

# The Effect of Supplementing Dry Feed with a Nutritional Gel Product at the Time of Vaccination on Nursery Pig Maintenance Behaviors and Postures

## A.S. Leaflet R2466

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### Summary and Implications

Swine industry feed suppliers are continually striving to develop techniques and tools to reduce the additive stressors imposed on the weanling piglet, to increase advantageous behaviors (feeding and drinking) and to reduce aggressive interactions. One product on the market designed to ease the transition from a liquid diet (sow's milk) to a dry ration is a gel-based feed supplement that was incorporated in this trial as a means to positively affect the aforementioned parameters. The trial was conducted in the spring of 2007. A total of 64 3-week old, crossbred pigs (4.2 kg) were received from a commercial farm and housed in Double L<sup>®</sup> confinement nursery buildings. Four treatments were compared. **Control groups (n = 4)** were defined as unvaccinated and without supplemental gel at days 9 to 11. **Treatment one (TRT 1 n = 4 groups)** was provided supplemental gel at days 9 to 11 without vaccination. **Treatment two (TRT 2; n = 4 groups)** was vaccinated but did not receive supplemental gel at days 9 to 11. **Treatment three (TRT 3; n = 4 groups)** received supplemental gel at days 9 to 11 and were vaccinated. The group of four pigs housed together in a pen was considered the experimental unit for data analysis. Definitions for the behaviors and postures recorded and summarized for the trial included the following: **Active** was defined as standing, this included any upright postures. **Inactive** posture was defined as sitting or lying postures (both lateral and sternal). **Time at drinker** was defined as when an individual pig's mouth was around the water nipple. **Time at feeding stations** was defined as the time when the individual pig's head was inside the creep (that contained gel) or the three hole feeder (dry pelleted feed). There were no differences between treatments for active ( $P = 0.60$ ), inactive ( $P = 0.99$ ) or time at drinker ( $P = 0.37$ ), respectively. There was a difference ( $P = 0.0085$ ) between treatments for the percentage of time spent at the feeding stations with pigs receiving vaccine and no gel

spending the least amount of time at the feeding stations compared to the other three treatment groups. Therefore, the availability of a gel product when pigs are vaccinated provided some benefit, as the time spent at the feeding station was higher compared to pigs that did not have access to the gel.

### Introduction

Swine industry feed suppliers are continually striving to develop techniques and tools to reduce stress imposed on pigs at weaning, to increase advantageous behaviors (feeding and drinking) and to reduce aggressive interactions. In addition to social reorganization, pigs are often vaccinated during the nursery phase to reduce the impact of potentially harmful diseases. It has been noted by swine practitioners that at the time of vaccination many pigs lie down, become more lethargic and reduce the amount of feed consumption over the vaccination period. These behaviors are a direct result or response by the pig to the vaccination process. One product on the market is a gel-based feed supplement that is designed to ease the transition from a liquid diet (sow's milk) to a dry ration. According to the manufacturer this gel-based feed supplement contains high quality ingredients is highly palatable and provides the young pig with both a feed component and a water component thereby influencing feed consumption and intestinal health. The gel can be used in addition to a standard dry based nursery feed. Although, often recommended to be used at the time of weaning, the possibility of implementing the gel around the time of vaccination is a novel concept that might impact the individual pig's overall performance through shortening the time the pigs are disinterested in eating and drinking behaviors. The objectives of this study were to determine if the addition of gel at the time of vaccination provided benefits to the nursery pigs' maintenance behaviors and postures.

