

Sexual behaviour in female pigs

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Abstract

This paper reviews the influence of social mechanisms on oestrus and sexual motivation in pigs. The social relations between the animals and the signals they send out can inhibit as well as encourage their social motivation. Social stimuli from both boars and other sows in oestrus tend to induce and synchronise oestrus and ovulation amongst sows. The courting behaviour of boars is also facilitated by social stimuli from other boars. However, when sows are kept under conditions where the social pressure is high, e.g. due to limited space and/or resources, the social stress experienced by particularly the subordinate individuals may inhibit sexual motivation during oestrus. To a large extent this effect seems to be mediated via specific fear reactions towards dominant individuals of sows that have lost many aggressive encounters. For example, fear reduces the sexual motivation during mating and during sexual interactions amongst sows within a group, and fear may thus inhibit their chances of reproductive success. Similarly, fear of humans caused by innate fearfulness or negative handling procedures reduces sexual motivation in the presence of the human handler even when sows are in standing oestrus.

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Free-living domestic pigs and wild boars form matriarchal family groups consisting of 1–4 sows with piglets depending on the supply of resources. Normally a well-established linear hierarchy dominated by the oldest sow is seen (Gundlach, 1968; Kaminski et al., 2005). When the males reach sexual maturity, they leave the group to form small groups of boars and later on they become solitary animals. Only in the mating season, which in wild boars is during the early winter months (Mauget, 1982), will the boars be in contact with the females (Gundlach, 1968). In contrast, domestic pigs have no marked seasonal variation in the occurrence of oestrus and, thus, often have more than one litter a year.

When sows approach oestrus, a marked increase in social activities is seen both when the sows are kept under semi-natural conditions (Babu et al., 2004) and when housed in female groups under production conditions (Nath et al., 1983; Pedersen et al., 1993; Pedersen, 1998; Signoret, 1971). These include snout contacts between sows, ano-genital sniffing, flank nosing and

female–female mounting. In the same period, the sows will approach the boar more and more often, and during oestrus they will spend much time in standing posture outside the boar pen (Babu et al., 2004; Nath et al., 1983; Pedersen, 1998; Signoret, 1971). Pedersen (1998) made 24 h sampling of the occurrence of all the social activity during the days around pro-oestrus and oestrus in three groups of sows, each of which consisted of 9 sows housed in large straw bedded pens (9 m × 6 m) and with access to one feeding stall per sow (voluntary cubicle). A gradual increase in mounting, nosing and standing close to the boar pen was seen from 2–3 days before standing oestrus (Fig. 1). For several days, some sows were observed to mount other sows more than 40 times per 24-h period. The sow performing the mounting was always in pro-oestrus or in oestrus. The activity was observed throughout the 24 h, thus the normal resting period at night was completely broken (Fig. 2). The function of these behavioural elements is presumably to attract the attention of the boar and to stimulate sexual activity in the male, as demonstrated in goats (Billings and Katz, 1999; Shearer and Katz, 2006). This part of the sexual behaviour is termed the appetitive part (also called the proceptive behaviour), and it differs from the consummatory part of the sexual behaviour that is characterised

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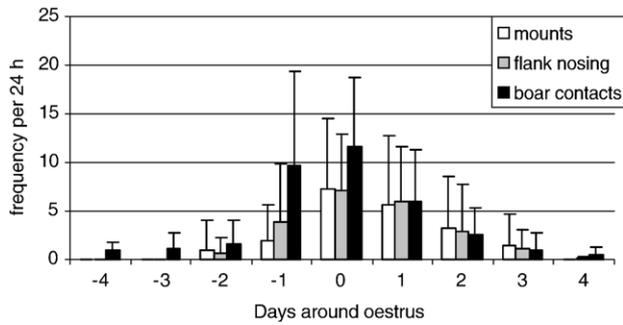


Fig. 1. The frequency per sow per day of mounting attempts, flank nosing towards other sows as well as the frequency of standing close to boar pen in 3 groups of 9 sows housed in straw bedded pens measuring 9 m × 6 m (modified after Pedersen, 1998).

by triggering standing posture and mounting (also called the receptive behaviour) (Beach, 1976).

When the boar is attracted to the group of females, he starts to court the sows. During the initial stage of courting, boars do not distinguish between sows in oestrus and sows not in oestrus, and consequently they court all the sows equally (Signoret, 1971). Thus, the sows' proceptive behaviour and their reaction to the boar's courtship are decisive for whether the boar will continue to mount and copulate or not (Signoret, 1971). The most important signal for mounting seems to be the sow's standing posture (Signoret, 1971).

