Guidelines for managing outdoor straw pads for beef cattle

Better Returns Programme

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Key messages

- When selecting a site for a straw pad, consider protection of watercourses and groundwater
- The development of a straw pad may require an application to the local planning authority
- Be prepared to explain why the pad is needed and emphasise the benefits, both in environmental terms and how it contributes to the business
- Where possible, straw pads should be lined with effluent collection facilities to minimise the risk of diffuse pollution from uncontained runoff
- Feeding off-pad reduces dung and urine input to the pad and minimises the formation of a very soiled region near the feeding area
- Where the water trough is located on the pad, the area around it must be kept clean and dry
- With an uncovered feed space, on a very wet day it is advisable to feed out more often, to prevent large amounts of feed being wasted
- Aim for a minimum depth of bedding of 30cm at the start of stocking. Additional straw should be added regularly to keep the surface clean and dry
- Stocking rates depend on the livestock category and whether feeding is on or off-pad. Feeding on-pad increases the loading of excreta so a greater area per animal is required
- In very hot weather, feed intake may drop due to heat stress. In these situations it is vital to provide plentiful clean water and keep feed fresh
- Keeping cattle outside can reduce respiratory problems as long as the pad surface remains clean and dry. Animals standing in wet manure for long periods can develop digital dermatitis and heel erosion
- Straw pads typically need clearing out every four to six months, by which point the bedding layer may be up to 1m deep

Keywords:

Straw pads for cattle, outwintering pads for cattle, planning a straw pad

Contents

Introduction

A straw pad is an outdoor deep-bedded enclosure for keeping cattle in. On unlined pads the depth of bedding should provide sufficient absorptive capacity to retain the dung and urine generated by the cattle and rainfall during the stocking period. Regular additions of bedding should be made to the pad during the stocked period, to keep the bed clean and dry and to prevent contaminated runoff from the pad.

Keeping cattle outside on a well-designed and managed outdoor pad, including straw and woodchip pads, offers many benefits including improved animal health and welfare, less damage to pasture from treading and potential poaching, reduced labour costs and a cheaper alternative to constructing traditional buildings. However, any effluent draining from a pad is likely to be high in nitrogen (N), phosphorous (P) and faecal pathogens and represents a high risk of diffuse water pollution.

Farmers thinking of constructing an outdoor pad are encouraged to seek specialist, professional advice at an early stage of design. Any effluent draining from a straw pad is classed as slurry and lined pads must drain to a slurry store.

Farmers considering constructing an unlined straw pad must first consult the Environment Agency, to demonstrate that their planned outdoor pad does not pose an unacceptable risk of diffuse pollution.

Site selection

When selecting a site for a straw pad, consider protection of watercourses and groundwater.

Protection of watercourses and groundwater

Do not locate the (lined or unlined) straw pad:

+ Within at least 10m of surface water, including ditches, or of a land drain
+ On shallow soil over gravel or rock
+ Within groundwater source protection zone 1. If a source protection zone has not been defined, then within at least 50m of any well, spring or borehole used for the supply of water for human consumption, including private water supplies
+ On land likely to flood or become waterlogged

The sensitivity of surface water and/or groundwater to pollution from an unlined straw pad may further prohibit their location in certain areas. In all cases what is/is not acceptable at a specific location will depend on a risk-based assessment (source – pathway – receptor). Farmers considering constructing a straw pad must first consult with the Environment Agency.

They can use the Environment Agency's 'What's in Your Backyard' tool, to identify whether a proposed site is in a source protection zone, or a groundwater or surface water safeguard zone (see Further Information, page 14).

Sloping ground

Where possible, locate the pad on flat ground. If the straw pad is sited on a slope, there is a risk of water draining in towards it. Ensure that there is no sub-surface or overland flow of water towards the straw pad. If necessary, construct a drain to intercept and re-route drainage around the straw pad.

A stack of bales can act as a windbreak for cattle wintered outside on a straw pad

Shelter

Whilst the pad will benefit from winds to assist surface drying, exposure to extreme cold winds and wet conditions can be a problem for animals. For exposed sites, use of a shelter, such as windbreak material or a hedge, can be beneficial for the welfare of less hardy breeds or younger animals.

