The Wildlife Trusts

Doing Dairy Differently

Why modern dairy is at breaking point and how to fix it for farmers, nature and climate

Executive Summary

The UK dairy sector is producing more milk from fewer, larger farms by moving towards more feed-reliant housed systems. Production for the 2025/26 season is forecast to reach 13.05 billion litres, while the number of producers continues to fall. This consolidation is reshaping the industry, with larger herds, more housed systems (herds kept indoors) and greater reliance on bought-in feed.

The number of dairy farms keeping cattle permanently indoors has more than doubled over the past decade. At least 40 'megadairies' have been identified across the UK with the largest holding 2,600 cows[1]. Yet unlike intensive pig and poultry units, large dairy and beef farms are not subject to the same government monitoring, so their size and environmental impacts are not kept in check.

While dairy remains an important part of the rural economy and many farmers are already farming with nature, the current direction of travel is placing growing pressure on land, rivers, soils, climate and nature. Larger herds and longer housing periods mean more slurry must be stored, managed and spread safely. Existing infrastructure and advice systems are not keeping pace.

Dairy slurry is a major source of pollution. The environment agency's recent agriculture and water environment 2026 report found **dairy activity responsible for 71 per cent of serious agricultural pollution incidents.** This is damaging rivers, driving algal blooms, reducing oxygen levels and harming freshwater wildlife. At the same time, the sector's dependence on feed crops increases pressure on land in the UK and overseas, including through imported soy associated with deforestation and biodiversity loss.

Climate change is already a business risk for dairy farmers, with heat stress reducing milk yields and increasing costs. A more resilient dairy sector must therefore cut pollution, reduce reliance on imported and industrial inputs, and work with natural systems rather than against them.

This report shows that better dairy is possible. Evidence from Maximum Sustainable Output (MSO) analysis suggests that lower-input, nature-friendly systems can improve commercial returns by reducing costly corrective inputs such as artificial fertiliser and concentrate feed. Farms that make better use of grass, healthier soils, well-managed grazing, clean and dirty water separation, suitable slurry storage and riparian buffers can reduce pollution risk while improving resilience and profitability.

However, farmers cannot deliver this transition alone. Many of the tools already exist through capital grants for infrastructure, nutrient management planning, Catchment Sensitive Farming advice, environmental regulation and market standards. Yet, they are not working at the scale or speed required. Upfront capital costs, limited advisory capacity and restrictive supply chain requirements are preventing many farmers from making changes that would benefit their businesses, their communities and the water our ecosystem are depending on.

The Wildlife Trusts call for decisive, practical action to move the dairy sector onto a nature-positive pathway.

- The UK government should strengthen regulation by extending environmental permitting for the highest-risk systems, and supporting nutrient planning at farm and catchment scale.

- Provide accessible finance and advice packages for slurry and clean-water infrastructure.

- Back organic and regenerative dairy by ensuring fairer supply chains that reward farmers for reducing pollution and restoring nature.

- The aim is not to create more paperwork, but a more resilient system: one that supports farmers, cleans up rivers, reduces climate impacts and helps dairy farming work in harmony with the natural systems on which food production depends.

[1] 'Battery cattle' farms rise in UK as milk price drops | TBIJ

COVER IMAGE: JOHN COTTLE

Part one: The scale of dairy today

The UK dairy industry is producing more milk from fewer, larger farms of cattle kept increasingly indoors. This is reshaping the industry.

Milk production for the 2025/26 season is forecast to reach 13.05bn litres, a five per cent rise on the previous year[2]. Over the last decade, average milk yield per cow has increased by nine per cent, reaching 8,169 litres per cow per year[3]. These gains are often presented as efficiency improvements, but they also mean greater pressure on land, feed, slurry storage and water quality.

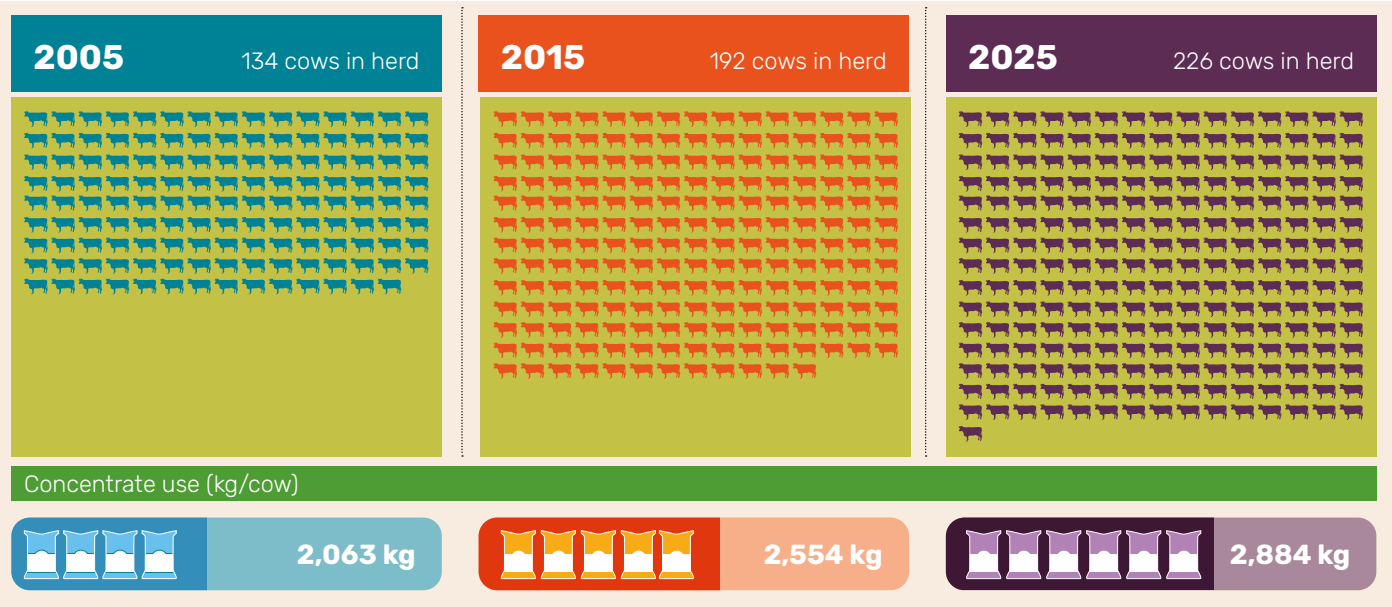
Fewer, bigger herds

At the same time, the number of dairy producers is falling. The UK saw a 14 per cent reduction in dairy producers between 2019 and 2023, from 8,720 to 7,500, with a further 190 producers leaving in the past year[4]. This consolidation is concentrating production into fewer businesses, increasing the scale of local nutrient, slurry and feed pressures where herd expansion is not matched by land, infrastructure or regulation.

As of October 2025, the total dairy herd stood at 2.51 million cattle[5]. Average conventional herd size has increased from 134 cows in 2005 to 226 in 2025. Larger herds can create more manure and slurry in one place, raising the risk of pollution if storage, spreading capacity and clean-water separation do not keep pace.

Production is rising because herds are getting larger. The Bureau of investigative journalism found the number of intensive unit where animals are kept permanently indoors has more than doubled in the past 10 years. Within this has been the rise of 'megadairies', which house more than 700 cattle. There are now more than 40 across the UK with the largest containing 2,600 cows[6]. Unlike pig and poultry units, beef and dairy intensive farms are not subject to the same permitting and are left unmonitored by the government.

Figure 1: UK herd size and concentrate use growth in 20 years

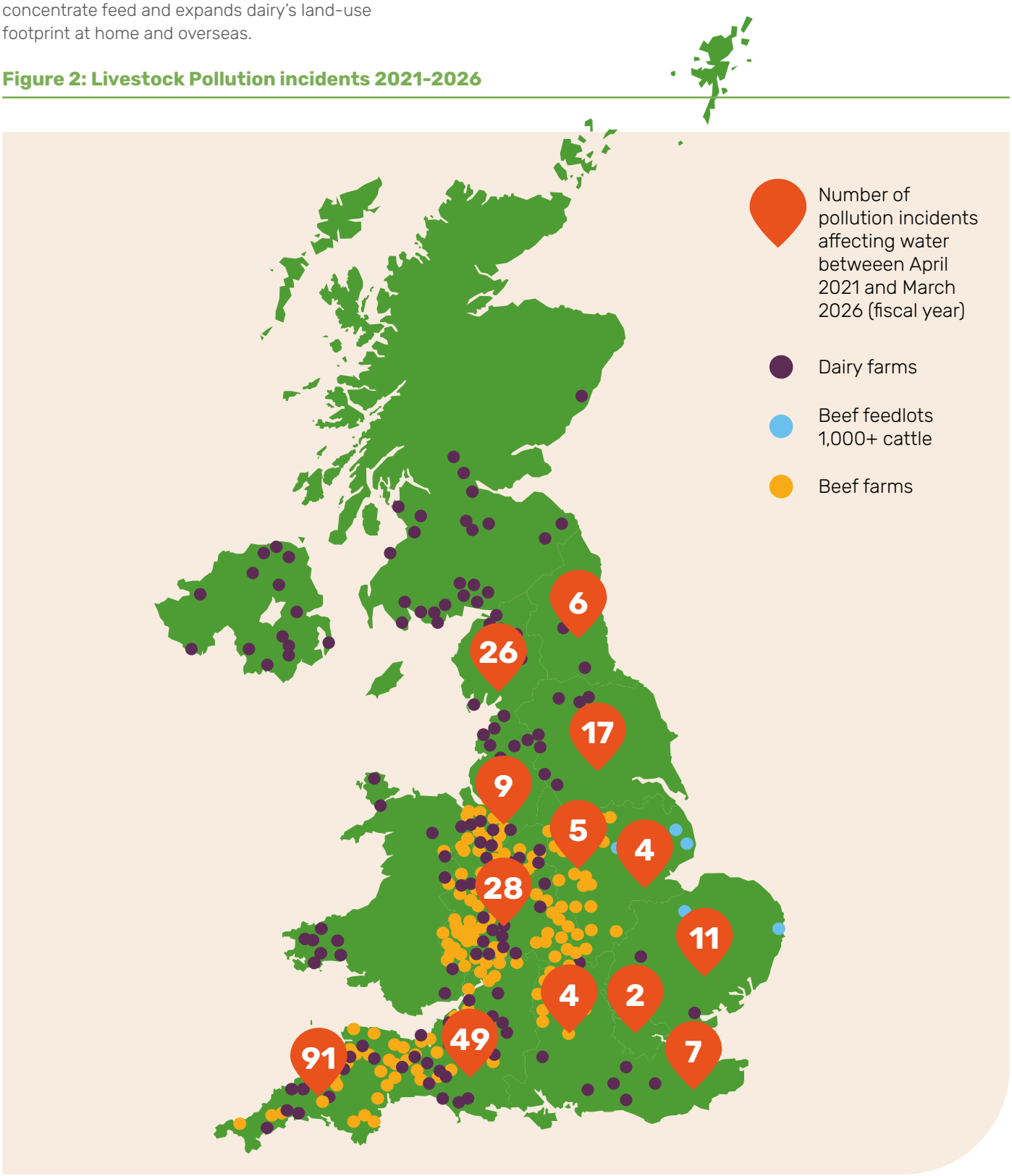


[2] Dairy market outlook | AHDB
[3] UK milk yield | AHDB
[4] GB producer numbers: Good economics until now slowed declines | AHDB
[5] GB producer numbers: Good economics until now slowed declines | AHDB
[6] 'Battery cattle' farms rise in UK as milk price drops | TBIJ

Changing systems

Regulators do not routinely collate figures on intensive dairy units, but recent estimates suggest up to 20 per cent of the UK dairy herd may have no or very limited access to pasture. More time indoors means more slurry collected in yards and stores, while lower grazing access increases reliance on concentrate feed and expands dairy's land-use footprint at home and overseas.

Figure 2: Livestock Pollution incidents 2021-2026



www.gov.uk/government/publications/agriculture-and-the-water-environment-2026-report/agriculture-and-the-water-environment-2026-report

www.thebureauinvestigates.com/stories/2026-05-26/battery-cattle-farms-surge-in-uk-as-big-dairy-rakes-in-profit

The organic herd

Organic dairy farming is slowly becoming more competitive, achieving an organic margin over purchased feed (MOPF) of 41.47p per litre compared with 32p for conventional herds.[7] MOPF measures how efficiently herds convert bought feed – typically the largest variable cost on dairy farms – into profit. The best-performing herds had the lowest stocking rates, making effective use of available forage. However, England is not capitalising on the growing organic market to convert more land to organic production. DEFRA statistics show UK organic dairy cow numbers fell by six per cent between 2023 and 2024, continuing a decline since 2019[8]. In 2024, organic dairy accounted for just 1.5 per cent of cow numbers in the June consensus.[9]

In Scotland, however, organic farming has doubled the volume growth reported for non-organic, at six per cent verses three per cent.[10] This is due to government support and guided action plans to increase organic land coverage.