The expression of sexual behaviour in pigs is controlled mainly by oestrogen secreted from the growing follicles (Ford, 1982, 1985). When the piglets are weaned from the sow the secretion of lactational hormones decreases, a sequence of neuroendocrine signals is initiated that simultaneously controls the onset of behavioural oestrus and ovulation. Ovulation takes place between 20–50 h after the onset of standing oestrus—i.e. approximately 2/3 into oestrus (Mburu et al., 1996; Nissen et al., 1997; Soede et al., 1992). A schematic drawing of the timing of hormonal and behavioural events around oestrus is shown in Fig. 3. To obtain good conception, it is important that the sperm cells are present in the female reproductive tract at ovulation because the fertility of the egg is quickly reduced (after approximately 4 h) (Hunter, 1982). Sperm cells remain

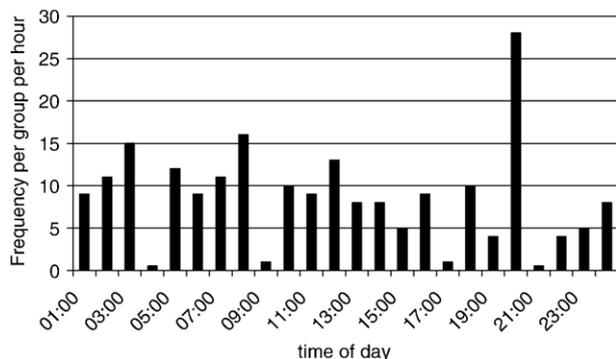


Fig. 2. The combined frequency of flank nosing and mounts per hour during day 5 after weaning (the day when most sows were in standing oestrus) in a group of 9 sows housed in a 9 m × 6 m straw bedded pen (modified after Pedersen, 1998).

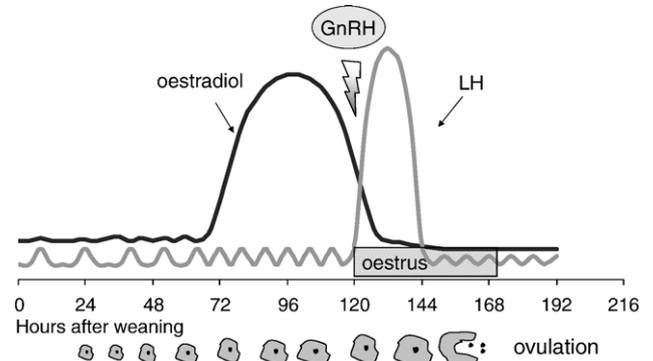


Fig. 3. Schematic drawing of the timing of ovulation with the hormonal and behavioural events taking place during the days around oestrus. The timing is shown in relation to the time of weaning of the piglets (hours after weaning=0) which under production condition takes place approximately 4 weeks after birth.

fertile slightly longer (approximately 24 h) (Rodríguez-Martínez, 2001). If mating takes place in early oestrus, the sperm cells may be inactive by the time of ovulation, especially if the oestrus period is long, and ovulation is consequently delayed. Thus, the timing between behaviour and ovulation is critical for successful reproduction.

Social stimulation of oestrus

Studies on the time relation between initiation of oestrus behaviour and ovulation have mainly been carried out using sows kept in individual pens (Mburu et al., 1996; Nissen et al., 1997; Soede et al., 1992). Therefore, the knowledge of how the social relations between the animals affect this timing is limited. Turner et al. (1998a,b) showed that daily physical contact with a boar shortened the length of the oestrus cycle. They compared two methods to stimulate oestrus, (1) imitation of the boar's physical courtship behaviour by a human (nudging the flank, side and the ano-genital region, back pressure) and (2) introduction of a boar. Both procedures were carried out daily for 5 min starting 14 days before expected oestrus. The study showed a significant activation of the HPA-axis in relation to boar introduction, which was not seen when a human imitated the boar's stimulation. The cortisol response was normalised within 60–90 min after introduction of the boar. Although the introduction of a boar did appear to be stressful to the sow, based on the cortisol response, the study also showed that (1) the oestrus cycle was shorter, and (2) more eggs were shed (though it resulted in the same number of fetuses on day 21) when the sows had daily contact with the boar. This indicates that short-term stress induced by the introduction of a boar may stimulate early oestrus (Turner et al., 1998a,b).

Another study indicates that oestrus may also be socially induced in other ways than by means of a boar. Pearce and Pearce (1992) compared the synchronisation and duration of oestrus in sows subjected to different social stimuli. The study included a control treatment consisting of sow kept in a stable groups without any physical contact with unknown sows and three experimental treatments where groups were subjected daily to either (a) physical contact with an ovariectomised sow,

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