Deforestation Technical Note

Farmed livestock is an integral part of the British food system, which in total covers an agricultural area of 17.3 million hectares, 71% of the UK land area[1]. The majority of this livestock is reliant upon forms of imported animal feed to match their nutritional needs for growth. Soybean and palm oil are such commodities in high demand both in the UK, and globally. The demand for these products is placing enormous pressure on the Earth's resources, particularly forests, which cover 31% of the Earth's global land area (Figure 1). Alongside development, logging and population increase, agriculture has contributed to the 420 million hectares of forest lost to human activities since 1990[2]. Whilst millions more hectares have experienced degradation, leaving forests incapable of fully functioning as healthy ecosystems that can regulate local climate, regulate water or sequester carbon[3].

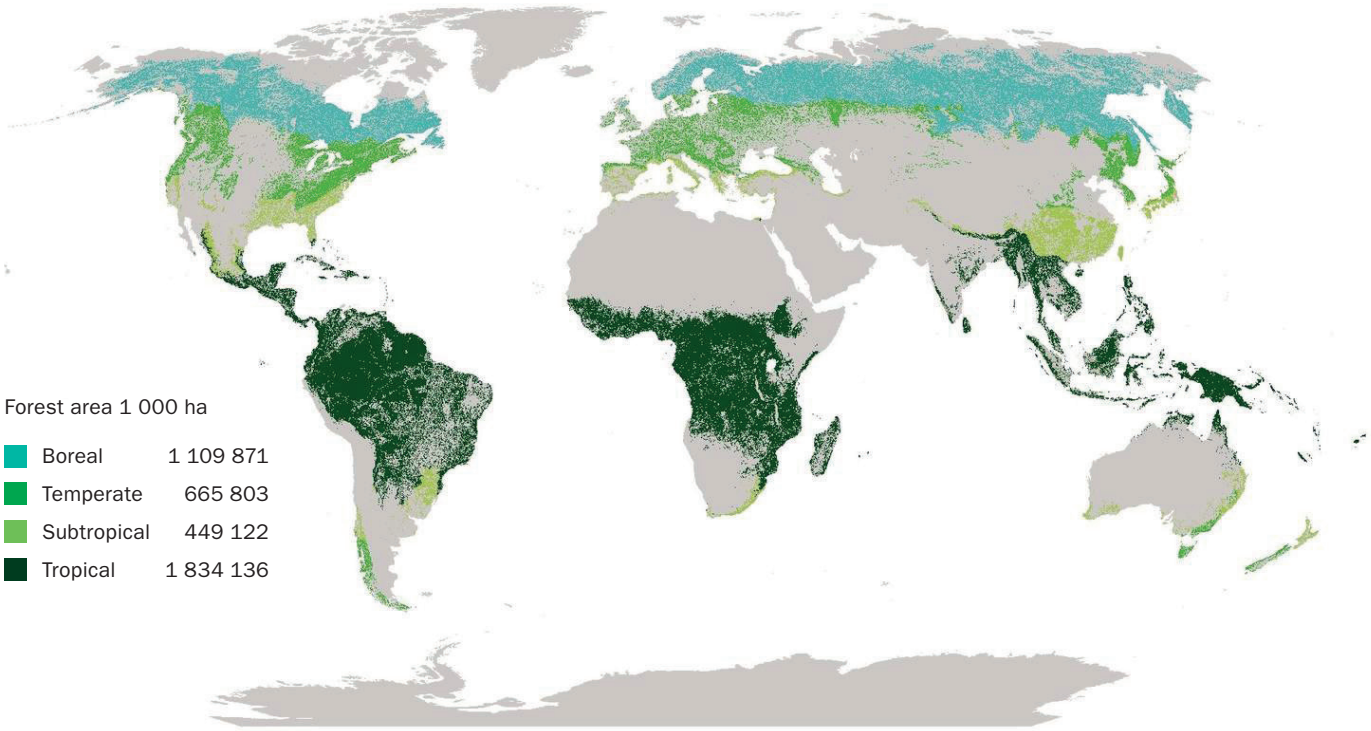


Figure 1. The global distribution of forests by climatic domain, 2020 (Source: FAO)[4]

AMC The Agricultural Mortgage Corporation

Since the early 20th Century, deforestation fronts have shifted significantly from temperate forests to tropical forests. Loss of temperate forest peaked in the first half of the century and has since reversed, with a net gain of forest since 1990. In contrast, tropical forests have experienced unprecedented losses and exploitation, peaking at 151 million ha of forest lost in the 1980's[4]. Greenhouse gas emissions, loss of wildlife habitats and impacts on indigenous communities have stimulated increasing global concern over the growing expansion of soybean and palm oilseed production on land recently converted from forests. Conversely, the wider-protection and restoration of forests is an important part of the jigsaw within UK and global policy and industry net zero.

Forests host and protect 80% of terrestrial biodiversity and more than 1.6 billion people are dependent on them for their livelihoods. As such, there are growing efforts to address deforestation through international and domestic policy, responsible financing, sustainable supply chains and certification schemes, with the latest being at the UN Climate Change Conference in Glasgow (COP26) to end deforestation by 2030[5]. Funding into research and development of alternatives to commodities such as soybean and palm oil is an important, yet developing area, that could significantly reduce UK agriculture's deforestation footprint.

To achieve sustainable commodity supply chains, it is essential to reduce their negative impacts such as deforestation, greenhouse gas emissions, water pollution, or other environmental impacts. The possible solutions to these complex drivers of deforestation require an appreciation of the role of producer and consumer countries, as well as the opportunities for those in the supply chain, from farmers to retailers, to limit the impact of deforestation.

