

STRESS ASSESSMENT OF PIGLETS UTILISING BEHAVIOUR TOOLS UNDER DIFFERENT MANAGERIAL PRACTICES*

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ABSTRACT

Stress in piglets undergoing routine surgical procedures related to managerial practices was assessed in the present study. Sixty male piglets formed ten treatments with six replicates. Treatments undertaken were ear notching, handling for ear notching, castration, sham castration (restrained identically but not castrated), combined handling and performance of ear notching and castration. Behaviour was observed during four different time frames viz: 30 minutes before the treatment, during the treatment, 30 minutes after the treatment and 24 hours after the treatment respectively. In one-week-old piglets, though the stress related behavioural scores due to ear notching was higher during the procedure, the scores got decreased after 30 minutes and 24 hours of ear notching. The scores were intermediate in the combined performance of ear notching and castration compared to individual performance at one week. Castrates at eight weeks showed fewer stress related behaviours than the castrates at one week of age.

INTRODUCTION

Behaviour is defined as some action or pattern of action in response to a stimulus. The behaviour includes all processes by which an individual senses the external world and the internal state of its body and responds to change which it perceives. The expressions depend on stimulus and response (Ranga, 2002).

An understanding of animal behaviour and factors influencing these phenomena is critical in assessing the needs of animals. Recognition of animal behaviour may serve as benchmarks of welfare adequacy and determine managerial strategies to minimize the possibility of stressful conditions. Constructive approach in stress, behaviour, animal well being and related management and care would enhance the long standing relationship between human and animals. Behavioural observation provides cues about the preference, needs and internal states of the animals. Knowledge of the normal species-specific behaviour is necessary for using behaviour as an indicator of stress and welfare (Ewing *et al.*, 1999).

Pigs express their discomfort by behavioural alterations. Present trend of

management is to give greater emphasis on the study of behaviour and apply control through intelligent manipulation of their behaviour than through inflicting painful anti-welfare procedures.

The present study is envisaged to assess stress due to handling and performing the routine surgical procedures such as ear notching and castration, to compare the effect of individual and combined performance of the routine surgical procedures and to assess effect of age on stress due to handling and castration.

MATERIAL AND METHODS

Experimental Location: The study was conducted at the Center for Pig Production and Research (CPPR) of Kerala Agricultural University, Mannuthy; located seven km East of Thrissur, at an altitude of 50m to 928m above msl (mean sea level) with latitude 10° 20' to 10° 56'N (north) and longitude 76° 05' to 70° 45' E (east). The state is endowed with humid tropical climate with maximum rainfall by South West monsoon from June to August and North East monsoon from September to October.

The experiment was scheduled for two months, from February to March 2003. The

*Part of M.V.Sc thesis submitted by the first author.

mean maximum and minimum ambient temperature was 34.7°C and 23.6°C in February and 34.6°C and 24.1°C in March respectively. The mean diurnal atmospheric humidity percentage was 83 in February and 86 in March. Rainfall recorded was 162 mm in February and 95 mm in March 2003.

Animals: Purebred Large White Yorkshire; Landrace; Duroc crossbred and Indigenous pigs were scientifically maintained in the farm. The piglets were reared till weaning in natural system, with their respective sows.

Management System: The animals housed in intensive system, were provided with 3 x 4 meters of floor space per sow with litters. Animals were identified based on their ear notches. Ear notching was done when they were one-week old. They had a body weight of one to one and a half kg. Castration was performed at eight weeks when they weighed 9 to 10 kg.

