

# PIGS

## VISION AND OTHER SPECIAL SENSES

Pigs have colour vision and a panoramic range of about 310°, and binocular vision of 35–50°. It is thought they have no accommodation (i.e., they cannot focus). Pigs are inquisitive and this must be remembered when moving them. If they are not hurried and can explore as they go along, they can be driven without effort. The extent to which pigs have colour vision is still a source of some debate. However, the presence of rods and cones with two distinct wavelength sensitivities in the blue and green frequencies (Lomas et al., 1998) suggests that at least some colour vision is present.

Pigs have a well-developed sense of smell and use is made of this in Europe where they locate underground truffles. Hearing is also well developed and localisation of sounds is made by moving the head. Olfactory rather than visual stimuli are used in the identification of conspecifics (Haupt, 1998).

Pigs learn quickly to manipulate food and water devices, to turn fans on and off (Ingram and Legge, 1970) and to turn on a source of radiant heat (Ingram et al., 1975).

Auditory stimuli are used extensively by pigs as a means of communication in all social activities (Gonyou, 2001). Alarm or aversive stimuli are transmitted to conspecifics not only by auditory cues but also via pheromones (Vieuille-Thomas and Signoret, 1992).

## SOCIAL ORGANISATION, DOMINANCE HIERARCHIES AND LEADERSHIP

The basis of the social structure in feral pigs is the matriarchal herd of several females and their offspring (Kurz and Marchington, 1972). Males are not permanently associated with such herds, and are often solitary or in bachelor groups.

In the domestic situation pigs may be kept together with littermates throughout their lives or be grouped with strange pigs of similar age and size. There are two types of social organisation in the domestic pig (Signoret et al., 1975):

- a. Teat order;
- b. Dominance hierarchy.

**Teat order.** Within the first few hours to two weeks after farrowing, the piglets become capable of recognising their positions on the udder and preferentially attach themselves to anterior rather than posterior teats. This was shown in the early work of Donald (1973a, 1973b) and confirmed by many later workers (Hemsworth et al., 1976). It has been shown that stimulation of the anterior teats appeared to be important in causing milk let-down (Fraser, 1973) so it might be to the advantage of the entire litter to have these teats occupied by healthy piglets. The teat order may function as a type of territorial spacing system which, in turn, means a stable family life with minimum competition.

Most fights that occur in young piglets are around the udder (Hartstock and Graves, 1976) and more fights were won at the permanent nursing site than away from

it. They called this the 'home-court advantage' and found that fighting declined as the nursing order was established.

Using an artificial sow to rear groups of piglets, Jeppesen (1982) suggested that recognition of a teat in a particular area of the udder depended on visual orientation by means of reference points on the udder to find the area, and then the olfactory sense is used for the search within that area.

**Dominance hierarchy.** This is the social organisation established in groups of weaned pigs. When a number of unacquainted pigs are mixed together for the first time, they fight to establish a dominance hierarchy, usually of a simple linear type. The fighting behaviour is generally mouth-to-neck attacks with strong thrusts sideways and upwards (McBride et al., 1964).

The establishment of the hierarchy occurs within 24 hours of mixing but the level of aggression drops dramatically after about one hour (Symoens and Van Den Brande, 1969). The dominance hierarchy is important as the social rank appears to influence productivity. It has been shown by some workers (Bielharz and Cox, 1967; McBride et al., 1964) that social rank influences growth, while others (Meese and Ewbank, 1973a) found that weight was not correlated with dominance or sex. The dominance hierarchy is important as a group stabiliser, but under adverse, intensive conditions, animals low on the hierarchy may be disadvantaged by lack of food and water.

The top-ranking pig can be removed from the group for up to 25 days and on return will still retain its position, but only if the social group it left was stable (Otten et al., 1997). A pig at the bottom of the hierarchy is treated as a stranger and attacked when returned after three days (Ewbank and Meese, 1971). Pigs probably recognise each other by sight and smell.

It is an advantage in a husbandry system to have a stable social organisation so that the pigs can settle down and grow and it may be that a system of 'birth-to-slaughter-weight-in-one-pen', in which pigs remain members of the same unchanged social group from birth to slaughter, is a way to reduce disturbances (Ewbank, 1978; Sainsbury D. and Sainsbury, P., 1979).

**Huddling behaviour.** Pigs are very susceptible to hot conditions and the rate of sweating is very low, so there is inadequate thermoregulatory compensation by respiratory evaporative loss. In the feral state, pigs seek shade and wallow in mud or water and become more active at night (Mount, 1979). Young pigs are sensitive to cold and a behavioural feature retained through a pig's life is the stimulus to huddle with littermates (Mount, 1979). Nest-building activity in the natural state provides shelter from environmental extremes.

