RESEARCH ABSTRACT

pork checkoff

ANIMAL WELFARE

Title: Providing humane on-farm handling tools to move non-ambulatory grow-finish pigs – **#17-030 IPPA**

Investigator: Dr. A. Johnson

Institution: Iowa State University

Date Submitted: May 1, 2019

Scientific Abstract:

Through the National Pork Board, the U.S. pork industry provides recommendations on humane handling tools and acceptable non-ambulatory pig handling. While these recommendations are useful, there is a lack of published evidence regarding humane handling tool options for moving non-ambulatory pigs. The objectives of this proposal were to (1) to evaluate four handling tools to move grow-finish pig cadavers and (2) to evaluate the most promising handling tools from objective one using non-ambulatory grow-finish pigs.

Objective One: To evaluate four handling tools to move grow-finish pig cadavers

Phase one: A wean-to-finish mat was modified to 1.8 m length x 60.9 cm width. Six caretakers were asked to move three commercial crossbred pigs (135, 118, 68 kg) that were selected from the hospital pen and euthanized according to company protocols, which were consistent with industry guidelines. Two empty pens were designated as the start (home pen) and end (hospital pen), corresponding to distance that a non-ambulatory pig would need to be humanely moved on a commercial farm. Outcomes included duration to move pig cadavers, differences in caretaker heart rate (bpm) and oxygen saturation (%), and caretakers' subjective effort score (1 = very difficult to 5 = very easy). Data were analyzed using a mixed model method (PROC MIXED) for parametric data. Employee was the experimental unit. The statistical design was a complete randomized design with the statistical model including the fixed effect of employee (n = 6) and cadaver (n = 3). Time to move the cadaver onto the MAT did not differ between employees (P = .87) or cadavers (P = .30). No employee was able to complete the entire task, such that none of the cadavers were moved into the hospital pen using the MAT. Only one employee was able to

move all cadavers into the alleyway (37.3 ± 12.7 s); two employees were able to move the heavier and lighter cadaver into the alleyway (68 kg: 11 ± 5.7 s; 135 kg: 39.5 ± 34.6 s). Force was measured only once and at the furthest location reached for each cadaver task. Employees did not differ for force used (P = .40). Less force was used for the lightest cadaver (68 kg: 88.5 ± 8.7 kgf; 118 kg: 145.6 ± 8.7 kgf; 135 kg: 165.2 ± 8.7 kgf; P = .0003). Employees did not differ in heart rate or oxygen saturation ($P \geq .05$). Similarly, heart rate and oxygen saturation did not differ between employees moving cadavers ($P > .05$). Employees agreed that moving the MAT in the home pen was very difficult, and the three employees who were able to move the MAT out of the pen into alley scored it as very difficult even with the lightest cadaver. Even though very durable, all employees felt strongly that the MAT would not easily move a non-ambulatory market-weight pig and would not recommend this MAT to other employees for moving a non-ambulatory market-weight pig.

Phase two: Three skeds were purchased and modified to each have final dimension of 1.9 m length x 91.4 cm width. Three deer sleds were not modified, but each had dimensions of 1.8 m length × 91.8 cm width. Three modified deer sleds were modified to each have final dimensions of 1.8 m length × 50.8 cm width. Four caretakers were asked to move fifteen commercial crossbred pig cadavers (59 to 134 kg) that were selected from the hospital pen and euthanized according to company protocols, which were consistent with industry guidelines. Two empty pens were designated as the start (home pen) and end (hospital pen), corresponding to distance that a non-ambulatory pig would need to be humanely moved on a commercial farm. The same outcomes from phase one were collected. Data were analyzed using mixed model methods (PROC MIXED) for parametric data. The statistical design was a complete randomized design with the statistical model including the fixed effect of employee (n = 4), handling tool (n = 3) and farm (n = 3) with cadaver (kg) as a linear covariate. Employee within farm was included as a random effect in the model. Total duration was affected by handling tool and farm ($P < .001$). Total duration was affected by cadaver, such that 0.64 s increase occurred with each one kg increase in weight ($P < .0001$). Modified deer sled was quicker to move than sked and deer sled ($P < .0001$). Employee was not a source of variation (P = .24). Exertion force at the end of the alley was affected by handling tool, farm and cadaver, such that 0.23 kgf increase occurred with each one kg increase in weight ($P < .01$). More force was required to move cadavers on sked then deer sled or modified deer sled. Employee was not a significant source of variation (P = .38). Change in heart rate after moving the cadaver from home- to hospital pen was affected by the handling tool used (P = .04). Change in heart rate was greater with sked than modified deer sled (P = .01); deer sled did not differ from sked or modified deer sled. Change in heart rate was affected by cadaver, such that 0.22 bpm increase occurred with one kg change in cadaver weight ($P <$ .0001). Employee and farm were not sources of variation ($P > .05$). Change in oxygen saturation after