### Materials and Methods

**Animals and Housing:** All procedures were approved by Iowa State University's Animal Care and Use Committee. The trial was conducted in the spring of 2007. A total of 64, 3-week old, crossbred pigs (4.2 kg) were received from a commercial farm and housed in Double L<sup>®</sup> confinement nursery buildings. Two identical barns, each with two rooms of 14 pens (1.49 m<sup>2</sup>) each were utilized. Each nursery pen contained one nipple drinker and one three hole feeder (1.15 m x 11.9 cm x 23.9 cm) attached to the front of the pen and feed

and water was provided ad libitum throughout the duration of the trial. Flooring was plastic and fully slatted. Environmental control was provided by a positive pressure system utilizing: two 1 m<sup>2</sup> exhaust outlets located under the pig flooring area, two 1 m<sup>2</sup> inlet fans, one ceiling mounted 60,000 BTU propane barn heater and one Varifan ECS-2 electronic controller for each individual room. All pigs were uniquely identified by one plastic ear tag (Allflex, Dallas, TX) located in their left ear, were blocked by weight and sex and sorted on the day of arrival to produce pen groups of equal weight and cohorts of two barrows and two gilts per pen providing 0.38 m<sup>2</sup> of floor space / pig. Pigs were observed twice daily by two experienced caretakers at 0600 and 1600 hours.

**Treatments:** Four treatments were compared. The pen of pigs was the experimental unit. **Control (n = 4)** group defined as unvaccinated and without supplemental gel at days 9 to 11. **Treatment one (TRT 1; n = 4)** were provided supplemental gel at days 9 to 11 without vaccination. **Treatment two (TRT 2; n = 4)** were vaccinated but did not receive supplemental gel at days 9 to 11. **Treatment three (TRT 3; n = 4)** received supplemental gel at days 9 to 11 and were vaccinated.

**Vaccination schedule:** A single dose (2 cc per pig) of commercially licensed *Mycoplasma hyopneumoniae* killed bacterin was administered intramuscularly to treatment groups' in the neck region on day 10 of the trial consistent with NPB PQAplus published guidelines for producers.

**Climatic measurements:** Environmental conditions were electronically monitored using two HOBO data loggers (Onset, Bourne, MA) for the entire trial. The HOBOS were hung from the ceiling (1.2 m length of rope) and recorded relative humidity (%) and temperature (°C) every 10 minutes. Maximums, minimums and averages are presented on a weekly basis (Table 1).

**Behavioral equipment and acquisition:** Piglet behavior was collected on 16 pens (n = 4 per treatment) from day 9 through day 11 of the trial. Scoring of video began at 10:00 am on day 9 (24 hours prior to vaccination) and ended at 10:00 am on day 11 (24 hours post vaccination). One day prior to visual recording of behavior, all pigs in a pen were identified with an individual number placed on the back between the scapulas using an animal safe crayon (Raiderx™ Animal Marking Crayons, Otterbach Company, Germany). One 12 v black and white CCTV camera (Model WV-CP484, Panasonic® Matsushita Co Ltd., Japan) was affixed onto the back wall of the nursery so that two pens were captured with a single camera. Cameras were placed approximately 1.66 meters above the pen floor. Video was captured onto a DVR (RECO-204, Darim Vision®, USA) at 10 frames per second in black and white mode (Figure 1). Video was then remuxed (defined as changing the recorded

format of film into a useable format for the computer) using Video ReDo® (DRD Systems, Inc.) and placed on DVDs. The acquisition of two postures (active and inactive) and two behaviors (time at drinker and time at feeding station) were collected by two experienced observers who viewed the DVDs utilizing a 10 minute scan sampling technique (Bowden et al., 2008). The postures and behaviors used are defined in the following text. **Active** was defined as standing, this included any upright postures. **Inactive** posture was defined as sitting or lying postures (both lateral and sternal). **Time at drinker** was defined as when an individual pig's mouth was around the water nipple. **Time at feeding stations** was defined as the time when the individual pig's head was inside the creep (that contained gel) or the three hole feeder (dry pelleted feed).

**Figure 1. Screen print of the nursery pen containing four pigs per pen.**



**Statistical Analysis:** All behavioral data were expressed as percentages and were subjected to arcsine square root transformation process to achieve a normalized distribution. Behavioral data were analyzed using the PROC MIXED procedure of SAS (SAS Inst. Inc., Cary, NC) software for parametric data on a pen basis. Statistical model main plot included the parameter of interest; day, main effects of gel, and vaccine, and the 2 x 2 factorial arrangement of treatments. Pen nested within treatment was included as a random effect in the model. A repeated measure statement of day nested within pen was used. A  $P < 0.05$  was considered significant and PDIFF was used to separate the means.

