

Validation of Scan Sampling Techniques for Lactating Sows Kept Outdoors

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Summary and Implications

Scan sampling, observing animals at set intervals is often used by behaviorists to reduce labor inputs which are necessary with continuous sampling. The interval used when scan sampling sows housed outdoors on pasture should take into consideration the desired behavior to be collected. The objective of this study was to validate scan sampling intervals for sow behaviors and postures when sows were housed outdoors on pasture. Validation for the scanning interval was conducted on 23 sows. Sows were scanned every minute between 0730 and 1130 and then again between 1430 and 1830 by one trained observer on one day in May 2001 at the Sustainable Pork Farm. Six behavioral categories were measured; standing, feeding, head down (rooting and grazing), inactive (lying and sitting), drinking and walking. Scan samples could be taken out to as long as 60 minutes or as little as 15 minutes and still obtain accurate data for most behaviors. Validation of scanning intervals based on correlations for walking (0.81 vs. 0.34) and head down (0.98 vs. 0.85) were less ($P < 0.01$) accurate at 15 min scan than when a 1-min interval was used. When LSM means were compared, standing, head and walking became less accurate ($P < 0.05$) at a 30 min scan compared to the 1 min scan control. For inactive behaviors there was no differences from 1 min scans until a 60 min scan ($P = 0.03$). In conclusion, when the period of scanning was shorter, a more precise prediction of behavior and postures was obtained. However, a balance must be struck between practical feasibility and accuracy when conducting 24 hours of behavioral observations in the field.

Introduction

Behavioral observations are a type of “assay” that is used to quantify animal biological responses. As with physiological measurements, methods of behavioral observation should be validated and selected based on the objectives of the particular study. Animal ethology has divided animal behavioral repertoires into two components; events which are relatively short in duration and states which are relatively long in duration. The type or types of behavioral patterns will often dictate the recording tool to use.

Animal behaviors can be observed, scored and acquired using several sampling and recording methodologies. Sampling methods include ad libitum, focal, scan and

behavioral methods. Recording rules can be neatly divide into two areas; continuous and time sampling. Each sampling and recording rule has their advantageous and their challenges associated with them. Continuous observation over an extended period of time is considered the ideal, but often due to labor, time, and other factors continuous observation is not always possible.

Therefore, if researchers validated the “time” sampling required to accurately capture the animals’ behavioral patterns then enormous amounts of time can be saved. The objective of this study was to validate scan sampling intervals for sow behaviors, postures and locations when sows were housed outdoors on pasture.

Materials and Methods

Animals and Housing: Farrowing paddocks was separated by a single stranded electrical wire (12 A), which was at a height of 59 cm above the ground. Sows and their litters were housed in English-style farrowing huts (1.12 m x 2.79 m x 1.65 m). One door was situated to the left side of the farrowing hut (1.23 m x 1.18 m) and a ventilation window was positioned on the back wall (43 cm x 1.19 m). The ventilation window was occasionally closed at the discretion of the farrowing manager. This was achieved by placing a wooden board (0.51 m x 1.19 m) over the open window. Closure rate was the same between all sows in and across pastures. All farrowing huts were orientated south. Short chopped what straw was used for bedding. Tall metal fenders (0.9 m height x 2.7 m width at the back of the hut and 0.7 m at the front x 1.60 m length) with a PVC roller (0.12 m x 0.12 m x 0.64 m) were used. Fenders were attached after the sow had chosen her farrowing hut and prior to piglets being born.

Measures: Validation for the scanning interval was conducted on 23 sows. Sows were scanned every minute between 0730 and 1130 and then again between 1430 and 1830 by one trained observer on one day in May 2001 at the Sustainable Pork Farm. Six behavioral categories were measured; standing, feeding, head down (rooting and grazing), inactive (lying and sitting), drinking and walking.

Standing was defined as when the sow maintained an upright position on extended legs but remained inactive. Feeding involved voluntary oral ingestion of concentrates. Head down was a combination of grazing (voluntary oral ingestion of plant material) and rooting (sow moved her head over inanimate objects and (or) thrust her snout into the earth). Inactive was a combination of lying (lateral/semi-lateral, ventral or sternal recumbency and involved contact of the sow body with the ground) and sitting (when most of the sow body weight and the posterior of the body trunk was

in contact and supported by the ground). Drinking was any contact between the sow mouth and the wallow water or fresh water from the PVC pipe. Walking included any actions while the sow was moving. The total amount of time spent by the sows in three areas of the radial was also determined: pasture, wallow and inside the farrowing hut.

Statistical Analysis: All analyses were performed using the GLM procedure of SAS (SAS Inst. Inc. Carry, NC) software for parametric data. The experimental unit was the individual farrowing paddock (n = 4) containing the lactating sows. All behavioral data were expressed as percentages and were subjected to a square root arcsine transformation process to achieve a normalized distribution. Transformed data for validating the behavioral scan sampling period was analyzed as a completely randomized design to achieve least squares means. Correlations were performed against a 1 min-scan sample for 5, 10 15, 30 and 60 min in scanning intervals.

Results and Discussion

Validation of scanning intervals based on correlations for walking (0.81 vs. 0.34) and head down (0.98 vs. 0.85) were less ($P < 0.01$) accurate at 15 min scan than when a 1-min interval was used. When LSMeans were compared, standing, head and walking became less accurate ($P < 0.05$) at a 30 min scan compared to the 1 min scan control. For inactive behaviors there was no differences from 1 min scans until a 60 min scan ($P = 0.03$). Although there were no differences ($P > 0.05$) for feeding and drinking behaviors there was a pattern that percentage of time engaged in these activities were over estimated as the scanning time intervals increase from 1 to 60 min respectively. Feeding and drinking behaviors were overestimated (Table 1).

In conclusion, when the period of scanning was shorter, a more precise prediction of behavior and postures was obtained. However, a balance must be struck between practical feasibility and accuracy when conducting 24 hours of behavioral observations in the field.

Table 1. Least squares means, standard errors and *P*-values for percentages of behaviors of 23 PIC lactating sows observed at different scanning intervals, 1, 5, 10, 15, 30 and 60 min/h at Idalou, May 2001. Sixty minutes is the control or complete sample.

Behavior, %	Scanning time, min						SE	P-values
	1	5	10	15	30	60		
Standing	6.4 ^a	7.1 ^{a b}	7.6 ^{a b}	6.9 ^{a b}	6.1 ^b	5.7 ^{b c}	0.01	0.024
Feeding	7.6	8.0	8.2	9.2	10.7	15.7	0.04	0.824
Head down	7.0 ^a	6.7 ^a	6.9 ^{a b}	5.8 ^{a b}	5.7 ^b	4.9 ^{b c}	0.01	0.002
Inactive	2.9 ^a	3.1 ^a	2.9 ^a	3.4 ^a	3.2 ^a	1.4 ^b	0.01	0.031
Drinking	3.1	2.8	2.6	3.1	3.1	4.4	0.01	0.131
Walking	5.1 ^a	4.8 ^a	4.2 ^{a b}	4.7 ^{a b}	3.7 ^b	2.6 ^c	0.01	0.001
Hut	68.2	68.1	68.2	67.4	68.2	66.1	0.04	1.00

a, b, c with different superscripts within rows are different ($P < 0.05$).