Experimental Design

Sixty male piglets formed the sample for the study. Ten treatments with six replicates were evolved from these piglets. The same handler under the same standard conditions did the handling and routine surgical procedures, throughout the experiment to avoid variation. The experiment was performed in isolated pens of 3 x 4 meters floor space per animal. Behaviour and vocalization were observed and recorded. The ten treatment groups were:

T_{1A} One-week-old control group with no treatment,

T_{1B} 8 weeks old control group with no treatment,

T₂ Handling for ear notching at 1st week of birth without performing ear notching

T₃ Handling for ear notching at 1st week of birth with performing ear notching

T₄ Handling for castration at 1st week of birth without performing castration (sham castration)

T₅ Handling for castration at 1st week of birth with performing castration

T₆ Handling for castration at 8th week of age without performing castration (sham castration)

T₇ Handling for castration at 8th week of age with performing castration

T₈ Handling for ear notching and castration simultaneously at 1st week of age without performing the procedures

T₉ Handling for ear notching and castration simultaneously at 1st week of age with performing the procedures

Sham castration: Restrained identically but not castrated

Method of castration: Subjects selected for castration, were restrained by local anaesthesia. 'Open covered' method of castration was followed. Piglets allotted to 'Sham castration' were handled similarly except that no operation was performed.

Method of ear notching: Experienced personnel in the farm performed ear notching using ear notcher. All male piglets were notched first followed by females or vice versa.

Recording of Behaviour: Behaviour patterns were recorded using 'Hitachi' color video camera cum Videocassette recorder with provision of horizontal resolution of 625 lines and 25 frames of auto speed and digital signal processing and it was transcribed into Compact Discs. Still pictures were taken using f 50 Nikon camera with Fuji crystal 200 films. 'Focal animal sampling' method, described by Martin and Bateson (1988) was used in the present study to observe each individual for a specified amount of time.

Behaviour score card used for the experiment:

BEHAVIOUR	DESCRIPTION	Scores*
Nosing, Mouthing	Snout is close to or in contact with a substrate	10
Biting, Chewing	Biting and/or nibbling the bar or substrates	20
Rooting	Digging the floor or substrate with the snout	30
Attempt to escape	Attempting to escape when approached or handled by personnel	40
Trembling	Shivering, in sitting, standing or recumbent posture	50
Startle reaction	Typical porcine reaction, with a 'woof and freezing' posture	60
Tail twitching	Twitching of tail or Straightened tail	70
Elimination	Defecation and/or Urination	80
Ventral recumbency	Motionless; body weight supported by belly. Sternum in contact with floor	90

* Scoring relates to intensity of stress

Observations were made in four different time frames *viz*: 30 minutes before the treatment, during the treatment, 30 minutes after the treatment and 24 hours after the treatment, respectively. Behaviour pattern scored in four different time frames were tested using Non-parametric, 'Mann-Whitney U test' (Siegel, and Castellan 1988).

RESULTS AND DISCUSSION

Measuring Behaviour: Mean behaviour scores to assess stress, due to handling and performing the routine surgical procedures such as ear notching and castration, are presented in the table. During the handling for ear notching, piglets attempted to escape, twitched their tail and defecated. During ear notching, the animals trembled, twitched their tail, urinated and attempted to escape more appreciably than handled for the same. In piglets handled for castration, trembling, startle reaction (typical porcine reaction with a 'woof and freezing' posture) are noticed during handling. During castration, piglets showed reduced attempts to escape and decreased tail twitching. These behaviour patterns are found after 30 minutes and 24 hours of castration. When the subjects handled for ear notching, was immediately handled for castration, they attempted to escape. Piglets with combined performance of ear notching and castration showed pain related behaviours such as startle reaction; tail twitching, straightened tail and they wandered less. These behaviours are observed around 30 minutes after

the procedures and are not appreciable after 24 hours. Control group piglets with no treatment are observed to be nosing, mouthing, biting, chewing or rooting the substrates. Mean behaviour scores ranged from 36.66 ± 5.58 to 148.33 ± 7.03 at one week of age and from 43.33 ± 5.58 to 126.67 ± 13.33 at eight weeks of age.

a. Scores in one-week-old piglets

Observation during second time segment (During the treatment)

Treatment group (T_3) that was ear notched, had higher behaviour scores and differed significantly ($p < 0.05$) from the control group with no treatment. Castrated group (90.00 ± 12.90) with higher behaviour scores differed significantly ($p < 0.05$) from the control group (43.33 ± 5.58). Treatment group that has been exposed to ear notching and castration scored high in behaviour and differed significantly ($p < 0.05$) from the control group.