The importance of forests to addressing net zero

Forests provide a multitude of benefits, not only for humans but for the whole planet. Not only do they provide habitats for biodiversity and livelihood for humans, forests also function as incredibly important carbon sinks. This means they regulate global water and climate systems and buffer both natural and human disasters such as pandemics.

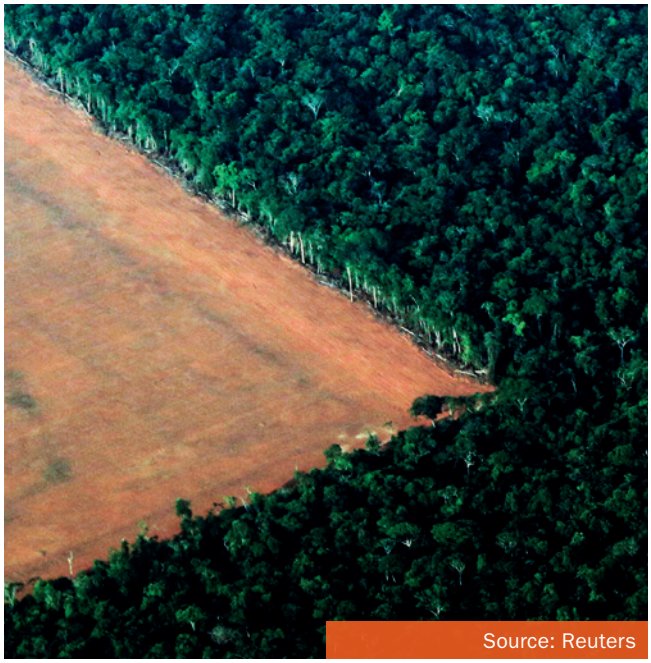
Forests remove and store one quarter of all the carbon dioxide released into the atmosphere from human activities, absorbing a net 7.6 billion tonnes of CO_2 per year, which is 1.5 times more carbon than the United States emits annually[6]. If the carbon in the standing timber of tropical vegetation were released it would be equivalent to emitting 667 gigatons of CO_2, equivalent to all fossil CO_2 emissions since about 1997[7].

Tropical forests are of particular importance due to their scale, current exposure to the deforestation front, and their role in mitigating climate change. This importance is likely to grow further as atmospheric CO_2 concentrations increase because tropical forests are likely to act as stronger sinks for carbon[8].

Cutting down trees has a two-fold impact on the climate. CO_2 emissions previously stored in the forest system are released, whilst reducing the amount of carbon that forests can sequester store in the future, meaning a higher proportion of future CO_2 emissions will remain in the atmosphere.

The loss of forests, driven largely by commodity-based agriculture, is resulting in catastrophic environmental and social decline. Deforestation is leading to the appropriation of land, causing conflicts between local communities. Many animal and plant species that are vital to the ecosystem services that support human life are at risk of extinction from deforestation and fragmentation.

Once converted from virgin forests, intensive agricultural land continues to cause ecological harm by the nature of monoculture, impacting water quality, quantity and soil fertility due to the increased use of agrochemicals, fertilisers and mechanised cultivation practices[9].



Source: Reuters

Agricultural drivers of deforestation

The main driver of deforestation is simply human activity, which includes losses to forestry activities, wildfires and urbanisation. Agriculture is the main global driver of tropical deforestation, accounting for 70-80% of tropical deforestation (Figure 2).