[7] Dairy Costings Focus Report 2025
[8] Organic farming statistics 2024: United Kingdom - GOV.UK
[9] Green shoots of recovery for organic dairy production | AHDB
[10] Farming News - Scotland 'trailblazing in nature friendly farming' as organic farmland rises while progress stalls in rest of UK

CASE STUDY

Strickley Farm, Cumbria

Organic Farming Delivering Benefits for Nature

James Robinson farms organically over 300 acres at Strickley Farm, where no artificial fertilisers or pesticides have been used for 16 years. This approach has helped support biodiversity across the farm by allowing natural pest control, improving soil health and creating a rich variety of habitats for wildlife. By planting woodland, maintaining tall hedgerows, fencing off watercourses, creating wetlands and using diverse herbal leys, wildlife populations have increased and water quality has improved. Regular soil testing is carried out to maintain the right level of nutrients to benefit both cattle and local wildlife.

Says James: "With flash flooding more common these days, due to our warming climate, much of our land get waterlogged and is only suitable for grazing. By fencing off wet areas and creating scrapes, the farm can hold standing water helping build natural flood defences."

"We need the UK government to back us not just in direct support of nature-friendly farming, but also in the trade deals which they negotiate."
- James Robinson, dairy farmer

Environmental impacts

Land use for pasture and feed

Defra data suggests that land used for dairy farming in England stood at 735,000 hectares in 2024 – ie eight per cent of farmland.[11]

Compared to beef cattle, dairy cattle graze less on grassland and spend more time indoors, thus relying more on feeds (predominantly maize silage, fodder beet, grains and a small amount of soy). Feed ratios will vary for different production systems, from 100 per cent grass (including silage and hay when not grazing) in certified pasture-fed farms, to very low proportions of grass in intensive dairy units.

The move to larger herds is also increasing reliance on purchased feed, with total purchased feed use up five per cent in 2025 compared to 2024[12]. Growing cereal crops to feed animals uses 40 per cent of the UK's entire arable land area – around 2 million hectares – and consumes half of our annual wheat harvest, the nation's most important staple crop. Government data is available to show the destination of manufactured compound feed from field crops (wheat, barley, maize), which indicates that roughly 80 per cent of animal feed is going to poultry and dairy units in equal portions. This is set to increase as more dairy cattle are being housed in intensive units relying on more compound feed[13].

The land footprint of animal feed is not limited to within our borders[14]. An additional 850,000 hectares is used abroad for producing soy cake and meal to feed to livestock, including dairy herds, in the UK. This means clearing critical areas of rainforest to grow soy, among other negative environmental impacts.

Slurry pollution

The UK dairy industry generates approximately 51 million tonnes of manure annually in England and Wales, with 35 million tonnes handled from housed animals, primarily as high-nitrogen slurry (65 per cent) and farmyard manure (35 per cent)[15].

A 700 kg cow produces over 60 litres of slurry per day· 'Indoor cows' generate more slurry, which needs spreading. Furthermore, with indoor-housed cattle consuming more nutrient-rich feed, their nutrient-rich slurry creates intense pollution when it runs into the land and rivers.

Larger herds which are kept increasingly indoors – together with increased rainfall – place greater pressure on outdated slurry management and storage systems.

This particular concern was highlighted in the Environment Agency agriculture and the water environment 2026 report, which showed that over 71 per cent of all serious agricultural pollution incidents originated from dairy farming activities, making dairy slurry the single largest cause of agricultural pollution incidents in the UK[16]. This is despite the number of dairy farms in England making up only eight per cent of agriculture land[17].

Agricultural pollution from dairy farms is not specific to England. Environmental agency data across 2020-2023 found non-compliance across[18].

- 80 per cent in Wales
- 69 per cent of dairy farms in England
- 60 per cent in Scotland
- 50 per cent in Northern Ireland

River pollution

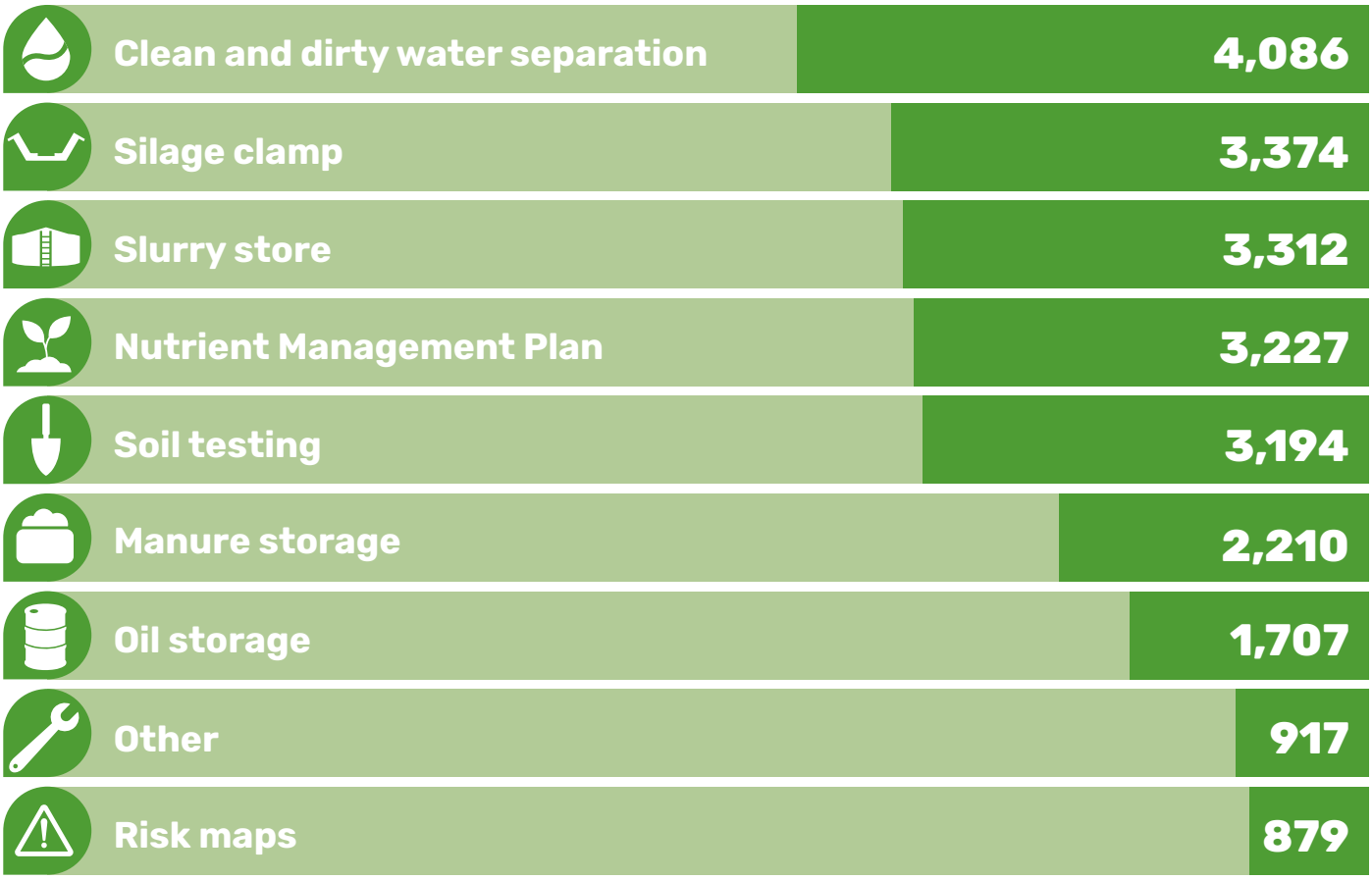
Dairy slurry and silage pollution incidents represent the largest single source of agriculture river pollution in the UK, due to nutrient loads, organic matter and sediment discharges from slurry, manure and feed crop production at catchment scale.

The associated ecological impacts include:

- Eutrophication and algal blooms
- Habitat deterioration for freshwater species
- Reduced biodiversity, especially invertebrate and fish communities
- Increase frequency of ecological 'dead zones'

[11] https://www.gov.uk/government/publications/farming-evidence-pack-a-high-level-overview-of-the-uk-agricultural-industry/farming-evidence-key-statistics-accessible-version
[12] Dairy Costings Focus Report 2025
[13] Agriculture in the UK 2019
[14] RiskierBusiness_July2020_V7_0.pdf
[15] A survey of the production and use of animal manures in England and Wales. III. Cattle manures - Smith - 2001 - Soil Use and Management - Wiley Online Library
[16] Agriculture and the water environment: 2026 report - GOV.UK
[17] Farming evidence - key statistics (accessible version) - GOV.UK
[18] committees.parliament.uk/writtenevidence/130081/pdf/

Top Improvement Actions Issues to non-Permitted Farms 2021 to 2026



It is particularly concerning to note from the Environment Agency's agriculture and the water environment 2026 report, that the farm improvement actions issued to prevent agriculture pollution incidents are already available, with both advice and financial support open to farmers. There is a bigger issue here with uptake of farm improvements.

Air pollutants from dairy farming

The UK dairy industry is responsible fora significant share of agricultural air pollution in the form of greenhouse gasses (methane, carbon dioxide and nitrous oxides), ammonia and particulate matter.

Climate change emissions

Agriculture accounts for an estimated 12 per cent of total UK greenhouse gas emissions (GHG), mainly nitrous oxide and methane, measured in million tonnes of carbon dioxide equivalent (MtCO2e). Of this, dairy cows are a significant contributor, producing methane through enteric fermentation and from manure decomposition. Around 50 per cent of agricultural GHG emissions come from methane produced by dairy farms.

There has been a reduction per litre of milk produced due to efficiency gains. The emissions intensity for dairy (GHG emissions per litre of milk production) has seen decrease since 1990, decreasing by 22 per cent between 1990 and 2022.[19]

However, dairy is still producing significant GHG emissions and the impact of climatic changes, such as drought and heat stress on the UK herd[20] and its forage crops, may reduce efficiencies and drive more feed imports putting stress on land elsewhere. Green Alliance report that high temperatures reduce milk yields by as much as 10 per cent and heat stress is estimated to cost individual farms up to £90,000 a year. Dairy herds in the southwest of England could see a tenfold increase in heat stress inducing days.[21] There are also GHG emissions associated with crop use and land conversion for feed production for dairy here and overseas. The land conversion of natural habitat to agricultural, and fertilizer production and use due to the demand for feed crops such as corn and soy, all release greenhouse gases.

Air quality

Air pollution can arise both directly from dairy systems from their waste and manure production and spreading but also indirectly via production of feeds.

[19] https://www.gov.uk/government/statistics/agri-climate-report-2024/agri-climate-report-2024
[20] Spatially explicit estimation of heat stress-related impacts of climate change on the milk production of dairy cows in the United Kingdom Nándor Fodor ,Andreas Foskolos,Cairistiona F. E. Topp,Jon M. Moorby,László Pásztor,Christine H. Foyer
Published: May 8, 2018
[21] UK food security in a climate changed world Green Alliance 2026

Ammonia

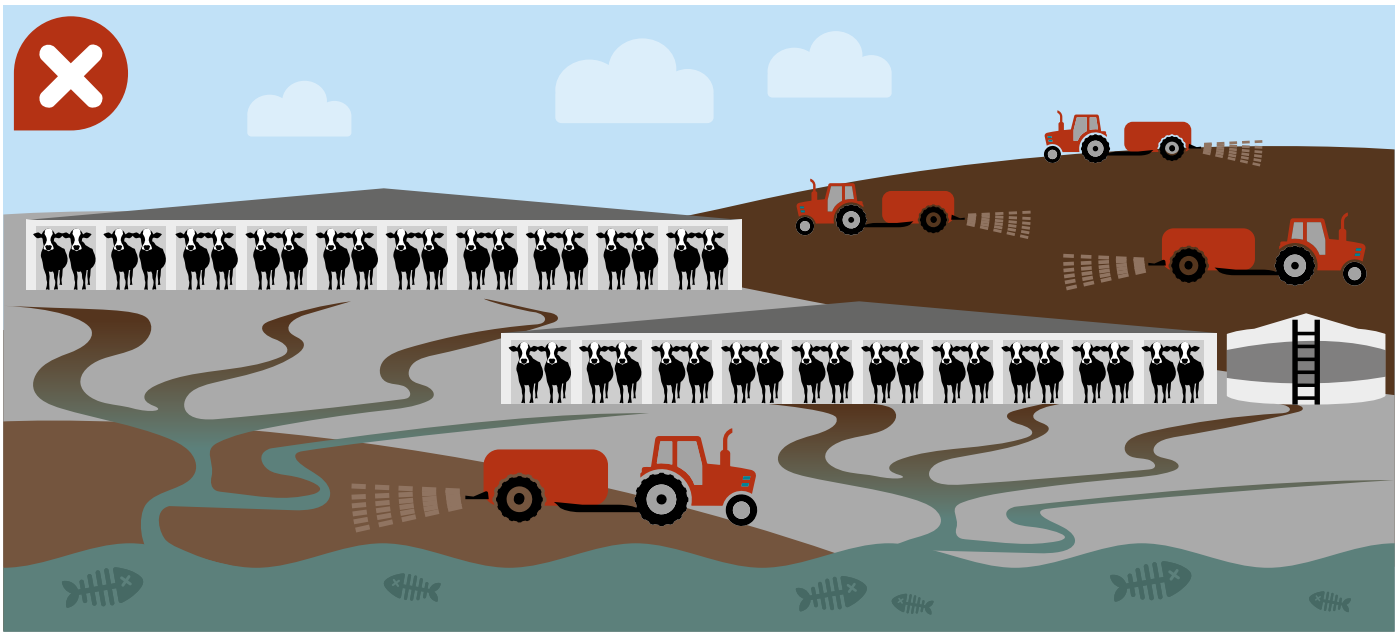
Cattle are the largest source of UK ammonia emissions, representing 67 per cent of all emissions from livestock in 2024 and 44 per cent of total ammonia. Emissions from dairy cows rose sharply between 2010 and 2020, while emissions from other cattle have been falling since 2010.[22]

