

Creep feeding and piglet development: new format and formulation approaches

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INSIGHT FOR PRODUCERS

Optimizing creep feeding may support piglets through the stressful experience of weaning, preparing them for the transition to solid feed. Creep feeding may also provide enrichment and encourage feeding behaviours.

SUMMARY

Weaning is stressful for piglets, especially for fast-growing piglets who may show signs of anemia. Providing creep diets to piglets can potentially reduce weaning stress and improve piglet health, however pellet size may affect their interactions and motivation to eat creep. This study investigated the influence of providing different forms of creep to piglets, specifically creep interaction and blood parameters. A pilot study was conducted to assess piglet preference for three different creep forms, and found that E17 horse feed (3cm pellet) and crumble starter diet maintained greater interest over a six-day observation period. The main study randomly assigned piglets to one of four diets: 1. Standard creep (SC), 2. Pellet creep (PC), 3. A mix of SC and PC (MC), and 4. No creep (NC). Overall fewer piglets interacted with the diets on day 1, with the greatest interaction on day 4. The greatest amount of interaction with the creep feed occurred in the first minute after it was placed in the feeder, with activity decreasing over time. Piglets were more likely to waste PC diets compared to MC. Creep diet had no effect on blood iron parameters, with large piglets showing greater signs of anemia. Further research is needed to develop creep diets which are nutritionally beneficial for reducing anemia and promote creep interaction and consumption to reduce stress at weaning.

INTRODUCTION

Benefits of creep feeding have not always been clear, with conflicting reports on weight gain before weaning and throughout the nursery phase. A literature review conducted by Muro et al. (2023) found creep feeding was reported to be beneficial in terms of gut development and growth performance more often than it was determined to have minimal or negative impacts. Confirming the positive impact of creep feeding indicates further research into best management practices is required to ensure optimal piglet growth and performance.

Creep intake is influenced by factors such as feed type, duration of feed availability, feeder location, and feeder design. Current creep diets tend to be formulated to contain high levels of starch, sugar, and lysine, and are generally expensive. The inclusion of sugars is meant to promote palatability and digestibility, though it has been suggested that the surge of insulin accompanying high glycaemic diets may result in fluid retention and edema, increasing body weight in a misleading fashion. This also causes an increase of red blood cells, which can mask anemia in rapidly growing weaned pigs. It has been recommended that diets for piglets should be formulated to contain fewer carbohydrates and lysine while increasing fibre content to reduce insulin spikes. High fibre ingredients typically contain more iron than high protein feeds, which may avoid or attenuate anemia. Regarding feed style, previous studies have shown that young pigs prefer larger pellets to finely textured feed.

The current study investigated if off-the-shelf, affordable large pellets meant for horses would be preferable to a standard creep diet (Phase 1 nursery diet) or influence blood iron status at weaning



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EXPERIMENTAL PROCEDURES

1. Pilot study

The first study aimed to assess piglet preference of four different types of creep feed. Twelve litters between 2-4 weeks of age were offered two choices of feed at the same time; control and experimental. Standard creep diet was offered as a control choice. Experimental diets included:

- Hoffmann's Horse Crunchies (HHC), an approximately 1.5cm³ pellet based on soybean hulls, peas, rice bran, wheat mill run, canola meal, malt sprouts, and oat hulls
- Equest 17% Horse Crunch (E17), a pellet approximately 4 x 1.5 x 1.5cm based on alfalfa, oats, and peas
- 50% HHC/50% standard
- 50% E17/50% standard

Piglets were feed creep feed three times per week. Feed was provided in a 22.5x33 cm (approx. 9x13") steel pan attached to a 44x70 cm (approx.. 17x28") mat, accommodating multiple piglets feeding and reducing feed wastage (Figure 2). Feeders were located either at the front or the back of the pen, in order to determine optimal location. Time to piglet interaction was recorded upon feed placement, and interactions with the feed was observed at 1, 2, 3, 30, 60, 90, and 120 minutes after placement.



Figure 1. Open style creep feeder, 22.5x33 cm (approx. 9x13") steel pan attached to a 44x70 cm (approx.. 17x28") rubber mat.