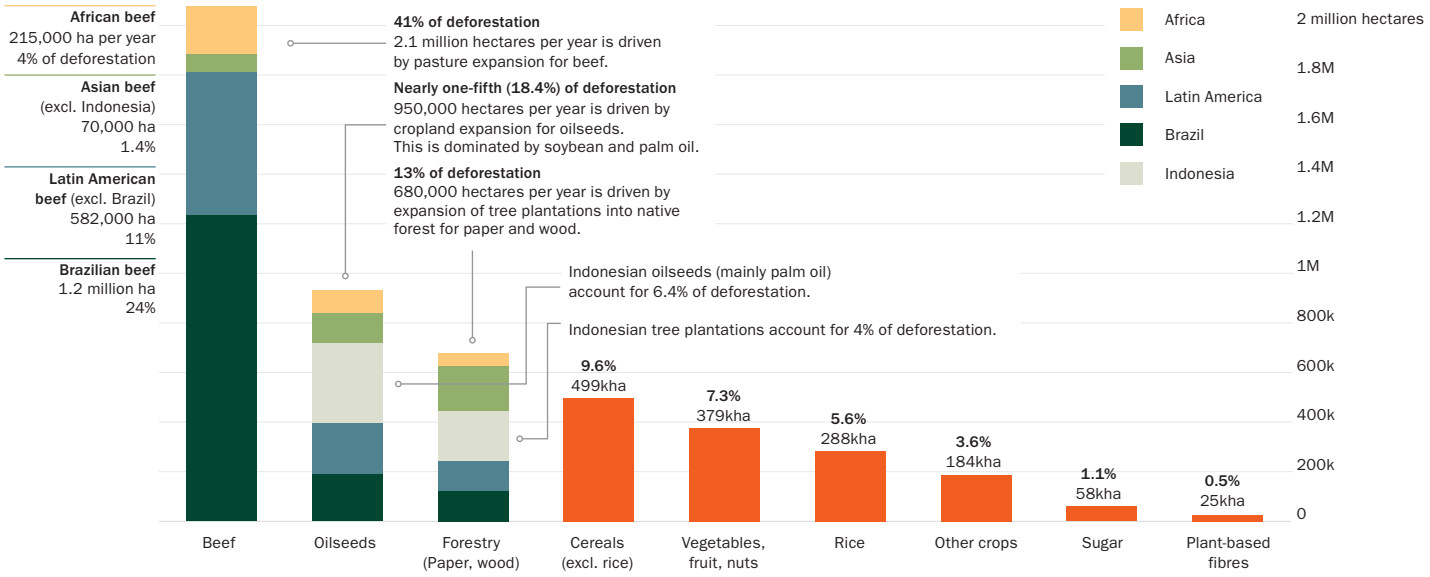


Figure 2. Global drivers of tropical deforestation 2005 – 2013 (Source: Our World in Data)[10]

The impact of agriculture is closely linked with population increases and the global shift towards increased meat intake in developing countries. Tropical deforestation occurs as a direct result of the conversion of land for high 'forest-risk commodities' including palm oil, soybean and beef, which form the top three commodities linked to deforestation in both the UK and globally due to their particularly high demand[11].

Production of beef contributes to 41% of deforestation, and this is followed by palm oil and soybeans which together account for 18%[12]. Compared to the global market, the UK is much more reliant on imported oilseed products than beef. The emissions impact of deforestation from products imported into the UK is demonstrated in Figure 3, with oilseed products responsible for 8.75 million tonnes of CO_2 emissions, almost double that of beef.

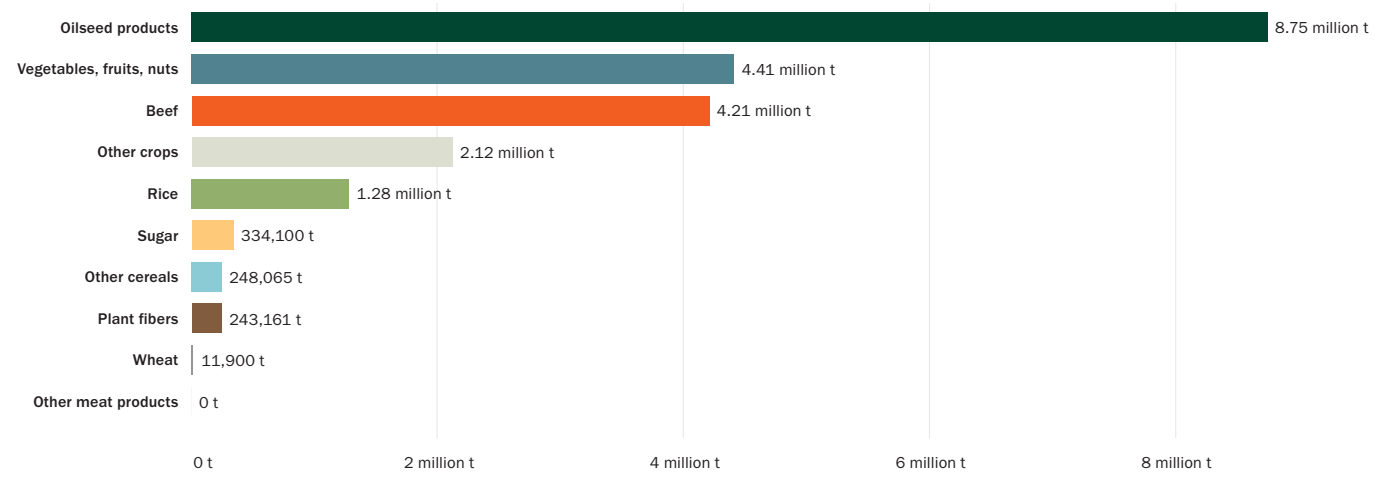


Figure 3. The UK's annual CO_2 emissions from deforestation by commodity between 2010 – 2014 (Source: Our World in Data)[12]

Soybean

Soybean is an important agri-food commodity, primarily used for animal feed and the production of biofuels. It is cultivated on a global scale, with South America and the US dominating production. Soybean is almost ubiquitous in the diets of pig, poultry and cattle due to its availability, consistency and characteristics of high digestibility and high protein content. The high concentration of essential amino acids in soybean products make them well suited to optimising the growth of livestock, and as a result 94% of soybean imported into Europe is fed directly to livestock[13]. This demand has seen its productive area increase fifteenfold since the 1950's, making soya the second largest driver of tropical deforestation[14].

The growing worldwide demand for meat and dairy products continues to track soybean production, which has more than doubled over the last two decades. Chinese imports of soya have increased by 2,000% in the same time period. Although the UK's consumption of 3.5 million tonnes of soybean represents only 1% of the world's global soybean consumption[15], it is still contributing to pressures on these biodiverse landscapes. UK soya consumption in 2017 led to over 3,000 hectares of deforestation – twice the area of London[16].

Over the last 30 years, Brazil's economy has benefited enormously from the growth in the soya industry, increasing average income and reducing the number of people living below the poverty line[9]. The global demand and short-term economic gain have continued to drive unprecedented expansion of soybean production into virgin tropical forests, causing biodiversity loss and displacement of indigenous peoples. Aside from the impacts of deforestation, soya is an intensively grown annual crop which demands high inputs of energy, water, and agrochemicals whilst increasing soil erosion and consequently, carbon losses.