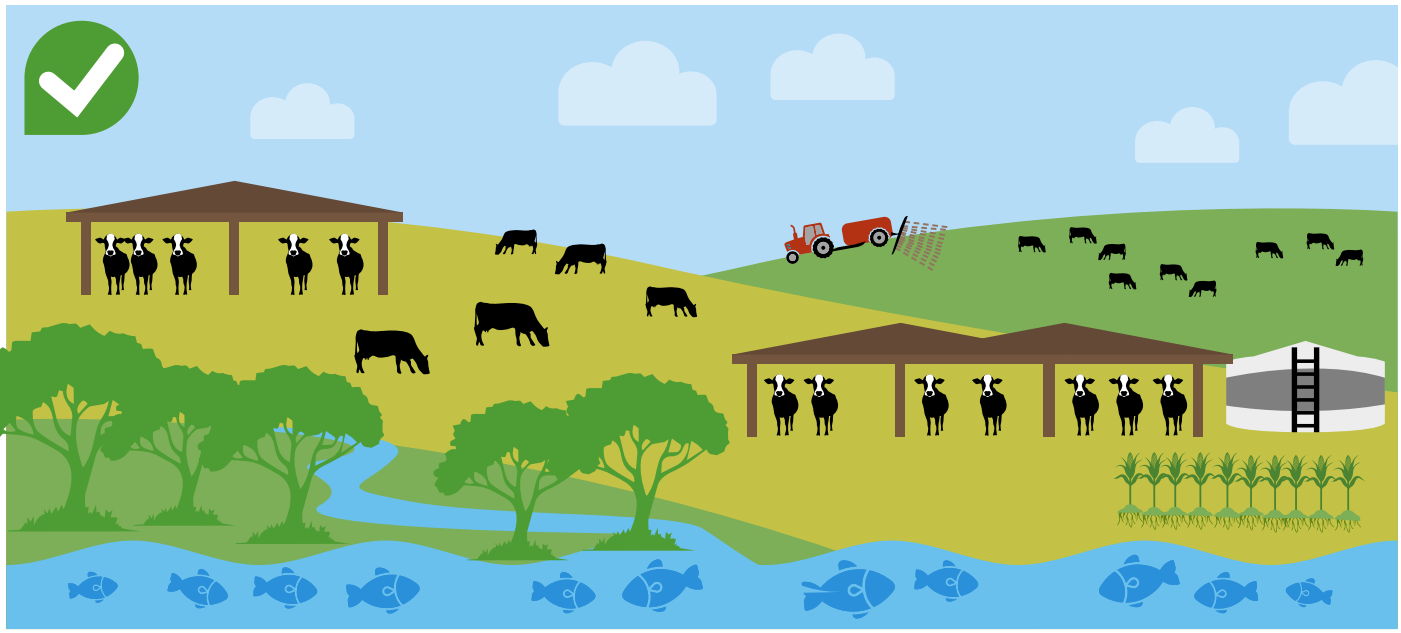
These ammonia emissions can significantly damage downstream habitats by increasing nitrogen concentrations in soil or water, encouraging species dominance and a loss of biodiversity. The output of particulate matter and odour from on-farm activities can also negatively impact air quality for humans as well as wildlife.

Particulate matter

When ammonia combines with other gases in the atmosphere, such as nitrogen oxides and sulphur dioxide, it can form particulate matter (PM) which is persistent, can be transported large distances, and cause significant environmental and human health issues especially in vulnerable groups. Dairy and beef cattle are the largest contributors, releasing ammonia from animal waste (urine and manure) and slurries but emissions rise from the spreading of inorganic, nitrogen-based fertilizers some of which is used to feed dairy cattle. It has been estimated that between 25 per cent and 38 per cent of air pollution that could harm human health in UK cities is the result of agriculture.[23]

The dairy transition needed





[22] https://www.gov.uk/government/statistics/emissions-of-air-pollutants/emissions-of-air-pollutants-in-the-uk-ammonia-nh3

[23] Jamie M. Kelly, Eloise A. Marais, Gongda Lu, Jolanta Obszynska, Matthew Mace, Jordan White, Roland J. Leigh, Diagnosing domestic and transboundary sources of fine particulate matter (PM2.5) in UK cities using GEOS-Chem, City and Environment Interactions, Volume 18, 2023, 100100, ISSN 2590-2520, https://doi.org/10.1016/j.cacint.2023.100100

Part two: Making dairy finances work for farmers

Over the past few years, Nethergill Associates have carried out detailed financial analyses on hundreds of farms' business accounts, to look at how the agricultural parts of the business can be made more profitable. More detail is in the Appendix.

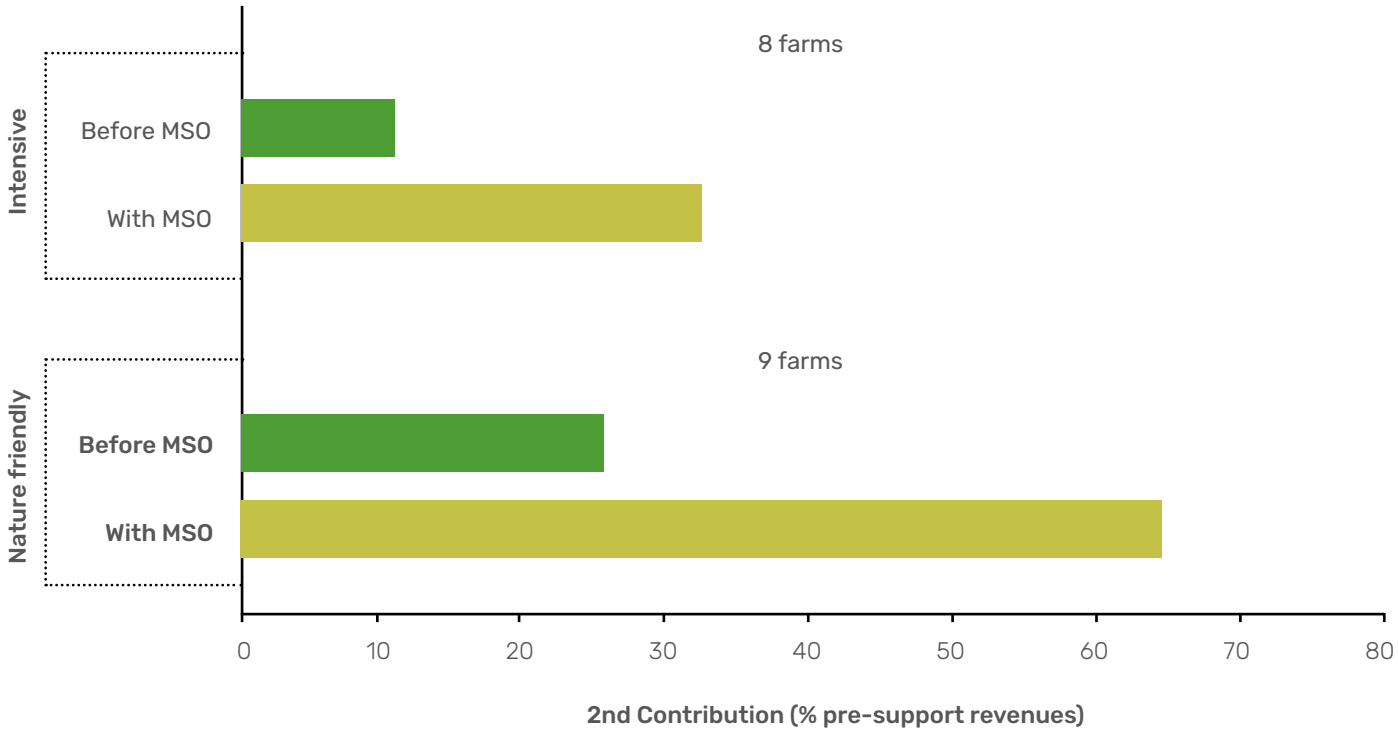
The analysis applies standard micro-economic theory to farm accounts, aiming to identify the point where commercial returns are maximised, referred to as the 'Maximum Sustainable Output' or MSO.

This has shown, for beef, sheep, dairy and mixed enterprises in both upland and lowland situations, **that farm businesses improve their commercial returns if outputs are reduced to a level where production relies on the farm's naturally available resources**. In effect, eliminating costly inputs – such as artificial fertilisers and feed concentrate – makes farmers significantly better off.

Moving farm businesses to operate at the MSO helps farms to become more profitable and reduces business risk by limiting the farm's exposure to external economic shocks. This benefits the farmer and the environment, since it reduces harmful or wasteful inputs - like pesticide use and nutrient leaching.

Our 2021 report *'Farming at the Sweet Spot'*, produced with Nethergill Associates and the Nature Friendly Farming Network, included analysis for 21 dairy farms which showed an average increase of outputs and commercial returns of 32.7 per cent if moving to MSO. We asked Nethegill to look in more depth at 17 dairy farm books and analyse the potential and the challenges of moving to an MSO approach. The results show significant benefits for most dairy farm units in using an MSO approach, reducing inputs and enhancing environmental gains.

Potential profit increase with MSO model, comparing regenerative dairy and intensive.



Graph 2 shows that the effects of moving to MSO vary between farm types in terms of the benefits achieved through increases in commercial returns. It is important to note that each situation is different as the changes required to move to MSO will depend on the characteristics of the land. Compared above are an intensive mainly houses dairy farm and a nature-friendly farm.

Both farms have the opportunity into increase profit through an MSO model. Nature friendly dairy farms were found to have the most opportunity for profit gain through an MSO model as they maximise grazing periods outside. A nature-friendly system often falls in line with an MSO model, working on the idea of decreasing reliance on input. It should be noted that the improvements in revenues are calculated before any potential support payments are considered. A nature-friendly farm could push the potential profit even further than the estimated MSO point of profit through the use of environmental land management schemes.

Moving farm businesses to operate at the MSO has been shown to help farms to become more profitable, whilst at the same time reducing pressures on the environment, benefitting biodiversity and enabling farms to become more resilient to external economic and climatic shocks. The importance of this has been thrown into sharp focus by the Government's most recent UK Climate Change Risk Assessment which has highlighted agriculture as one of the most exposed sectors to climate change, due to a lack of policy and action to promote resilience across the sector.


ROSS HODDINOTT/2020VISION

CASE STUDY

Raisgill Farm, Cumbria

This dairy business had been a typical farm with high levels of rainfall that consequently experienced seasonal challenges with hay and silage making. The practice in the business had been to intensify as much as possible and push outputs. Fertilisers were used extensively on the farm, and cake was used liberally in the parlour, partly to meet the milk buyers' specifications. At the time of the MSO study the farm was transitioning from one generation to the next.

The older generation was apprehensive of affecting output volumes whereas the younger generation had concerns about the impact of agri-chemicals on soil fertility and animal welfare. After some debate, a programme to move to MSO was adopted. This involved a reduction in purchased inputs for the farm and the parlour. Performances, in business terms, improved and the older generation gave its full support to the programme commenting:

"I was pleasantly surprised by the improvements and recommend the practices involved in getting to MSO"
- Steve Dunning, dairy farmer

Maximum Sustainable Output (MSO) in dairy farm businesses have access to two different sources of energy: free-issue energy delivered by nature (eg solar power) and industrial energy embedded in purchased supplies such as fertilisers, sprays and feed concentrates.

The MSO economic model breaks down variable costs into these two components, with the costs associated with free-issue energy sources defined as 'productive variable costs' (PVCs) and those associated with industrial energy defined as 'corrective variable costs' (CVCs).

- **Productive Variable Costs (PVC)** – these are the essential or unavoidable costs incurred when producing within the confines of the naturally available resources – this includes seed, bedding, contract labour, essential vet and medication costs, etc.

- **Corrective Variable Costs (CVC)** – these are avoidable or non-essential costs associated with production above what is possible to be produced using the naturally available resources (eg artificial fertilisers, plant protection products, or bought in feed - inputs with an industrial energy content).

The 'sweet spot' - or MSO - point on a farm is to be found when outputs are maximised without incurring any CVCs. This results in bigger profits, less energy consumption (taking the farm towards net zero), and reduced pressures on the environment. This closer relationship with nature also improves soil health, boosting a farm's resilience to climate-related shocks like flooding and drought.

In the Nethergill approach, analysis starts by calculating variable costs against revenues. Most dairy farm businesses use purchased inputs, such as fertiliser, at a higher rate than other farm types, to boost outputs. Consequently, these businesses deliver the lowest '**first level contributions**' in farming at, typically, 49 per cent.

A '**second level contribution'** is then calculated, deducting fixed costs such as those necessary to run the business - legal compliance, running costs, and so on. This gives an indication of true operating profitability. Adding in support payments such as ELMS income delivers a **'third level contribution'.** Although support levels are lowest for dairy farming at just seven per cent, fixed costs burdens in dairy farming are also relatively low, resulting in second level figures for dairy that are the highest in farming, at around 17 per cent. Maximising this second level contribution figure, rather than focusing on outputs or yields, is the primary financial objective for a profitable farm business.

