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Sexual behaviour patterns of crossbred LWY boars under varying mating systems

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Abstract
The present study was conducted on 18 crossbred Large White Yorkshire (LWY) gilts and sows, mated with suitable boars, to evaluate the impact of different mating frequencies on breeding behaviour. The animals were randomly assigned to three equal groups (N=6 per group): Group I, II, and III, which were subjected to single, double, and triple mating, respectively, during each estrus period. Boars were observed for both pre-coital and coital behavioural activities under each mating regimen. The most frequently observed pre-coital behaviours were nosing (1.78±0.11) and nudging (1.97±0.09). Notably, specific pre-coital behaviours such as sniffing (1.83±0.17), head-to-head interaction (1.60±0.24), and genital sniffing (1.67±0.21) were significantly (p<0.05) more frequent in Group I compared to Group III (1.23±0.11, 1.00±0.12, and 1.21±0.11, respectively). Other behavioural parameters did not show significant differences among the groups. The average mount duration was 11.26±0.27 minutes, while the average intromission duration was 10.42±0.28 minutes, with no significant variation observed across the three groups.

Keywords: Crossbred LWY boars, Crossbred LWY gilts and sows, mating frequencies, sexual behaviour

Introduction
Among livestock species, pigs hold a significant position, particularly as they are commonly reared by socio-economically disadvantaged communities. Compared to other livestock, pigs offer faster economic returns to farmers due to their inherent advantages such as high fecundity, efficient feed conversion, early maturity, and short generation intervals. Reproductive management in swine is crucial, as it directly influences productivity and the rate of stock multiplication. In commercial pig breeding operations, profitability is closely linked to reproductive efficiency.

Common mating systems practiced in organized pig farms include pen mating, hand mating, and artificial insemination. Although artificial insemination is allowed, natural mating is often preferred (Kongsted and Hermansen, 2008) [1]. Natural mating can be conducted at varying frequencies once, twice, or three times during estrus. Several researchers have examined the influence of mating frequency on reproductive outcomes (Domaski, 1966; Miljak et al., 1969; Tilton and Cole, 1982; Flowers and Alhusen, 1992; Xue et al., 1998a; Attupuram, 2012) [2-7]. Reproductive efficiency and behaviour may also differ between gilts and sows and can vary depending on geographical and environmental factors (Dan and Summers, 1996) [8].

Given that the sexual behaviour of boars during mating plays a critical role in the reproductive success of gilts and sows, the present study was undertaken to assess the effect of different mating frequencies on sexual behavioural expression in crossbred LWY boars, using an outdoor hand-mating protocol.

Materials and Methods
The present research was carried out using a stock of gilts and sows maintained at the Livestock Farm Complex, NTR College of Veterinary Science, Gannavaram, and a local farm located in Simhadripuram, Andhra Pradesh, India.

General Management of Experimental Animals

A total of 18 crossbred Large White Yorkshire (LWY) sows and gilts were used in the study. The animals were selected based on age and body weight, and were evenly distributed into experimental groups to ensure uniformity. Six crossbred LWY boars, with an average age of 20.5±0.5 months, were chosen for mating. Mating was conducted randomly under an outdoor hand-mating system, with varying mating frequencies, and the behavioural observations were recorded using closed-circuit cameras. All female animals were maintained in a group housing system, with two animals per pen, while boars were housed individually throughout the study period. Feeding management was kept identical for all the experimental animals. Hand mating system was followed where the oestrus gilt/sow was brought to the boar's pen as per the laid down breeding plan of the farm. Uniform management practices, including cleaning, sanitation, disinfection, and healthcare measures, were maintained for all animals throughout the experimental period. Skilled personnel were employed to handle the mating procedures, under the supervision of trained staff.

Experimental Design

The crossbred LWY gilts and sows were randomly assigned to three groups, ensuring uniformity in age and body weight across groups. A total of 18 animals were mated with selected boars based on mating frequency. Group I (G I) consisted of six gilts/sows mated once during a single estrus period. Group II (G II) animals (N=6) were mated twice, while Group III (G III) animals (N=6) were mated three times during the same estrus period. Boars were selected randomly for mating, and their pre-coital and coital behavioural patterns were recorded.