Palm oil

Palm oil is an extremely efficient crop with versatile properties and functions, making it a valued global commodity. These properties contribute to the presence of palm in around 50% of food and non-food packaged products located in UK supermarkets[17]. Grown only in the tropics, Indonesia and Malaysia produce around 85% of the world's palm oil, with palm oil currently the third largest driver of deforestation[14]. Palm oil use in UK agriculture is largely concentrated within livestock sectors, where palm oil derived supplements, palmitic and lauric acid, are used to benefit animal health, nutrition, as well as productive capacity.

The yield capacity of palm oil is unrivalled compared to other vegetable oils. Globally, palm oil supplies 40% of the world's vegetable oil demand on just under 6% of the land used to produce all vegetable oils such as soybean, coconut and sunflower oil[18]. Within UK agriculture its use is particularly concentrated in the dairy sector, where the fat supplements provide palmitic acid in the cow diet to provide energy and enable cows to maintain butterfat levels. Lauric acid is another fatty acid, which is used more frequently in monogastric animals such as pigs and poultry for its antiviral and antibacterial properties which help to prevent diseases.

Palm oil is viewed as an attractive crop for growers and farmers who can rely on the stable income palm oil offers due to its consistent yield performance and demand. However, the allure of this crop has meant significant expansion in the growing area of palm oil plantations and as a consequence, forest loss in these sensitive habitats. This is illustrated by an expected doubling of production area by 2050[3], placing even greater pressure on these regions. Tropical rainforests are not the only forest habitat to have suffered losses related to production of palm oil. It is estimated that 16% of all deforested mangroves in South East Asia were replaced by palm oil plantations[19]. Mangroves are important as they are amongst the most carbon-dense ecosystems in the world.

Iceland: A retailer's challenge to eliminate palm oil from products

The properties and productive efficiency of palm oil makes it a difficult commodity to replace with like-for-like alternatives. This was illustrated when the retailer, Iceland, missed a deadline when struggling to reformulate 17 of their products after committing to remove palm oil from all their own-brand products. This has been further compounded as the retailer has been forced to temporarily begin using palm oil again since sunflower oil, a key alternative, has increased in price by 1,000% following the war in Ukraine. It is evident that ensuring sustainable sourcing of palm oil throughout the supply chain is of utmost importance to limiting the impacts of deforestation.

Influence of trade agreements

Beef production is the top driver of tropical deforestation, accounting for 36% of all agriculture-linked forest replacement. This scale of deforestation has been driven by growing international demand for beef in emerging economies. As the global appetite shifts to include more meat, more virgin forest in South America is required for conversion into cattle ranches, which are consequently followed by soybean farms. There is an interplay of the two commodities, however beef is often seen as the primary cause of deforestation as just 5% of forest loss is driven directly by soya[20]. Additionally, as the demand for meat increases, so does the land needed to grow additional soya for animal feed as these two products are closely linked.

Although the beef-linked deforestation footprint of the UK agricultural industry is minimal, UK beef farmers face increasing competition from beef imported from areas with high deforestation risk. In 2021, UK consumption of beef and leather accounted for the largest share of the UK's imported deforestation[21]. UK supermarkets were linked to purchases of beef from JBS, a meat processing conglomerate which sources cattle from the Amazon for its global beef market, who have been subject to 'beef laundering' claims, where beef from deforested areas is moved to a farm clear of deforestation[22]. In light of this investigation, Sainsbury's, amongst other European supermarkets, have announced they will cease selling several Brazilian beef products due to their link to deforestation[23].

Further threats to increasing imported deforestation and degrading UK's high agricultural and environmental standards, as well as commitments to end deforestation also emerge as the UK continues to agree new trade deals following Brexit. A trade deal agreement for Australia to export 35,000 tonnes of beef tariff-free risks undercutting UK farmers on income and standards[24], whilst the export expansion will be met by 10,000 acres of virgin lands to cattle farms in the next decade, much of which is forested land[3].

The impact of UK and global policy and private governance on deforestation

Policy, or lack of, is influencing the rate and extent of global deforestation. In response to the negative externalities of deforestation, considerable efforts have been made to halt deforestation, through global-leading environmental legislation and private-industry mechanisms, such as the industry-led Amazon Soy Moratorium which has reduced forest loss in the region since 2006. These have formed part of a broader governance response which has developed voluntary, market-based instruments to address the negative social and ecological impacts of deforestation[25]. Despite this, deforestation has continued at an unsustainable rate through soybean and palm oil production, as well as cattle ranching and logging, and is becoming concentrated in other deforestation fronts, such as the dynamic forested region of the Cerrado in Brazil. These drivers, both direct and indirect, are summarised in Figure 4, which also demonstrates the many governance mechanisms and practical responses to addressing the threats to deforestation.