moving the cadaver from home pen to hospital pen was not affected by handling tool, cadaver weight, employee, or farm ($P > .05$). The sked was the most durable with only a rip and crease and the deer sled was the least durable with multiple creases and holes. Overall, employees recommended the sked and deer sled as suitable handling tools to move non-ambulatory pigs, whereas the modified deer sled would not be recommended as a suitable handling tool due to no-restraints.

Objective two: To evaluate the most promising handling tools from objective one using non-ambulatory grow-finish pigs

Phase three: Three handling tools (sked, revised deer sled and ice fishing sled) were evaluated as suitable handling tools to move non-ambulatory grow-finish pigs. The sked was modified to have a final dimension of 1.9 m length x 91.4 cm width. The revised deer sled was modified to affix restraint straps and a polypropylene rope for a handle with final dimension of 1.8 m length × 91.8 cm width. The ice fishing sled was modified to affix restraint straps and a polypropylene rope for a handle with final dimension of 109 cm length x 58 cm width x 27 cm height. 18 commercial crossbred genetic line pigs (average BW of 99.9 ± 25.3 kg) were randomly assigned to one handling tool. Two empty pens were designated as the start (home pen) and end (hospital pen), corresponding to distance that a non-ambulatory pig would need to be humanely moved on a commercial farm. Each pig was moved to the start pen. A lidocaine epidural block was administered to each pig in order to induce a non-ambulatory state. Once confirmed non-ambulatory by a swine veterinarian, two production well-being employees positioned the pig onto the handling tool and moved them. Outcomes included duration to move from start- to end pen (s) that covered a distance of 20.6 m, change in pig temperature (ºC), taken with an Infrared gun on the ventral plane, pig respiration rate (bpm), pig vocalization score (0 = none to 2 = continuous grunts/calls) and struggle score (0 = none to 2 = continuous movement of legs and/or head). Change in pig temperature- and respiration rate and handling tool duration data were analyzed using mixed model methods (PROC MIXED) for parametric data with fixed effect of farm (n = 1), handling tool (n = 3), and sex of pig (M/F) with pig weight (kg) as a linear covariate. Pig vocalization and struggle score data were analyzed using PROC FREQUENCY and CHI SQUARE to observe the distribution of vocalization and struggle scores by handling tool. Total duration was affected by pig weight ($P = 0.014$). Handling tool and sex were not sources of variation ($P > 0.10$). There were no associations between handling tools and pig vocalization and struggle scores when moving non-ambulatory pig from home pen floor onto the handling tool, securing pig onto the handling tool, and moving the handling tool and pig from start pen to end pen ($P > 0.10$). Change in pig temperature (ºC) and respiration rate (bpm) was not

affected by handling tool, sex or pig weight ($P > .05$). The ice fishing sled was the most durable with no creases, rips or holes. The sked and deer sled both had a total of two creases.

In conclusion, the modified wean-to-finish mat and modified deer sled are not suitable handling tools for moving non-ambulatory grow-finish pigs. Whereas, the sked, deer sled, revised deer sled and ice fishing sled are suitable handling tools for moving non-ambulatory grow-finish pigs' on-farm.