Best Practice Environmental Management for Stud Farms

A brief guide to sustainable practices
in this rapidly evolving policy area

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THE THOROUGHBRED BREEDERS' ASSOCIATION

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Introduction

The Thoroughbred Breeders' Association (TBA) is a membership organisation that represents thoroughbred breeders, mare owners and bloodstock enthusiasts. At its heart are the stud farms. These range in size from small family enterprises to very large commercial facilities. Many of these enterprises, as landowners, have engaged with the Basic Payment Scheme and agri-environment schemes over the years, to provide additional financial support.

The landscape is changing as the UK transitions away from the EU Common Agricultural Policy to a national or devolved government policy landscape. The way payments will be made is changing. Additionally, in June 2019, UK government enshrined in law the aspiration for the UK to become a 'net zero' emitter of greenhouse gas (GHG) emissions by 2050. This means that all aspects of UK society will have to take action to ensure that the volume of GHGs that are associated with their businesses and day to day lives are reduced by as much as possible.

As the policy landscape changes over the next few years, it is important that stud farm owners and land managers are in a position to demonstrate that their farms are delivering a wide range of public goods. Legislative changes are anticipated in the coming years, such as air quality legislation for example. These changes will affect farmers and land managers as a result of the UK leaving the EU and no longer being part of the Common Agricultural Policy. This brief guide sets out best practice in managing aspects around biodiversity, climate, soil health and water quality on stud farms to give a starting point for stud farm managers. It is based on the findings from two case studies completed in spring 2021. The guidance sets out first what the TBA are aiming to achieve across biodiversity, climate, soil and water. It then looks at the types of habitats and features on farms and provides guidance on practices that should be promoted (do more), and those that should be avoided (do less), and the aspects of the environment that the practice impacts on.

Biodiversity

Stud farms, like many landscapes, provide opportunities to promote biodiversity. Within each landscape there are often different associated features that are characteristic to a specific landscape. For biodiversity to thrive it is important to understand how different species interact with each other and their surrounding landscape.

Many species and habitats now survive in small, isolated sites, which is difficult for many species, and often impossible in the longer term, to survive as they rarely contain the level of resources or diversity of habitats needed to sustain populations. In 2010, the John Lawton report *Making Space for Nature* identified a number of key components for ecological networks to function effectively which was simplified into simple measures described as 'more, bigger, better and joined-up sites within the landscape'. These measures can be described effectively by the following diagram in Figure 1. Stud farms are often a combination of many habitats and therefore when looking to enhance biodiversity on farms the first thing to consider is how to connect these pockets of different habitats to allow species to move around the site. It is also important to consider how the habitats are managed to promote soil, insect, plant and vertebrate diversity. Habitats associated with stud farms consist of a range of different habitat types mainly; grass fields (paddocks), woodlands, hedgerows, grassland strips, gladeways and standing trees. These habitats have a high level of distinctiveness value in relation to biodiversity net gain calculations and would provide considerable opportunities for the biodiversity on studs.