## Results and Discussion

There were no treatment differences detected for active ( $P = 0.60$ ), inactive ( $P = 0.99$ ) or time at drinker ( $P = 0.37$ ), respectively. There was a difference ( $P = 0.0085$ ) between treatments for the percentage of time spent at the feeding stations with pigs receiving vaccine and no gel spending the least amount of time at the feeding stations compared to the other three treatment groups (Table 2). Therefore, the

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availability of a gel product when pigs are vaccinated provided some benefit, as the time spent at the feeding station was higher compared to pigs that did not have access to the gel.

### Acknowledgements

The authors would like to thank Josh Bowden, Tyson Dinslage, Larry Sadler, Allison Meiszberg, Tony Uhlenkamp, and Jill Garvey for helping with the trial procedures. Thanks to Land O' Lakes and Iowa State University Animal Science department start up funds for providing financial assistance.

**Table 1. Descriptive climate measures recorded over six weeks comparing the supplementation of a gel feed with normal dry feed to nursery pigs at the time of vaccination.**

Parameter <sup>#</sup>	Trial duration (weeks)					
	1	2	3	4	5	6
<b>Air temperature, °C</b>						
Minimum	27.40	24.70	26.20	25.50	25.10	22.99
Maximum	32.30	31.10	30.40	30.70	33.60	30.44
Average	29.90	28.90	28.50	28.00	29.00	26.39
<b>Relative humidity, %</b>						
Minimum	22.30	32.70	42.60	30.00	33.20	43.22
Maximum	41.10	69.30	72.00	60.50	77.10	96.32
Average	31.20	44.60	53.70	43.50	52.00	66.55

<sup>#</sup>Environmental conditions were electronically monitored using two HOBO's data loggers (Onset, Bourne, MA) for the entire trial. The HOBO's recorded relative humidity (%) and temperature (°C) every 10 minutes. Maximums, minimums and averages are presented on a weekly basis.

**Table 2. Least square means and standard errors for the combination of gel and vaccine on the postures and behaviors of recently weaned pigs one day before, on vaccination day and one day after. Superscripts within a row indicate a difference at a  $P < 0.05$ .**

	Treatment <sup>#</sup>				P-values <sup>*</sup>
	Control	TRT 1	TRT 2	TRT 3	
<b>Posture, %<sup>§</sup></b>					
Active	12.11 ± 1.34	10.50 ± 1.34	12.83 ± 1.34	10.97 ± 1.34	0.60
Inactive	79.89 ± 1.24	80.19 ± 1.24	80.05 ± 1.24	79.56 ± 1.24	0.99
<b>Behavior, %</b>					
Feeding station	7.74 ± 0.43 <sup>a,b</sup>	9.11 ± 0.43 <sup>a</sup>	6.89 ± 0.43 <sup>b</sup>	9.07 ± 1.43 <sup>a</sup>	0.0085 <sup>^</sup>
Drinker	0.26 ± 0.07	0.19 ± 0.07	0.23 ± 0.07	0.41 ± 0.07	0.37

<sup>#</sup>Four treatments were compared. **Control** (n =4) group defined as unvaccinated and without supplemental gel at days 9 to 11. **Treatment one** (TRT 1 n =4) were provided supplemental gel at days 9 to 11 without vaccination. **Treatment two** (TRT 2; n =4) were vaccinated but did not receive supplemental gel at days 9 to 11. **Treatment three** (TRT 3; n =4) received supplemental gel at days 9 to d11 and were vaccinated.

<sup>§</sup>**Active** was defined as standing, this included any upright postures. **Inactive** posture was defined as sitting or lying postures (both lateral and sternal). **Time at drinker** was defined as when an individual pig's mouth was around the water nipple. **Time at feeding stations** was defined as the time when the individual pig's head was inside the creep (that contained gel) or the three hole feeder (dry pelleted feed).

<sup>\*</sup>P-values under  $P < 0.05$  were considered to be significant.

<sup>^</sup>Least squares means within the same row that have a different letter differ at the  $P < 0.05$  level.