What MSO approaches mean for a dairy farming future

Applying the principles of MSO theory to dairy businesses will be beneficial and worthwhile, both for farmers and farm animals. The livestock farm element of a dairy business will optimise its commercial performance when:

- Herds comprise breeds that have naturally evolved to take advantage of regional conditions
- Animals are capable of living outdoors on a year-round basis
- Animals are all-grass fed
- Attention is given to growing the best grass possible and grazing it effectively
- All inputs with an industrial energy content, such as fertilisers, sprays, food concentrates and supplements, are minimised (some milk product specifications will make complete elimination impossible)
- Fixed costs comprise no more than 40 per cent of sales revenues before support
- Variable costs are contained within the range of five per cent to 15 per cent of sales revenue before support

The milking parlour element of a dairy business will optimise its commercial performance when:

- The milking cows deliver 4,500 to 7,000 litres/cow pa and enjoy four to six+ lactation cycles in a lifetime of service
- The farm component of the business is made to break even, at least, through transfer pricing practices

Dairy businesses may have bigger revenues and better profit streams than other types of farming but these businesses will still be small in relation to other players in the food supply chain and it is all too easy for their interests to be crushed by the actions of large corporate players. Dairy farms have the potential to operate at the MSO, reducing environmental risks and increasing farm resilience as well as farm profitability, but to support this, it will be necessary to ensure that oppressive supply chain policies and practices do not prevent farms taking the positive steps towards this lower-input, higher profit way of farming.

"Protecting water quality is essential for society and central to the future of regenerative dairy farming. The water cycle is as crucial as healthy soil to a regenerative farming system, and this approach gives us a much clearer picture of where the risks are, what is driving them and where action can make the biggest difference.

"By embedding nutrient footprinting and water risk mapping into our regenerative model, First Milk is demonstrating how to strengthen safeguards for our rivers and landscapes while maintaining a productive, resilient dairy sector. It is also an important part of our wider work to build robust evidence around the real-world environmental outcomes that regenerative dairy farming can deliver.

"Critically, this is not about asking farmers to choose between performance and environmental responsibility. Our data shows that productive dairy farms can also have a lower nutrient footprint. This approach enables targeted, practical, evidence-led change that protects rivers, strengthens farm resilience and delivers long-term value for our farmer members, customers and communities."

Lee Truelove, First Milk's Director of Regenerative Farming & Agriculture

For dairy businesses, resilience increasingly depends on treating nature not as an optional extra, but as a core part of the farm business model. Optimising grazed dairy farming is one clear way to improve productivity by reducing costs of feed, however the UK is set to see more extreme weather as climate change progresses. Wet winters paired with summer droughts are putting pressure on grazed systems. Nature-friendly solutions including healthy soils, deep-rooting pastures, diverse habitats, clean water and well-managed grazing all help farms reduce reliance on costly inputs and withstand drought and flooding. The summer of 2026 has seen milk volumes drop as high stress continued to suppress yields and cut forage production, tightening margins further[24]. The following case studies show how farmers are already putting nature at the heart of their businesses, demonstrating that dairy can remain productive and profitable while supporting the natural systems it relies on.

[24] GB milk deliveries: Milk volumes decline as high heat continues | AHDB

GUY EDWARDES/2020VISION

CASE STUDY

Yard Farm, Leicestershire

The Power of Dairy Co-operatives

The family business has a milking herd of 250 pedigree Holsteins and 100 followers over 110 hectares. For the last 30 years they have supplied milk to Long Clawson Dairy, a farmer-owned co-operative of 31 family dairy farms. The co-operative not only provides a market for members' milk but also supports farmers to reduce emissions, improve biodiversity, enhance water quality and strengthen animal welfare standards. Ruth Grice is Long Clawson Dairy's Farm Liaison and Sustainability Manager. She says:

"I want our cows to still be able to graze the fields in 20 years' time, and if the weather continues as it is, with these hot, dry summers, we are going to have to make changes."

In the past few years, 1.5km of new hedgerows have been planted at Yard Farm, mainly on land purchased in the 1980s which was in poor condition after years of intensive arable production. New trees have also been planted within established hedgerows every year for more than a decade, as part of a Leicestershire County Council scheme. The family's cows are grazed seasonally at Yard Farm. Typically, the herd is outside between early April and mid-October, depending on the field condition. "We're on heavy clay soils here, and we really can't afford any poaching of the grass," Ruth says. Grazing is split into blocks, with grass conditions monitored daily and animals rotated to allow suitable recovery periods. Grass growth is maintained through a combination of organic fertiliser and additional nitrogen. When a grazing field starts looking tired, it is planted with crops such as winter wheat, winter barley or maize to provide feed for when the cows are housed over winter.

This combination of crop breaks and cow manure means that average soil organic matter is around eight or nine per cent, with some fields reaching 12 or 13 per cent. To ensure the soil is not disturbed excessively, the farm uses a min-till approach to crop production, while contractors use lighter machinery and make fewer passes when producing silage or spreading slurry.

The Long Clawson Dairy co-operative has supported its 31 farmer-owners to engage with government schemes such as the Sustainable Farming Incentive. Financial support for actions such as hedgerow management and cultivating herbal leys reduces the business risks of making environmental improvements. The co-operative has ambitious targets of reducing carbon emissions by 30 per cent by 2032, while also delivering its own farm assurance standards covering animal welfare, improving water quality, increasing biodiversity and supporting local communities.

Since 2020, Long Clawson Dairy's farmer-owners have measured their carbon emissions annually through the co-operative's sustainability programme, receiving expert analysis and recommendations on how to improve performance. Ruth has seen how collective action enables farmers to share knowledge, access support and adopt nature-friendly practices more confidently.

"Ultimately, dairy farms are businesses that need to be profitable. Because the majority operate as 'price takers', where the price paid per litre of milk sold is determined by the buyer, margins can be tight when the global milk price is low. Because of this, dairy farmers need to be supported to undertake nature-friendly farming initiatives, whether that's through government or the supply chain."

- Ruth Grice, Farm Liaison and Sustainability Manager

JOHN COTTLE

Part three: Recommendations

Dairy farming can be part of a thriving countryside, but only if the sector is helped to move away from high-input, high-pollution systems and towards farming that works with nature. Many dairy farmers already want to protect soils, rivers and wildlife while running viable businesses. The barrier is not a lack of good practice; it is a food and farming system that too often rewards volume over resilience, pushes risk back onto farmers, and fails to account for the damage caused by pollution, imported feed and declining natural assets.

The Wildlife Trusts want a fair, practical and phased transition for dairy farming. This means combining stronger safeguards for the highest-risk systems with investment, advice and market reform so that farmers are supported to reduce pollution, restore nature and build resilient farm businesses. Action is needed from government, regulators, supply chains, certification bodies, public institutions and consumers.

Action 1: Strengthen regulation for the highest-risk dairy systems

Government and environmental regulators should:

- Extend environmental permitting to the most intensive and highest-risk dairy systems, including large housed units and no- or very-limited-grazing systems where slurry, feed and land-use pressures are greatest.

- Require robust environmental risk assessments for new or expanding intensive dairy units, including slurry storage, clean and dirty water separation, nutrient management, feed sourcing and off-site manure use.

- Use permitting to prevent pollution rather than simply punish it after the damage is done, while ensuring requirements are proportionate and do not unfairly penalise well-managed family farms. Increase inspection, advice-led compliance and enforcement capacity so that existing rules on water, slurry and nutrient management are applied consistently across the sector.

- Permitting must learn from the strengths and weaknesses of existing pig and poultry regimes. It should be targeted at the systems most likely to cause harm, designed around catchment risk, and accompanied by practical support so farmers can meet legal standards and avoid costly pollution incidents.

Action 2: Help farmers invest in slurry, water and pollution-prevention infrastructure

Government should:

- Provide low- or no-interest loans, advance payments or revolving funds so farmers can install slurry storage, roofing, yard works, clean and dirty water separation, riparian fencing and other pollution-prevention measures without impossible upfront costs.

- Review why previous capital grants have not had sufficient uptake from dairy farmers, and redesign schemes around the real cash-flow constraints faced by farm businesses.

- Ensure public funding supports the 'no regrets' actions that reduce pollution quickly, including slurry covers, sufficient storage capacity, rainwater separation, nutrient testing, soil health measures and buffer strips.

- Public money should only support cohesive actions, that are completed together, not in isolation which would leave farm practice open to pollution risk still. Funding slurry storage in isolation without nutrient management plans in place would not see the benefit the actions set out to achieve.

- Make farm infrastructure funding simple, accessible and timely, with particular support for tenant farmers, smaller farms and new entrants.

Action 3: Put trusted advice back at the heart of change

Government, regulators and delivery bodies should:

- Expand Catchment Sensitive Farming and Environment Agency farm advice so more farmers can access trusted, independent, face-to-face support.

- Fund demonstration farms, farmer-to-farmer learning and business support, including MSO analysis, to show how lower-input dairy can improve profitability and resilience.

"Catchment Sensitive Farming are very keen to work with dairy farmers. We have a lot to offer in terms of advice and support for capital grants, that will reduce their environmental impact. We normally have to be very careful at events when we talk about our support for grant as we can become very quickly overwhelmed with enquires from low priority farmers and farming agents, this makes us less effective over all! The genius of working with dairies like Long Clawson is that every dairy farmer supplier is a high priority farmer deserving of our help and support. This allows us to go all out and promise help and support to every farmer that supplies them. This removes a whole process of sifting and desk-based risk assessments that in themselves take a lot of time. The result in this case is 20 farmers; 15 farmers attended on joint event on the 24th March this year. All of them have received a visit from their Catchment Sensitive Farming Advisor and 14 of them have been sent support letters for when DEFRAs capital grant scheme opens later this month. They will also be sent an email when the scheme opens reminding them to submit their application with the provided support form."

CSF Bob Marsden, East Midlands River Basin District Co-ordinator

- Ensure advice is linked to regulation and funding, so farmers receive clear guidance on what they need to do, how to pay for it and how it will reduce risks to their business and the environment.

- Support advisors with the skills and time to work at both farm and catchment scale, rather than relying on one-off visits or generic guidance.

Action 4: Require nutrient planning that works for farms, rivers and catchments

Government should:

- Require all dairy farms to produce one clear, comprehensive nutrient management action plan that satisfies farm regulation, assurance and supply-chain requirements, avoiding duplicated paperwork. Reintroduce financial support for nutrient management planning and ensure plans include soils, slurry, manure, fertiliser, feed inputs, livestock density, off-site manure movements and the destination of exported nutrients.

- Develop farm-gate nutrient balance sheets to help farmers understand whether nutrient inputs and outputs are in balance, and where changes can reduce waste, pollution and costs.

- Use anonymised and aggregated farm data to inform catchment nutrient budgets, so local decisions on planning, permitting and investment reflect the real nutrient pressure on rivers and protected sites.

- A national nutrient strategy should bring this together, setting a clear direction for reducing nutrient losses to water, soil and air while avoiding pollution-swapping between sectors or catchments. Catchment nutrient budgets should guide regulation, public funding and planning decisions, helping to restore rivers and unlock genuinely sustainable development.

Action 5: Stop high-risk expansion in vulnerable catchments

Planning authorities and regulators should:

- Prevent new industrial dairy units, and the expansion of existing high-risk units, in catchments where protected sites are already failing or at risk because of nutrient pollution.

- Require any proposed dairy expansion in sensitive catchments to demonstrate genuine local nutrient neutrality, including robust mitigation for off-site manure, feed and land-use impacts.

- Ensure planning decisions consider cumulative impacts across the catchment, rather than assessing each development in isolation.

Action 6: Back nature-friendly, organic and regenerative dairy

Government should:

- Use Environmental Land Management schemes and future farming policy to support lower-input, pasture-based, organic and accredited regenerative dairy systems.

- Provide transition payments, maintenance payments and business advice for farmers reducing artificial fertiliser, imported feed, pesticide use and pollution risk.

- Set clear targets for increasing organic and other credible nature-friendly dairy systems, supported by conversion advice, market development and public procurement.

- Support diversification into mixed farming, agroforestry, herbal leys, species-rich grassland, wetland restoration and riparian habitat where these improve farm resilience and nature recovery.

Action 7: Make supply chains fair, transparent and accountable

Processors, retailers, assurance schemes and government should:

- Ensure milk buyers reward farmers for reducing pollution, improving soil health, protecting water and restoring habitats, rather than locking them into specifications that drive higher inputs and higher risk. Strengthen fair dealing rules and enforcement so farmers are not forced to carry environmental and financial risk while value is captured elsewhere in the chain.

- Require processors, supermarkets and food service companies to report and reduce the environmental footprint of the dairy they sell, including imported feed, nutrient losses, water impacts and greenhouse gas emissions.

- Raise assurance standards so schemes such as Red Tractor drive measurable environmental improvement, including nutrient balance, slurry management, riparian protection and soil health.

Action 8: Use public procurement to grow the market for better dairy

Government and public institutions should:

- Use schools, hospitals, prisons and other public settings to create reliable demand for dairy produced to high environmental and welfare standards. Update public food standards so public money supports nature-friendly, lower-pollution and fairly-traded dairy where dairy is served.

- Use procurement budgets to support shorter, more transparent supply chains and regional markets that reward farmers for better practice.

Action 9: Put dairy feed and land use into the Land Use Framework

Government should:

- Assess the land used in the UK and overseas to grow feed for the UK dairy herd, including the impacts of cereals, maize and imported soy. Ensure the Land Use Framework considers where land is best used for nature recovery, climate resilience, direct human food production, agroforestry, flood management and lower-input grazing.

- Support a shift away from feed-reliant dairy systems where they drive pressure on land, water, soils and habitats.