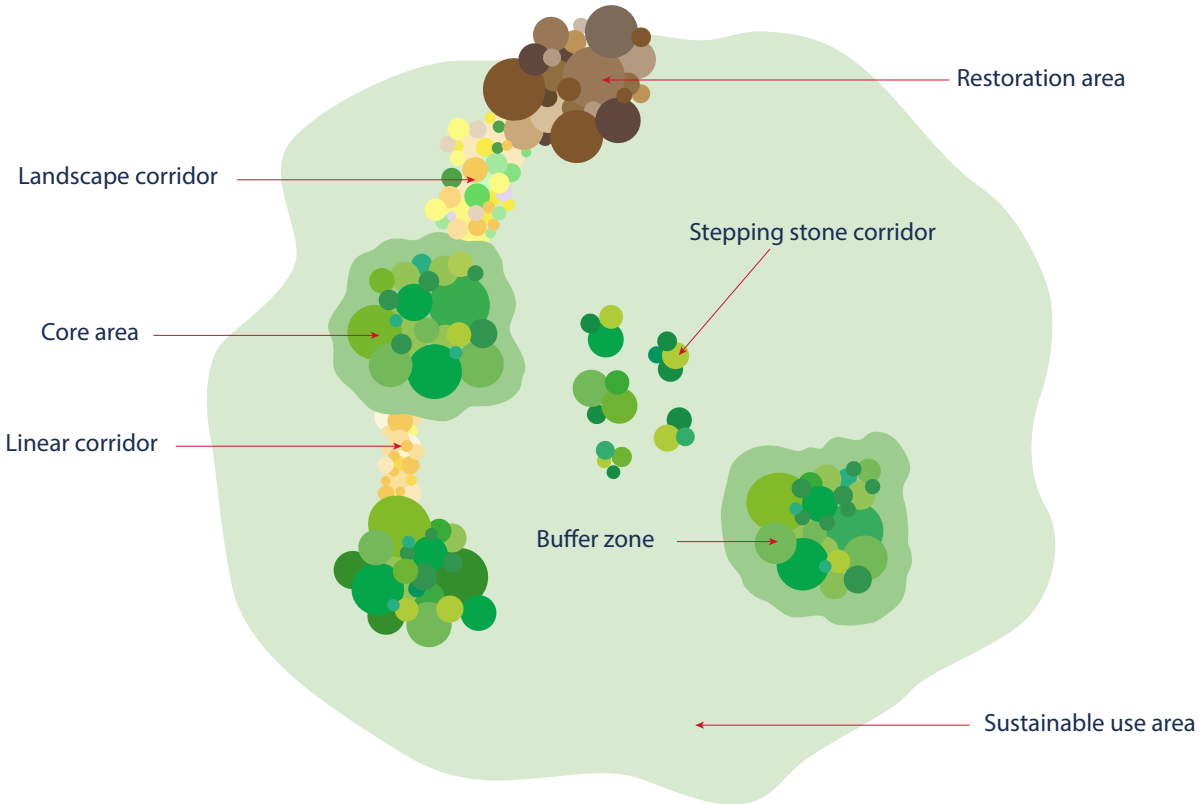


Figure 1. Key components of ecological networks.

Opportunities to increase biodiversity on a stud include:

- Restoration and creation of low-input and unimproved grassland.
- Lowering nutrient input, grazing/cutting after flowering of any surplus paddocks not required for horses, to expand species-rich grassland area.
- Promoting and enhancing management of verges for high-quality grassland habitat, e.g. reducing mowing frequency.
- Restoring semi-natural habitats/woodlands including allowing formation of scrub and understory vegetation to increase habitat diversity. Avoid mowing or over managing woodland floor, allow deadwood to remain in place to provide habitat.

Figure 2. Clockwise from top left: good example of woodland with shrub under tree canopy; moderate example of wooded laneway with some ground layer between post and rail fencing; poor example of woodland with bare ground under tree canopy.

Climate

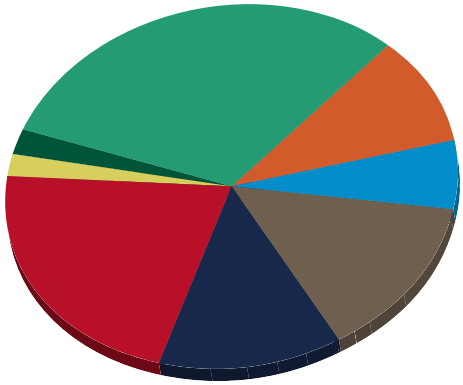
There are two aspects to stud farm climate impact: the emissions produced as a result of activities and the carbon that is stored or sequestered as a result of the way the land is managed.

GHG emissions

All activities on farms have the potential to impact on climate change. Every item that is purchased or brought on to farms has embedded emissions from its production or manufacture – this includes the feed and bedding used on the stud, plus manufactured fertilisers, plastics, equipment and even the horses themselves. All the vehicle and machinery movements utilise fuel, which is normally petrol or diesel and therefore from a fossil source. The electricity used to light and power the buildings and infrastructure on site also has the potential to release emissions, especially if grid electricity is used. In addition, the horses themselves are a source of emissions. They produce a small amount of methane during digestion and their manures are a source of methane and nitrous oxide, both potent greenhouse gases.