Access and proximity to other farm infrastructure

When selecting a site for a straw pad, consider whether vehicle access is needed for delivery of bedding, feed etc. Close access to silage clamps or other feed facilities minimises the work involved in daily feeding, while close access to other farm buildings may make it easier to handle cattle and bring them inside off the pad if needed.

Planning requirements

The development of a straw pad may require an application to the local planning authority. Individual farm circumstance, the extent of the structure and number of livestock to be accommodated, will dictate whether this can take the form of a permitted development, subject to prior notification under Part 6 of Schedule 2 of the Town and Country Planning Permitted Development Act 1995 (as amended), or a full planning application. For the largest structures of more than 500m^2, the local authority may also check if an Environmental Impact Assessment is necessary.

The development of a straw pad may require an application to the local planning authority.

Notification of whether the straw pad is lined and drained, including details of slurry storage, or whether it is unlined and sufficient bedding will be used to absorb all the liquid, will be required.

Important: Planning criteria are subject to change. These details should be checked with the relevant local authority before submitting an application, to ensure that the correct procedure is employed and that sufficient information is provided to ensure the application is assessed quickly.

Prior notification route

+ Applies to farm units of 5ha and above
+ The floor area of the straw pad should not exceed 465m^2
+ The straw pad should not be within 25m of a metalled trunk or classified road, including C class country lane
+ The straw pad and any associated manure/slurry storage facility should not be within 400m of a protected building, ie a non-agricultural dwelling

The process

An application should be made to the local planning authority before beginning the development, to determine whether the siting, design and appearance of the straw pad requires their prior approval.

The application requires a written description of the proposed development and of the materials to be used, along with a plan indicating the site. This should cover the pad size and associated works, or a wider area within which the pad(s) would be expected to be used.

The local authority has 28 days to determine whether prior approval is required or not. If prior approval is deemed to be required, the local planning authority can ask for further information and impose conditions on the development.

Works can start, subject to meeting any specified conditions, from the date of the notice, or up to five years after the supply of information. If prior approval is not required and the local planning authority has not written to ask for more information or a planning application, then work can start after the 28-day period.

It is always worth locating a straw pad where it will have least environmental impact

Full planning application

A full planning application will be required for development which does not fulfil the tests of the above notification, or sometimes in cases where the farm unit is subject to existing planning conditions and restrictions.

It is always worth thinking which location for a straw pad would have the least impact on any site of environmental value, including local nature conservation areas, publicly accessible views and protected environments. Avoid putting developments near public footpaths/bridleways or roads if possible.

The time taken to determine an application can be up to eight weeks, or potentially longer for the largest proposals, which may take between 13 and 16 weeks. It is important to think ahead and plan for the time taken to collect the required information.

The exact list of requirements varies between authorities and the sensitivity of the site. Expect to produce a site plan and either photos or plans of the pad size and depth and any form of enclosing structure. If a new road is proposed, in particular a new field access from a publicly accessible road, the local planning authority will need the details. A Design and Access Statement, a Planning Statement, plus possibly an Ecological Report and Landscape Assessment, as well as drainage information may be required. Check online and with the local planning authority if in doubt. Understand why any documents specified are needed.

The local planning authority will be interested to see how smell, noise and disturbance will be managed, in addition to appearance, so answers to all of these issues must be included in the information. Be prepared to explain why the pad is needed and emphasise the benefits, both in environmental terms and how it contributes to the business.

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Any information supplied will be available for the general public to view and comment on, if they consider it raises specific planning issues that impact on them. Expect to see a site notice displayed for 21 days and for the local parish council or amenity groups to comment.

Local planning authorities are particularly interested in the visual aspects of any development and how screened they are from wider public views, for example from footpaths and houses, particularly if structures are large. They will also be interested in any drainage/slurry information for pads sited in areas where there are flooding or other known drainage issues. Expect to be asked for more information if this is the case. Provide this in the first instance, if possible. The local planning authority may ask for information about how land will be remediated after the pad is removed. They may also ask for landscape screening for fields.