Action 10: Protect UK farmers from lower-standard imports

Government should:

- Introduce core environmental and welfare standards for dairy imports so trade deals do not undercut farmers who are meeting higher standards at home.

- Ensure imported dairy products are not produced through practices that would be unacceptable in the UK because of pollution, deforestation, poor welfare or weak enforcement.

- Use trade policy to support a race to the top, not a race to the bottom.

Action 11: Support a managed shift towards less and better dairy

Government, retailers and food service companies should:

- Support healthy, sustainable diets that make better quality dairy the norm, while reducing dependence on high-volume, low-margin, high-impact production.

- Reduce food waste and unnecessary use of dairy ingredients in ultra-processed foods.

- Work with farmers and supply chains to manage changes in demand fairly, so environmental gains do not come at the expense of farm livelihoods.

- Build a more resilient domestic dairy market focused on quality, transparency, fair returns and lower environmental impact.

Together, these actions would help move dairy onto a nature-positive pathway: one that supports farmers, cleans up rivers, reduces climate and air pollution, restores habitats and gives the public confidence that the dairy they buy is produced within environmental limits.

Appendix: The Dairy Farming Business in 2026

Introduction

This report is based on an analysis of data drawn from a database of over 350 farm businesses that were evaluated by Nethergill Associates in its' work on the concept of maximum sustainable outputs (MSO theory) undertaken since 2018.

Context

Comparative Performances

A comparison of the difference in performances between different sectors of the farming economy, each represented by a typical farm businesses, is set out in the following table.

Comparative Performance Indices (Extracts from nethergill Database)				
Management Accounts	**Arable**	**Dairy**	**Grassland**	**Upland**
Farm Output	100.00	100.00	100.00	100.00
Variable Costs	**42.93**	**50.76**	**46.60**	**45.00**
1st Contribution	57.07	49.24	53.40	55.00
Fixed Costs	**64.58**	**31.70**	**37.78**	**56.86**
2nd Contribution	-7.51	17.54	15.62	-1.86
Total Support	**21.64**	**6.98**	**17.26**	**48.67**
3rd Contribution	14.14	24.53	32.88	46.82
Total Assets	**837.25**	**413.14**	**680.56**	**908.33**
2nd Contribution Margin (%)	-7.51	17.54	15.62	-1.86
Assets Turn (x)	0.12	0.24	0.15	0.11
ROTA (%)	**-0.90**	**4.25**	**2.30**	**-0.20**

Margins after variable costs were deducted from pre-support revenues, defining a 1st contribution, were at their lowest on the dairy farm, at 49.24 per cent. This reflects the heavier dependence of this sector on purchased inputs (at 50.76 per cent on this dairy farm) to boost output.

However, after fixed costs were deducted, margins defined as 2nd contributions, were at their best on the dairy farm, at 17.54 per cent. This reflects the lower relative burden of fixed costs in dairy farming (at 24.53 per cent on this dairy farm) which comes directly from its superior earnings opportunities when compared to other farming sectors. [Note: 3rd Contributions equate to EBITDA measures]

The dairy farm secured the lowest level of support, at just 6.98 per cent of sales value, amongst the other typical farm types.

A true measure of business performance is ***return-on-total-assets-employed*** (ROTA) which is analogous to the interest rate on bank deposits. Whereas, in 2026, a good interest rate at a bank would be five per cent this reflects a risk-free situation. Farming, or any business endeavour, is anything but risk-free and it would be reasonable (and essential) for a business to be rewarded for its risks. A suitable premium would be 10 per cent implying that the target ROTA objective for a farm business should be 15 per cent.

The dairy farm in the comparison table delivers only 4.25 per cent ROTA yet this is better than the rates achieved by the other farms. The challenges in delivering a 15 per cent ROTA are substantial but not impossible.

In general, the full database shows that 18 per cent of all farm businesses deliver negative 1st contributions. This means that these businesses are losing cash on every transaction. This signals an intrinsic un-viability (which subsequently gets masked by the support mechanisms that characterise the farming sector). The same data shows that only 20 per cent of farm businesses make a positive 2nd contribution.

Those businesses that fail at this level are de-capitalising and would simply fall into bankruptcy without support.

Support payments transform the apparent economics. After support payments, where profitability is defined as a 3rd contribution, only 20 per cent of farm businesses continue to 'fail'. Despite the many criticisms levelled at the support payments system, it has acted as a price support mechanism and maintained business continuity in a distressed sector of the economy. Notice the impact on an upland farm; real losses equivalent to -1.86 per cent of sales (the 2nd contribution) are transformed into apparent profits of 46.67 per cent (the 3rd contribution).

[H2] The structure and scope of a dairy farm
A dairy farm business typically comprises two sequentially-related strategic business units (SBUs). It will comprise a livestock farm and a milking parlour. The livestock farm will follow the MSO economic model and the milking parlour, which has the characteristics of a factory, will follow the standard economic model for business.

However, there are two important variations from this norm.

Some dairy businesses operate a flying-herd model. In these businesses cows are acquired directly for milking and no animals are bred. These dairy farms perform well in comparison to others but they are much more vulnerable to animal health problems and they ignore what may be bad farming practices to be found in the supply chain for milking cows. The better performances come from the avoidance of risks in breeding stock.

Some dairy farms will use all or part of the milk produced to make added-value products especially cheese. Provided these businesses transfer the milk from the parlour to the cheese-making facilities, all the SBUs (farm, parlour, cheese-making) can do well. Cheese, as a branded product, can command a sufficiently large margin to reward the entire enterprise.

Farm practices fall into two main groups dependent upon the grazing strategies adopted.
Some farms will have a herd that is all-grass fed. Other farms will adopt a zero-grazing regime. The regime adopted will usually reflect the practical realities at the particular farm. Few dairy farm businesses will feed their calves with cow's milk and prefer to use milk substitutes. Male calves are usually sold off to finishers at the earliest opportunity.

The Study Group

The study group comprised 17 dairy farms where the data was current and extensive. The farms were drawn from all parts of the UK except Scotland

- South of England 7 farms
- North of England 4 farms
- Wales 4 Farms
- Ulster 2 farms

The average output of the group was £755,000 per farm with two farms delivering over £1,000,000 in sales value and three farms delivering under £100,000

Concepts used in the analyses

Farm v Factory

A 'Typical Dairy Business' will be used in this section of the report as a reference point. It can be split up into two component SBUs. The table below shows the management accounts for such a business, as they were presented. All the numbers are indexed on the pre-support sales revenues attributed to the livestock farm SBU.

Typical Dairy Business	SBU-1		SBU-2			
Indexed Management Accounts	**Farm**	**%**	**Factory**	**%**	**Business**	**%**
Business Revenues	**100.00**	**100.00**	**289.99**	**100.00**	**389.99**	**100.00**
Variable Costs	78.32	78.32	88.34	30.46	166.66	42.73
1st Contribution	**21.68**	**21.68**	**201.65**	**69.54**	**223.33**	**57.27**
Fixed Costs	61.61	61.61	78.56	27.09	140.17	35.94
2nd Contribution	**-39.93**	**-39.93**	**123.09**	**42.45**	**83.16**	21.**32**
Other Farm Income	0	0.00	1.28	0.44	1.28	0.33
Environmental Payments	68.19	68.19	0	0.00	68.19	17.49
Total Support Payments	68.19	68.19	0	0.00	68.19	17.49
3rd Contribution	**28.26**	**28.26**	**124.37**	**42.89**	**152.63**	**39.14**

The farm delivers a negative 2nd contribution of -39.93 per cent. In contrast, the parlour returns a positive 2nd contribution of 42.45 per cent and the combined business 21.32 per cent. Whilst this overall performance looks creditable the parlour is effectively subsidising the losses on the farm. This raises a key question: if the farm is a vital part of an integrated business why is it being subsidised by the parlour?

Transfer Pricing

If a farm is to be an integral part of a dairy business it should, at the very least, break-even. To do this, the losses at the 2nd contribution level (39.93) for the 'Typical Dairy Business' should be added as an income from the parlour to the farm and taken as a charge on the revenues of the parlour, as in the table below.

Typical Dairy Business	**SBU-1**		**SBU-2**			
Indexed Management Accounts	**Farm**	**%**	**Factory**	**%**	**Business**	**%**
Recorded Revenue	100.00	100.00				
Transfer Price to Farm	39.93	39.93				
Business Revenues	**139.93**	**139.93**	**289.99**	**100.00**	**389.99**	**100.00**
Recorded Variable Costs			88.34	30.46		
Transfer Cost to Parlour			39.93	13.77		
Total Variable Costs	78.32	78.32	128.27	44.23	206.59	52.97
1st Contribution	**61.61**	**61.61**	**161.72**	**55.77**	**223.33**	**57.27**
Fixed Costs	61.61	61.61	78.56	27.09	140.17	35.94
2nd Contribution	**0.00**	**0.00**	**83.16**	**28.68**	**83.16**	**21.32**

This may appear academic as the overall position has not changed. However, this restructuring will offer a better basis for effective decision-making. With transfer pricing, the farm now breaks-even and the parlour experiences a reduction in its 2nd contribution from 42.45 per cent to 28.68 per cent, which is more realistic.

The impact of transfer pricing becomes more dramatic when milk is diverted into cheesemaking. In one interesting case, a cheesemaker was producing a highly distinctive and sought-after product. Initially, milk was transferred to the cheesemaking factory at its market price of £0.32/litre. Profits were made on the business as a whole (comprising a farm SBU, a milking parlour SBU, and a cheese factory SBU) and all seemed well. However, on this basis of accounting, losses were incurred on the farm SBU yet it was the unique characteristics of the grazing that really differentiated the cheese. When a proper transfer price was applied, at £1.21/litre, to allow the farm to be profitable, the cheese prices were increased accordingly and the market simply absorbed the differences with little difficulty.

Maximum Sustainable Output (MSO)

Farm businesses do not follow the standard economic model of the firm. The reason lies in the impact of having access to two different sources of energy. There is the free-issue energy that is delivered by nature in the form of solar power, and its photosynthetic component, and there is the industrial energy embedded in purchased supplies such as fertilisers, sprays and feed concentrates. Energy from these sources become constituents in food products. Other forms of industrial energy, such as tractor diesel, are enablers (not constituents) and can be treated differently as conventional costs. The MSO economic model recognises this by de-composing variable costs into two components.

Those costs associated with free-issue energy sources, and working with nature, are defined as productive variable costs (PVCs) and those associated with embedded industrial energy, and substituting for nature, are defined as corrective variable costs (CVCs). The MSO point on a farm (sometimes referred to as the sweet spot) is to be found when outputs are maximised without incurring any CVCs. At this point three things coincide; profits

are maximised (measured at the 2nd contribution level); the energy consumption in the business is minimised (effectively taking the farm to net zero); and there will be an unadulterated natural environment optimised for production. The optimised environment will not necessarily deliver biodiversity net gain (BNG), but it will increase the bioabundancy that prevails in the habitat.

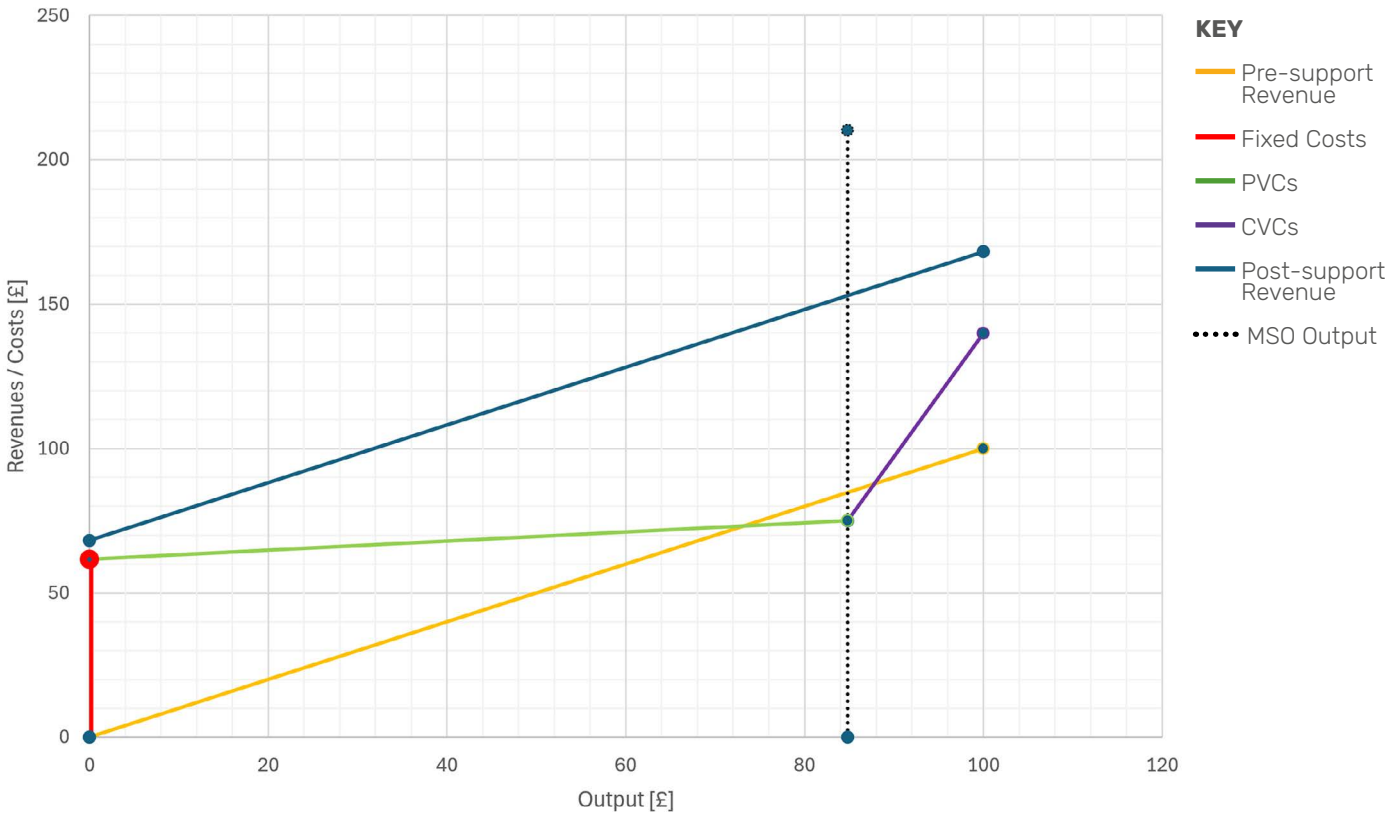
The table below shows the 'Typical Dairy Business' data re-cast in MSO format for the farm.