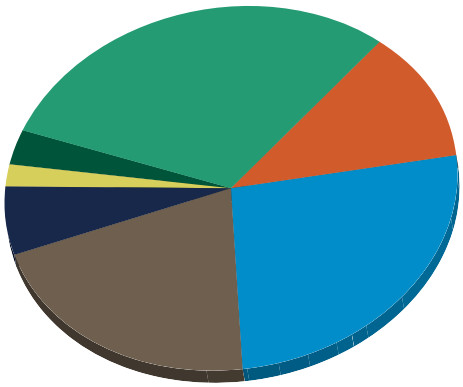
Completing a greenhouse gas emission assessment will help determine what the most significant source of emissions is on the farm and take action to minimise its climate impact.

STUD FARM 1: Total emissions 130 t CO_2e



Purchased feed	31%
Energy	10%
Transport (livestock)	6%
Horses (digestion and manure)	14%
Cattle (digestion and manure)	13%
Sheep (digestion and manure)	22%
Application of manufactured N	2%
Manufacture of fertiliser	2%

STUD FARM 2: Total emissions 380 t CO_2e



Purchased feed	30%
Energy	12%
Transport (horses onto farm)	26%
Horses (digestion and manure)	21%
Cattle and sheep (digestion and manure)	6%
Application of manufactured N	2%
Manufacture of fertiliser	3%

Figure 3. Proportion of emissions from each source – comparison of two different stud farms. Stud farm 1 (left) had no resident stallions, and hosted mares and foals for 4-6 months during early development, it had a resident flock of sheep and visiting cattle. Stud farm 2 (right) had resident stallions and regular visiting mares, it had a small number of cattle and sheep.

Key hotspots that were identified on the two assessed farms are shown in **Figure 3**:

- **Transport** of horses – the more the horses move on and off site and the greater the distance they travel the higher the emissions. The stud farm (2), with resident stallions and visiting mares had transport as one of its major sources of emissions.
- Embedded emissions in **feed** – it is the bagged feed that contributes the majority of feeding emissions, rather than the hay or haylage. This is because many of the feeds used on these stud farms contained a significant proportion of soya, with no designation of origin. The majority of soya imported to the UK comes from South America and carries a heavy embedded emission burden associated with deforestation on the farms where it is grown.
- The **horses** themselves, particularly the manures that they produce. The way manures are managed can impact emissions, with most stable manure managed in open heaps where nutrients and gases are lost to the environment.
- **Other livestock** – both farms co-grazed with sheep and cattle. As ruminant livestock these produce large amounts of methane during digestion as well as manures which contribute to emissions. Where these other livestock are used for co-grazing purposes they should be managed productively and efficiently to produce milk or meat in order to deliver a valuable product in exchange for the emissions they produce.

Enhancing sequestration

Carbon sequestration is becoming an increasing focus for the land manager as it becomes recognised that the way land is managed can impact its ability to not only store carbon, but also remove carbon from the atmosphere.

The aim of sequestration is to remove carbon long term from the atmosphere. The most robust approach is through the planting of trees with the Woodland Carbon Code providing a good mechanism for measuring the carbon captured through tree planting. Soil carbon is an area that is of increasing interest, but is notoriously difficult to measure accurately. Increasing soil carbon levels takes time, with measurements needing to take place over years to determine change. A soil carbon code is in development which aims to provide a standardised approach to measurement. Minimising disturbance of existing permanent pasture (cultivation/poaching), and adding organic materials (manures), are key measures to protect and enhance soil carbon.

Currently, the most robust source of UK-specific habitat carbon figures is the latest Natural England report. The carbon figures quoted in that report are show in the table below.

