Field Demonstration:
Evaluation of four commercially available swine drying agents on mat surface temperatures and absorbent capacity

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Introduction:
Providing a warm and dry environment is well recognized as one of the basic needs for the well-being of newborn piglets. At birth, piglets, particularly low-birth weight piglets, are prone to excessive heat loss due to their wet skin, relatively large surface area to body mass ratio, and lack of energy reserves among others. If piglets are not adequately attended to, core body temperatures can decrease quickly, and thus potentially delay colostrum intake (Lossec et al., 1998; Pedersen et al., 2013). Thus, to minimize heat loss immediately after birth, piglets are commonly dried and placed under a heat lamp or near the sow's underline. While this management strategy has shown beneficial results in reducing heat loss and reducing the latency to suckle, we are unware of any studies that have examined the effects that drying agents have on the microenvironment. Therefore, the objectives of these studies were to investigate the effects of four commercially available drying agents on mat surface temperatures and determine their absorbent capacity.

Procedures:
For this study, three light colored drying agents (Products A, B, and C) along with a dark colored drying agent (Dual Dry, TechMix, LLC) were evaluated under controlled laboratory conditions. The test was carried out in an environmentally controlled, draft-free room with an ambient temperature maintained at ~ 72°F. All equipment, materials, and products used for this study were stored in the same room where the study was conducted. Heat lamps were equipped with a 250 W incandescent infrared heat bulb and were suspended 26 ¼" above black rubber mats (28 ¼" × 40") placed on a solid tile floor. The suspension height was measured from the mat surface to the bulb face. Lamps were energized and allowed to stabilize (90.2 ± 0.08°F) before the initiation of the trial. Thermal stabilization of mats was determined when the change in temperature of a radial spot (center point of a 6 ¼" × 6 ¼" square) reached zero.

Following mat temperature stabilization, 27 mL of water (~71°F) were mixed with 54 g of product and applied evenly to a 6 ¼" × 6 ¼" area of the mat to emulate the moisture from a scouring litter. Mat temperatures were measured using an infrared laser gun (Milwaukee Tool Corp., Brookfield, WI) held 40 ½" from the mat for each measurement (0: pre-application, 1, 5, 10, 15, 30, 45, 60, 75, and 90 min. post-application). After 90 min., mats were removed, cleaned, and allowed to cool before the process was repeated for a total of 6 replications per drying agent. Absorbent capacity was determined by weighing 20 g of sample and placing it into a 150 mL glass beaker. Next, water was added using a pipette until the material was fully saturated. Saturation was determined when water began pooling on the surface of the material. Each drying agent was assessed in triplicate.

Collected data on mat surface temperatures were analyzed as a complete randomized design using the appropriate standard methods. Results were considered significant at $P \leq 0.05$ and marginally significant between $P > 0.05$ and $P \leq 0.10$.

Results & Conclusions:
Prior to drying agents being applied, initial mat surface temperatures were similar ($P = 1.000$) among all mats (Figure 1). As expected, an immediate reduction in temperature was observed regardless of drying agent 5 min post-application; however, mat surface temperatures increased to a greater extent ($P < 0.001$) with Dual Dry over time, whereas light colored drying agents had no change. The absorbent capacity varied considerably between drying agents with the greatest absorption recorded for Dual Dry and the lowest value for Product B.

In conclusion, our data suggest that Dual Dry is more absorbent and may increase mat surface temperatures to a greater extent over time, whereas light colored drying agents had no change after 5 min post-application. Based on these findings, Dual Dry may prove to be a valuable tool in minimizing cold stress in piglets.

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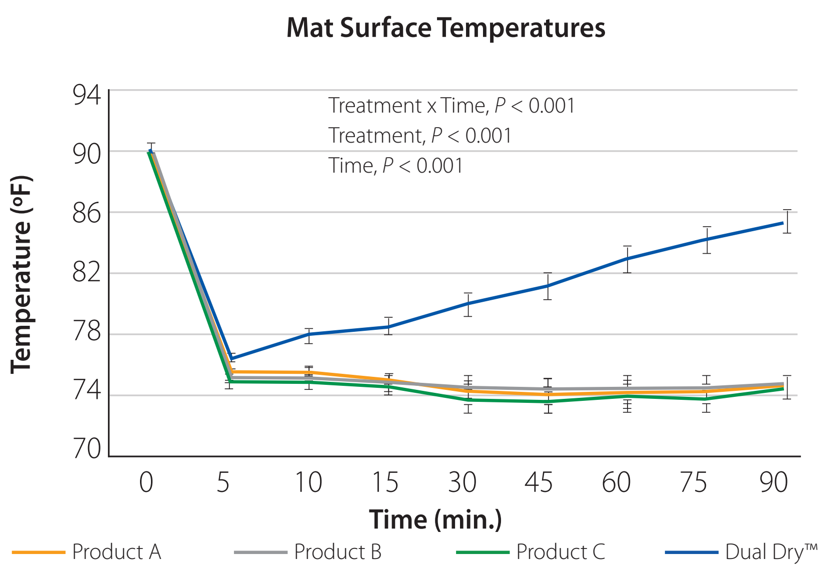

Figure 1. Effects of applying four commercial drying agents (Products A, B, and C – light colored drying agents; Dual Dry – dark colored drying agent) on mat surface temperatures. n=6 mats/treatment. Data are means ± SEM.

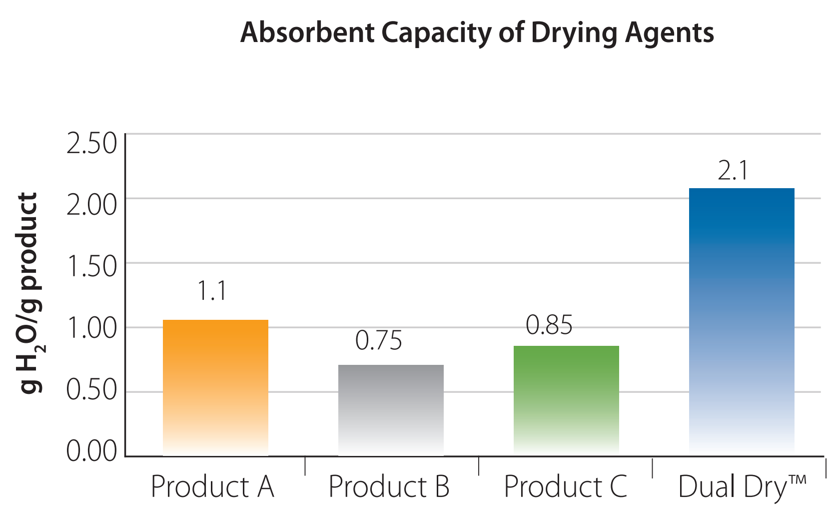

Figure 2. Effects of four commercially drying agents (Products A, B, and C – light colored drying agents; Dual Dry – dark colored drying agent) on absorbent capacity. Absorbent cacpacity was determined when 20 g of material became fully saturated. Saturation was determined when water began pooling on the surface of the material. Each drying agent was accessed in triplicate.