Observation during third time segment (30 minutes after the treatment)

Behavioural scores were higher in ear notched group, which differed, significantly ($p < 0.05$) from the treatment group handled for ear notching. Castrated group (133.33 ± 9.89) with higher behaviour scores significantly differed ($p < 0.05$) from sham-castrated (restrained identically but not castrated) group (51.67 ± 5.42). Treatment groups with combined performance of ear notching and

castration scored high in behaviour and differed significantly ($p < 0.05$) from the group exposed to only handling for ear notching and castration.

The pig behaviours described by Houpt (1998) in the study on domestic animal behaviour and Hay *et al.* (2003) indicative of behavioural signs of castration in piglets, were akin to the methodology used in the present study.

During the handling for ear notching, piglets attempted to escape, twitched their tail and defecated.

During ear notching, the animals trembled, twitched their tail, urinated and attempted to escape more appreciably than handled for the same. Present findings are akin to Houpt (1998) who reported that skin irritation caused tail twitching and increased rate of elimination.

In piglets handled for castration, trembling, startle reaction (typical porcine reaction, with a 'woof and freezing' posture) were noticed, during handling. During castration, piglets showed reduced attempts to escape and decreased tail twitching. These behaviours were found after 30 minutes and 24 hours of castration. This may be due to pretreatment with local anesthetic. Findings of Houpt (1998) are in disagreement with the present findings. He has reported that, pigs castrated without anaesthesia stood and suckled less and laid more. It was concluded that this response occurred in piglets castrated at any age from day one of life, indicating that they were able to perceive the pain.

When the subjects, handled for ear notching, were immediately handled for castration, they attempted to escape. This behaviour in pain-inflicted piglets may be due to aversive sensing as part of protective action.

Piglets with combined performance of ear notching and castration showed pain related behaviours such as startle reaction; tail

twitching, straightened tail and they wandered less. These behaviours were observed around 30 minutes after the procedures and were not appreciable after 24 hours. Present results are in accordance with Houpt (1998). He has reported that normal pigs do not wander and their tail positioned straight indicated fright or distress.

Control group piglets with no treatment were observed to be nosing, mouthing, biting, chewing or rooting the substrates. This is in tune with reports of Houpt (1998) in piglets. It was reported that piglets in confined environment explored by rooting, mouthing, biting or chewing.

b. Scores in eight weeks old piglets

Castrated group (T_7) had shown lower behaviour scores and differed significantly ($p < 0.05$) with the sham-castrated group (T_6) during the treatment. In fourth time segment, castrated group scored high in behaviour and differed significantly ($p < 0.05$) from the sham-castrated group.

Piglets handled for castration, showed increased attempts to escape. They trembled and twitched their tail frequently during handling. Equivocal responses were reported by Ewing *et al.* (1999). They have suggested that enlightened design criteria increased the ease of animal handling and understanding the animal behaviour in confinement could enhance safety of animals and its handlers.

Castrated piglets depicted reduced attempts to escape, reduced tail twitching but increased time in ventral recumbency, after 30 minutes of castration. The intensity of these behaviours declined after 24 hours. This may be due to the performance of castration by experienced personnel. Findings of Hay *et al.* (2003) confirmed that castration of piglets without anaesthetics induced pain. It was also reported that tail wagging existed for two days

TABLE 1: Stressors and mean behaviour scores in piglets of different ages during four time segments