	Improved Grassland System	Mixed Native Woodland System
Soil carbon to 1 metre depth	72-204 t C/ha	108-173 t C/ha (22-204 t C in vegetation)
Average total carbon	130 t C/ha	255 t C/ha
Confidence	Low	Medium

Water

Protecting water courses

Livestock access to watercourses has a significant impact on water quality. Preventing livestock accessing watercourses is crucial to minimise poaching and risk of phosphate, sediment and faecal contamination. Fencing off ditches, streams and other watercourses on farms to minimise risk of livestock access is recognised as best practice for protecting water quality.

In addition, where watercourses run through or are adjacent to paddocks it is important to implement buffer zones when applying pesticides, manufactured fertilisers or spreading manures to minimise the risk of run off into the watercourse.

To prevent scouring of banks during high water events, scrub should be managed at an acceptable density – sufficient to protect banks, but not block the water course. Scrub aids in reducing speed and power of the water flow, reducing the likelihood of downstream flooding. Additionally, meandering watercourses promote habitat diversity with pools and eddies. Fenced areas of ditches and streams are an optimal location to plant native tree species which provide shade to support and protect aquatic life.

Figure 4. Example of watercourse protected from livestock with fencing.

Muck heaps

Muck heaps are a potential source of pollution. Management of muck heaps, on both agricultural and equine farms is experiencing increasing scrutiny under the Farming Rules for Water. A key challenge associated with the management of equine muck heap is the requirement for any heaps situated on soil (rather than an impermeable surface), to be moved on an annual basis, meaning that it is not going to be possible to maintain a muck heap in a single convenient location long-term unless a proper muck bay is constructed. Heaps should also be placed over 10m away from a watercourse and should be banked up to minimise the surface area exposed to rain reducing the risk of runoff.

Best practice is the installation of a concrete base and supporting walls/earth bunds, with the facility to collect runoff water to prevent contamination of surface and groundwater.

Soil health

Good pasture management is critical to maintaining good soil health. The aim is to minimise compaction and protect the soil structure to enable healthy swards of grass to be maintained and support the grazing of horses. Part of this is also about ensuring that there is a healthy microbial community in the soil, to ensure the soil is able to function effectively in both dry and wet conditions.

Pasture rotation is a key practice in ensuring good soil health. Regular tight grazing to sward heights below 10cm depletes roots and grass resilience to stress factors. Healthy roots increase sward height and drought resilience. Longer roots access deeper water reserves and support grass competitiveness against weeds. Ideally grass should be maintained in the vegetative growth stage, with sward heights exceeding 10cm and not permitted to go to seed. Rotational grazing should be practiced, resting paddocks and allowing grasses to recover. Returning horses when sward height is 20-30cm will promote a healthy root system.

Rotation will also minimise the risk of poaching and soil compaction from developing as the ground has time to recover between each grazing period and swards will protect soil during wetter conditions. When conditions are particularly wet, engaging in frequent paddock rotation and stoning gateways and high traffic areas will reduce poaching.

Rolling is common practice on stud farms to ensure pastures are smooth and minimise the risk of injury to young foals. However, this practice increases the risk of soil compaction as it reduces the air space in the top 10cm of the soil, therefore limiting future grass growth. Rolling should only be carried out in dry conditions, to minimise the depth of compaction. Using a slit aerator after rolling will help to alleviate some of the compaction issues.

Under the Farming Rules for Water guidance, all applications of manure/fertilizer are required to be planned to meet soil or crop needs. Soil test results must show pH, nitrogen, phosphate, potassium and magnesium values. If not required annually for guiding applications, soil sampling should ideally be completed every 3-5 years. However, as soil pH can change more rapidly, if there is concern about possible soil acidity more frequent samples can be taken to assess pH only.

Further guidance on good soil management is available in this guide on the Principles of Soil Management.

