

Model Farm Project

Case studies



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Pigs: the deep-litter solution

Deep-litter compost systems make sense for pig welfare and sustainability.

With pig production, system design and waste collection methods can vary significantly, with differing implications for animal welfare and the environment. On small-scale farms in China, for example, pigs are typically kept in solid floor concrete pens with manure collected manually, while urine is allowed to drain from the pen. But with more intensive commercial production, slatted concrete floors are often used, with manure and urine passing through and collected in tanks before treatment. But treating such waste is a huge and growing issue for pig producers worldwide.

There is an alternative system,

however, that could provide a solution by treating pig waste before it leaves the pen. Deep-litter compost systems, utilised primarily in South East Asia, use a pigpen comprising a conventional concrete apron for eating, resting and cooling and a 'deep pit' area filled with bedding material to absorb pig manure (Sheen, 2005). Waste is thus treated in situ, with the manure-litter mix remaining in the pen before being used as a compost/fertiliser.

Research has shown the average daily body weight gain, feed conversion ratio and survival rate of piglets raised in deep-litter pig pens to be equal

or superior to those raised in conventional concrete floor pig houses (Sheen, 2005, Correa, 2009). There are also benefits for animal welfare – by providing a more comfortable lying surface, deep-litter systems result in less joint lesions (van Grvenhof *et al.*, 2011). They also provide a constant source of manipulable material for rooting and other natural behaviours (Morrison *et al.*, 2007). Deep-litter systems can take different forms from farm to farm, but certain features must be included in order to achieve good animal welfare, please see below.

Waste is treated in situ... remaining in the pen before being used as a fertiliser

Key features and benefits

Core feature	More detail	Key benefits
Basic structural requirements.	Barn design similar to conventional system with the addition of a deep pit. Feeding and drinking area separate to deep-litter. Concrete cooling pad/apron large enough for all pigs to lie/partly lie on simultaneously. Good ventilation and/or air movement essential.	Simple structure results in low construction and labour costs.
Deep pit floor.	Each finishing pig requires 1.5–2m ² litter-bed space at a 25–50cm depth.	Urine and faeces is treated in the pen, eliminating the need for treatment elsewhere and producing good quality compost.
Manipulable bedding material.	Corn stalk topped with wood shavings (directly from wood, not furniture) and rice hulls or chopped corn cobs are recommended. Material added to ensure the water content of litter remains at <40% and bedding is kept at a depth of 25–50cm. All bedding to be replaced every 3–5 years.	Provision of sufficient bedding material helps avoid problematic behaviours such as tail biting and generation of wastewater and odour. Dry bedding provides a comfortable, clean environment. No daily washing is required, thus water usage and labour reduced.
Microbial activity.	Regular addition of a bacterial mixture to litter to obtain correct temperature for composting manure and for pathogen removal.	A high temperature is maintained, reducing or eliminating the need for additional heating in winter.

(Sheen, 2005. Little Donkey and Yue Gang farms.)

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Deep-litter systems in practice

Farms opting for the deep-litter approach are already enjoying the benefits.



Little Donkey, Fenghuangling, Beijing

At Little Donkey, approximately 130 pigs are finished per year and a deep-litter system has been used since December 2008.

The pen has a northern wall made of brick and a southern wall made of plastic; the latter is covered with black screening during summer to reduce heat. There are windows in the upper roof for ventilation and a concrete walkway around the pen's perimeter. The pit is 1m deep half-filled with crushed corn and soybean stalks then topped with sawdust and rice hulls. Dirt and salt is added to provide minerals and bacteria is added to aid or slow fermentation. Any excess manure is dug into the litter twice weekly, the top 5–10cm of which is turned every two months. Passive solar energy along with the heat generated from the deep-litter, maintain above freezing temperatures. "The pigs can exercise, play and root and they show good health," says Mr Huang Zhi You, farm marketing coordinator at Little Donkey. "There is no heating in the barn, yet the coldest it gets is around 7–8°C during winter."



Yue Gang, Nankou, Changping, Beijing

Mr Yue Gang has 1000 LuHua chickens, 50 sows (resulting in approximately 900 fattening pigs per year) plus produce crops. He has used a deep-litter system since 2007.

The pig barn has a deep-litter pit, a concrete apron and the capacity to house ~180 pigs with 2m² per finisher. The pit is filled with half sawdust and half rice hulls, to a depth of 70cm. Dirt is added occasionally as additional rooting material. Costs are estimated at ~70-80 RMB for sawdust and rice hulls per m², plus 10 RMB per packet of bacteria used. Manure is dug into the litter which is turned over weekly. "With no washing required, the system saves water and labour and there is no water pollution," says Mr Yue Gang. "There are also less problems with disease and we use the compost produced as a fertiliser for the garden and trees on our land."



Find out more

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