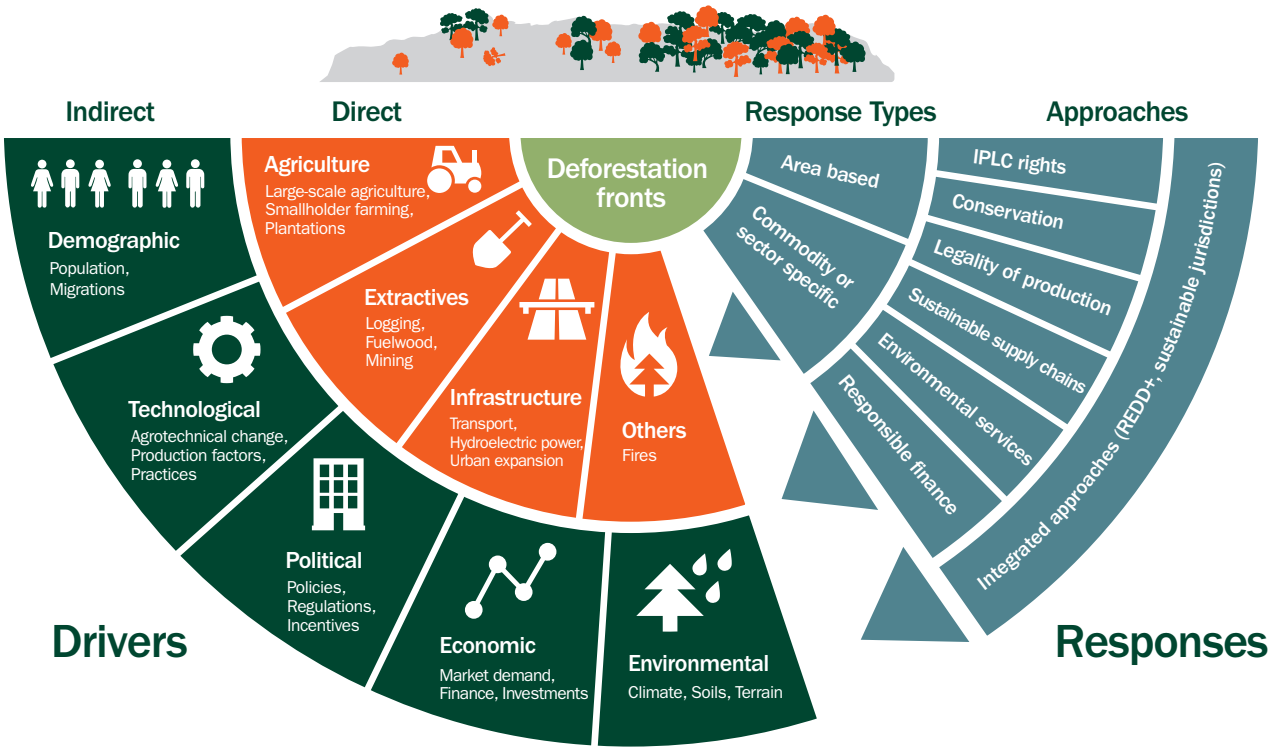


Figure 4. The interrelationships between drivers and responses to the global deforestation front (Source: WWF)[3]

The UK has continually recognised the contribution of domestic agriculture to deforestation and has made this a key consideration in the target of net zero by 2050 in the UK, and by 2045 in Scotland[26]. On a global policy front, the importance of forests is illustrated by their central role in many of the UN's 17 Sustainable Development Goals (SDGs), which were established to stimulate global sustainability action[27]. The REDD+ UN programme offers a carbon credit-based approach to the private market, benefiting the economies of developing countries through payment for ecosystem services through delivering responsible management practices and governance, which limits carbon emissions. Other private arrangements to limit the impact of deforestation include zero-deforestation commitments from multinational corporations, and certification standards such as the Round Table on Responsible Soy (RTRS) and Round Table on Responsible Palm Oil (RSPO)[28].

The global appetite to take significant action on deforestation was met with the agreement of 141 countries to end deforestation by 2030 through Glasgow Leaders' Declaration on Forests and Land Use at the UN Climate Change Conference in Glasgow (COP26). This agreement covers a total of 91% of the world's forested areas and emphasises the critical and interdependent roles of forests, to balance greenhouse gas emissions with carbon sinks whilst maintaining other ecosystem services.

This commitment has been included in the UK's Environment Act, which targets a clean-up of the UK's supply chains to tackle illegal deforestation[29]. Despite these efforts and commitments, this new legal framework within The Environment Act has been criticised for having limited scope and ambition. Forest commodities that are produced illegally are restricted under producer country laws, however one-third of global tropical deforestation is considered 'legal' under local laws[30]. This framing of The Environment Act therefore threatens the UK's ambitions to reduce deforestation; the Brazilian Government is in the process of passing a package of laws that will weaken or abolish protections for forests, protected areas and Indigenous Peoples, legalising millions of hectares of deforestation.

How can UK farm businesses move forwards to helping limit deforestation?

The link between the UK agricultural sector and imported deforestation is clear. Whilst governance, private mechanisms and agreements between major producer and consumer countries will help shape this landscape, UK farmers will be impacted by their outcomes and are increasingly expected to take account of their carbon footprint and find opportunities to diversify to limit the wider ecological and social impacts of products within the supply chain. This responsibility has been brought into further focus with the National Farmers Union's target of net zero greenhouse gas emissions by 2040.

From environmental and social perspectives, it is crucial that livestock production begins to decouple animal feed from deforestation, since high demand for these commodities in tropical regions is always likely to be met with deforestation. Alternative feed sources are therefore of major importance to shifting this demand, whilst certification in absence of an alternative can also provide a tangible option for UK farmers.

Can soybean and palm oil certification schemes provide a solution?

Certification credits are available for agri-businesses to purchase which, amongst other targets, aim to prevent deforestation. This provides the UK farm industry with the assurance that these commodities are sourced from certified, sustainable growers. There are several certification bodies for both soya and palm oil, with the most popular being Roundtable of Sustainable Palm Oil (RSPO) and Round Table on Responsible Soy (RTRS), respectively.

