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AS-695-W

ANIMAL WELFARE

Advancing Swine Welfare with Environmental Enrichment

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Introduction

Whether you are a 4-H'er, producer, pet owner, or pig enthusiast, understanding the factors influencing the welfare of pigs is important. Animal welfare refers to "the physical and mental state of an animal in relation to the conditions in which it lives and dies" (WOAH, 2018). This means that an animal's welfare can range from poor to good and anything in between, and the animal's welfare can change from one moment to the next. One way you can strive to ensure good welfare for pigs under your care is by enriching their physical, mental, and social lives with environmental enrichment.

The purpose of this article is to explain 1) what environmental enrichment is and why it is important, 2) provide background information on common pig behaviors, 3) review various forms of environmental enrichment that can improve pig welfare, and 4) discuss tips for successful and safe implementation of environmental enrichment.

Figure 1. *Nursery-age piglet chewing on a plastic enrichment.*

What is environmental enrichment?

Environmental enrichment (or simply enrichment) can be defined as adding some form of stimulation to a captive animal's environment that improves the overall welfare of the animal (Newberry, 1995). The goals of providing enrichment are to encourage animals to express a variety of species-specific behaviors, prevent or reduce unwanted behaviors

(e.g., aggression, chewing on pen, pacing), and increase their ability to have more control over their environment (Shepherdson, 2003; Young, 2003).

Environmental enrichment can provide both mental and physical benefits to the animal. For example, pigs that live in a barren or unstimulating environment may develop abnormal behaviors (e.g., bar biting, sham chewing, tail biting) as a consequence of not having a way to cope with their environment. Pigs can become frustrated, have increased stress levels, or decrease their activity levels if they do not have an outlet for fulfilling their behavioral needs (Beattie et al., 2000). Research has shown that providing the appropriate enrichments to pigs reduces tail biting (Van de Weerd et al., 2006), increases disease resilience (van Dixhoorn et al., 2016), and improves the human-animal relationship (Marcet-Rius et al., 2020).

Pigs are 'rooted' in their behaviors

It is important to consider the pig's sensory perception and behavior when selecting an enrichment. The snout is a unique physical feature of pigs that allows them to gather information about their surrounding environment via smell and touch. Pigs are social creatures that engage in activities like nose-to-nose contact, vocalizations, and play behaviors (e.g., gentle chasing, reciprocal nudging; O'Malley et al., 2022). Pigs are strongly motivated to perform foraging behaviors such as rooting, nosing, chewing, and exploration. Also, mature pigs like to build nests for comfort, and sows will do this as a maternal instinct in preparation for farrowing (giving birth) when they have the resources to do so.

Understanding pigs' behavioral needs, behaviors that are essential for psychological and physical well-being, and the characteristics of environmental enrichment that they prefer will make selecting an enrichment easier and ensure that the pig is benefiting from using the enrichment.

Types of environmental enrichment

Enrichments can be categorized as nutritional, occupational, physical, sensory, and social enrichment (Bloomsmith et al., 1991). These enrichment categories are not mutually exclusive, meaning that an enrichment can fit into more than one category. When selecting an enrichment, the age, size, and living conditions of the pig need to be taken into consideration. Also, not everything that is added to a pig's environment can be considered to be enrichment. For example, adding items such as metal chains or hard plastic balls do not effectively promote pigs' natural behavior (e.g., root, nose, chew, explore), and may therefore not be cost-effective.

To determine what qualities pigs prefer to have in an environmental enrichment, a team of researchers studied more than 70 enrichment materials for pigs. They concluded that pigs interacted with an enrichment more if it was ingestible (they could eat it), odorous (they could smell it), chewable (they could chew it), deformable (they could change the shape of the enrichment), and destructible (they could destroy it) (Van de Weerd et al., 2003). These qualities guide which types of enrichments to use, but it may not be feasible to find enrichments that meet all of the criteria of being ingestible, odorous, chewable, deformable, and destructible. Further, not all types of enrichment are equally applicable or feasible to use in commercial production systems compared to hobby farms. Ultimately, it is up to each person to find enrichments that work best within their system and for their pigs.

Nutritional enrichment. Enrichments that are nutrition-based encourage pigs to perform natural foraging behaviors. Since pigs are often provided food without having to work for it, increasing foraging behaviors can increase their activity levels and cognitive abilities (Reimert et al., 2013). Examples of nutritional enrichments include puzzle feeders, food toys, and hiding scattered food under bedding material. In addition, adding new food items to the diet as a "treat" can add novelty to their environment. Before adding nutritional enrichments, contact your veterinarian to ensure the enrichments that you plan to use are safe for pigs.

Figure 2. *Pigs rooting straw.*

Occupational enrichment. This involves giving pigs a "job" that motivates them to perform natural behaviors and increases their physical activity. Providing pigs with problem-solving tasks, such as a puzzle feeder and scatter feeding methods (mentioned previously under nutritional enrichment) makes them work for their food. Also, adding straw/hay bales to their environment encourages mental and physical engagement if they are using these substrates to build nests. Walking pigs in a

secure area can serve as a way to release energy and support physical exercise. For 4-H, walking pigs is an essential element when showing, so it is important to train pigs using positive reinforcement techniques to walk in a calm manner.