**Leadership.** The work of Meese and Ewbank (1973b) showed no clear relationship between leadership, exploratory behaviour or social rank in groups of pigs in an outdoor area.

Dominant pre-weaned piglets have higher growth

rates than subordinates due to suckling the more anterior teats (which secrete the most milk and have the lowest incidence of mastitis), allowing their dominance to be maintained through to post-weaning (Dyck et al., 1987).

Agonistic behaviour among piglets will decrease if they are regrouped during lactation rather than post-weaning (Olsson and Samuelsson, 1993).

Instability of the dominance hierarchy increases with stocking density, thus increasing stress and aggression. This appears to depress the immune system and thus heighten the herd's susceptibility to disease (Turner et al., 2000).

Grouping pigs by weight heterogeneously rather than homogeneously, as is the current practice, may increase growth rate and reduce hierarchical conflict by allowing clear weight differentiation among littermates (Francis et al., 1996).

Odour masking, by methods such as creating a familiar odour on all pigs, masking the odour of unfamiliar pigs, and the use of pheromones and/or artificial compounds, has had little, if any, effect in limiting aggression and increasing hierarchical stability (Gonyou, 1997).

Isolation from a social group is very stressful for pigs and may result in stereotypies or attempts to escape (Gonyou, 2001).

## SEXUAL BEHAVIOUR

Courtship behaviour lasts only a short time when a boar is placed in a small pen with an oestrous female. The sow plays the critical role of meeting sexual partners as boars show equal choice between an oestrous and an anoestrous sow. The male sniffs the female, noses sides, flanks and vulva, and emits a 'mating song' of soft guttural grunts (6–8 seconds). He foams at the mouth and moves his jaw from side to side as the female poses and bites the male's ears gently. When the sow becomes stationary the boar mounts. Androstenone within boar saliva aids in eliciting the standing response in the sow (Gonyou, 2001). Some sows are more attractive to boars than others and occasionally a sow may avoid and refuse to stand for a specific boar. Rearing females in isolation from males delays the standing response of the females once they are introduced to boars (Soede and Schouten, 1991).

Pheromones in boar saliva and preputial secretions induce oestrus in gilts and sows (this is known as the boar effect) (Pearce et al., 1988).

The presence of stimuli from boars (namely odour) will induce earlier puberty in gilts than if no other stimuli were present (Hemsworth et al., 1988).

Because an oestrous sow will stand near the boar (Bressers et al., 1991), penning breeding females adjacent to a boar makes identification of oestrous sows easy.

The social environment that boars have been raised in influences their levels of sexual activity (Hemsworth et al., 1977). Boars that are raised individually with no visual contact with immature females, but who can hear and smell the females, have reduced copulation frequency and shorter average duration of ejaculation

compared to those raised in all-male or male-female groups. Boars that engage in more courting activity, especially nosing of the sow's flanks before mating, have higher conception rates (Hemsworth et al., 1978). This study suggested that extra flank-nosing might stimulate oxytocin release from the sow's pituitary gland and this could increase sperm transport and the number of sperm in the oviduct and so increase the chances of fertilisation.

Dominant boars cover the markings of subordinate animals with urine that is often contaminated with preputial secretions (Mayer and Brisbin, 1986).

## MATERNAL–OFFSPRING BEHAVIOUR

In a paddock the sow will nest-build for up to six hours before parturition. She hollows out a depression and lines it with straw, grass, sticks, or other available material. While farrowing crates in intensive piggeries prevent much of this nest-building behaviour, many elements are still present and the sow will often perform similar activities to those of pigs provided with nesting material (Blackshaw J. and Blackshaw, A., 1982).

Pigs of lower social status tend to produce litters with piglets that are lighter in weight (Mendl et al., 1992).

Dominant sows give birth to more male piglets than do subordinate ones (Mendl et al., 1995).

Compared to other mammals, pigs display complex nursing and suckling behaviour (Fraser, 1980; Signoret et al., 1975). Nursing is frequent, every 50–60 minutes, and the sow requires stimulation from piglets before milk let-down. Sensory inputs (vocalisation, odours from mammary and birth fluids and hair patterns of the sow) are particularly important immediately post-birth to facilitate teat location by the piglets (Rohde Parfet and Gonyou, 1991).