In theory any application for intensive agriculture developments over 500m^2 can generate the need for an Environmental Impact Assessment (EIA). However, the test carried out by the local planning authority, known as a Screening Opinion, has set criteria to check whether this would be necessary. If the development exceeds this threshold, it is worth checking with the local planning authority and ensuring they have the basic information needed to screen the application, before submitting it. Otherwise it could create additional cost and delay.

Unlike the prior notification process, farmers have to wait for a determination on a planning application before starting work. It is usual for planning conditions to be imposed. There would normally be three years to start works. Some local planning authorities may grant a temporary planning permission, for a limited time, if they are unsure of the long-term impact.

Always keep an eye on the progress of any application and be prepared to clarify matters. This can help speed up determination of the application. In the unlikely event that the application has not been determined after 13 weeks, or 16 weeks with an EIA, a farmer can appeal and ask the Planning Inspectorate to determine the application. An appeal can also be made to the Planning Inspectorate if a planning application is refused. However, it would always be advisable to check first with the local planning authority to see whether any problems can be overcome.

Pad design

Drainage

Where possible, straw pads should be lined with effluent collection facilities to minimise the risk of diffuse pollution from uncontained runoff. The sensitivity of surface water and/or groundwater to pollution from an unlined straw pad may further prohibit their location in certain areas.

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Guidance on the construction of the drainage system is available in the AHDB Beef & Lamb publication **Improved design and management of woodchip pads for sustainable out-wintering of livestock**.

Care should be taken when 'mucking out' the soiled straw bedding, so as not to damage the drainage system.

Under current Nitrogen Vulnerable Zone (NVZ) regulations, any effluent draining from a straw pad is classed as slurry. Farms in NVZs must show their storage requirement calculations and provide five months storage for effluent and slurry. Slurry stores should also meet the Storage of Silage, Slurry and Agricultural Fuel Oil (SSAFO) regulations.

While farmers constructing a lined straw pad may remove the topsoil layer when installing the drainage system, topsoil should not be removed for an unlined straw pad.

Effluent collection

Farmers considering constructing an unlined straw pad must first consult with the Environment Agency and be able to demonstrate that they will use sufficient bedding to absorb all the dung, urine and rainfall to the pad area. Their planned outdoor pad must not pose an unacceptable risk of diffuse pollution.

Feed and water

The cattle may be fed either on or off the pad.

Feeding off the pad can be achieved by installing a concrete or hardcore feeding stance next to the pad, allowing access to a feed barrier. This allows cattle some hard-standing when feeding, reduces dung and urine input to the pad and minimises the formation of a very soiled region on the pad near the feeding area.

Feeding off the pad reduces dung and urine input to the pad and minimises the formation of a very soiled region near the feeding area.

Where feeding off-pad, the feed stance should be designed to allow regular, two to three times a week, scraping. The feed stance should be long enough to accommodate all the cattle feeding at one time. It should be wide enough to allow the whole animal to stand on it whilst feeding without fouling the pad area behind it, approximately 3.5-4.5m. A kerb on both sides of the feed stance allows it to be scraped regularly, without spreading the slurry back onto the pad or towards the feed.

Feeding off-pad should allow all animals to eat at once

Free and rapid access to the feed and water areas are best practice, rather than through a gate or narrow ramp. If there is restricted access to the feed or water area, this will need careful management to avoid it becoming a hotspot for greater dung accumulation. It might need greater frequency/quantity of bedding added and removal of heavily soiled bedding.

Where the feed stance runs along one side of the straw pad, a step up to it will help management. After four to five months of regular straw additions, the depth of bedding is typically greater than 70cm. Where the feed stance is level with the base of the pad this may result in a slope down to the feed stance, making it difficult to keep it clear of bedding.

Where the cattle are fed on-pad, the feed area has to be managed carefully to avoid it becoming a hotspot area for dung accumulation. The feed area will require a greater quantity and frequency of bedding addition to keep it clean and dry. It may be necessary to periodically remove heavily soiled bedding from this area and replace it with fresh bedding. Similarly, where the water trough is located on the pad, the area around it must be managed to keep it clean and dry.

