Effects of Enrichment Objects on Piglet Growth and Behaviour

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Summary

The purpose of this study was to perform an initial evaluation of pigs' preferences for several enrichment objects and examine their effects on piglet growth and welfare during the nursery period. Thirty litters were selected at farrowing and assigned to three treatments: enrichment provided post-weaning (EN), enrichment provided both pre- and post-weaning (EFN), and no enrichment provided (Control). Enrichment consisted of a series of object enrichments, with three or four enrichments provided at once, and rotated twice weekly. Enrichment had no effect on growth during the nursery phase, but enrichment given before weaning (EFN) resulted in reduced pen-mate manipulation and a tendency for reduced aggression. The suspended enrichments were most frequently contacted compared to objects placed on the floor. Enriched pigs showed greater exploration at 21 d post-weaning compared to Controls, and pigs in the EN treatment had fewer skin lesions on the head and shoulders at 25 d post-weaning. Physical enrichment objects show promise for improving piglet welfare and are feasible for implementation in intensive operations.

Introduction

Most commercially-reared pigs in North America are housed in pens with slatted flooring and limited opportunity for species-specific behaviours. As of 2014, The Canadian Code of Practice requires that pork producers provide "multiple forms of enrichment" to all pigs (NFACC, 2014) however the requirements for enrichment provision are not clearly defined.

Environmental enrichment has been defined as modifications to the environment of captive animals which result in improvement in their biological function (Newberry, 1995). When considering swine production, previous research has shown

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that enrichment has the potential to improve weight gain, increase play behaviour, and reduce aggression and fear.

Providing enrichment to finisher pigs has been studied to a greater extent and is relatively common in practice since damaging behaviours can be more prevalent and have a significant impact on growth and production in this stage. However, it may be especially important to provide more stimulating environments to piglets during lactation and in the nursery. The rearing environment of young pigs is critical to their development both physically and cognitively as they grow and develop social and exploratory behaviour during the early stages of life. The environment in which piglets are raised has been shown to impact their behaviour, welfare, and growth later in life (see Beattie et al. 2000; Telkänranta et al. 2014).

The use of substrate enrichment in commercial production is often limited due to concerns over manure management and biosecurity. The use of object enrichments may be more practical and biosecure than straw or other substrates, especially in fully slatted pens.

This was a preliminary study to examine the effects of multiple enrichments on the growth and behaviour of nursery pigs. The objectives were to, 1. Evaluate the feasibility and attractiveness to piglets of several enrichment objects, and 2. Compare the effects of pre- and post-weaning enrichment treatments on piglet behaviour and growth in the nursery (up to 8 weeks of age).

Experimental Procedures

Thirty litters (318 piglets) were randomly assigned to three treatments at approximately 3 days of age.

- Enrichment provided in farrowing and nursery (1 to 8 weeks of age: EFN)
- Enrichment provided in the nursery only (4 to 8 weeks of age: EN)
- No enrichment provided (Control)

Pigs were weaned at ~28 d of age, with litters that received the same treatment being mixed together in nursery pens (10-11 pigs/pen). Enrichment objects were provided 3-4 at a time and the set was rotated twice weekly. The enrichments used included: Black PVC pipe (diameter: 7.5 cm, length: 30 cm), knotted cotton rope, timothy hay cubes, "Bite-Rite" (Ikadan Systems, Ikast, DK), "PorkyPlay" (Ketchum Manufacturing Inc. Brockville , ON) and rubber mat (30 cm x 30 cm) (Fig. 1).

All pigs were weighed at ~3 d of age, at weaning, and at 8 weeks of age. Six focal pigs per pen received scores based on the severity of skin lesions on three regions of the body before weaning, 24 h post-weaning, and 4 weeks post-weaning. Piglet behaviour was recorded using one-hour videos, with the behaviour of pigs being recorded using scan sampling. Piglet interactions with enrichment were recorded at 8 and 10 d post-weaning in the enriched pens, and transcribed using 3-min scan sampling (all pigs). Behaviour at weaning and 21 d post-weaning was recorded in all pens, and transcribed using 5-min scan sampling (focal pigs only).
A Human Approach Test was conducted at 9 and 22 d post-weaning; the latency for one pig and three different pigs to contact the observer were measured and the results of all 4 tests were averaged for each pen. Data were analyzed using mixed model and Glimmix models in SAS 9.1, with treatment as a main effect and block as the random effect.

Results and Discussion

No treatment differences in body weight or ADG were found ($P > 0.10$). This may be due to the rapid growth occurring in all pigs during the nursery stage. Continued monitoring of pig growth during grower and finisher periods would be of interest but was not possible in this trial.

