IceTag™ Devices: Feasibility for Measuring Activity and Postures in Gilts

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Summary & Implications

The objectives of this project were 1) explore the feasibility of securing the IceTag™ device on sexually mature gilts, 2) determine effects of IceTag™ device on gilt behavior, and 3) compare IceTag™ data from gilts against the gold standard-behavioral data manually collected by a trained observer. Four individually housed bred gilts (~200kg) were used. The treatments were as follows: Gilt 1 – both hind legs; Gilt 2 – right hind leg; Gilt 3 – both hind legs; Gilt 4 – left hind leg. Gilts were monitored at least twice daily for signs of inflammation, lameness and lesion development. Behavioral and postural data were collected from video by a single trained observer. A minor lesion (redness) was noted above the IceTag™ on gilt 4. The gilts did not display acute signs of discomfort or distress when the device and bandages were placed on the leg since gilt lay or stood quietly during the procedure. The correlation between the IceTag™ devices and the behavioral observations were high for standing duration, with the exception of gilt 4. In conclusion, the IceTag™ devices correlated well with behavioral observations. Further research is needed for practical and safe methods to secure the device on the swine leg when placement is required for several days.

Introduction

IceTag™ devices have the benefit of reducing time associated with manual collection of behavioral data. IceTag™ devices were designed and validated for empirical information on cattle standing, number of steps taken and the frequency and duration of lying bouts using a motion index. The motion index is a proprietary metric of the overall animal activity measured in three dimensions. Use of IceTag™ devices have been explored in other species, such as sheep, goats and swine, but validation studies for these species have not been published. The objectives of this project were to 1) explore the feasibility of securing the IceTag™ device on sexually mature gilts, 2) determine effects of IceTag™ device on gilt behavior, and 3) compare IceTag™ data from gilts against the gold standard-behavioral data manually collected by a trained observer.

Materials and Methods:

This project was approved by the Iowa State University IACUC. Four individually housed bred gilts (~200kg) were used. Two days prior to IceTag™ placement, a camera was placed in each pen providing an overhead panoramic view of the gilt in her pen. Video was recorded continuously from 0600-1800 using the Noldus™ Portable Video Lab. On day 0, the IceTag™ treatments were administered. The treatments were as follows: Gilt 1 – both hind legs; Gilt 2 – right hind leg; Gilt 3 – both hind legs; Gilt 4 – left hind leg. Prior to IceTag™ placement, the legs were wiped clean and dried with paper towels. Cotton was wrapped around the leg. The IceTag™ was placed on top of the cotton at the lateral aspect of the cannon on the hind leg, centered between the hock joint and the dew claw. The cotton and IceTag™ were secured with vet wrap. Next, Elastikon® was placed over the vet wrap to keep the entire "bandage" in place. On day +5, any IceTag™ devices and bandages remaining on the legs were removed.

Feasibility: Gilts were monitored at least twice daily for signs of inflammation, lameness and lesion development. In addition, the physical position of the IceTag™ on the leg was monitored daily. If the IceTag™ had slipped from its original position, but was not causing injury or impairment of gait, the device and bandage were adjusted to the original position. If the IceTag™ was completely removed from the gilt or was causing injury, the animal was removed from the trial and data collection ceased.

Behavioral observations: Behavioral and postural data (Table 1) were collected from the video by a single trained observer using the Observer® software program for the duration that the gilts were on trial.

Analyses: Due to the low sample size and the challenges of keeping the IceTags™ secure on the gilts' hind leg(s), correlation between the IceTags™ and the manual behavioral observations were described for each gilt.

Results and Discussion:

Feasibility: A minor lesion (redness) was noted above the IceTag™ on gilt 4, but did not progress in severity over the next few days it was on the gilt (Table 2). This was the only gilt on which any redness or irritation was observed. Further work needs to be done to determine a method to keep the devices securely on the leg of gilts. Placement of the IceTag™ devices on a different part of the body, such as the neck, in addition to the leg would be worth investigating to be better able to differentiate these behaviors.

Behavioral observations: The gilts did not display acute signs of discomfort or distress when the device and bandages were placed on the leg since gilt lay or stood quietly during the procedure. Casual observation after placement did not reveal obvious signs of discomfort, other than minor and transient kicking. Biting or prolonged kicking of the leg with the device, escape behaviors or vocalizations were not observed. The problems in keeping the devices secure made it challenging to determine long-term effects of the devices on gilt behavior.

The correlation between the IceTag™ devices and the behavioral observations were high for standing duration, with the exception of gilt 4 (Table 3). The lower correlation for the number of steps taken could be due to devices slipping on the legs, and/or due to challenges of identifying single steps with the camera angle. Unlike cattle, swine also perform sitting and this posture may not be differentiate from lying, resulting in lower correlations between the devices and behavioral observations.

In conclusion, the IceTag™ devices correlated well with behavioral observations. Further research is needed for practical and safe methods to secure the device on the swine leg when placement is required for several days.

Table 1 Ethogram for behavioral observations of gilts wearing IceTag™ devices

Behavior	Definition
Standing	Gilt standing up on all four legs
Right Step	Step taken with the right hind leg
Left Step	Step taken with the left hind leg
Lying	Gilt sternal or lateral with legs tucked and/or extended and belly touching the floor
Other	Any other behavior not included in the ethogram that was noted

Table 2 IceTag™ Physical position and impact on the gilt leg

	Gilt ID					
Measure	**1**		**2**	**3**		**4**
Leg	Right	Left	Right	Right	Left	Left
Duration	5 days	2.5 days	2 hours	2 hours*	5 days	1 day
Lesion/Irritation	**	-	-	-	-	-

*IceTag™ was moved to front leg, but fell off after 1 day

**Inflammation observed above the IceTag™

Table 3 Correlations between IceTag™ devices and behavioral observations of gilts

IceTag™ ID	Gilt ID	Leg	No. of steps taken R^2	Standing R^2	Lying R^2
30412559	1	Left	0.71	0.96	0.84
30412561	1	Right	0.62	0.93	0.77
30412562	4	Left	--*	0.51	0.82
30412586	2	Right	0.89	0.99	0.1

*IceTag™ slipped from position and data were not collected