Where the water trough is located on the pad, the area around it must be managed to keep it clean and dry.

Design of the straw pad should also take into account how the feed is presented to the cattle. For example, the outdoor system would not be suited to intensively finished cattle on *ad-lib* cereals, unless the feed was kept dry in watertight hoppers.

Uncovered feed space will incur more wastage than on an indoor system due to the weather. Rationing needs to balance this. On a very wet day it is advisable to feed out more often, to prevent large amounts of feed becoming wet and wasted. Wet feed that has been lying out may reduce feed intake and liveweight gain in finishing cattle.

With an uncovered feed space, on a very wet day it is advisable to feed out more often, to prevent large amounts of feed becoming wet and wasted.

The standing area must be wide enough to allow dunging and urinating off the straw pad whilst the animals are eating

Bedding requirements

Bedding recommendations are based on the quantity of straw required to absorb the liquid input of excreta and rainfall to the pad. As well as rainfall levels, this depends on livestock type and whether cattle are fed on or off the pad (Table 1 and Table 2).

Figure 1 shows average annual rainfall for the whole of the UK. For comparison, Tables 1 and 2 give bedding recommendations based on average monthly rainfall of 55mm and 75mm.

Figure 1. Average annual rainfall for the UK (source Met Office, National Climate Information Centre)

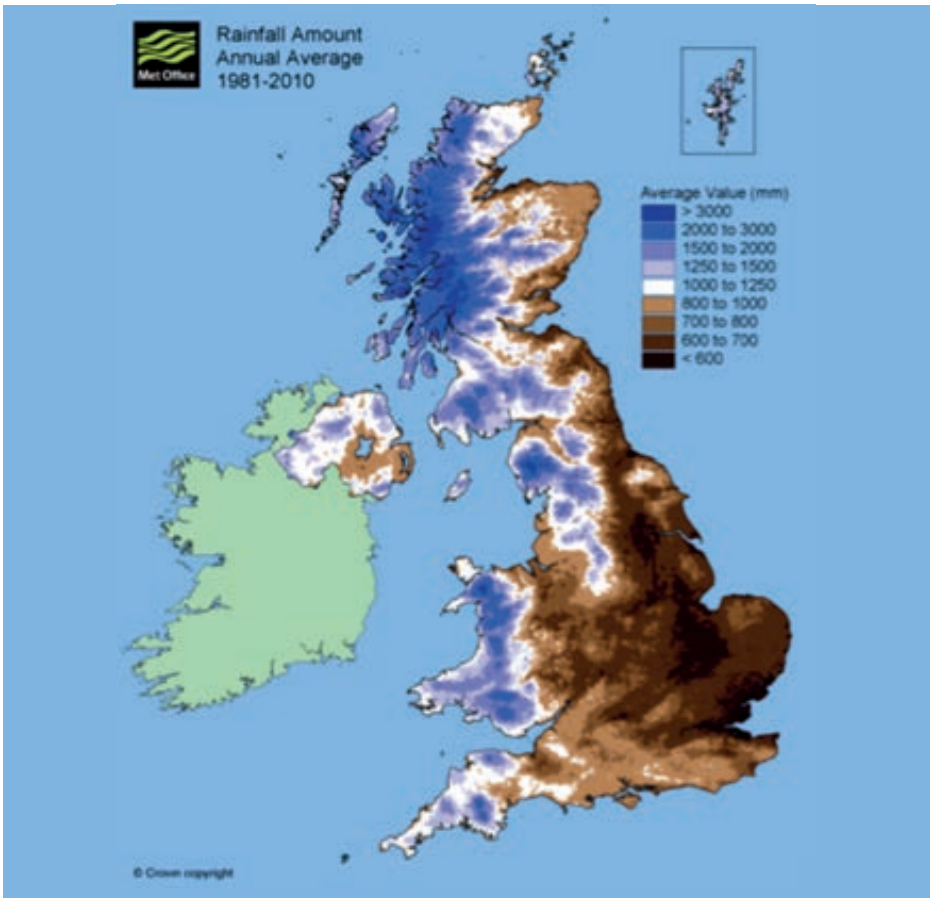


Table 1. Straw bedding requirements (tonnes of straw/animal/month) based on average monthly rainfall of 55mm (equivalent to 660mm per year)