Conclusion

Stud farms have a diverse range of habitats on them and if managed sensitively it is possible to provide multiple benefits to the environment as well as to the horses living on site. Some of the opportunities for enhancing environmental outcomes may require rethinking how certain aspects of the farms are managed, but many will complement existing management practices. Stud premises habitats have a high value in relation to biodiversity net gain given the numerous opportunities for increasing biodiversity on site, these benefits could even be increased through collaborative working between adjacent stud farms to enhance connectiveness of habitats across a larger area and link wildlife corridors. Collaborative working can also enhance water quality by ensuring all landowners along the length of a watercourse work together to minimise the risk of losses of nutrients and pollutants into the water.

Best practice dos and don'ts across the farm

The following tables list a series of activities to implement or avoid across different areas of the farms and highlight their impact on:

biodiversity climate water soil

with ✓ for positive impact and ✗ for negative

Key habitats present on stud farms and considerations on their management are given below.

	Grazed grass – horse paddocks	biodiversity	climate	water	soil
DO MORE ✓	Rotational grazing – maintain grass sward heights at 10-30cm in height.	✓	✓	✓	✓
	Use soil sampling and create a targeted nutrient management plan.		✓	✓	✓
	Encourage sward diversity where possible – allowing small forbs (herbaceous flowering plants), to establish.	✓			
	Use well-rotted manure to provide nutrients and organic matter to benefit soil biodiversity.	✓	✓		✓
	To minimise ground poaching, gateways should be placed on higher ground and hardcore or stones laid near the gateways and water troughs to avoid poaching in high traffic areas.			✓	✓
DO LESS ✗	Overgrazing – grazing grass too short leaves bare areas that allow ingress of undesirable species, also increases risk of compaction and surface water run-off.		✗	✗	✗
	Spraying with broad spectrum weed killers around boundaries – this leaves bare areas prone to weed ingress.	✗		✗	✗
	Rolling in wet conditions – this will compact the soil and encourage anaerobic conditions, decreasing water infiltration. When rolling, only do so in dry conditions and ensure soils are aerated afterwards.	✗	✗	✗	✗

	Mown verges / grass margins	biodiversity	climate	water	soil
DO MORE ✓	Reduce mowing frequency and allow sward to increase in height, including allowing some grass margin areas to set seed – reducing mowing reduces compaction and improves soil health.	✓	✓	✓	✓
	Retain existing grassland habitat sward structure and increase botanical diversity; the provision of native plug plants (for example, Common Knapweed, Field Scabious, Oxeye Daisy, Salad Burnet, Wild Carrot), as opposed to re-seeding or over-seeding. The target would be at least 30% cover of wildflowers.	✓			
	Cut and collect to reduce nutrients and leave some areas uncut to provide habitat diversity. Or cut and collect to reduce nutrients – compost cuttings in a slatted wood bin which enables wildlife like grass snakes to use it as a site for egg laying.	✓			
	Seeding and overseeding with suitable pasture seed mix of areas dominated by coarse grasses, or short-mown grassland along the grassed tracks.	✓			
DO LESS ✗	Spraying with herbicides – allow natural diversity to develop, just target problem species with selective herbicides, to minimise risk of bare ground.	✗		✗	✗

Woodlands				
DO MORE ✓	Promote native species and increase diversity of native tree species in woodland through regular planting – this will also increase age diversity of trees and improve soil health.	✓	✓	
	Leave fallen dead wood, including fallen trees to provide habitat.	✓		
	Retain standing deadwood. If trees need to be felled, consider leaving tree stumps.	✓		
	Promote shrub layer under trees by planting native scrub species under existing stands of trees (Berberis, Bramble, Cornelian cherry, Dogwood, Hawthorn), to increase diversity of species and habitat through the woodland, allowing natural regeneration of trees. Alternatively, fence woodland to minimise grazing by large herbivores and allow natural regeneration of young trees and vegetation.	✓	✓	✓	✓
	Protect young trees from herbivore damage.	✓			
	Install open-bottom bat roost boxes on woodland trees. Open-bottom roosts do not require cleaning.	✓			
DO LESS ✗	Non-native species such as sycamore, cotoneaster, rhododendron dominate – aim to systematically remove and replace with native species.	✗			
	Mowing under trees – this prevents natural regeneration and removes much of the scrub layer, removing habitat.	✗	✗		
	Nutrient enrichment – aim to minimise the level of additional nutrients entering woodland (e.g. run off from stables or muck heaps).	✗	✗	✗	

