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Prostaglandin F2α Induced Nest Building Behavior in the Non-Pregnant Sow, and Some Welfare Considerations

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Nest building behavior, induced with intramuscular injections of prostaglandin F2α (PGF2α), was studied in non-pregnant sows. Acute effects, which included salivation, scratching, vomiting, defaecation and ataxia, were also recorded. Sows (Large White x Landrace) were housed in two different environments; six sows in bare pens and six sows in pens provided with bedding material. In all cases except one (bare pen) nest building sequences of differing intensities were recorded. Welfare suggestions include questioning the justification of using a drug (PGF2α) in pig husbandry, which has unpleasant acute effects, and the suggestion that the provision of bedding material is not necessary for a nest building sequence to occur.

Introduction

Nests are important to the sow ready to farrow. Feral pigs show a reduction in movement about one month prior to farrowing and tend to restrict their activities to around the farrowing nest (Kurz and Marchinton, 1972). These nests are shallow pits made by sows and are lined with bedding material (Hanson and Karstad, 1959; Kurz and Marchinton, 1972), to provide shelter for the sow and her new born pigs. The nests of the Australian feral pigs reported by Pullar (1950) were large (6-8 ft in diameter) and well camouflaged, consisting of interlaced branches, fern fronds and grass.

Domestic pigs will attempt to build a nest with whatever material is available but concrete floors and farrowing crates prevent much of the nest building behavior, although many of the motor elements are still present (Signoret, Baldwin, Fraser and Hafez, 1975).

Nest Building Behavior

Several phases of nest building can be distinguished in the wild pig after she has selected a suitable place (Frädrich, 1974). With her snout she digs a hollow about the same length as her body. She then collects dry grass, leaves and small sticks to line the nest. This material is evenly distributed over the hollow by rooting and moving in a circle. Leaves and grass lying outside the nest are brought in by pawing with the front legs. These actions may be repeated several times so that the completed nest is of several layers and may become one meter high. As the sow uses the heap it becomes flatter and assumes a round or oval form.

In domestic pigs, Jones (1966), described efforts to begin preparing a nest during the 24 hours before parturition. During the 6 hours before parturition nest building activity increased and the sows made vigorous pawing movements of each foreleg working alternately. This appeared to distribute the bedding to the animal's liking. Often the sows would move the bedding from one position to another. Periods of nest building alternated with quiet intervals until 60 to 15 minutes before the birth of the first pig, when the sows lay quietly on their sides.

The use of prostaglandin (PG) F2α for induction of farrowing in the sow is used in intensive piggery management (Diehl and Day, 1974), and it is known that PGF2α causes an immediate increase in prolactin levels in the sow (Taverne *et al.*, 1978/79). Maternal behavior patterns (such as nest building and retrieval of young) in young virgin rats have been induced by the administration of prolactin (Riddle *et al.*, 1935).

Preliminary work showed that PGF2α injections induced nest building behavior in non-pregnant sows (Blackshaw and Smith, 1982). Boars also responded to PGF2α by displaying elements of copulatory behavior but with no signs of nesting behavior (Blackshaw, J. and Blackshaw, A., 1982).

The present study was undertaken to study in detail the acute behavioral effects of PGF2α on the non-pregnant sow and the resulting nest building behavior. Welfare implications were also considered for the housing of sows in a bare environment or in an area supplied with bedding material.

Materials and Methods

The non-pregnant sows (Large White x Landrace) were in two groups. One group of sows (6) were housed in the intensive, 55 sow, Specific Pathogen Free piggery at the Veterinary Science Farm, University of Queensland, Australia, in bare pens (2.0 m x 1.5 m). The other group of sows (6) was penned (3.5 m x 1.4 m) at the University's Large Animal Clinic, and supplied with straw or shredded paper. All floor surfaces were concrete.

Each sow was injected intramuscularly with PGF2α (Lutalyse, Upjohn) using 10 mg/100 kg, on four occasions following a control injection (buffer and solvent) one hour before. Injections were made during lactation (1-2 days before weaning) the post-weaning oestrus, the subsequent luteal phase (11-13 days post oestrus) and the second oestrus (21 days). Observations were recorded for 45 minutes after both control and test injections. Acute effects and nest building activity were recorded in detail.

Results

Prostaglandin F2α caused behavioral changes in both groups of non-pregnant sows, which were not observed after control injections. The acute effects included salivation, chewing movements, scratching with a hind leg, rubbing on the wire pen side, vomiting, defaecation and ataxia.

Nest building behavior included snout rubbing on the floor, straw or paper gathering if available, pawing and walking in circles. The acute and nest building behaviors are defined in Table 1.

The onset of the acute behaviors after PGF2α injection was between 1-15 minutes. Table 2 shows the frequency of acute behaviors in both groups of sows and also the time of onset after injection.

All sows in both groups salivated and made chewing movements; they also scratched with their back legs, rubbed against the pen wire, defaecated and displayed ataxia. Vomiting was restricted to 2 pigs in the piggery and 5 in the clinic.

Nest building behavior was induced in all 6 sows provided with bedding material, and in 5 sows in the piggery. This behavior began 19-38 minutes after injection.

A complete nest building sequence of a sow in a bare environment included:

a) walking around the pen,

b) vigorously snout rubbing on the floor in a confined area,

c) pawing with front legs in that area,

d) circling again and snout rubbing,

e) lying down on one side in that area.

TABLE 1 Definitions of Acute and Nest Building Behaviors After Prostaglandin F2α Injection into Non-pregnant Sows.