Source: RSPO

Roundtable on Sustainable Palm Oil (RSPO)

Roundtable on Sustainable Palm Oil (RSPO) is a certification tool used to assess the credibility of producers claiming to 'sustainably source palm oil', certifying 19% of all global palm oil[31]. As of 2018, palm oil produced to RSPO standards is required to be deforestation-free. This change has closely tracked the trend of decreasing deforestation in Indonesia, Malaysia and Papua New Guinea, which alongside certification, has been influenced by law enforcement and moratoria[31].

UK agriculture can help to address the issues related to palm oil production by sourcing RSPO certificates, which recognises the value of the high-yielding crop when palm oil demand can be met without further forest and ecosystem degradation by increasing productivity on existing land, and ensuring expansions are solely on already degraded land. Research highlights that RSPO-certified smallholders facilitate higher yields through good-quality planting materials and good nutrient management[32], whilst producing palm oil at 35% lower levels of greenhouse gas emissions[33].

Animal feed is an area that is currently responsible for a significant gap in the uptake of certified sustainable palm. Greater commitment, transparency and ambition is required from the UK agriculture industry to help tackle the UK's palm-induced deforestation footprint.

Round Table on Responsible Soy (RTRS)

Amongst the most well-known soya certification schemes is The Round Table on Responsible Soy (RTRS) certification programme, which was established in 2006, in response to growing criticism of soya production. It assures that soya produced under its label is deforestation and conversion-free. 22% of soya imported to the UK is grown to this standard, however, there have been questions raised over its sustainability credentials with criticism in terms of its traceability. Others have also challenged the negative impact of soybean production upon aspects of local communities and the practice of monocultures, particularly in dynamic forested regions such as the Cerrado in Brazil[34].

The fact that not all certification is the same can complicate insight into the effectiveness of credits and can be viewed as problematic. The most basic tier involves the purchase of offsets for soybean in an organisation's supply chain thus supporting farmers producing soya responsibly, but the soybean in the supply chain is not necessarily responsibly sourced. The following tier operates on "area mass balance", where certified and non-certified soybean is mixed in the supply chain but the proportion of certified can be tracked and increases with purchase of credits. The final tier is purchasing only segregated soybean, which stays separated as certified soybean from production to the customer.

Country of origin

Country of origin of soya is a major driver of feed emissions, due to the relative impact of deforestation. The emission factor of soya grown in Brazil is over twice that of North American soya since most soybean production in North America is on arable cultivated land which has already lost a significant amount of its organic matter[35]. European soya is grown over 4.5 million hectares, at an emission factor 10 times lower than Brazilian soya, however, it is rarely available beyond the European continent so is therefore not a viable solution[36]. Farmers with the option to select the country of origin of their soya can therefore have a tangible influence on limiting the risk of deforestation, whilst reducing their carbon footprint, without necessarily requiring a soya-free diet.

Alternative livestock feeds for UK farmers

Alternative livestock feeds offer the opportunity for the UK agricultural sector to address the level of deforestation driven by the UK's soybean and palm oil consumption. Several farmers have already been empowered to experiment with reduced or no soybean and palm oil feed regimes. M&S is working with 44 British dairy farmers producing M&S RSPCA Assured milk to replace soya in feed rations with alternatives, as part of action to limit deforestation within their supply chain[37]. There are currently barriers to a rapid industry switch, with dialogue between feed companies and the UK Government required to stimulate transformational changes to addressing the cost and availability of alternatives, as well as the mass volumes of feed required.

Soya

Soybean is a significant component of most livestock diets due to its high protein content, favourable characteristics and availability. Within free-range egg units, feed accounts for on average 87% of the carbon footprint, with soybean responsible for up to 30% of this due to the emission linked to deforestation, land use change, processing and transport[38].

Reducing or replacing soya in livestock diets is possible with the integration of alternative protein sources into the ration. Many are currently available to farmers, with ingredients such as rapeseed meal, sunflower seeds, wheat distillers and legumes, widely used within current rations. Their availability within the world's collective growing area is, however, currently limited compared to soybean and therefore an industry-wide shift to soya-free diets is at present extremely challenging[38]. The impact of a volatile global market for alternative proteins on the financial viability of soy-free diets for UK farmers has been brought to front and centre by the war in Ukraine. Disruption of the supply chain has increased reliance on soybean, and impacted long-term availability of oilseed alternatives, as 60% of sunflower products are produced in Ukraine and Russia[39].

A multi-faceted and resilient solution is therefore required to address soya-driven deforestation, with several promising alternative protein sources that could feasibly replace soya if made commercially available. These include products such as algae meals and insect proteins, such as black soldier fly larvae. The current scalability of both protein sources is limited due to commercial viability, cost and legislation, and as such they are seen as supplements rather than replacements. However, research and development and productive scale of each is increasing rapidly. A report, published in partnership by WWF and Tesco, states using insect meal to feed livestock and fish could cut the UK's future soya footprint by a fifth, with a projected demand of 540,000 tonnes of insect meal by 2050[40].

Processed animal proteins (PAPs) are a promising source of protein due to their mass availability, however, there remain some challenges around establishing dedicated processing chains to avoid cross-species contamination and risks to biosecurity. Due to this, and questions over consumer acceptability of PAP usage, the UK government does not currently have a formalised plan to introduce regulated use of PAP. In contrast, the EU approved PAP for animal feed in 2021 but wider incorporation into animal feed is not expected until the mid-2020's.

