Scan Sampling Techniques for Behavioral Validation in Nursery Pigs

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Summary and Implications

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. The objective of this study was to validate the accuracy of scan samples at various predetermined intervals for confined nursery pigs. Twenty, 35 day old, crossbred PIC (USA) nursery pigs were housed in five pens within a confinement building. Eight scan sample treatments (1, 2, 3, 5, 10, 15, 30, and 60 minutes) were individually compared to continuous observation. Scan sample was defined as the first second for each scan interval (1 minute scan sample intervals provided 60 selected scans of one second duration per pig per hour). The percentage of the total time observed for each behavior and posture then calculated for each pen. Drinking differed ($P = 0.0019$) from the continuous data at intervals greater than 5 minutes or more. For all other behaviors and postures there were no ($P > 0.05$) differences between scan treatments and the continuous data. In conclusion, scan samples under these experimental conditions were accurate for all behaviors and postures except drinking.

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 repertories 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. The objective of this study was to validate the accuracy of scan samples at various predetermined intervals for confined nursery pigs.

Materials and Methods

Animals and Housing: Twenty, 35 day old, crossbred PIC (USA) nursery pigs were housed in five pens within a confinement building.

Measures: Observations occurred continuously for a 24 hour period using one color camera positioned over the pen that recorded onto a RECO-204 digital video recorder at 1 frame per second. The day before validation, each pig was individually marked using an animal safe crayon between the scapulas.

Phase one screened four pens containing four pigs per pen (two barrows and two gilts) continuously for 24 hours to identify the most active periods of the day for further detailed observation. Active defined as walking, standing, eating gel, eating trough and drinking and Inactive defined as lying and sitting were acquired (Figure 1). Phase one identified 0600 to 1000 as the most active period.

Phase two screened five pens containing four pigs per pen (two barrows and two gilts) on one day from 0600 to 1000 respectively. Eight scan sample treatments (1, 2, 3, 5, 10, 15, 30, and 60 minutes) were individually compared to continuous observation. Scan sample was defined as the first second for each scan interval (1 minute scan sample intervals provided 60 selected scans of one second duration per pig per hour). Three pig behaviors (eating at trough, eating gel and drinking) and two postures (active; defined as standing and walking and inactive) were continuously acquired for each pig.

The percentage of the total time observed for each behavior and posture then calculated for each pen.

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

Statistical Analysis: The percentage of the total time observed for each behavior and posture then calculated for each pen. Data were analyzed using Proc Mixed procedure in SAS® and the experimental unit was the pen.

Results and Discussion

Drinking differed ($P = 0.0019$) from the continuous data at intervals greater than 5 minutes or more. For all other behaviors and postures there were no ($P > 0.05$) differences between scan treatments and the continuous data (Table 1).

In conclusion, scan samples under these experimental conditions were accurate for all behaviors and postures except drinking. Some limitations must be noted; the subjects were limited to nursery age pigs, therefore, the ability to extrapolate this data to different aged pigs and in different housing systems is unknown, and finally, 5 pens were observed for 4 hours, perhaps more pens for a longer period of time would result in different outcomes. Scan samples could be applied to specific activities in behavioral studies to save labor while still accurately depicting pig behaviors and postures.

Table 1: LSMeans and standard errors for 35-d nursery pigs housed in a conventional system.

	Treatment (minutes)									
Measures	**Continuous**	**1**	**2**	**3**	**5**	**10**	**15**	**30**	**60**	***P-Values***
Postures										
Active	16.75 ± 3.30	16.79 ± 3.30	16.50 ± 3.30	16.06 ± 3.30	16.88 ± 3.30	16.88 ± 3.30	16.25 ± 3.30	14.38 ± 3.30	22.50 ± 3.30	0.99
Inactive	73.86 ± 4.81	73.77 ± 4.81	73.50 ± 4.81	74.25 ± 4.81	73.44 ± 4.81	73.33 ± 4.81	75.63 ± 4.81	73.75 ± 4.81	73.86 ± 4.81	0.99
Behavior										
Gel	6.65 ± 2.38	6.73 ± 2.38	7.00 ± 2.38	7.40 ± 2.38	7.40 ± 2.38	7.92 ± 2.38	5.94 ± 2.38	9.38 ± 2.38	8.75 ±2.38	0.30
Dry feed	2.16 ± 1.68	2.19 ± 1.68	2.38 ± 1.68	2.19 ± 1.68	2.08 ± 1.68	1.46 ± 1.68	1.88 ± 1.68	1.88 ± 1.68	1.68 ± 1.68	0.88
Drink	0.59 ± 0.28^{a}	$0.52 \pm 0.28^{a,b}$	$0.49 \pm 0.28^{a,b}$	$0.50 \pm 0.28^{a,b}$	0.21 ± 0.28^{b}	0.42 ± 0.28^{b}	0.31 ± 0.28^{b}	0.63 ± 0.28^{a}	0.00 ± 0.28^{c}	0.0019