced media (different agenda)	All
Rewards/incentive for reducing C emissions	Funding (if rewards comes from external bodies) or willingness to pay if it falls on the consumer	All

REFERENCES

1.https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/populationestimatesforukenglandandwalesscotlandandnorthernireland. [Online]

2. https://www.cornwall.gov.uk/health-and-social-care/public-health-cornwall/joint-strategic-needs-assessment-jsna/data-maps-and-infographics/tab-placeholder-hidden/data/population-projections/. [Online]
3. https://www.cornwall.gov.uk/health-and-social-care/public-health-cornwall/joint-strategic-needs-assessment-jsna/data-maps-and-infographics/tab-placeholder-hidden/data/. [Online]
4. https://www.cornwall.gov.uk/media/18168474/equality-data-for-cornwall-rebecca-cohen.pdf. [Online]
5.https://www.ons.gov.uk/economy/regionalaccounts/grossdisposablehouseholdincome/bulletins/regionalgrossdisposablehouseholdincomegdhi/1997to2017#what-was-the-average-disposable-household-income-in-your-local-area. [Online]
6. https://www.nomisweb.co.uk/reports/lmp/lep/1925185540/printable.aspx. [Online]
7. https://www.cornwall.gov.uk/council-and-democracy/data-and-research/data-by-topic/deprivation/. [Online]
8. http://www.newquayweather.com/wxtempsummary.php. [Online]
9. https://www.metoffice.gov.uk/climate/uk/regional-climates/sw. [Online]
10. https://www.cornwall.gov.uk/environment-and-planning/countryside/coast-and-seas/. [Online]
11. https://www.cornwall.gov.uk/environment-and-planning/conservation/world-heritage-site/. [Online]
12. https://www.nfuonline.com/assets/9492. [Online]
13. Eurostat and AHDB data. [Online]
14. http://www.farmcornwall.co.uk/wp-content/uploads/2017/09/Newsletter-022-September-2016.pdf. [Online]
15. http://www.ukcommunityfoundations.org/wp-content/uploads/2017/10/Cornwalls-Vital-Issues-2017.pdf. [Online]
16. https://www.visitcornwall.com/sites/default/files/generic_files/Cornwall%20Visitor%20Economy%202014-20%20Consultation.pdf. [Online]
17. https://www.cornwall.gov.uk/media/3634031/Baseline.pdf. [Online]
18. https://www.cornwall.gov.uk/media/24212257/environmental-growth-strategy_jan17_proof.pdf. [Online]
19. https://www.cornwall.gov.uk/media/3638076/Agriculture-and-Food.pdf. [Online]
20.https://socialsciences.exeter.ac.uk/media/universityofexeter/research/microsites/centreforruralpolicyresearch/pdfs/researchreports/Cornish_food_economy_final_report_FINAL.pdf. [Online]
21. http://www.britishgrassland.com/system/files/uploads/SM15%20Booklet%20v2%20(updated)_0.pdf. [Online]
22. Eurostat. [Online]
23. https://www.visitcornwall.com/sites/default/files/generic_files/Cornwall%20Visitor%20Economy%202014-20%20Consultation.pdf. [Online]
24. https://www.cornwall.gov.uk/media/3634031/Baseline.pdf. [Online]