How to choose the most efficient litter conditioner for pig production

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The use of litter desiccants, also called litter conditioners, has greatly developed during the past 20 years and is now accepted as a basic tool in pig production worldwide.

Their uses in pig farms are multiple, as are their benefits. They contribute to sanitise the environment all along the production cycle, from gestating sows to fattening pigs, including the firm favourite of use on piglets at birth. It ensures hygiene and well being of the pigs and contributes to their good performance. This, however, is on paper. Indeed, the increased use of litter conditioners in pig farms lead to an increased choice of products, further resulting in a very varied offer in terms of quality and efficacy.

Making the right choice

Facing the high number of products available on the market, choosing a litter conditioner can quickly turn into a headache for farmers! If they all look the same, specific technical parameters reveal that appearances may be deceptive.

The aim of a litter conditioner in pig production is to have drying properties, both for the skin of the animals (piglets at birth, sow's vulva) and for the pen floor (to sanitise the environment). Moreover, some litter conditioners contribute to pigs' well being thanks to healing properties and the development of olfactory memory.

Comparing the numerous commercial products in vivo is tedious. However, a screening may be done based on the characteristics of the product. Among the technical criteria to look at, physico-chemical characteristics are a good start.

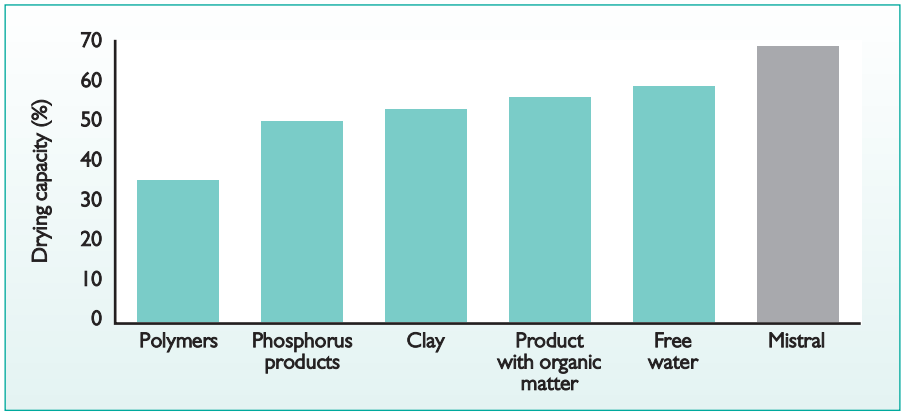

Fig. 1. Drying capacity (%) of litter desiccants available on the market.

One of the specifics in pig production is that litter conditioner is mostly used in the presence of the animals and, more precisely, in direct contact with the animals' skin.

Therefore, one of the first criteria to check for is the pH. The pH of the litter conditioner should be close to neutral in order to be used on a regular basis. Acidic products or alkaline products are likely irritant for the animals, and for the farmer.

Consequently, their use in pig production should be avoided in order to respect the animals' skin and tissues. The content of the litter conditioner in organic matter is also of importance. For their development, bacteria need an appropriate temperature, some water and organic matter.

If the litter desiccant aims at depriving bacteria from water to prevent their growth, the product should not bring in extra organic matter which may be used by the bacteria as substrate for their development. In this respect, products with a high cellulose content should be avoided in favour of mineral products.

Importance of form

Beyond the choice of ingredients that make up the litter desiccant, its presentation can make the difference. If all products come in powder form, their particle size is not always standardised. It may be more or less coarse, with more or less homogeneity.

For an optimum coverage of all surfaces (equipment or animals), particle size should be very fine with a high homogeneity. This will guarantee easy dispersion of the product and good spreading, with a minimum quantity of product used.

Once a prior screening has been done based on physico-chemical properties, the desiccant efficacy of the products may be looked at. In this field, adsorption capacity is the favourite criteria to look for. The most common test to evaluate it in vitro is to pour increasing quantities of water onto a set quantity of product and to check how much water can be adsorbed by the product. Although this technique is very easy to implement, it may not be the most appropriate when it comes to evaluating the efficacy of litter conditioners. Indeed, measuring the capacity of adsorption of a material in vitro reflects its capacity to retain water on the floor or on the skin of the animals. Yet, the objective of a litter conditioner is to take the humidity away from the litter or the skin of the animals, in order to keep them dry. Therefore, the drying capacity, with particular attention paid to the effect over time, rather than the immediate adsorption capacity should be measured.

Adapted tests to evaluate the drying capacity over time consist of measuring the evaporation rate of water that is regularly poured onto a set quantity of litter desiccant. This type of test allows producers to discriminate 'sponge effect' products

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(with a high capacity for retention of water) from products capable of reversible hydration. Reversible hydration is the capacity of the product to adsorb water from the support it was spread on and to further release it in the air by evaporation.

Comparison study

Olmix conducted a study comparing physico-chemical properties and drying capacity of 12 commercially available litter conditioners. Results confirmed that all products are not equivalent on the market.

Moreover, general trends could be established by category of products, with the following groups: mineral, high organic matter content (HOM), polymer and phosphorus products.

Particle size analysis first showed that all tested products had a majority of particles under 300µm. However, more than half of the products had particles above 300µm, with up to 10% of particles larger than 800µm for some powders. Such products will obviously have a poorer spreading and lower contact surface than fine products. They will require higher quantities of use and will not perform well.

Mistral from Olmix was one of the only products with no particles above 300µm. On the other hand, the measure of pH showed that most mineral, HOM and polymer products have a neutral pH. However, phosphorus products were shown to have a very acidic pH (<4) and lime-based products a very alkaline pH (>10). These products should not be used on a regular basis in the presence of animals.

When measuring in vitro the efficacy of the different products to keep the litter dry, the two previously described methods were compared: adsorption capacity on one hand and drying capacity on the other.

First the capacity of adsorption of water for 100g of product was evaluated, for which polymer products were far ahead of all other products (2000g of water for 100g of desiccant). Though it is impressive, such adsorption capacity is not sought for a litter conditioner as it will retain the water on the floor or on the skin of the animals. It will keep the environment wet instead of dry.

Measurement of drying time

The second experiment was then set, where the drying capacity over time was measured. For 20g of product implemented, 5-20g of water was regularly added to it during seven hours. The drying capacity was then evaluated according to the restituted mass of water.

In this experiment, results showed that most products' drying capacity was below 58%, with a poor score of 37% for polymer-based products. Free water, used as the control, had a drying capacity of 59%, meaning that it more easily evaporates by itself than when it is trapped in some products. On the other hand, Mistral, based on micronised clay, showed the highest drying capacity with 70% drying capacity.

This effect is related to the reversible hydration capacity of the clay used in Mistral, where micronisation increases the contact surface of the clay. With a higher surface of contact, Mistral accelerates water evaporation and dries its environment for lasting hygiene.

Conclusion

Considering both physico-chemical properties and drying capacity, Mistral scored the best among the tested products. It has also proven its efficacy in vivo, both in scientific and field studies conducted across the world during the past 18 years.

Increased skin temperature of the piglets after birth, faster access to colostrum, faster drying and dropping of umbilical cord and reduced diarrhoea occurrence and veterinary costs in maternity are some of the effects demonstrated with Mistral, whether it was compared to a negative control or a competitor. ■

References are available from the author on request