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## A behavioural and physiological study of the responses of inexperienced gilts to electric fencing

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### Introduction

The expansion in use of outdoor pig production systems in the UK and Europe has led to increasing exposure of pigs to electric fencing. Little is known of the responses of pigs to these fences, and as a major factor of the animal's environment they may have significant impact on welfare and productivity. The study described here was conducted in order to investigate the behavioural and heart rate responses of gilts encountering electric fencing for the first time.

### Materials and Methods

12 group-housed Large White x Landrace gilts, having no prior experience of electric fencing or outdoor pig housing systems, were used in this study. On day one, pigs were paired at random, fitted with Polar Sports Tester heart rate monitors (Polar Electro, Kempele, Finland), and each pair placed in turn in an 85 m x 35 m paddock. This paddock was enclosed by a three wire electric fence, bearing a voltage of approx. 7.5 kV with respect to ground. Behaviour and heart rates of each of the six pairs were recorded for one hour, after which they were removed to a holding area. On the second day of the study, all 12 gilts were placed together in the paddock and behaviour recorded over four one hour sessions distributed throughout the day.

### Results

Most fence strikes occurred in the first ten minutes of observation on day one (Table 1).

Table 1. Total number of fence strikes per observation period on day 1 (Friedman's test).

	Period of observation (minutes)					
	00-10	10-20	20-30	30-40	40-50	50-60
No. of Fence strikes	24 <sup>a</sup>	5 <sup>b</sup>	3 <sup>b</sup>	3 <sup>b</sup>	4 <sup>b</sup>	2 <sup>b</sup>

Values with different superscripts differ at  $P < 0.01$ .

Both gilts exhibited a heart rate response when a fence strike occurred, which was greater for the animal receiving the shock than for the other member of the pair (the pair-mate) (Table 2).

Table 2. Heart rate responses to fence strikes (S.E. in brackets) (Wilcoxon signed-rank test).

Heart rate measure	Shock receiver	Pair-mate	Z	Significance
Mean peak (beats per minute)	168.9 (7.0)	142.7 (5.3)	-2.7	$P < 0.01$
Mean increase (beats per minute)	+58.1 (5.9)	+32.9 (4.6)	-2.7	$P < 0.01$

Neither the shock receiver nor the pair mate exhibited any reduction in heart rate response over successive strikes. The magnitude of the response (both peak and increase) was positively correlated with stage of gestation (Table 3).

Table 3. Correlation of heart rate responses with stage of gestation.

Gilt	Heart rate measure	r	Significance
Shock receiver	Mean peak	0.70	P=0.02
	Mean increase	0.71	P=0.02
Pair-mate	Mean peak	0.69	P=0.03
	Mean increase	0.67	P=0.03

On day 2, gilts spent more time moving in the morning than in the afternoon ( $P < 0.01$ ), and more time rooting and grazing in the afternoon than in the morning ( $P < 0.05$ , Table 4).

Table 4. Total number of moves and roots and grazes a.m. vs. p.m. on day 2 (Mann-Whitney U test).

	A.M.	P.M.	U	Significance
Total Moves	46	17	5.5	P<0.01
Total Roots and Grazes	63	86	23.5	P<0.05

### Discussion

The behavioural data indicate that gilts initially direct explorative behaviour towards the electric fence, but after receiving a few shocks begin to avoid it. It is interesting to note that gilts do still touch the fence after receiving these initial shocks, as this is contradictory to beliefs expressed by many farmers. However, after the first hour of exposure to the fence, the gilts tend to avoid contact with it, although they can be observed grazing and rooting very close to it. Behaviour on the second day, when gilts were exposed to the fence and paddock as a group, is indicative of an initial period of exploration, followed in the later part of the day by less exploratory and more ingestive types of behaviour. The novelty of the outdoor environment, compared with their previous straw yard housing, is likely to have over-ridden any previous diurnal pattern of foraging behaviour. Indeed, prior to moving to the outdoor unit, these pigs were fed in the mornings, thus one would expect them to forage more in the morning if there were a residual diurnal effect, rather than their foraging more in the afternoon as observed. Heart rate responses do not decrease over subsequent fence contacts, although the behavioural responses reduce the incidence of such contacts. The magnitude of heart rate responses on fence contact, increasing with stage of gestation, suggest that exposure to electric fences may be a contributory factor to reproductive upset, particularly in animals experiencing them for the first time in late gestation.