Both legislative changes and financial incentives to support innovative farming methods are crucial to scale up these industries and bring down costs to farmers. Costs of alternative proteins such as insect meal are up to 10 times more per tonne than soybean meal, with nil-soya poultry rations formulated with rapeseed meal up to £35 more per tonne[38].

Palm Oil

Finding alternative fat sources to palm oil that both match its nutritional performance and are produced at a lower environmental impact is challenging due to its production efficiency compared to other oilseeds. Substitutes for palm kernel meal as a pasture supplement include rolled cereal grain and sugar beet pulp, which can balance excess rumen-degradable protein from pasture grass and enhance microbial protein production, reducing excessive excretion of N in urine, thereby increasing N use efficiency[41].

There is also growing funding for research and development into novel alternatives for palm oil and its derivatives. Substituting palm oil for mealworm oil in poultry diets has been demonstrated as a deforestation-free supplement with a significantly lower carbon footprint that can also improve meat quality[42]. Mealworms also have a high protein content, and can be raised on food waste. Further research undertaken at the UK Centre for Innovation Excellence in Livestock (CIEL), demonstrated that substituting palm-based fat supplements in dairy diets for a palm-free supplement composed of locally sourced vegetable oil and fish oil not only reduced the carbon footprint of the feed but improved feed efficiency, milk yield and quality, too[43].

Despite promising advances in this area of research, commercial application remains some way off. If palm oil cannot be replicated in the short term, its environmental impact can be limited by supporting sustainable production.

Emerging actions and strategies to tackle deforestation

As the global commodity market continues to grow, there are many opportunities for the UK farming industry and farmers to reduce their impact on deforestation, be it farm-level or supply chain collective action.

Supply chain actions

UK Roundtable on Sustainable Soy & UK Soy Manifesto

The UK Government has funded establishment of The UK Roundtable on Sustainable Soy to allow UK industry to work together towards secure and resilient supplies of deforestation-free sustainable soya throughout the supply chain. Action from UK industry in limiting soya-linked deforestation has continued, culminating in the launch of the UK Soy Manifesto, which commits signatories to buying only soya that has been produced without deforestation or removal of native vegetation by 2025[44]. Between the signatories, almost two million tonnes of soya are purchased each year, representing 60% of all UK soya bought each year. This will impact most UK livestock agri-businesses since signatories include all of the biggest UK grocery retailers, some of the largest meat producers and food service companies.

Commercial moves towards more physical supply chains of certified soya

Cranswick and Moy Park, major pig and poultry processors respectively, sit amongst others that are pushing plans to move beyond purchases of basic certificates towards physical supply chains of certified sustainable soy. The UK's pork sector has gained recognition for beginning a transition to physically verified deforestation-free soya[15]. As well as being a signatory of the UK Soy Manifesto, The Agricultural Industries Confederation (AIC) has also developed a Responsible Sourcing Module which enables UK purchasers of animal feed containing both soya and palm oil, to more easily request feed ingredients produced in both a legal and responsible manner[45].

On-farm strategies

Soya production could reach the UK

Climate change has brought about warmer temperatures to southern England, and this climatic pattern can be expected to continue further north, resulting in suitable conditions for soybean production as far north as southern Scotland. The Rothamsted study suggested that by 2050 soybean could be a viable crop across most of England and south Wales as its demand and financial attractiveness significantly reduces its carbon and ecological footprint[46].

Co-products can supply the nutritional requirements of livestock

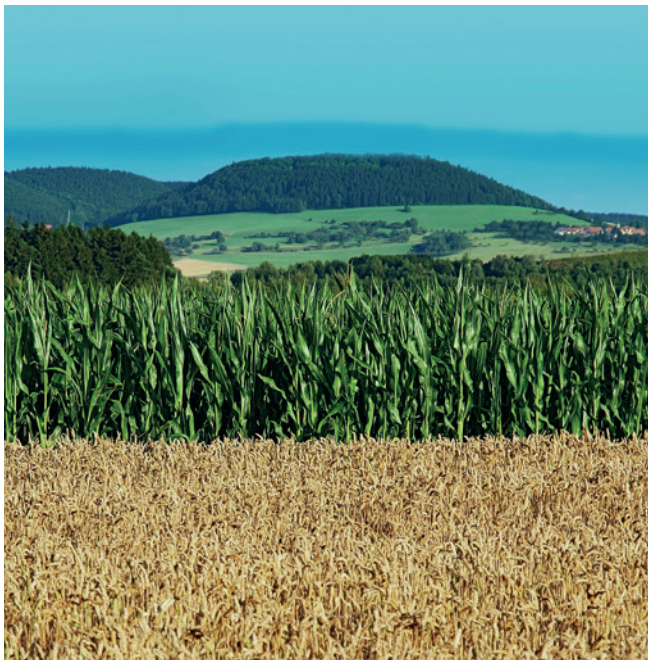
Synthetic amino acids have potential in replacing the limiting amino acids in livestock diets provided by soybean. They are a product growing in application primarily in the poultry and pig market, particularly methionine, threonine and lysine. Research suggests that inclusion in poultry feed formulation can result in a 50% reduction in soybean meal use[47]. Seaweed is a naturally occurring co-product that is emerging as an option to replace protein in livestock diets whilst also having the potential to limit methane production significantly[48].