Livestock category	Season	Stocking rate (m²/animal)			
		10-12	14-16	18-20	22-24
Cattle fed off-pad[1]					
Suckler cow (up to 500kg)	Winter	0.34	0.39	0.44	0.49
	Summer	0.24	0.26	0.28	0.29
Suckler cow (over 500kg)	Winter	0.42	0.47	0.52	0.57
	Summer	0.32	0.34	0.35	0.37
Cattle (1-2 years)	Winter	0.31	0.36	0.41	0.46
	Summer	0.21	0.22	0.24	0.26
Cattle (<1 year)	Winter	0.27	0.32	0.37	0.42
	Summer	0.17	0.19	0.21	0.22
Cattle fed on-pad					
Suckler cow (up to 500kg)	Winter	0.44	0.49	0.54	0.59
	Summer	0.34	0.36	0.37	0.39
Suckler cow (over 500kg)	Winter	0.56	0.61	0.66	0.71
	Summer	0.46	0.47	0.49	0.51
Cattle (1-2 years)	Winter	0.39	0.44	0.49	0.54
	Summer	0.29	0.30	0.32	0.34
Cattle (<1 year)	Winter	0.33	0.38	0.43	0.48
	Summer	0.23	0.25	0.27	0.28

1. For cattle fed off-pad, the stocking rate excludes the hard feed area.

Where straw pads are used throughout the year, bedding use in the summer is likely to be lower, reflecting the higher summer evaporative losses.

Most straw pads are located in the drier eastern counties. The bedding recommendations given in Table 1 are based on average monthly rainfall of 55mm. Where the actual rainfall is greater than this, more straw bedding will be required.

Table 2. Straw bedding requirements (tonnes of straw/animal/month) based on average monthly rainfall of 75mm (equivalent to 900mm per year)

Livestock category	Season	Stocking rate (m²/animal)			
		10-12	14-16	18-20	22-24
Cattle fed off-pad[1]					
Suckler cow (up to 500kg)	Winter	0.42	0.50	0.58	0.65
	Summer	0.32	0.37	0.41	0.45
Suckler cow (over 500kg)	Winter	0.50	0.58	0.65	0.73
	Summer	0.40	0.44	0.49	0.53
Cattle (1-2 years)	Winter	0.39	0.46	0.54	0.62
	Summer	0.29	0.33	0.37	0.42
Cattle (<1 year)	Winter	0.35	0.43	0.51	0.58
	Summer	0.25	0.29	0.34	0.38
Cattle fed on-pad					
Suckler cow (up to 500kg)	Winter	0.52	0.60	0.67	0.75
	Summer	0.42	0.46	0.51	0.55
Suckler cow (over 500kg)	Winter	0.64	0.71	0.79	0.87
	Summer	0.54	0.58	0.63	0.67
Cattle (1-2 years)	Winter	0.47	0.54	0.62	0.70
	Summer	0.37	0.41	0.45	0.50
Cattle (<1 year)	Winter	0.41	0.49	0.57	0.64
	Summer	0.31	0.36	0.40	0.44

1.For cattle fed off-pad, the stocking rate excludes the hard feed area.

These recommendations should be combined with a visual inspection of the pad. Additional straw should be added as required. This should keep the surface of the pad clean and dry and ensure there is no 'pooling' of liquid on the surface, or any seepage of effluent from the pad.

It is also important to consider the timing of bedding application. In particular, to ensure sufficient bedding is added early in the stocking period, so that the straw pad has the capacity to absorb the effluent produced following short periods of heavy rainfall.

Farmers should aim for a minimum depth of bedding of 30cm at the start of stocking. Additional straw should be added regularly to keep the surface of the pad clean and dry. During wet periods this may typically be every one to two days. In dry periods this may be once a week. The straw bedding requirements given in Tables 1 and 2 are total bedding requirements and include straw added initially and then regularly to keep the surface clean.