Figure 1. *Three of the enrichment objects tested. Left to right: the "Bite-Rite" and "PorkyPlay" (commercial enrichment objects) and knotted cotton rope.*

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Of the six enrichments tested, rope was the most frequently contacted enrichment, followed by the hanging 'PorkyPlay' ($P < 0.05$) (Figure 2). Overall, the cotton rope received the most interactions followed by the commercially available toys and the rubber mat. This result agrees with previous research on grower-finisher pigs (Van de Weerd et al. 2003).

Post-weaning enrichment was associated with reduced skin lesions, with pigs in the EN treatment having fewer skin lesions on the head and shoulders at 4 weeks post-weaning compared to EFN and Control ($P = 0.004$). In the human approach test, enriched pigs (EFN, EN) tended to contact the human more quickly than Controls ($P = 0.075$), indicating reduced fear of humans.
Pre-weaning enrichment (EFN) was associated with decreased pen-mate manipulation ($P = 0.004$) and a tendency for reduced aggression at weaning ($P = 0.074$) than EN and Control pigs (Table 1). Both pre- and post-weaning enrichment (EFN, EN) treatments resulted in increased exploratory behaviour at 21 d post-weaning compared to Controls (Table 2).

In addition to the behaviours indicated in Tables 1 and 2, the frequency of play behaviour was also recorded, however, frequencies observed were very low and were not included in analysis.

Implications

Providing enrichment to piglets before weaning and/or in the nursery increased exploratory behaviours, reduced pen mate manipulation and tended to decrease agonistic behavior compared to controls which received no enrichment. Hanging enrichment objects such as cotton rope or commercially available toys may be a viable alternative to substrate enrichments. It should be noted that multiple enrichments were provided at once in this experiment, and were rotated twice weekly.

Although the study was limited in size and the number of observations, these findings suggest that young pigs benefitted from object enrichment. Future studies should continue through the grower and finisher stages to determine if long term benefits are achieved.

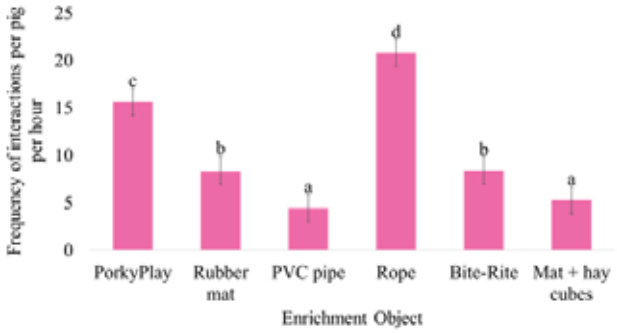

Figure 2. *Frequency of enrichment interaction (LS means ± SEM). One hour videos were transcribed using 3 minute scan sampling.*

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Table 1. *Piglet behaviour at weaning. Six focal pigs per pen observed for 1 hour after mixing using scan sampling at 5 min intervals.*

Behaviour (% of observations)	Treatment			P-value
	EFN	EN	Control	
Walking	2.5	2.0	2.7	0.287
Sleeping	44.4	42.5	51.3	0.326
Enrichment interaction	13.0	12.5	-	0.825
Aggression	1.2	2.9	2.4	0.074
Awake inactive	18.4	13.5	18.1	0.075
Pen-mate manipulation	0.6b	2.2a	2.7a	0.004
Pen exploration	10.4	13.2	14.5	0.076
Eating	8.1	8.9	6.1	0.516
Drinking	1.6	1.7	2.0	0.738
Other	1.1a	1.3a	0.1b	0.021

abValues within a row with different superscripts are significantly different ($P < 0.05$).

Table 2. *Piglet behaviour at 21 d post-weaning. Six focal pigs per pen observed for 1 hour after enrichment rotation using scan sampling at 5 min intervals.*

Behaviour (% of observations)	Treatment			P-value
	EFN	EN	Control	
Walking[z]	0.3	0.1	0.4	-
Sleeping	69.0	74.3	81.8	0.284
Enrichment interaction	12.6	7.6	-	0.080
Aggression[z]	0.5	1.2	0.5	-
Awake inactive	3.1	3.6	5.3	0.113
Pen-mate manipulation	1.9	1.8	4.5	0.101
Pen exploration	6.0[a]	6.7[a]	3.2[z]	0.012
Eating	4.7	4.0	3.6	0.575
Drinking	1.2	0.3	0.6	-
Other	1.3	0.6	0.1	-

ab Values within a row with different superscripts are significantly different ($P < 0.05$).
z Frequency of behaviour was too low; not used in analysis