Behavior	Definition
Acute	
Salivation	Saliva drips from mouth.
Chewing movement	Pig opens and shuts mouth 2-4 times. May or may not be accompanied by salivation.
Scratch	Pig uses either back leg to reach its side and/or belly area.
Rub	Pig stands beside wire of pen and rubs side, face or rump area up and down.
Ataxia	Pig becomes very staggery in the back legs.
Nest Building	
Snout rubbing	The top of the snout is rubbed against the floor as though pushing straw into a pile. If straw is provided the snout is used to make a pile. It is distinct from floor feeding where the bottom lip is extended and used to gather food from the floor.
Straw or paper collecting	Pig may collect bedding in its mouth and carry it to a desired place.
Pawing	The front legs are used alternately in a rapid up and down movement along the floor in front of the pig (2 to many times $>$ 10).
Circling	The pig walks in a circle in the nesting area which may be bare or contain a straw or paper nest.
Nest building	The complete activity includes snout rubbing, pawing, straw collecting, circling. Some pigs may not show all these elements.

TABLE 2 Acute Behavioral Responses of Sows After PGF2α (10 mg/100 kg) Injection. Each of the Sows in the Two Groups Was Tested on 4 Occasions over 21 Days.

	Frequency		
Behavior	Clinic **environment**	Piggery **environment**	Onset after PGF2α **(minutes)**
Salivation	24 (6)*	24 (6)	1— 8
Chewing movement	24 (6)	24 (6)	1— 8
Scratching	24 (6)	24 (6)	3— 9
Rubbing	24 (6)	24 (6)	3— 5
Vomiting	20 (5)	8 (2)	4— 6
Defaecation	24 (6)	24 (6)	2—14
Ataxia	24 (6)	24 (6)	2— 7

*Number of pigs showing behavior

These activities were performed for 1-10 minutes, but not all pigs showed all nest building behaviors after each injection. Snout rubbing and pawing occurred in 70 percent of the observations and imitate the nest building phases described by Frädrich (1974).

Pigs in the environment provided with bedding material showed similar behavior except they collected the material in their mouths or pushed it up together with their snouts, to make a nest. One pig consistently made a very large nest 0.5 m x 1.5 m and 15-20 cm high. Another pig although supplied with nesting material with which it played, made an "imaginary" nest like the pigs in the bare environment.

Another feature of the nest building behavior was its intensity (Table 3). This is a subjective measurement which was recorded during observation. Very active snout rubbing and pawing was scored as intense (3); less active, as medium (2); and in cases where the behavior was performed once, this was recorded as weak (1).

From Table 3 it is seen that 3 of the 5 sows showing nest building activities in the bare environment and 5 of the 6 sows in the environment with bedding, showed intense behavior during lactation (post weaning). Two of the 5 nest building sows in the bare environment showed intense building behavior during the second oestrus, and 4 of the 6 sows provided with bedding showed similar behavior. Table 3 also indicates the individual differences in nest building behavior of non-pregnant sows.

Discussion

This study shows nest building activity can be induced by PGF2α injection in non-pregnant sows housed in bare pens or supplied with bedding material. In both environments nest building behavior was similar, and followed the pattern of behavior seen in wild pigs (Frädrich, 1974) and in domestic pigs preparing a nest during the 24 hours before parturition (Jones, 1966).

TABLE 3 Intensity of Nest Building Behavior in Non-pregnant Sows in a Bare Environment, and in an Environment Supplied With Bedding Material, After PGF2α Injection.

	PGF2α administration (10 mg/100 kg)			
Pig	**1-2 days before weaning**	**Post weaning oestrus**	**Luteal phase (11-13 days post oestrus)**	**Second oestrus (21 days)**
Bare Environment				
1	3	1	1	1
2	1	1	2	3
3	No building			
4	1	1	1	2
5	3	3	1	3
6	3	1	1	1
Bedding Supplied				
1	3	1	1	2
2	3	2	1	3
3	3	2	1	1
4	3	2	2	3
5	1	1	2	3
6	3	1	3	3

Intensity of Nest Building
3 — intense (vigorous snout rubbing and pawing)
2 — medium (less active snout rubbing and pawing)
1 — weak (snout rubbing and pawing performed once)

There is a growing awareness of animal welfare as it affects pig production. Emphasis is placed on the provision of an environment which will satisfy the behavioral needs of intensively housed pigs. Farrowing crates without bedding may seem unsuitable for sows but this study suggests that sows will carry out nest building sequences even without bedding material. It is interesting that one sow in the pen provided with bedding material did not use the material but built an "imaginary" nest, while performing the nest building sequences. The main requirement which can be suggested for sows just before parturition is that they have enough space to perform the various nest building behaviors.

During lactation, prolactin plays an important role, and levels of plasma prolactin are elevated at the beginning of an oestrous cycle and towards the end (Hughes and Varley, 1980). The added prolactin release caused by PGF2α administration may be responsible for the differences in nest building intensity over the oestrous cycle.

The acute effects of PGF2α on the sow also raises the question of its suitability as a drug to induce farrowing. It is easy to ignore these effects if the end result is achieved. If the welfare of the animal is considered seriously it is important to look at all aspects of drug therapy.

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Animals Rights—Animal Souls?

Veterinarian L.T. Keenan of Pomona, New York, writing in the **Journal of the American Veterinary Medical Association** (Vol. 183, July 1, 1983, p. 10) states that he is "tired of being an 'animal doctor.' I want to become a 'real doctor.' This can only be achieved if animals are believed to have souls and the same basic rights as our fellow human beings. Only then can I justify to clients large money outlays for reconstructions, repairs, or treatment modalities. It would help my professional status if an Animal Bill of Rights were to be proposed and eventually made into the law of the land....The sooner this is accomplished, the better it will be for me, my fellow veterinarians, and our fellow animals."