Hedgerows				
DO MORE ✓	Allow greater vegetative density, hedge height and width, replant any gaps in hedgerows.	✓	✓	✓	✓
	Increase the hedgerow network onsite by identifying opportunities to link up existing hedge lines.	✓	✓	✓	✓
	Only cut hedgerows once every 2-3 years. Where possible allow a side of hedgerow to be cut every other year.	✓	✓		

Gladeways and shelter belts				
DO MORE ✓	Increase shrub layer, tree and shrub diversity by planting native species.	✓	✓		
	Retain standing deadwood. If trees need to be felled, consider leaving standing monoliths.	✓			
	Remove non-native species: e.g. Laurel, Rhododendron, Cotoneaster.	✓			
DO LESS ✗	Spraying with broad spectrum weed killers around tree bases – this leaves bare areas that are prone to weed ingress.	✗		✗	✗
	Mowing - reduce grass cutting around gladeways to allow undergrowth to increase.	✗	✗		

Watercourses

DO MORE ✓	Cut back bramble scrub from the watercourse banks and channel.	✓		✓	
	Clear obstructions from the channel.			✓	
	Fence off watercourses to prevent livestock access.			✓	✓
	Place muck heaps more than 10m from watercourses and don't allow effluent to flow from heap to water.			✓	✓
	Utilise a 3m+ buffer zone between watercourse and any applications of pesticide or fertiliser.			✓	✓
	Wetland regeneration, permitting land to be allocated back to wetlands where applicable.	✓		✓	
	Creation of ponds (outside of paddocks), to create increased diversity of habitats and provide water source for wildlife.	✓		✓	
	Manage scrub along a watercourse allowing sufficient growth to prevent scouring of the bank, whilst also maintaining flow of the watercourse.		✓	✓	✓
	Plant native trees where watercourses/ditches are fenced off to provide shade and stability to the watercourse banks.	✓	✓	✓	✓

Stable yard and buildings

DO MORE ✓	Source feed which contains a protein source derived from little or no soya, and ensure that the soya included is from certified sustainable sources.	✓*	✓		
	Move field muck heaps on an annual basis.			✓	✓
	Build purpose made muck storage area with a concrete base and solid sides (ideally with a roof/cover to prevent rain access and minimise gaseous losses). Ensure any run-off is collected and stored appropriately before being spread on suitable land.		✓	✓	✓
	Consider ways to reduce transport miles (e.g. 'car pooling' collective transport of mares).		✓		
	Keep yards swept clean and minimise run off from yard to watercourses.			✓	
	Recycle packaging from bedding and feed.		✓		
	Where energy usage on site is sufficiently high consider investing in solar panels on the roofs of buildings to run LED lighting systems and meet other energy requirements.		✓		
	Collect and recycle rainwater from roofing through rainwater harvesting systems. Water can be stored and used for washing or irrigation. Where appropriately managed and cleaned it may also form a drinking water source for livestock.		✓	✓	
	Consider modifying car parks to re-enforced grass car parks or permeable paving. Consider how biodiversity can be included into parking areas, e.g. a plant border to encourage bees and insects.		✓		
	Consider developing a living green wall / green roof to provide increased diversity of plant species on site. Green roofs generally need to be considered as part of the construction of a new building, whereas green walls can be as simple as adding troughs or planters to existing walls through to more complex inbuilt systems. Linking these to rainwater harvesting systems to irrigate will help to minimise management requirements.	✓	✓	✓	

*Biodiversity benefits are off –farm, in the country of origin

Useful native grasses and shrubs

Useful native grasses and shrubs for increasing diversity of species throughout woodlands and grass margins.

1 Common Knapweed
2 Field Scabious
3 Oxeye Daisy
4 Salad Burnet
5 Wild Carrot
6 Berberis
7 Bramble
8 Cornelian Cherry
9 Dogwood
10 Hawthorn

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