

# Finding best practice for woodchip pads

**Keeping livestock on woodchip pads is to come under the spotlight, as new LINK-funded research aims to help farmers realise the benefits while minimising risks to the environment. ADAS principal researcher Ken Smith explains what we already know and what we need to find out**

For several years, there has been considerable interest in the use of low-cost woodchip pads, originally developed in New Zealand, for out-wintering livestock.

Woodchip pads have been seen as an economic means of over-wintering animals, potentially avoiding the need for conventional housing, reducing labour inputs and avoiding the high cost of straw bedding.

There are estimated to be more than 100 woodchip pads in Ireland, more than 400 in Scotland and about 170 in England, with 70% of the latter used by beef cattle.

In addition to reducing costs, woodchip pads appear to bring animal health, welfare and production benefits.

Research in Ireland has shown they can improve daily liveweight gain and feed conversion in cattle (see Table 1) and decrease fat deposition.

The rapid drainage and relatively clean surface of well designed pads has also been associated with reduced foot disorders.

However, after an initial wave of enthusiasm among beef and dairy producers, interest in woodchip pads has waned in the past two years.

This may partly be the result of a new requirement by the Environment Agency that any new facilities should have a base lining or seal and effluent collection. This follows evidence that unlined and unsealed corrals present an unacceptable risk of water pollution on most sites.

It also seems possible that the approach has fallen slightly into disrepute as a result of some high profile problems and pad failures. Even with pads installed on highly permeable substrata, drainage has sometimes been compromised and slurry known to build up to such an extent that cattle have had to be withdrawn from the pad or continued use has required substantial use of straw.

## Future for woodchip pads?

In view of past problems, the increasing regulatory pressures and therefore increasing costs, is there still a way for woodchip pads to contribute to the sustainability of beef and dairy production systems?

It seems clear that carefully managed, out-wintering of cattle can provide a low cost alternative to housing and may become a more attractive option for farmers in the future as tighter controls over the storage and spreading of livestock manures are adopted, through the revision of the Nitrates Directive Action Programme.

Woodchip pads may provide a key element of such an out-wintering strategy, protecting pastures from damage during the wetter periods by



*Dairy cattle on a woodchip pad with feed passage and partial roofing (optional) by polythene tunnel at Teagasc, Moorepark, Eire.*

allowing the removal of stock. Such a system, through reducing the volume of effluent collected with animals spending more time at pasture, may reduce slurry storage facilities needed to comply with the minimum 22 weeks capacity required.

Even where well drained grassland is available in drier areas of the country, woodchip pads could provide an important insurance component of out-wintering systems.

## Technical Information

In the past, the absence of good sources of technical information has seen some woodchip pads installed with little or no guidance and this has seen a number of notable pad failures. Useful guidance

has now been published in Ireland and in Scotland, with *Technical Note TN595 Woodchip Corrals* by the Scottish Agricultural College (SAC, 2007) ([www.sac.ac.uk/consultancy/livestock/pubs/beeftechnotes/](http://www.sac.ac.uk/consultancy/livestock/pubs/beeftechnotes/)) and the *Guidance Document for the Design, Siting and Operation of Out Wintering Pads* by the Irish Department of Agriculture (2007) ([www.agriculture.gov.ie/areasofi/fds/S132OWPGDfeb2007.pdf](http://www.agriculture.gov.ie/areasofi/fds/S132OWPGDfeb2007.pdf)).

## New research

Building on the results of recent research, it is hoped that causes of pad failures can be better understood and fully addressed, alongside Environment Agency requirements for controlling pollution risks from future installations.

Recently commissioned research, under the Sustainable Livestock Production LINK Programme provides an opportunity to evaluate the implications of more stringent controls on environmental emissions and how pad performance can be improved through better design and management.

The research aims to promote clear, best practice

**Table 1. Effect of wintering system on finishing cattle performance**

	OWP <sup>1</sup>	OWP + slats <sup>2</sup>	Slats	Straw
Space allowance (m <sup>2</sup> /head)	18.0	17.5	2.5	4.0
Feed intake (kg DM/day)	10.88	10.58	9.50	9.79
Liveweight gain (kg/day)	1.40	1.33	1.01	1.10
Feed conversion (kg DM/kg LW)	7.77	7.95	9.41	8.90

1 OWP – out-wintering pad. 2 Slats at 2.5 m<sup>2</sup>/hd with free access to OWP at 15 m<sup>2</sup>/hd.  
Source: P French, TEAGASC, Moorepark Research Centre, Fermoy.

guidelines for the construction and management of woodchip pads. It will also test the hypothesis that pads can provide a reduced cost, overwintering option for cattle, with a significantly reduced pollution risk.