Achieving maximum protein efficiency in livestock requirements

By matching protein provision with maximum utilisation efficiency, waste, and therefore the impact of deforestation, can be limited. Excess protein in the diet of ruminants, particularly through concentrate feeds, cannot be metabolised by the rumen, and is therefore excreted in the urine as urea, which volatilises into ammonia therefore also negatively impacting the surrounding environment of the farm[49]. Low and no soya diets in laying hens can be targeted post 40 weeks in the flock cycle as protein requirement drops and the risk to flock performance and welfare lessen[38].

Enhancing protein content of homegrown feeds

Increasing protein self-sufficiency is an effective strategy to limit reliance on deforestation-linked soya, whilst limiting emissions from transporting feed. This can be achieved by diversifying crop rotations to incorporate protein-rich species. Intercropping cereals with peas for forage production is one example of this. In this scenario, peas offer the protein source and limit N application requirements, whilst barley prevents pea lodging, suppresses weeds and increases the quality of the harvested crop[50]. Integrating multi-species swards into rotations can also provide an excellent protein source with leguminous species, offering arable farms a break in the rotation to produce protein-rich forage.



Key steps farmers can take in the short, medium and long term to limit deforestation

There are a wide range of actions farms can begin to take to limit their deforestation footprint; in the majority of cases these often have stacked benefits in reducing business emissions and contributing to net zero targets. These farm-level changes can complement Government commitments and action in the supply chain to curtail the UK's overseas footprint for climate change. A simple way to start is by measuring your farm's carbon footprint to better understand key sources of emissions related to purchased and homegrown feeds. From here plans can be made to match the business strategy, limit risk and improve resilience. This then provides the foundation to integrating some of the more novel innovations to replace and eliminate soy and palm oil imports.

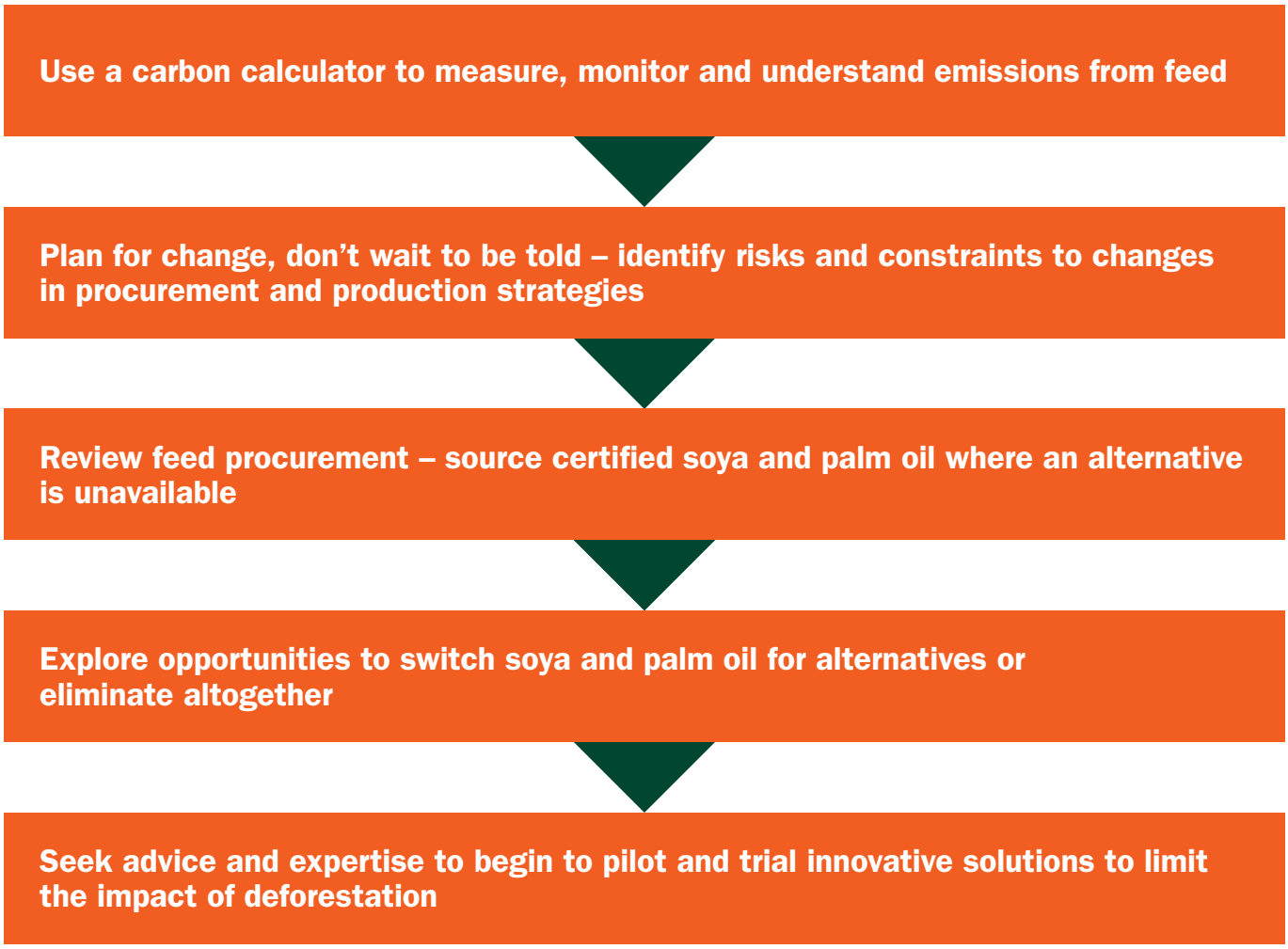


Figure 5. Farm-level steps to limit overseas deforestation

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