Aim for a minimum depth of bedding of 30cm at the start of stocking. Additional straw should be added regularly to keep the surface clean and dry.

Recent AHDB Beef & Lamb research carried out on a commercial straw pad, showed that these bedding recommendations provided a good guide for the total quantity of bedding required during the stocked period. However, the actual quantity of bedding used varied between months, depending on the amount of rainfall.

The quantity of bedding used varies between months, depending on rainfall

These bedding requirements are based on a typical absorbency value for cereal straw of 300%. Other bedding material may have lower or higher absorbency values, which will affect the quantity of bedding that needs to be used.

Data from recent AHDB Beef & Lamb research indicated that 'old/weathered' straw typically had an absorbency of around 230% and waste wood shavings had an absorbency of around 110%.

Stocking rates

Stocking rates depend on the livestock category and whether feeding is on or off the pad. Feeding on-pad increases the loading of excreta so a greater area per animal is required.

Stocking rates depend on livestock category and where feeding takes place

Stocking rates depend on the livestock category and whether feeding is on or off the pad. Feeding on-pad increases the loading of dung and urine, so a greater area per animal is required. Minimum space allowances given for woodchip pads can be used as guidance for straw pads (Table 3).

Table 3. Suggested minimum on-pad space allowances for animals on straw pads

	Minimum space requirements per animal (m^2)	
Animal type	**On-pad feeding**	**Off-pad feeding**
Suckler cow	16	10
Beef cattle (>2 years)	16	10
Cattle (1-2 years)	12	8
Cattle (<1 year)	10	6

Research in the UK on woodchip pads has shown that increasing the area allowance per animal is associated with faster growth rates in cattle weighing between 470-670kg. Increasing the area allowance from 11.8m^2/animal to 14m^2/animal increased the daily liveweight gain from 1.20 to 1.39kg/head/day.

Feeding cattle on straw pads

When cattle are out-wintered on straw pads, they may need to generate more heat to maintain a constant body temperature.

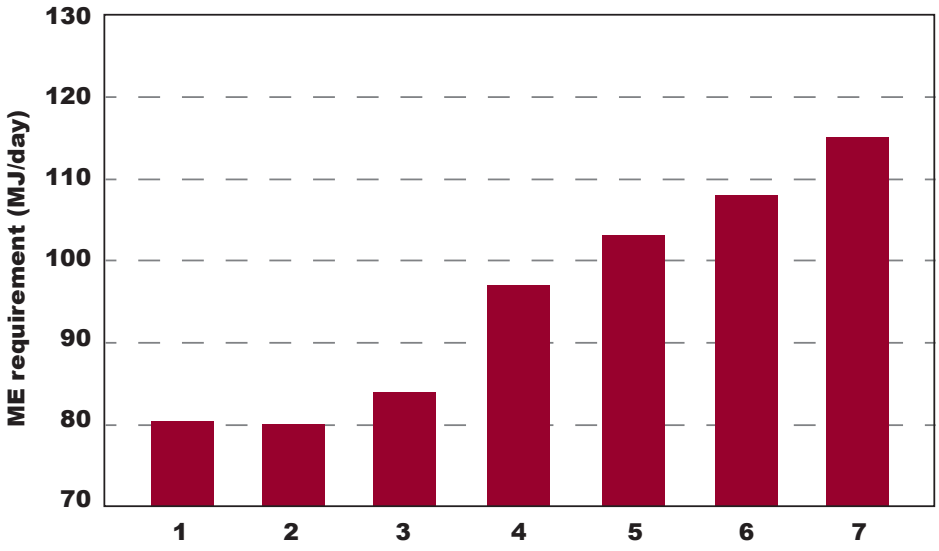
All cattle must maintain a constant body temperature. When they are out-wintered on straw pads, they may need to generate more heat to achieve this.