Treatments	Time segment			
	First	Second	Third	Fourth
One-week of age				
T1A	43.33 ± 5.58	43.33 ± 5.58 ^a	43.33 ± 5.58 ^a	43.33 ± 5.58 ^a
T2	40.00 ± 5.16	90.00 ± 10.95 ^b	50.00 ± 6.83 ^a	50.00 ± 5.77 ^a
T3	40.00 ± 2.58	123.33 ± 6.14 ^b	101.67 ± 16.00 ^b	50.00 ± 7.30 ^a
T4	40.00 ± 3.65	103.33 ± 7.15 ^b	51.67 ± 5.42 ^a	55.00 ± 5.63 ^a
T5	40.00 ± 2.58	90.00 ± 12.90 ^b	133.33 ± 9.89 ^b	145.00 ± 10.24 ^b
T8	40.00 ± 3.65	102.27 ± 9.50 ^b	53.00 ± 9.18 ^a	55.00 ± 6.19 ^a
T9	36.66 ± 5.58	106.67 ± 14.29 ^b	123.33 ± 6.66 ^b	148.33 ± 7.03 ^b
Eight-weeks of age				
T1B	46.67 ± 6.66	46.67 ± 6.66 ^a	46.67 ± 6.66 ^a	46.67 ± 6.66 ^a
T6	48.00 ± 1.67	91.66 ± 17.59 ^a	80.00 ± 3.65 ^b	58.33 ± 6.00 ^a
T7	43.33 ± 5.58	85.00 ± 7.19 ^b	126.67 ± 13.33 ^b	120.00 ± 5.16 ^b

Note: Means bearing different superscripts within the same column differ significantly ($P < 0.05$)

First time segment : 30 minutes before the treatment

Second time segment : During the treatment

Third time segment : 30 minutes after the treatment

Fourth time segment : 24 hours after the treatment

after castration and behaviour responses were exacerbated during the first few hours following castration. The results of Wemelsfelder *et al.* (2000) are in agreement with the present findings. They believed that spontaneous qualitative assessment of behaviour provided empirical access to behavioural expressions associated with welfare of animals.

c. Age interaction

Assessment of effect of age on stress is given in the Table 1. In the treatment groups of sham-castration, groups of eight week olds; attained higher behaviour scores and differed significantly ($p < 0.05$) from one-week-old groups.

Piglets castrated at one week of age were observed to be in ventral recumbency and with startle reaction, after 30 minutes of the treatment. This indicated perception of pain due to castration at younger age. Subjects castrated at eight weeks of age showed rooting, nosing and mouthing the substrates after 30 minutes and 24 hours of treatment. The difference in age and the ability to withstand stress may be the possible reasons for the difference observed in the present study. Present

results are in accordance with the findings of Van *et al.* (2002). According to them, time; test situation and individual difference, determined the animal's behavioural reaction. Observations of Thronton and Pearson (2002) are not in agreement with the present findings. The difference in the species and strain may be a possible reason for this difference. Bataille *et al.* (2002) suggested that clipping of the temporary incisors and docking should be carried out as routine practices in pigs, only when vice of tail biting and damage occurred.

CONCLUSION

In behavioural observation, control group piglets with no treatment were observed to be nosing, mouthing, biting, chewing or rooting the substrates. One-week-old piglets during the handling for ear notching, attempted to escape, twitched their tail and defecated. During ear notching, the animals trembled, twitched their tail, urinated and attempted to escape more appreciably than handled for the same. In piglets handled for castration, trembling, startle reaction (typical porcine reaction, with a 'woof and freezing' posture) were noticed, during handling. At the time of

castration, piglets showed reduced attempts to escape and decreased tail-twitching activity. When the subjects handled for ear notching were immediately handled for castration, they attempted to escape. Piglets subjected to combined performance of ear notching and castration showed pain related behaviours such as startle reaction, tail twitching, straightened tail and they wandered less. Eight-week-old ones, handled for castration, showed increased attempts to escape, trembled and twitched their tail frequently during handling. Castrated piglets depicted reduced attempts to escape, reduced tail twitching and also increased time spent on ventral recumbency, after 30 minutes of castration. Piglets castrated at one week of age were observed to be in ventral recumbency and exhibited startle reaction, after 30 minutes of the treatment. Subjects castrated at eight weeks of age were observed to be nosing and mouthing the substrates after 30 minutes and 24 hours of the treatment. Individual performance of ear notching and castration was less stressful. Performance of ear notching at one week and castration at eight weeks of age is beneficial.

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