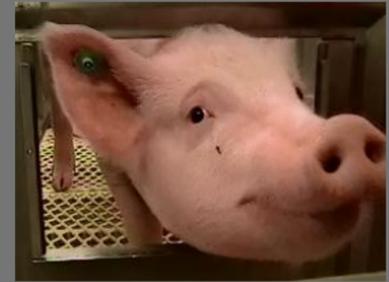


# Refinement of Swine Enrichment via Customization of Foraging Balls Results in Increased Duration of Play

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## ABSTRACT

Providing research animals with appropriate environmental enrichment helps to encourage species-specific behavior. In swine, this includes behaviors such as rooting and foraging. One of the ways to achieve this goal for swine in the research setting is to place food enrichment into a foraging ball—a hard, hollow, plastic toy which has pre-drilled holes in it to engage the swine in removing the food. Many of the commercially available foraging balls for swine have multiple small holes throughout the surface. This requires the use of small food items, which poses the problem of food falling through the grated, elevated flooring that swine are housed on in our facility. There are also commercially available foraging balls that have few extremely large holes in the surface; and in our experience, they do not present enough of a challenge for the swine. In an effort to provide the best possible enrichment for our swine, we created customized foraging balls from herding balls—a hard, hollow, plastic ball with no holes. The herding balls were customized by drilling varying size and numbers of holes. This allowed larger food enrichment choices which would not fall through the flooring, but still provided more of a challenge for the animals. The swine were observed playing and investigating the foraging balls for longer periods of time, approximately 30-45 minutes while there was food in the ball. These customized foraging balls create a more challenging experience for our swine, thus extending play time and providing a better enrichment experience in our facilities.

## BACKGROUND

- Rooting is well-documented as an essential foraging behavior in pigs.
- Studies show that domestic pigs spend 51% of their day investigating and rooting in their surroundings.
- This natural behavior can become destructive to the pig itself or to the enclosures they occupy unless the behavior is redirected.
- When pigs were observed in an enclosure with enrichment, they spent their time rooting, biting, and chewing the available enrichment. Pigs in enclosures devoid of enrichment spent their time rooting, biting, and chewing the floors and walls of their enclosure.
- To date, the University Laboratory Animal enrichment program for swine included daily food enrichment placed in the food bowl once daily and toys rotated in the cage once a week.
- The purpose of this study was to develop an enrichment device that was efficient and effective at enhancing the food enrichment they were already receiving while also promoting healthy normal behaviors.

### References

1. "The development of feeding and investigatory behavior in free-ranging domestic pigs during their first 18 weeks of life"; Volker Petersen; *Applied Animal Behavior Science* 42 (1994), page 88.
2. "The effect of environmental stimulation on the development of behavior in pigs"; Volker Petersen, Henrik B. Simonsen, Lartey G. Lawson; *Applied Animal Behavior Science* 45 (1995), page 215.
3. "The foraging ball as a quick and easy enrichment device for pigs (*Sus scrofa*)"; Mary E Huntsberry, MA, Debbie Charles, MS, Kristina M. Adams, MS, and James L. Weed, PhD; *Lab Animal*, Vol. 37, No. 9, page 413.



Figure 1. The original herding ball (top) and the customized foraging balls (29mm, 35mm, or 44mm).

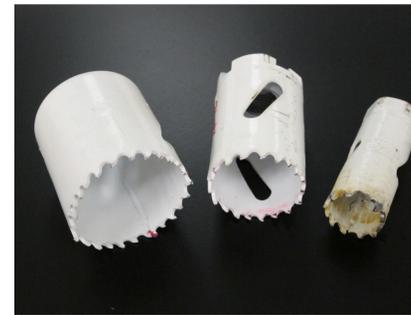


Figure 2. Hole saws used to modify the herding balls.



Figure 3. A carrot and a grape on the standard flooring in our facilities.



Figure 4. Pig interacting with modified (29mm hole) foraging ball.



Figure 5. The video camera used to collect data fixed to the top of a run.



Figure 6. Pig drinking ignoring the control herding ball and playing with lixit instead.