Some problems of corral drainage failure are likely due to the sealing of the base of the corral by solids in effluent.

One Pembrokeshire dairy farmer, who uses a large woodchip pad for dry cows on his organic unit, has observed a build up of solids within the drainage network. He has modified the system to allow the pipes to be flushed out.

Irish pads often include a surface layer of fine chips/bark which appears to be effective for solids retention and which can be removed (with solids) annually.

Collection and recycling effluent from woodchip pads will also greatly reduce risks of water pollution from them.

#### Environmental benefits

There is research evidence that woodchip pads may reduce gaseous nitrogen emissions. Farmers sometimes use woodchip pads to reduce pasture damage from cattle in wetter months, with stock allowed access to grazing for up to six hours a day.

Work in New Zealand has confirmed that time spent by cattle on woodchip pads can reduce nitrous oxide emissions compared with those from cattle stocked at the same rate on conventional grass paddocks.

This strategy reduces urine deposition to pasture in winter months and, hence, can reduce both nitrate leaching and nitrous oxide emissions. While such losses are small and of no significance agronomically, they are of importance environmentally because nitrous oxide is a powerful greenhouse gas with global warming potential estimated at 310 times that of carbon dioxide.

Ammonia emissions from

animal housing and hard standings are a major contributor to total ammonia emissions from agriculture.

Woodchip pads may offer potential to reduce winter emissions and preliminary measurements from Teagasc, Grange Research Centre, Eire, suggest a reduction in emissions of almost 25% from woodchip pads compared with the emissions from beef cattle in slatted housing.

The LINK research project will include studies on nutrient balance, quantifying nutrient retention in the woodchip, outputs in effluent and gaseous ammonia emissions. The construction and running costs, including maintenance and depreciation, will also be considered.

The research will be based around observations on commercial dairy and beef units and a replicated, pilot scale facility (with four separate pads, each 10m x 10m) to be constructed at North Wyke Research Station in Devon. Priority areas for investigation in the research pads include: woodchip size; surface layer chip size and their impact on solids movement, effluent quality and emissions; stocking density and livestock and woodchip pad management.

#### Manure economics

Sealing of woodchip pads, with adequately designed effluent collection, storage and management, will minimise the risk of contamination of ground or surface waters. But it will also give access to manure as a fertiliser, which in the face of escalating prices, is becoming increasingly valuable.

With 34.5%N costing more than £350/t, triple superphosphate at more than £670/t and muriate of potash at almost £560/t, interest in better recycling of manures is unprecedented.

Typically, a dilute, cattle slurry is worth about £6/m<sup>3</sup> (£28/1000 gals), more than



*A woodchip pad may be a viable alternative to a badly placed feeder, which can lead to severely poached soil.*

four times the value of slurry about three years ago. The winter slurry output from 100 sucklers is, therefore, worth £8000 and that from 100 dairy cows almost £12,000.

The cost of effluent storage is an important consideration, but opportunity to recycle this material provides some compensation.

SAC estimates suggested effluent storage would increase pad costs by about £300/cow, but would depend on the period of pad occupation, the winter rainfall and type of storage.

#### Construction costs

A review of pad construction costs has already been undertaken in view of the variability in design requirements, management objectives and regional costs.

A modular approach was adopted, identifying all the measures likely to be required in site preparation and construction. This included all labour and material costs - it is believed that past farm estimates have undervalued or excluded farm labour inputs. This costing schedule is intended to allow a general idea of likely costs, as part of the essential investment appraisal and planning.

On this basis, construction costs of a woodchip pad for a 100-cow suckler unit, at typical stocking density of 10m sq/beam, range from about £200/head for a basic installation up to £600/head for a very full specification. Both scenarios include effluent collection facilities, but do not include any effluent storage provision.

#### Help needed

In order to fulfil research objectives in this LINK project, access to a small number of well designed woodchip pads (with lining and effluent collection) is required - to allow measurement and sampling of effluent flow and gaseous emissions.

If any dairy or beef producer, operating a suitable woodchip pad is interested in assisting this research, the project leaders would be pleased to explain the implications and benefits to you.

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#### Comparative housing costs from Nix (38th edition, 2008)

Covered straw yard, concrete floor, pens only (4.0m <sup>2</sup> /head)	£620/head
Portal framed building with cubicles	£1200/head
Slatted floor cattle building (120 growing cattle) (1.7m <sup>2</sup> pen space/head)	£900/head