

## The effect of alternative bedding materials on sheep behaviour and welfare

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- Bedding is important for keeping animals clean and dry but also for environmental enrichment in housed sheep systems to improve animal welfare.
- Straw encourages natural sheep behaviour but is increasingly expensive and increases the environmental footprint of the Welsh sheep industry through haulage of cereal straw across the UK.
- Recent studies have investigated viable options for sheep bedding. In Wales, woodchip has been demonstrated as an option, as long as the farm is set up to properly manage the bedding.
- Further work is needed to investigate other viable sources of bedding at different stages of the sheep's life.

Choice of bedding is important in animal housing to ensure that animals are kept clean and dry. However, bedding also has a role in enrichment in indoor sheep housing and is clearly demonstrated to improve animal welfare and behaviour. Although the use of pen enrichment, through the inclusion of obstacles such as extra levels to jump onto, has been shown to be beneficial in housed feedlot lambs, it is also clear that the bedding material included in the pen can add to environmental enrichment.

### Bedding must encourage:

- Resting
  - Comfortable
  - Dry
- Natural behaviours
  - Environmental enrichment
- Good welfare standards
  - No effect on health or stereotypical behaviours
  - Keep animals clean
- Production
  - No detriment to production traits

Nutritionally it is clear, that when feeding high concentrate diets to indoor fattening lambs, the choice of straw bedding is beneficial over slatted floors. Higher levels of copper have been identified in the liver of lambs housed on slats compared to those on straw. Lambs that are housed on straw are often seen eating their bedding. This is more likely a behavioural need rather than hunger, as the lambs favour the process of chewing the forage, which occurs for longer than that of concentrate. Through this process, there will be [increased saliva production and rumination](#) which will create a less acidic and better rumen environment and improve digestibility. The reduction in rumen acidity will likely diminish the proportion of dietary copper that is available to be absorbed and subsequently the copper levels in the liver. If the storage capacity for copper in the liver is reached, chronic copper poisoning will be apparent in the animals.

The presence of straw in housed systems clearly improves animal welfare through the display of more natural behaviours. Sheep on straw will spend a greater amount of time foraging, ruminating and exploring compared to those housed in unenriched pens with a thin layer of sawdust. Furthermore, sheep housed on straw show [less stereotypical behaviours](#). Stereotypical behaviours are classed as abnormal and often repetitive behaviours such as gnawing repeatedly on objects without feeding, and are a clear demonstration of lack of enrichment in the environment.

Yet growing demand and prices for cereal straw in the UK mean that it is increasingly unsustainable for sheep systems to rely on buying in straw for housing during winter, fattening and lambing. This is even more of a concern in areas such as Wales which have a low prominence of arable systems. Concerns in these areas should be raised on the dependability on other areas of the UK for straw production, but also from the increased carbon footprint of haulage of the product. Transporting one tonne of straw 300 km (180 miles) across the UK on an articulated lorry [gives rise to 42 kg CO<sub>2</sub>](#). So what are the alternatives?

Farming Connect and Hybu Cig Cymru – Meat Promotion Wales (HCC) carried out a project alongside several academic partners between 2005 and 2008 to assess the use of woodchip as bedding for livestock. Work at IBERS, Aberystwyth University, found that growing lambs showed a preference for woodchip over straw. There was [no difference between woodchip and straw as bedding](#) on animal behaviour, average daily gain or food intake. However, no measurements on stereotypical behaviours or natural behaviours such as foraging were taken. It would be interesting to ascertain whether woodchip stimulates behaviours such as foraging. Lambs were fed hay as well as concentrates during this period, but the lack of straw as bedding did not lead to animals housed on woodchip eating more hay. A further study investigated lambing onto woodchip compared to straw and found there to be [no differences in behaviour or lamb survival](#). Much more woodchip was used over the lambing period than straw, but it was concluded that, if produced on farm, woodchip prices could be much reduced.

There are [several characteristics of woodchip that should be attained](#) such as a moisture content of less than 30% to maximise the absorbency of the material. The farm must assure that the wood chip source is appropriate and that only clean woodchip (i.e. not contaminated with glues or plastics) is used. In order to use woodchip appropriately in the system, the farm must be properly set up to support its use. The bedding must be mechanically handled, meaning that sheds must be able to be driven into to apply woodchip. Furthermore, storage must be accounted for, it is much easier to buy wood and chip on-farm, but this still requires some thought into adequate and safe dry-storage of the material.

To complete the cycle, woodchip bedding, as with straw, has been [demonstrated to be compostable](#). However, the composting process takes longer than with straw, and immature compost should not be used on land until fully broken down, which can take 2-3 years. Yet re-using the woodchip for bedding the following year can not only save room and money from buying in a full supply of woodchip again, but the process also aids in compositing by adding extra nitrogen to the material. A [T23 exemption](#) needs to be registered with Natural Resources Wales to compost the bedding and a U10 exemption is required to subsequently spread it to the land.

A recent scientific study completed in Spain investigated the use of several [organic bedding materials \(cellulose, rice husk and sawdust\) compared to straw](#), for fattening lambs in a feedlot system. Sawdust had the best absorbency properties and lowest dry matter before application. As dry matter of bedding decreases, through absorbance of urine and other matter, quality is reduced alongside the welfare of the animal. At the end of the study, cellulose had the highest dry matter and kept the animals cleaner than those on straw. Moreover, bacteria counts of the bedding were similar at the end of the trial, but before addition, were zero for cellulose. As cellulose is an industrial by-product of paper and pulp, through the manufacturing process there will have been treatments that likely reduce microbial development. Whereas any bedding materials that are by-products of agricultural industries i.e. straw do not have this treatment and therefore have bacterial loads dependent on their origin. This is potentially a useful consideration for lambing pens. The study concluded that cellulose and rice husks are viable alternative bedding materials to straw. However, the study did not recommend sawdust – likely due to its high cost and low dry matter content before and after the study. Yet, animals on sawdust were as clean as those on cellulose and in a previous study, animals also showed preference to lie down on sawdust over straw. Both cellulose and rice husk were more expensive than straw, and so, although it appears that cellulose is a viable alternative to straw, the costs of its use should be weighed against the benefits to assess its sustainability within the business.

Both paper pulp and sawdust are [permitted to be used as animal bedding in the UK](#), as long as they are produced from untreated materials. Farmers wishing to use paper sludge or paper sludge ash need to ensure that it is a pure product and not co-combusted with other wastes. In Wales there are currently no plants producing paper sludge ash but there are some sources of paper sludge in Wales. Farmers interested in using sawdust as bedding also need to ensure that no glues, resin or foreign materials exist in the sawdust, as these are not permitted for use as bedding on-farm.

There has been little research into alternative bedding sources other than woodchip and straw at lambing, and even this is limited. Investigations into ewe preference before lambing is needed as well as the health, welfare and survival of lambs on different bedding materials. Future work within the Farming Connect demonstration network will investigate the use of alternative bedding sources in lambing pens, both in terms of animal welfare and cost to the system. Look out for updates during lambing season. For more information on different bedding options see the HCC booklet '[Alternative bedding materials for beef and sheep housing systems in Wales](#)'.



## Think Climate

By reducing the amount of straw that needs to be driven into Wales for bedding, we could reduce the carbon footprint of the sheep industry

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