Initially, the piglets jostle for position at the udder, then each piglet massages around its respective teat with its snout, during which time the sow grunts at slow, regular intervals. Each series of grunts varies in frequency, tone and magnitude, indicating the stages of nursing to the piglets (Algers, 1993). The phase of competition for teats and of nosing the udder, lasts for about one minute, and ends when milk flow begins. In the third phase, the piglets hold the teats in their mouths and suck with slow mouth movements (one per second), and the rate of the sow's grunting increases and lasts about 20 seconds. The grunt peak in the third phase of suckling does not coincide with milk ejection but rather the release of oxytocin from the pituitary into the bloodstream (Castren et al., 1989). Phase four coincides with the period of main milk flow (10–20 seconds' duration) when the piglets suddenly draw back slightly from the udder and start sucking with rapid mouth movements of about three per second. The sow grunts rapidly, lower in tone and often in quick runs of three or four, during this phase. Finally, the flow stops and so does the grunting of the sow and the piglets may dart from teat to teat and recommence suckling with slow movements, or nosing the udder.

Piglets massage and suckle the sow's teats after milk flow ceases as a way of letting the sow know their

nutritional status. This helps her to regulate the amount of milk released from that teat in future sucklings. The more intense the post-feed massaging of a teat, the greater the future milk release from that teat will be (Jensen, Gustafsson and Augustsson, 1998).

It is often hard to tell if the nursing episode is initiated by the sow or the piglets and almost any disturbance causes the piglets to rise, squeal and then nurse. The sound of one litter nursing may initiate nursing among other litters. Fostering piglets from one litter to another is often carried out in the pig industry and it is recognised that sows may react aggressively to foster piglets and that suckling periods are disrupted. Horrell and Bennett (1981) exchanged three piglets between five pairs of litters at seven days of age after the teat order had been established. Compared with control litters, cross-fostering disrupted the teat order relationships of the whole litter. Weight gain of fostered piglets during the second week was reduced to 79% of that in their non-fostered littermates. If fostering has to be done, it has more chance of success if the piglets are only one to three or four days old. Cross-fostering of piglets should be undertaken before teat order is established and involve movement of larger piglets rather than small ones to minimise teat order disruption and associated mortality and production losses (Gonyou, 2001).

In the natural environment, farrowing nests are built at least 100 m from the communal nest to improve piglet survival (Jensen, 1989).

PGF<sub>2a</sub> appears to be the hormonal regulator of nest-building behaviours such as nosing, rooting and pawing to create a depression, as well as the gathering of straw to line the nest (Burne, Murfitt and Johnston, 2001).

By the time piglets are 6 days old, they have begun to follow their mother (Stangel and Jensen, 1991).

Recognition between the sow and her piglets is by olfactory and vocal cues (Jensen and Redbo, 1987).

Without human interference, weaning is finished by the time the piglets are about 17 weeks old, but it may begin as early as 4 weeks of age when the mother begins to reduce her nursing efforts (Jensen and Recen, 1989).

## **ABNORMAL BEHAVIOUR**

Abnormal behaviours often found in pig units include:

1. Tail and ear biting (Blackshaw, 1981);
2. Cannibalism;
3. Reproductive behaviour problems such as abnormal mating behaviour and abnormal maternal behaviour;
4. Eating too much or too little; dominance relationships

that prevent some animals from having access to food and water;

5. Abnormal dunging habits;

6. Persistent inguinal nose thrusting (PINT) (Blackshaw, 1981). PINT is defined as occurring when a pig repeatedly thrusts its nose into the inguinal area of a resting pig with the top of its snout, until the recipient pig moves. It is a behaviour pattern of high-ranking pigs, although other pigs do it;

7. Various stereotypies, which are repeated actions with no goal direction, have been described (Fraser, 1975) in tethered sows when not provided with straw;

8. Snout rubbing, when pigs rub their snouts on the flanks of other pigs causing necrosed areas (Allison, 1976).

These behavioural problems are easy to see and tell us something about the mental well-being of the animals. However, we do not know if animals experience emotional feelings in the same way as humans. Perhaps, the important thing to recognise is that these abnormal behaviours tell us that all is not well in the husbandry system.

A deficiency in iron may contribute to the incidence of tail biting (Fraser, 1987), but other factors have since been ranked as being of greater importance.

The incidence of cannibalism such as tail and ear biting has exceeded 10% of pigs in some studies (Arey, 1991).

Stereotypies may increase in prevalence through a piggery via social facilitation (Appleby, Lawrence and Illius, 1989).

Some stereotypies, such as ear sucking and biting, may be associated with low levels of fibre in the diet (Meunier-Salaün, Edwards and Robert, 2001).

Belly nosing/snout rubbing by piglets does not appear to be related to stress, diet quality or the presence of milk in the diet but is somehow related to the age at weaning (Gardner, Duncan and Widowski, 2001).

Abnormal behaviours, such as tail and ear biting, stereotypies and belly nosing, may be redirected rooting or nosing behaviour caused by barren commercial environments (Beattie, Walker and Sneddon, 1996).

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