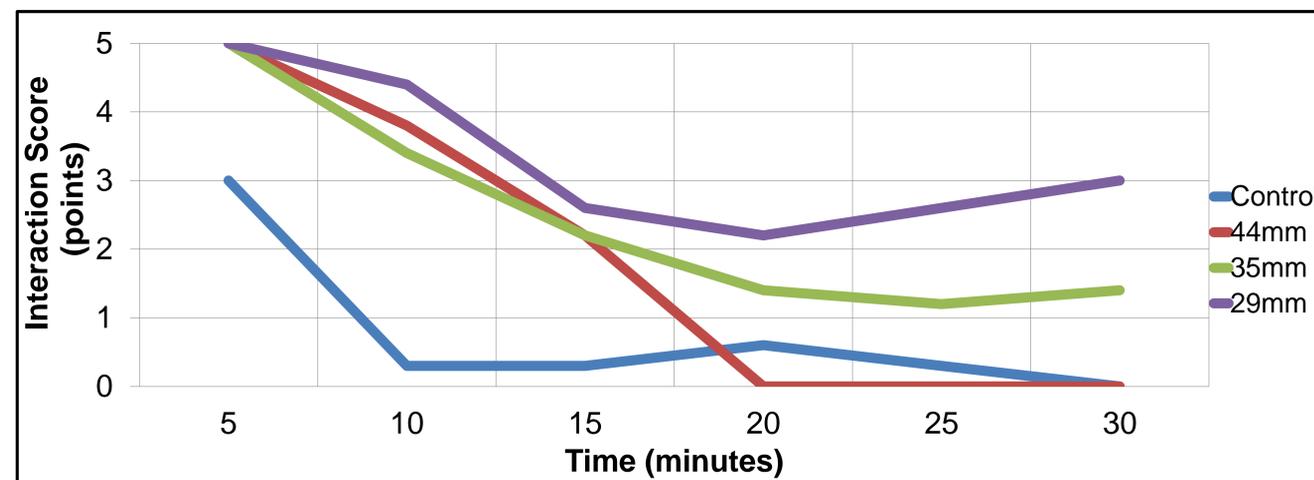


Figure 7. Scored amount of interaction with a ball in five minute intervals

## MATERIALS AND METHODS

### Equipment

- Six inch diameter herding balls were purchased from a commercial vendor and a hole saw from a local hardware store to modify the herding balls (Figures 1 and 2).
- Balls were either left unmodified or had a hole(s) drilled into them. Three arbitrary hole sizes were used-- 29mm, 35mm, or 44mm (Figure 1).
- The hole(s) drilled into the ball were sanded with fine grit sand paper to smooth any rough edges and remove any flakes of remaining plastic.
- No ball had more than three holes in it and all holes in an individual ball were the same size.
- The balls with the hole(s) had enrichment food items such as grapes, strawberries, carrots, cherry tomatoes, or pieces of pear placed in them. Food enrichment was chosen based on size--whether or not it would fall through the flooring (Figure 3). The unmodified balls had no food enrichment.

### Animals

- A group of 18 pigs were used for data collection: five pigs to test each of the experimental balls and three for the control ball.
- Pigs were housed in a 90in X 38in run and fed Mazuri mini pig diet twice daily. City water was provided via an automatic watering system (lixit).

### Experimental Design

- The pigs were exposed to a ball for thirty minutes and videotaped (Figure 5).
- The videos were then reviewed and scored based on the amount of contact time each pig had with the ball.
- Points were awarded at each 5 minute interval.
- The ball received one point for every minute of time the pig was in contact with it for a maximum score of five points per interval.

## RESULTS

- Balls with multiple holes showed no difference compared to the balls with only one hole (data not shown).
- The 29mm hole was the most effective at creating a more challenging enrichment experience (Figures 4 and 7) compared to 35 mm and 44mm modified balls and the control ball (Figure 6 and 7) based on duration of interaction.
- The 29mm hole also enabled staff to use food items that would not fall through the floor grates.

## CONCLUSION

By customizing a foraging ball to our specifications, we were able to create a more challenging enrichment experience that promoted normal swine behavior in the laboratory setting for an increased duration of time. The optimal size foraging hole(s) which engaged the animals for the longest duration without loss of food through the run flooring is 29 mm.