Typical Dairy Business	At MSO	
Indexed Management Accounts	**Farm**	
Business Revenues	**100.00**	**84.83**
PVCs	13.41	13.41
CVCs	64.92	
Total Variable Costs	78.32	13.41
1st Contribution	**21.68**	**71.42**
Fixed Costs	61.61	61.61
2nd Contribution	**-39.93**	**9.81**

When all the CVCs are eliminated on this farm the output falls by 15.15 per cent to its MSO point at 84.83. However, the 2nd contribution increases from -39.93 per cent to 9.81 per cent.

The break-even chart for this MSO model is shown below.

Dairy Business: Break-even Chart Farm SBU



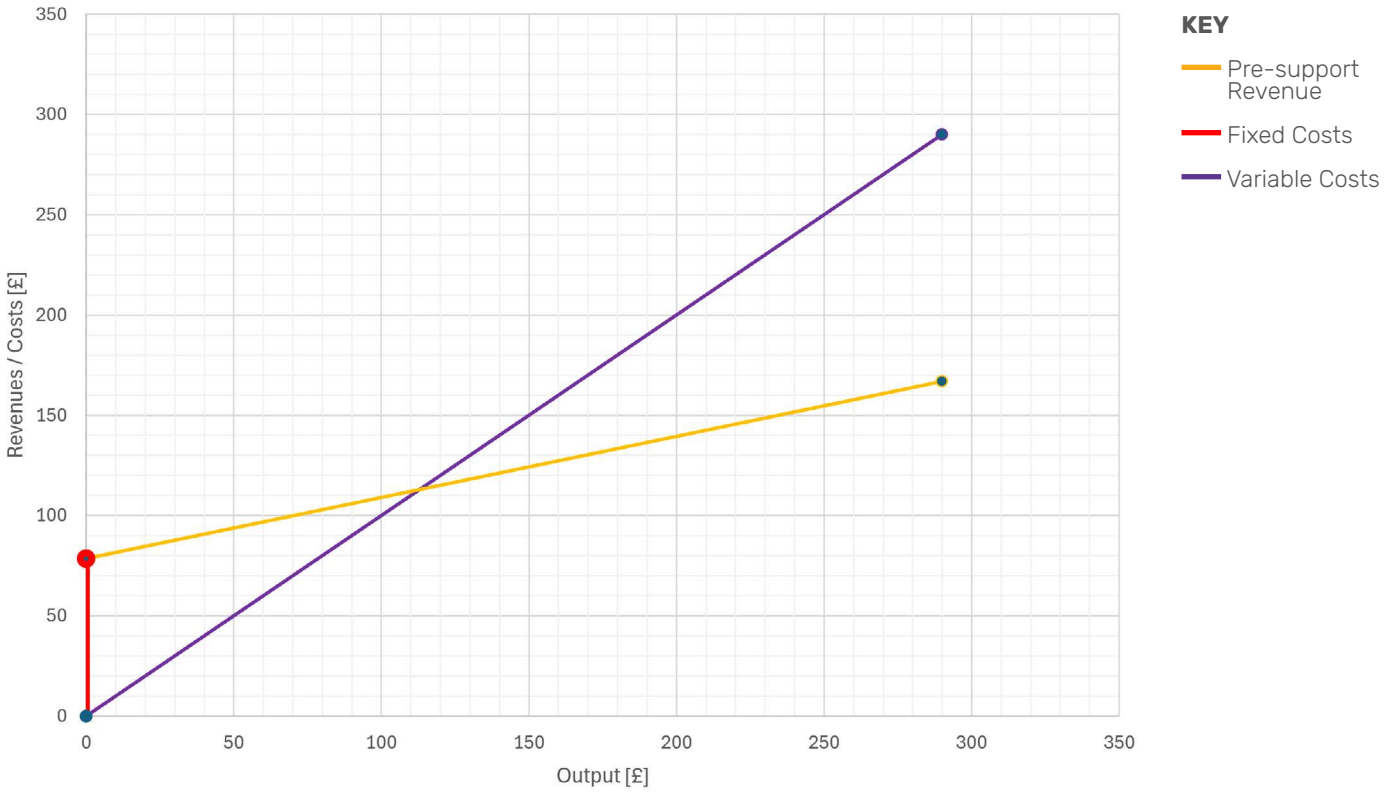
The Farm SBU breaks-even on its pre-support revenue (where the green and orange lines cross) just before all the free-issue energy is used up at the MSO point. Beyond this point the CVCs cut in and the Farm SBU breaks-back into unprofitability (where the purple and orange lines cross) on its pre-support revenues. Beyond the MSO point every £1 of extra revenue costs £4.28 and this measures the adverse cost leverage of CVCs on profitability.

A farm business is more resilient when the break-even point on its pre-support revenues occurs at a lower percentage of its total output. This can be measured by a Resilience Index (RI) which is 100 at no output (the case when fixed costs are zero); which is zero at full output when the 2nd contribution is zero; and which is negative when the 2nd contributions are negative. On this farm the RI is 27. On this scale the minimum acceptable threshold value is 30 and a good target would be 40+.

The parlour works on a factory model where all the variable costs are linear.

The corresponding break-even chart for the parlour is shown below. Its RI is 61. If transfer pricing is practised the farm RI improves to 45 from 27 and the parlour RI falls to 51 from 61. This is more realistic and reflects the value in adopting transfer pricing.

Dairy Business : Break-Even Chart for Milk Parlour SBU



Return on Total Assets Employed (ROTA)
ROTA is a two-dimensional relationship between ***assets turn***, which relates to the ***Balance-Sheet***, and ***margins***, which relate to the ***Profit & Loss Account*** in a business. The essential equation is set out below.

ROTA [R] = Return on Total Assets Employed
Margin (X) = 2nd contribution as a % of Sales
Assets Turn (Y) = Sales / Assets Employed

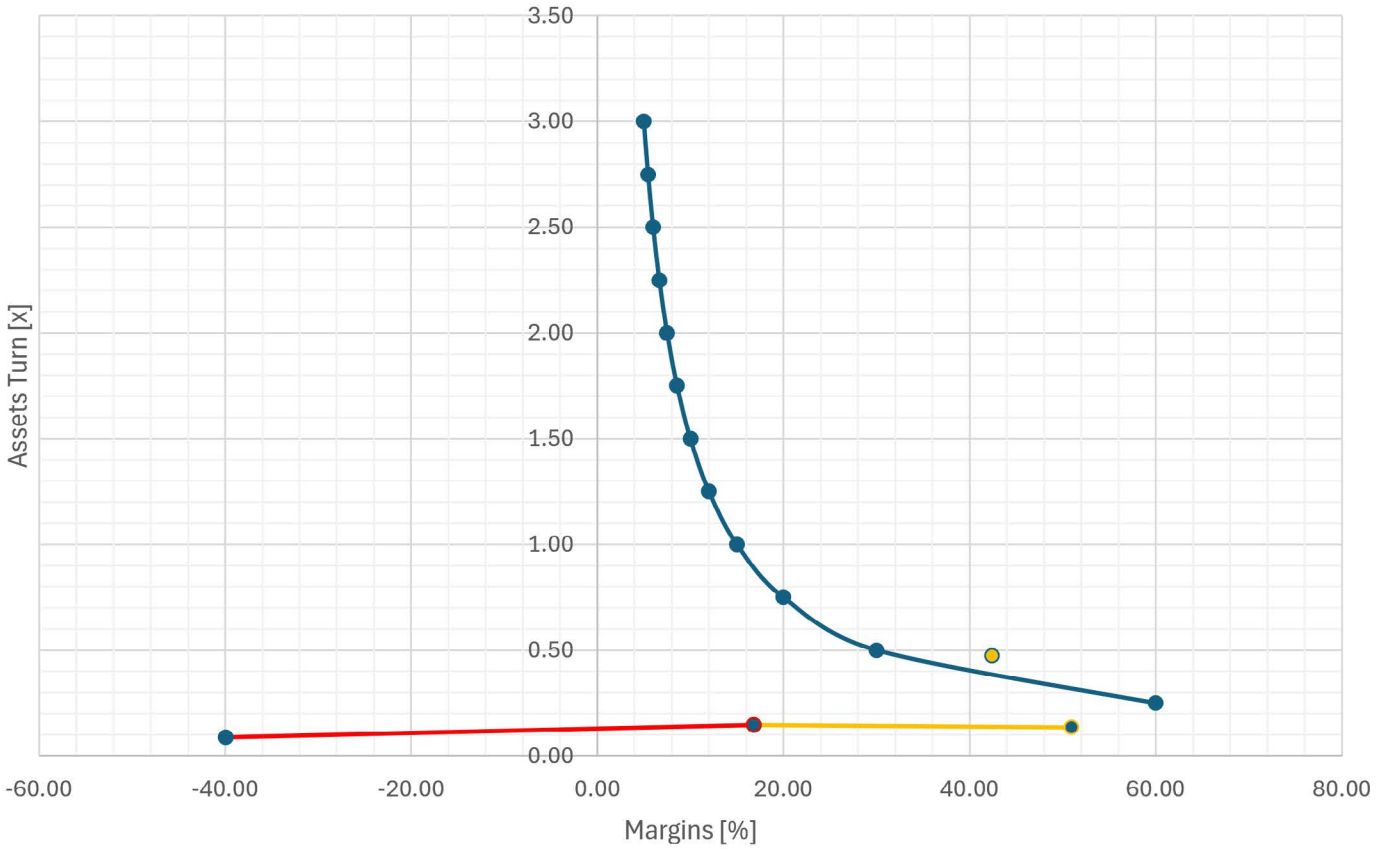
R=X*Y

The equation is the formula for an hyperbola. If a 15 per cent target is set for a business there will be an hyperbola describing an infinite set of combinations of assets turn and margins that will deliver a 15 per cent return.

For the 'Typical Dairy Business' its ROTA performance is shown in the chart below.

The blue curve is the hyperbola for a 15 per cent return.
The yellow dot is the performance of the parlour.
The red line is the effect of support payments on the performance of the farm and the orange line shows the further impact of moving to MSO.

Dairy Business : ROTA Performance Chart

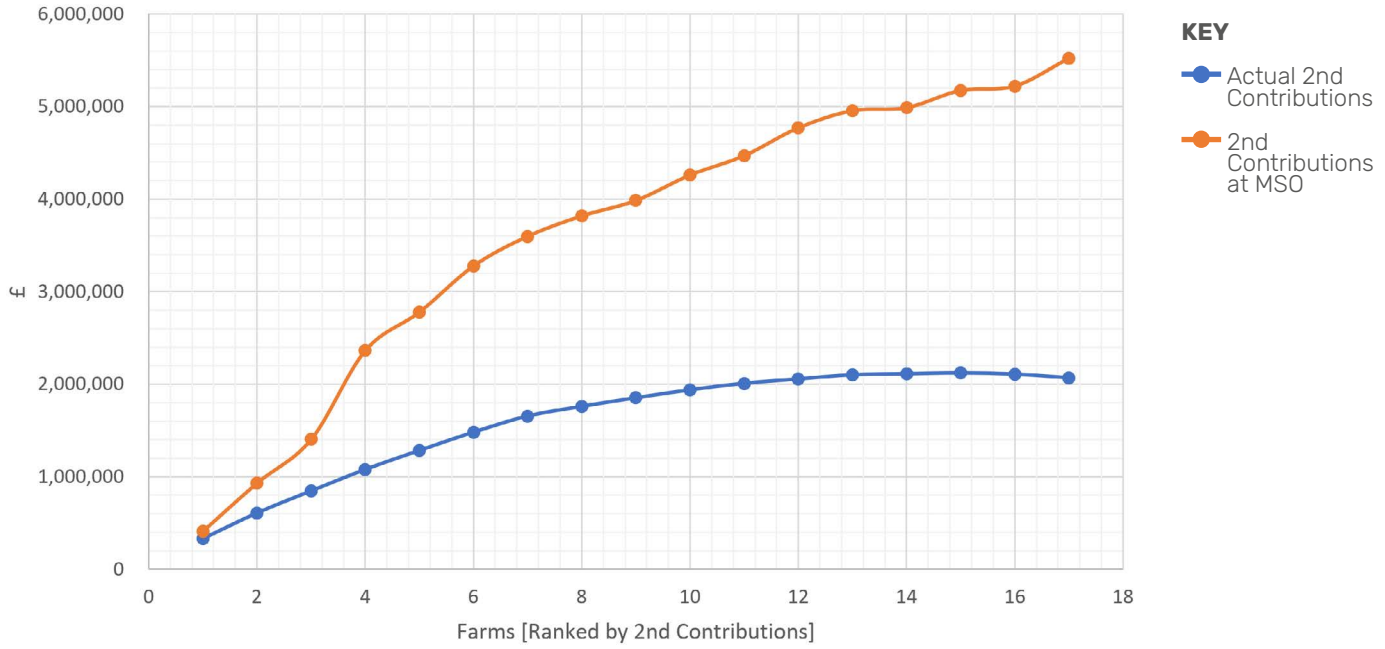


Findings from the study group

Patterns of Profitability

Three of the dairy farm businesses in the study group did not return a positive 2nd contribution. Only one of the businesses was operating below its MSO level of output. All the dairy businesses would benefit from moving the farm SBU to its MSO point.