Physical enrichment. Enrichments that modify or add complexity to the pigs' environment are categorized as physical enrichments. Providing objects is the easiest way to offer physical enrichments to pigs. Ropes, wood blocks, and peat are a few examples of physical enrichments that promote natural behaviors, such as chewing, rooting, and nosing. Incorporating objects that have the properties found to be attractive to pigs can reduce how much pigs bite and chew the body parts of other pigs (Telkänranta et al., 2014) and increase play behavior (Luo et al., 2020) compared with pigs that do not have enrichments. However, physical enrichments will only work if they are of interest to pigs, so rotating enrichments or adding multiple at a time can help maintain pigs' interest in the enrichments.

Figure 3. *Sow and piglets chewing on wooden blocks hung on sisal rope in a farrowing crate.*

Sensory enrichment. These types of enrichments need to appeal to the pig's different senses, such as smell, touch, and hearing. For olfactory enrichments, placing scents near the pig can improve their mental stimulation and welfare. Some scientists have found out that pigs provided with natural or synthetic odors in their environment gained weight better (Archer et al., 2022), spent less time acting aggressively (Nowicki et al., 2015), and had lower stress levels (Oostindjer et al., 2011) during the weaning phase compared to pigs that did not have these odors added to their environment.

Another way that pigs can interact with their environment is through touch. Wood shavings is an example of tactile enrichment that can encourage exploratory behaviors and provide a comfortable floor surface. Pigs love to scratch, so supplying them with a scratching post or gently brushing them can help maintain good skin health.

Playing background music is a great example of auditory enrichment for pigs. Music can change an environment that has the same, consistent sounds, or help prepare the pig for a stressful event. For example, 4-H'ers can benefit from playing music to their show pigs before taking them to a show so that pigs are comfortable with the various noises that will occur during a show. Pigs prefer music that is at a safe volume of less than 70 dB (Nian et al., 2023) and harmonically pleasing to hear (Zapata Cardona et al., 2022).

Social enrichment. It is important for pigs to experience positive social interactions with humans and other pigs. Pigs can recognize familiar humans (Brajon et al., 2015) so it is important to foster a positive relationship with pigs whether they are pet, show, or production pigs. Social enrichment with humans can be accomplished by providing positive reinforcement, such as giving pigs treats, talking to them in a calm manner, and gentle pets and handling. Doing this consistently can strengthen the human-animal bond as well as reduce the pigs' stress.

Tips for successful and safe implementation of environmental enrichments

1. **Know your animal's environment.** It is vital to consider the pig's living area when selecting the best enrichment. For example, straw can make an excellent enrichment, as a pig can manipulate, root, and consume it. However, if the floor is slatted, then straw has the potential to block the slurry system and poses a risk to the pig's health and hygiene (Horback et al., 2016) if not managed properly. If straw is being used, then the pen needs to be kept clean and straw should be tested for mycotoxins and stored appropriately.
2. **Enrichments should not cause frustration to the pig.** A suitable enrichment means that the pig is using it, benefiting from it and not harmed because of using the enrichment. If a pig cannot interact with the enrichment because of size, weight, or it is too difficult to interact with, then the enrichment can increase aggression among pigs. Also, if an enrichment will last for only a short period of time (e.g., the pig destroys/

eats it too quickly) then it may do little to improve the pig's welfare and will not be cost-effective.

3. **Enrichments need to be safe and easy to clean.** Another way that an enrichment can have negative impacts is if it is harmful to the pig or yourself. As mentioned throughout this article, pigs love to chew and destroy things. If there is a chance that a pig can destroy/deform an enrichment, then it must be safe to consume, it should not have the potential to trap the pig or part of the pig, and it should not have sharp edges that could cause injuries to the pig, other pigs, and humans.

   Pigs can lose interest in an enrichment if it becomes dirty. Keeping enrichments clean allows pigs to use the enrichment longer and reduces the risk of disease. In a production setting, biosecurity is a high priority for ensuring the health of the pigs. To achieve a balance between biosecurity and efficient enrichment, producers should consider the enrichment material, where the enrichment is placed, and the potential of using single-use/disposable enrichments to reduce the risk of disease transfer. An example of an enrichment that can be a biosecurity concern and challenge to clean would be enrichments made out of fabric or porous materials because they can easily absorb and retain pathogens even after cleaning.

4. **Do you have enough enrichments for the number of pigs?** Unfortunately, there is no magic number or equation to figure out how many enrichments you need for the number of pigs in a pen. Pay attention to the pigs' behaviors when introducing a new enrichment. If you see pigs guarding an enrichment or displaying aggressive behaviors, then that might be a sign that you need to provide more enrichments or increase the space around the enrichments so that multiple pigs can use the enrichment at the same time. More enrichments are usually better than too few enrichments.

5. **Create an enrichment program.** It is important to constantly evaluate the effectiveness of an enrichment because pigs can lose interest in the enrichment over time. Individual pigs may differ in their preferences and how they use enrichments, especially if they have had previous experience with some types of enrichments. Strategies to consider for keeping pigs engaged are: 1) choice: supplying multiple enrichments at the same time enables pigs to choose what they want to interact with; 2) rotation: switching enrichments around can help keep the environment interesting; and 3) variety: give pigs different categories of enrichments to promote different behaviors. Incorporating these strategies allow for a successful long-term enrichment program.

Conclusion

Adding environmental enrichment can play a key role in ensuring pigs are experiencing positive welfare by addressing their physical, mental, and emotional needs. Enrichments do not need to be expensive or complicated. Providing pigs with various types of enrichment gives them a sense of control over their environment, reduces stress, and can help satisfy their behavioral needs.

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