Behavioural Parameters Recorded

Observations were made for a 20-minute mating session following the introduction of the gilt or sow into the boar's pen. The frequency and duration of various sexual behaviours exhibited by the boars were recorded. Key male sexual behavioural activities observed included sniffing, biting, champing, licking, nuzzling, nudging, tail biting, sniffing of genitalia, dribbling of urine, and mounting attempts. Besides, the males were subjected to recording of reaction time, mounting time and total mating time and total duration of intromission. Along with mounting efficiency, durations such as refractory period, mount duration, and duration of intromission were also estimated. Refractory period was estimated by noting the time taken to mount again after the end of a successful mount. Total mount duration was the sum of duration of successful mounts achieved in a mating session and total duration of intromission was the duration of intromission happened throughout the mating session. Mounting efficiency was taken as, the number of successful mounts per number of mounting attempts and multiplied with 100 to get percentage.

Results and Discussion

- **Male Sexual Behavioural Activities:** The bout frequencies of male sexual behavioural activities were categorized into pre-coital, coital, and post-coital phases. The mean±SE values for the frequency of these behaviours in crossbred Large White Yorkshire (LWY) boars are presented in Table 1.
- **Pre-Coital Behaviour:** The overall mean±SE bout frequencies of various pre-coital sexual behaviours were as follows: sniffing (1.46±0.08), biting (1.19±0.07), champing (1.20±0.08), licking (1.32±0.10), nosing/ nuzzling (1.78±0.11), nudging (1.97±0.09), head-to-head interaction (1.18±0.09), caressing ears (1.00±0.00), sniffing genitalia (1.28±0.08), tail biting (1.00±0.00), playful/teasing behaviour (1.00±0.00), aggression (1.00±0.00), dribbling of urine (1.28±0.08), non-specific exploration (1.00±0.00), and chin resting (1.04±0.04). Among these, nudging (Figure 1) and nosing (Figure 2) were the most frequently exhibited behaviours.
- These findings align with Tanida et al. (1991), who noted that nosing plays a critical role in inducing the sow's standing reflex, and with Attupuram et al. (2022) [10, 7], who also reported nudging and nosing as dominant behaviours.
- No significant differences (p>0.05) in most pre-coital behaviours were found between groups. However, sniffing (Figure 3), sniffing genitalia (Figure 4), and head-to-head interaction (Figure 5) were significantly (p<0.05) higher in Group I compared to Groups II and III.
- **Coital Behaviour:** The mean values for coital behaviours are shown in Table 1. There was no significant difference in the number of successful mounts across the groups. On average, 1.00±0.00 successful mounts (Figure 6) occurred after 1.36±0.08 mount attempts (Figure 7) during the 20-minute mating sessions. This results in a mounting efficiency (successful mounts ÷ total attempts × 100) of approximately 73%, comparable to Attupuram (2012) [7], who reported 76% in crossbred (L×D) gilts.
- No significant differences (p>0.05) were observed in mount attempts or efficiency among groups. The relatively high efficiency in the current study contrasts with the < 10% efficiency reported by Tanida et al. (1989) [11], likely due to methodological differences. In their study, animals were housed together and observed over a 72-hour period. In contrast, our study involved targeted observation for 20 minutes post-estrus detection, consistent with Hafez and Signoret (1969) [12], who recommended a focused behavioural observation window of 20 minutes to capture intensive mating behaviour.
- **Post-Coital Behaviour:** Post-coital behavioural bout frequencies were also recorded: sniffing (1.31±0.08), biting (1.09±0.06), champing (1.48±0.09), nosing (1.50±0.08), nudging (1.52±0.11), head-to-head interaction (1.09±0.06), caressing ears (1.00±0.00), and circling the partner (1.11±0.08). No significant differences (p>0.05) were observed between the groups. Nudging and champing were the most frequently exhibited post-coital behaviours, differing from Tanida et al. (1991) [9] and Attupuram et al. (2012) [7], who found nosing to be the predominant behaviour post-mating.

Table 1: Mean (±SE) Frequency of sexual behavioural activities in crossbred LWY Boars