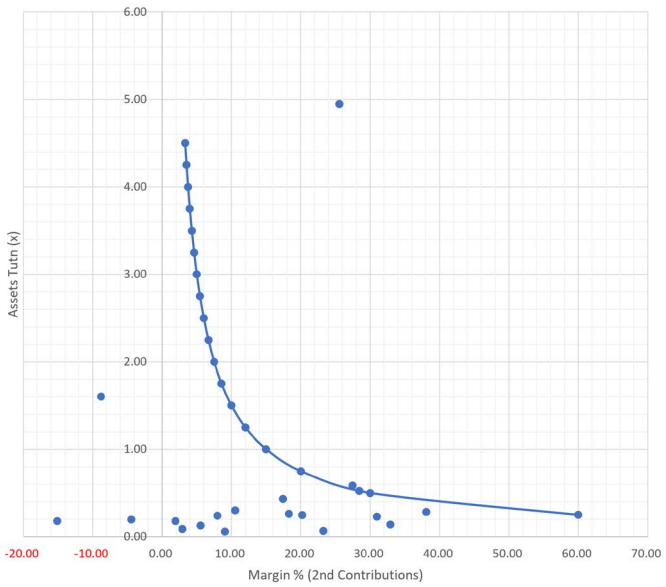
Impact of Moving to MSO



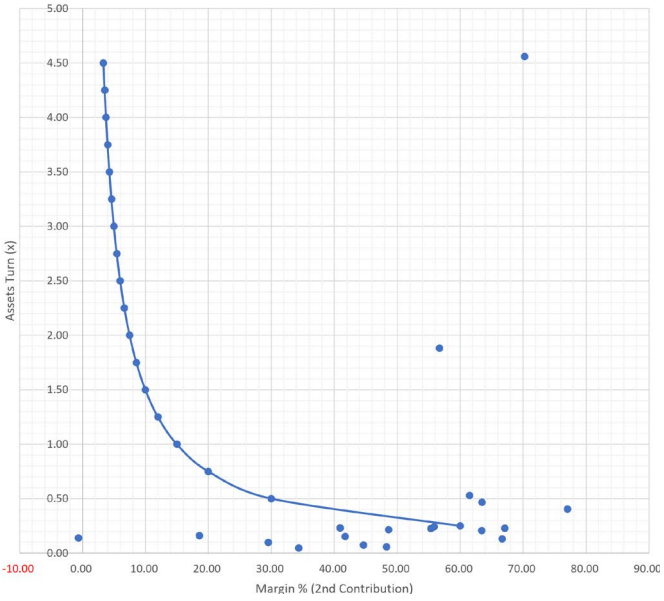
The chart above shows the cumulative growth of the 2nd contributions returned by the dairy businesses. Cumulative profitability peaked at farm number 14 in the study group and then declines as the unprofitable farms were added. If all the farms in the study group moved to MSO the 2nd contributions would grow substantially by 267 per cent in total.

The impact of moving to MSO can be seen for each of the businesses in the study group by comparing the ROTA performance as shown below.

ROTA Performances Actuals



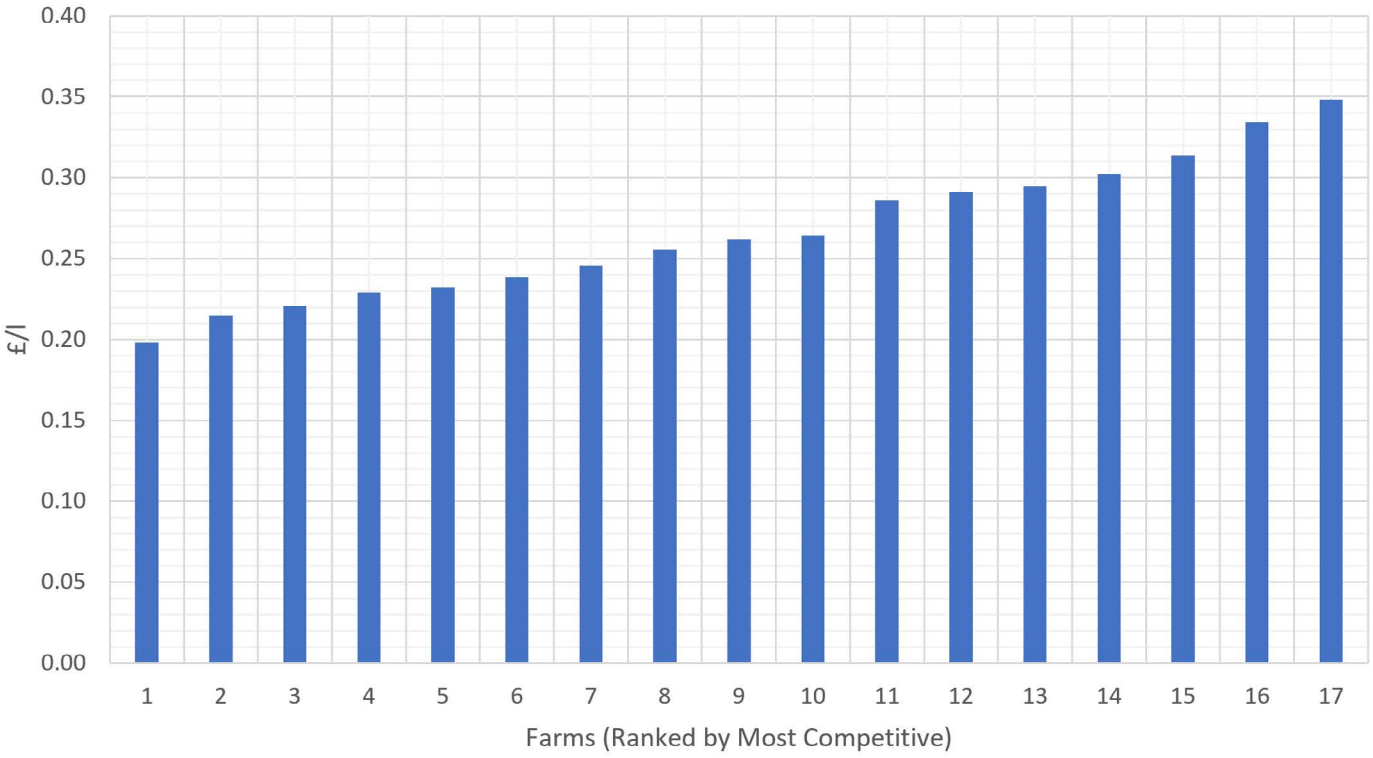
ROTA Performances At MSO



The cluster of points can be seen to have shifted towards better returns at MSO

Cost Drivers in Dairy Businesses
Production costs in the study group ranged from just under £0.20/litre to just under £0.35/litre as shown in the chart below.

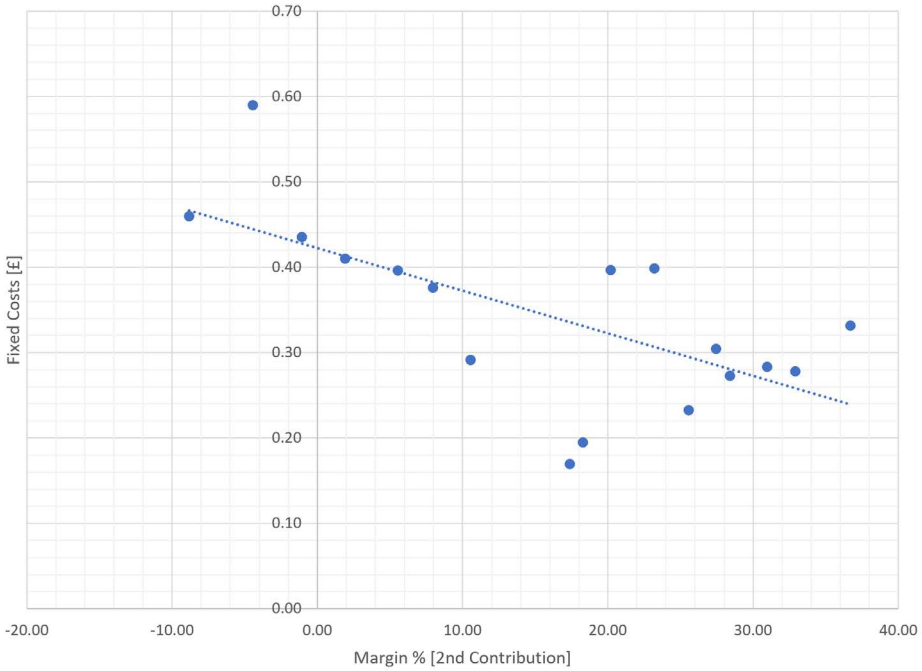
Milk Production Costs



At a milk price of £0.32/litre two of the businesses were uncompetitive and were decapitalising.
Fixed cost levels will have a critical impact on profitability in all businesses. For non-dairy farms in the UK, fixed costs average around 62.5 per cent of pre-support sales value (from the Nethergill Database). Few of these farms will return a positive 2nd contribution when its fixed costs exceed 40 per cent of pre-support sales. Dairy farms tend to experience lower fixed costs burden and the study group averaged 34 per cent of sales output before support.

The impact of fixed cost on profitability, for the study group, can be seen in the chart right.

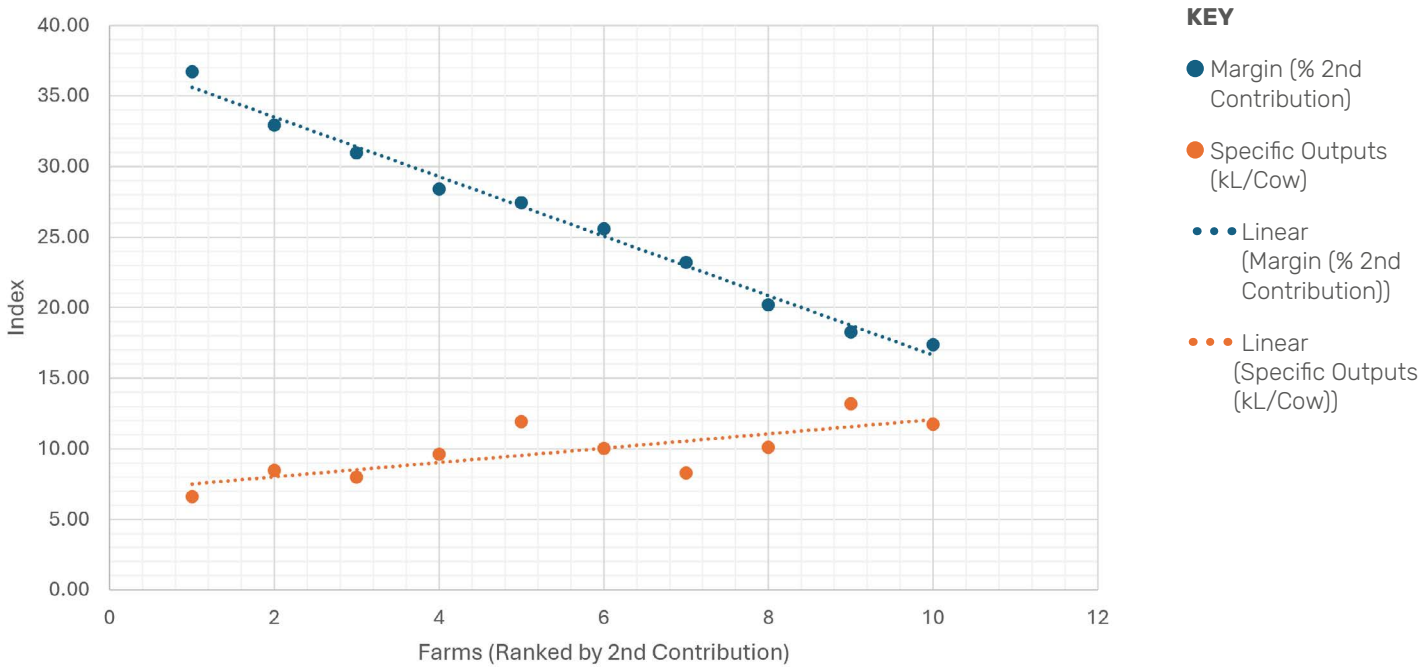
Impact of Fixed Costs on Profitability



The Productivity Paradox in Dairy Businesses

The specific outputs per cow, measured in litres/cow per annum, varied within the study group from 1,544 litres/cow pa to 13,197 litres/cow pa. However, for the 10 most profitable farms in the study group there was an inverse relationship between profitability and the specific output per cow. This is shown in the chart below.