2. Main study

After determining a preference for E17 pellets in the pilot study, the second study commenced. For this study, 21 litters (283 piglets) were randomly assigned to one of four diets:

- Standard creep (SC, Figure 2)
- Pellet creep (PC (E17), Figure 2)
- Mix of SC and PC (MC)
- No creep (NC)

At 10 days of age, litters were provided with 1400g of their assigned diet daily until weaning. Piglets were weighed individually at D10, D24 (weaning), D28, and D52 (nursery exit). At the beginning of the trial, average piglet weight did not differ across treatment groups.

Behavioural observation was conducted every 3 days starting at D13, with notes taken at 1, 2, 3, 30, and 60 minutes after creep was made available. The weight of leftover feed was taken before the addition of the daily ration, and the amount of waste on the feeder mat recorded.



Figure 2. Standard creep feed (SC, left) and Equest 17% Horse Crunch (E17) for pellet creep (PC, right).

Blood profile analysis

For analysis of blood profiles, samples were collected from one small and one large male piglet per litter the day before weaning. Parameters considered to be indicative of anemia included red blood cell count (RBC), hemoglobin concentration (HGB), hematocrit measure (HCT), mean corpuscular volume (MCV), red blood cell distribution width (RDW), iron concentration (iron), and total iron binding capacity (TIBC).

RESULTS AND DISCUSSION*1. Pilot study*

Following observation of piglet engagement with creep feed, it was determined the E17 pellets and standard creep diets generated more interest than the HHC pellets. It was determined the best location for the creep feeder was in the middle of the pen, near the heat lamp. This location encouraged interaction while avoiding the occurrence of piglets soiling on the mat.

2. Main study

No difference in weaning weight or average daily gain (ADG) was found across different creep treatments, as well did not influence the latency of piglet interaction, interaction over time, or the amount of feed left at the time of the next ration delivery. Creep waste (feed left on the mat but not in the bowl) tended to be lower in litters assigned the MC treatment.

Creep treatment had a significant impact on blood profile. It was determined that selected piglets from PC and MC litters had a greater variation in RDW compared to those from SC and NC litters, which is an indicator of anemia. Creep treatment and piglet size also impacted HGB and HCT, with large piglets from PC litters having the poorest measures.

Without the influence of diet, piglet size had a significant effect on all measures except RBC count; larger piglets were more likely to have a count indicative of anemia than their smaller counterparts ($P < 0.001$). Large piglets also displayed an average iron concentration of less than half that of smaller piglets. This result confirms the idea that large piglets are more likely to be anemic due to faster growth but may suggest that they consume less creep than smaller littermates.

Increased exposure to creep feed decreased the time to piglet interaction; piglets took less time to approach the feed on days 14-16 than they did on D13. Piglets interacted with the creep more, and less feed was left, as the trial progressed. The most interaction with creep occurred in the 2 minutes after addition and waned over time ($P < 0.001$).

"Creep may act as a form of enrichment and acts to stimulate interest in solid food in early development."

IMPLICATIONS

Though we had hypothesized that provision of a large pellet creep feed with high iron content would result in greater creep interaction and improvement of blood profiles in relation to anemia, the opposite was seen. Previous studies conducted at PSC have indicated that larger piglets tend to spend more time on the teat and less time interacting with creep feed. Observations specific to piglet size and creep interaction were not undertaken in this study, therefore the cause of the poor blood panel results cannot be clearly identified.

Regarding the style of creep feeder used, it was observed that the open style encouraged social feeding (Figure 1). The drawback of this design is the ability for piglets to push the feed out of the bowl; in this study we observed that the feed bowl was usually empty but there was clear wastage on the mat. As enrichment is generally lacking in farrowing pens, creep may act as a form of enrichment and acts to stimulate interest in solid food in early development.

While feed disappearance and wastage were estimated, actual feed consumption was not tracked. Further studies to understand creep consumption may endeavor to identify 'eaters' versus 'non-eaters' and if there is a clear connection to piglet size.

Optimization of creep diets can support piglets through a stressful period of early life. Formulating diets to include important components such as fibre and other micronutrients will support gut health and hopefully mitigate iron deficiency at weaning.

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