The amount of additional energy cattle require on straw pads depends on:

+ Animal size. Smaller cattle have greater surface area in relation to their liveweight than larger cattle, so they lose heat faster
+ Hide thickness. Dairy cross beef cattle have thinner hides and therefore have poorer insulation than pure beef breeds
+ Coat condition and thickness. The depth of an animals' coat will also affect heat loss, as will their condition. Dirty, wet coats reduce insulation
+ Body condition of cattle. Thin cattle have poorer insulation than fatter cattle
+ The weather – temperature, rain, wind and sun exposure all affect cattle energy requirements to some extent
+ Growing cattle. Fast growth rates require higher energy intake but the animals give off more heat, so there is less effect of cold stress

An example of how these factors affect the energy requirement of spring-calving suckler cows is shown in Figure 2.

Figure 2. Energy requirements of spring-calving beef suckler cows (650kg) in good condition (BCS 3), two to three months from calving, under different climatic situations (all at 5°C) needed to maintain cow condition at the same level as that of housed cows fed 80MJ ME/day.



Key

1 Housed on straw bedding
2 Out on a dry, calm day with coats clean and dry
3 Out on a wet, but calm day with coats wet and matted
4 Out on a dry but windy day (20mph)
5 Out on a wet and windy day (> 20mph)
6 Out on a wet and windy day with coats covered in mud
7 Thin cows (BCS1.5) out on a wet and windy day, with coats covered in mud

In very hot weather, feed intake may drop due to heat stress. In these situations it is vital to provide plentiful clean water and to keep feed fresh and appetising.

In very hot weather, feed intake may drop due to heat stress. In these situations it is vital to provide plentiful clean water. Keeping feed fresh and appetising will also help optimise feed intakes.

Animal health and welfare

Keeping cattle outside can reduce the risk of respiratory problems. However, it is important for optimum health and welfare to manage the pad so the surface remains clean and dry. Do not allow hotspot areas of greater dung accumulation to develop, particularly around the feed or water areas. Animals standing in wet manure for long periods can develop digital dermatitis and heel erosion.

Keeping cattle outside can reduce respiratory problems as long as the pad surface remains clean and dry. Animals standing in wet manure for long periods can develop digital dermatitis and heel erosion.

Mucking out/management of soiled bedding

Straw pads typically need clearing out every four to six months, by which point the bedding layer may be up to 1m deep.

Straw pads typically need clearing out every four to six months, by which point the bedding layer may be up to 1m deep.

The soiled straw bedding should be cleared from the pad and managed as farmyard manure (FYM). If the straw pad is lined with effluent collection, care should be taken when removing the soiled straw bedding not to damage the drainage system.

Soiled straw bedding should be cleared from the pad and managed as farmyard manure

The total fresh weight of soiled bedding produced is likely to be between four and four and a half times the initial weight of straw added to the pads.

The soiled bedding can be stacked in heaps prior to land spreading, either on concrete pads with effluent collection or in field heaps. Field heaps in NVZs must not be located:

+ Within 10m of surface water, including ditches, or of a land drain
+ Within 30m of surface water, including ditches, if the land slopes steeply, ie more than 12°
+ Within 50m of a spring, well or borehole
+ On land likely to flood or become waterlogged

The soiled straw bedding is likely to have a lower total nutrient N, P and potassium (K) concentration than typical cattle FYM. This reflects the higher proportion of bedding to excreta on the outdoor straw pads, compared to typical bedding use in a building.

Where possible, samples of the soiled bedding should be analysed for dry matter, total N, P, K and ammonia-N (NH_4-N) before spreading. Guidance on sampling solid manures for analysis can be found in Appendix 6 of The Fertiliser Manual RB209.

Further information

AHDB Beef & Lamb Better Returns Programme Improved design and management of woodchip pads for sustainable out-wintering of livestock

beefandlamb.ahdb.org.uk/returns/brp/

The Fertiliser Manual (RB209), 8th edition

www.ahdb.org.uk/cropnutrition

Guidance for farmers in Nitrate Vulnerable Zones

www.gov.uk/nitrate-vulnerable-zones

MANNER-NPK software can be used to assess the crop available nutrient supply from different organic materials

www.planet4farmers.co.uk/manner

Guidance on SSAFO

www.gov.uk/storing-silage-slurry-and-agricultural-fuel-oil

Environment Agency - *What's In Your Backyard (WIYBY) for farmers*

http://maps.environment-agency.gov.uk/wiyby/

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