Impact of Specific Outputs on Profitability

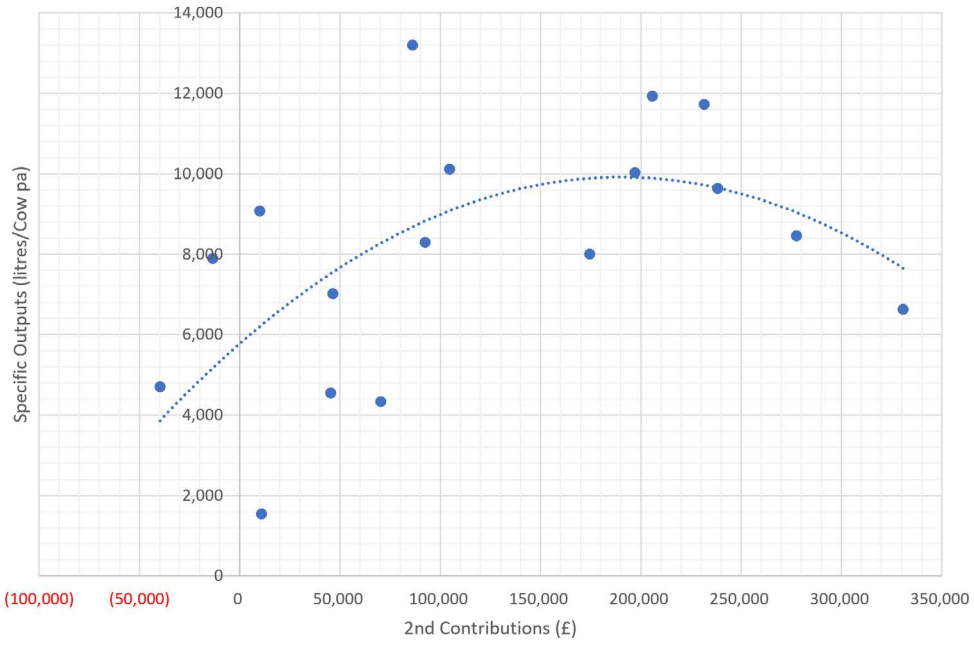


The average specific output of the study group was around 8,000 litres/cow pa. Output at this level equates to a 2nd contribution of about £120,000. If the farms in the study group all moved to an average, the specific output would fall to about 7,000 litres/cow pa but the 2nd contribution at this level would equate to £325,000. This indicates a trade-off between specific output and profitability.

There was a wide spectrum of relationships between specific outputs and 2nd contributions within the study group, but it was possible to find an 'optimised fit' with a polynomial regression. This analysis is shown right.

This clearly points to a limit in pressing cows to produce ever more and deliver ever growing levels of profit.

Optimised Outputs Actuals



Challenges

The Concept of Lifetime Costing Practices

As cows are pressed harder for output their useful productive life gets shorter. Cows producing over 10,000 litres per annum can expect just over two lactation cycles. In contrast, cows producing around 6,500 litres per annum can expect five to six lactation cycles. The lifetime outputs would seem to be maximised around 6,000 litres/cow pa and the costs per litre produced are minimised. This is shown (right) from research carried out by Nethergill Associates.

Other benefits accrue from a lifetime costing policy. Replacement rates are lowered, animal welfare improves; and profitability increases (although the investment in the herd will increase). However, this pattern of operating is not favoured by milk buyers.

Carbon-Offsets

Milk buyers are ever keen to minimise their collection costs. The driving force for this comes from a desire to reduce the carbon footprint of their operations. This translates into schemes to maximise the volumes at all collection points (which then reduces the number of collections and the consumption of hydrocarbon fuels).

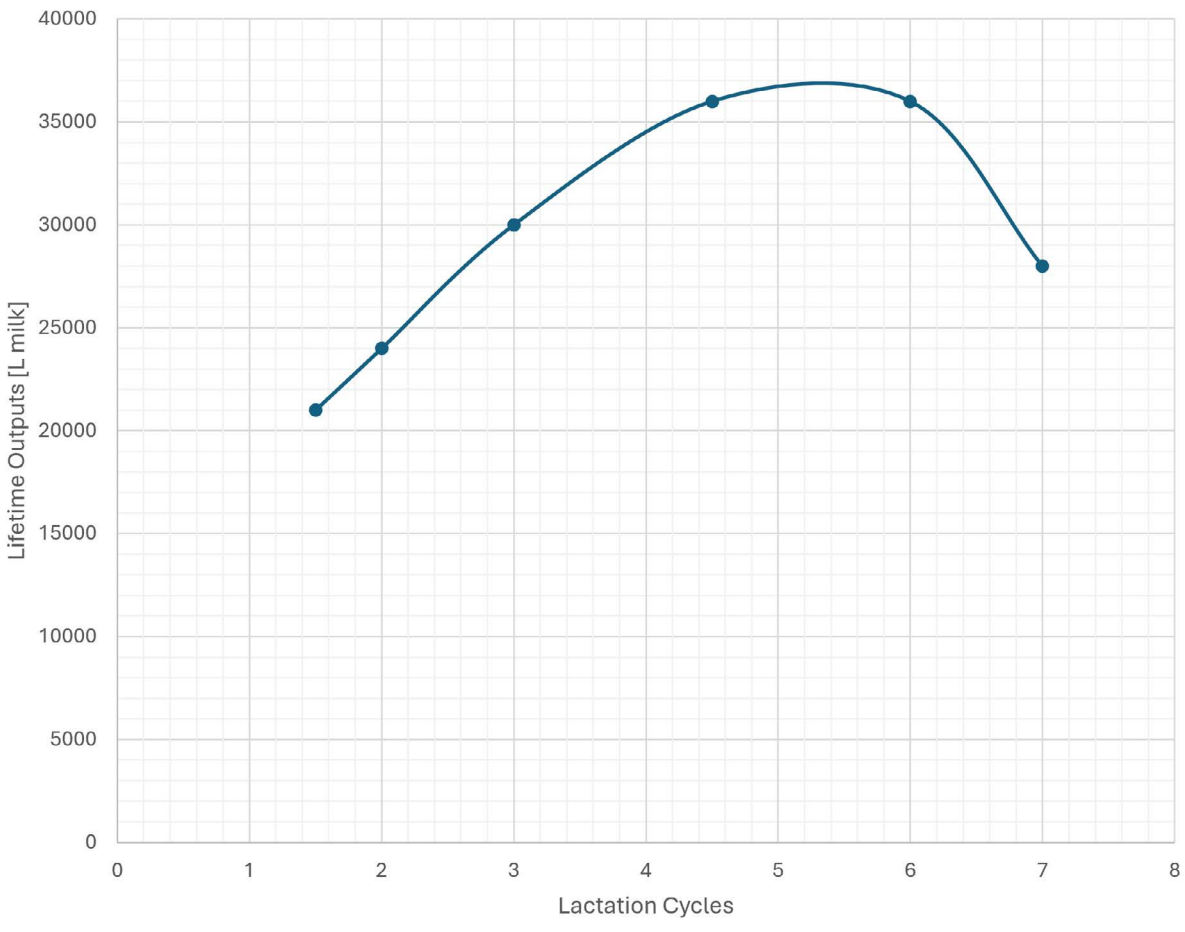
All the major milk buyers have carbon-offset programmes. Each differs in detail, but the objective is usually to minimise diesel fuel consumption. Dairy farms are incentivised, through pricing premia, to support these programmes. However, this is counterproductive if lifetime costing models are better for dairy farmers (in terms of prospective profitability and better animal welfare). Most dairy farms would be too small to promote this position alone.

Prospects for the future

Profitability is the ultimate measure of success in a business enterprise and ensuring greater profitability in the farming sector is the ultimate underpinning for any national food security policy. Greater profitability will improve the resilience of the farming sector to economic shocks; reduce the dependence on State aid programmes; and deliver greater surpluses for investment.

Applying the principles of MSO theory to dairy businesses will be beneficial and worthwhile. The livestock farm element of a dairy business will ***optimise*** its commercial performance when:

Milk Yields Trade-off: Outputs -v- Lactation Cycles



- Animals are capable of living outdoors on a year-round basis

- Animals are all-grass fed

- Attention is given to growing the best grass possible and grazing it effectively

- All inputs with an industrial energy content, such as fertilisers, sprays and purchased food concentrates, are eliminated. This may take about four years or so to achieve although it will be very unlikely all such costs will be totally eliminated

- Fixed costs comprise no more than 40 per cent of sales revenues before support

- Variable costs are contained within the range of five per cent to 15 per cent of sales revenue before support

The milking parlour element of a dairy business will optimise its commercial performance when:

- The milking cows deliver 4,500 to 7,000 litres/cow pa and enjoy 4 to 8 lactation cycles in a lifetime of service

- All inputs with an industrial energy content, such as feed concentrates and supplements, are minimised. Complete elimination of these inputs might be possible but some milk product specifications will make this impossible. When this happens milk prices should reflect the extra cost

- The farm component of the business is made to break-even, at least, through transfer pricing practices

As farms move to their MSO points outputs will initially fall. This will be offset by improvements to the 2nd contribution but in a sector where output volumes are often contracted this presents a problem. In time, as soil fertilities improve, outputs tend to be restored to earlier levels but, of course, without the purchased inputs.

Support payments are common and vital for the farming sector whilst food prices are prevented from being set at true market rates. Historically, support has played an important part in acting as an unearned price premium which has kept farms out of bankruptcy. Unfortunately, many farms have used their support payments to purchase industrial supplies, such as nitrogen fertiliser, to boost output. This behaviour simply entrenches unprofitability and makes it more difficult to change. Currently, support payments are being linked to the sentiment of 'public payments for public goods'. This shift is now driving a new problem. When 'public goods' are defined in terms of some habitat specifications, desirable though these might be in abstract, if this causes farmers to spend money on changes the benefits get diluted quickly.

Support payments should be taken whenever it works as a price support; its cashflows would be used most effectively if it funded a transition to MSO.

Future payment schemes would do well to consider this.

In parallel with a revolution to improve profitability there is a need for better management control practices within farming. Three simple changes could be adopted rapidly:

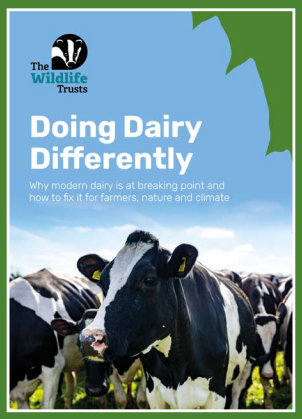
- All farm businesses should budget for the year ahead to manage cash flows with fewer surprises

- All farm businesses should adopt the practices of management accounting to track the delivery of profits

- All farm business should become familiar with using ROTA analyses to track the wider progress of the business. ROTA tracking over time exposes the results of changing farm practices and the impact of weather events and will advise the prospects for future change

Dairy businesses may have bigger revenues and better profit streams than other types of farming but these businesses will still be small in relation to other players in the food supply chain. It is all too easy for farming interests to be crushed by the unthinking or selfish actions of large corporate players. This is unlikely to change in the foreseeable future. Change will only come when farmers take a bigger grip on supply chains (by controlling abattoirs, milling factories, cold storage, and creameries, for example) and when there are opportunities to move away from commodity supplies into branded goods.

Doing Dairy Differently



Acknowledgements

Special thanks to our Case Studies from First Milk, Nature Friendly Farming Network and Catchment Sensitive Farming: without these discussions and real-life examples we would not be able to show the hard work farmers are already doing to improve advice services, relieve supply chain pressures and showcase that farming with nature works for both habitat and business.

This report would not have been possible without the generosity and co-operation of all the farm businesses who have allowed their accountsto be examined and given up their time to meet and discuss the findings with Chris Clark.

About the authors

Chris Clark
Chris is a Partner in Nethergill Associates (NA), a business management consultancy currently assisting with the conjecturing and management of future farming uncertainties in all four countries within the UK as well as overseas. He and his NA team, as of June 2023, have analysed over 200 farms. With all these farms he has advised them on how to move their business towards Maximum Sustainable Output (MSO) and hence achieve maximum profitability without compromising nature. He is co-author of The Less is More report commissioned by the RSPB, National Trust and The Wildlife Trusts. Previously he owned and managed Nethergill Farm with his wife Fiona in the Yorkshire Dales. They built an eco-hill farm business with a sustainable added-value meat activity, an educational and field study facility and eco-tourism holiday lets. They moved to Devon in 2020 to be close to family, a new challenge involving ancient woodland recreation, hay meadow restoration and creation of wildlife ponds.

Brian Scanlon
After degrees in Physics and Operations Research, Brian joined British Steel Corporation in the corporate planning function and then became Development Manager responsible for global logistics. Subsequently he spent over 10 years as a management consultant with AT Kearney where he became responsible for the Strategy and Marketing practice in the UK before joining Costain Group as Marketing Director. His work at Costain included heading its new Ventures Division which took equity positions in major projects around the world. Over the past 20 years or so, Brian has run his own company as a vehicle to undertake consultancy and project development work where he has served over 70 companies across most sectors of the economy in the fields of strategy development, marketing, logistics, operational improvements, and new venture development. He has held, and still holds, a number of positions as Chairman, CEO or NED of fast growth SMEs. More recently, Brian moved to a client and became Vice President of Treasury Services with JP Morgan Chase Bank, the largest clearer of US$ funds in the world.