Activity	G I	G II	G III	Overall Mean
Pre-Coital Sexual Behaviour				
Sniffing	1.83±0.17[a] (6)	1.58±0.15[ab] (12)	1.23±0.11[b] (17)	1.46±0.08 (35)
Biting	1.33±0.21 (6)	1.10±0.10 (10)	1.20±0.10 (15)	1.19±0.07 (31)
Champing	1.00±0.00 (5)	1.14±0.14 (7)	1.33±0.14 (12)	1.20±0.08 (24)
Licking	1.67±0.33 (6)	1.33±0.14 (12)	1.15±0.10 (13)	1.32±0.10 (31)
Nuzzling/Nosing	2.16±0.31 (6)	1.83±0.17 (12)	1.61±0.14 (18)	1.78±0.11 (36)
Nudging	2.33±0.21 (6)	1.91±0.15 (12)	1.89±0.14 (18)	1.97±0.09 (36)
Head to head	1.60±0.24[a] (5)	1.20±0.13[ab] (10)	1.00±0.12[b] (12)	1.18±0.09 (27)
Caressing ears	1.00±0.00 (2)	1.00±0.00 (3)	1.00±0.00 (4)	1.00±0.00 (9)
Sniffing genitalia	1.67±0.21[a] (6)	1.17±0.11[c] (12)	1.21±0.11[b] (14)	1.28±0.08 (32)
Tail biting	1.00±0.00 (2)	1.00±0.00 (3)	1.00±0.00 (3)	1.00±0.00 (8)
Teasing / Playful	1.00±0.00 (3)	1.00±0.00 (2)	1.00±0.00 (4)	1.00±0.00 (9)
Aggression	1.00±0.00 (2)	1.00±0.00 (3)	1.00±0.00 (3)	1.00±0.00 (8)
Dribbling of urine	1.20±0.20 (5)	1.45±0.16 (11)	1.15±0.10 (13)	1.28±0.08 (29)
Non-specific exploration	1.00±0.00 (2)	1.00±0.00 (2)	1.00±0.00 (4)	1.00±0.00 (8)
Resting of chin	1.16±0.16 (6)	1.00±0.00 (7)	1.00±0.00 (9)	1.04±0.04 (22)
Coital sexual behaviour				
Mounting attempts	1.33±0.21 (6)	1.42±0.15 (12)	1.33±0.11 (18)	1.36±0.08 (36)
Successful mounting	1.00±0.00 (6)	1.00±0.00 (12)	1.00±0.00 (18)	1.00±0.00 (36)
Post-coital sexual behaviour				
Sniffing	1.33±0.21 (6)	1.36±0.15 (11)	1.27±0.12 (15)	1.31±0.08 (32)
Biting	1.20±0.20 (5)	1.11±0.11 (9)	1.00±0.00 (7)	1.09±0.06 (21)
Champing	1.40±0.24 (5)	1.58±0.19 (12)	1.43±0.12 (16)	1.48±0.09 (33)
Nuzzling/Nosing	1.83±0.17 (6)	1.50±0.15 (12)	1.35±0.13 (14)	1.50±0.08 (32)
Nudging	1.50±0.22 (6)	1.75±0.22 (12)	1.37±0.12 (16)	1.52±0.11 (34)
Head to head	1.20±0.20 (5)	1.12±0.12 (8)	1.00±0.00 (8)	1.09±0.06 (21)
Caressing ears	1.00±0.00 (2)	1.00±0.00 (3)	1.00±0.00 (3)	1.00±0.00 (8)
Circling the partner	1.00±0.00 (5)	1.29±0.18 (7)	1.00±0.00 (5)	1.11±0.08 (17)

Fig 1: Nudging Behaviour of Crossbred LWY Boar

Fig 2: Nosing Behaviour of Crossbred LWY Boar

Fig 3: Sniffing Behaviour of Crossbred LWY Boar

Fig 4: Sniffing of Genitalia by Crossbred LWY Boar

Fig 5: Head to Head Interaction of Crossbred LWY Boar and Sow

Fig 6: Successful Mounting by Crossbred LWY Boar

Fig 7: Mounting Attempt by Crossbred LWY Boar

Conclusion

Among the various pre-coital behaviours observed in crossbred LWY boars, nosing (1.78±0.11) and nudging (1.97±0.09) were the most frequent. Significant differences (p<0.05) were noted for sniffing, head-to-head interaction, and sniffing genitalia, which were higher in Group I compared to Group III. However, no significant differences (p>0.05) were observed in the overall pre-coital behavioural frequencies among the three groups. Each mating session, lasting 20 minutes, resulted on average in 1.00±0.00 successful mounts from 1.36±0.08 mount attempts, yielding a 73% mounting efficiency. This efficiency was notably higher than previously reported by Tanida et al. (1989) [11]. In the post-coital phase, nudging (1.52±0.11) and champing (1.50±0.08) were the most commonly observed behaviours, though no significant differences were found between groups. Different mating frequencies had a significant (p<0.05) effect on a few pre-coital behaviours, such as sniffing, head-to-head interaction, and sniffing genitalia, but overall behavioural expressions and reproductive performance remained largely consistent across all three mating regimens.

Conflict of Interest

Not available

Financial Support

Not available

Reference

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