

Group housing of sows in small pens: Advantages, disadvantages and recent research



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Introduction

Public perceptions, particularly misconceptions, of animal husbandry practices, can negatively impact the swine industry. Increased awareness of modern agricultural practices has raised concerns over their impact on food safety, the environment, and animal welfare. Recent activities by retailers, such as fast food restaurants and supermarket chains, as well as animal rights organizations, have increased pressure on various sectors of the agricultural industry to address controversial practices that may affect food safety, the environment, and animal welfare.

Presently, one of the most controversial issues of conventional pig production is the individual housing of gestating sows. In Europe, 70% of gestating sows are individually housed (Hendricks et al., 1998). In Australia and New Zealand, 63 and 50% of sows are housed individually (Patterson et al., 1997; Gregory and Devine, 1999). In the USA, Barnett et al. (2001) estimated that 60-70% of sows are housed in stalls throughout gestation.

Although conventional gestation stalls allow for easy management, and individual feeding, they are perceived by the public to negatively impact sow welfare (Washington Post, 2001). In gestation stalls, sows are prevented from performing many of the behavior patterns that pigs would perform in more natural or less restricted conditions resulting in a negative impact on sow welfare.

The issue of sow housing and other welfare issues have been investigated by animal welfare scientist for many years (see SVC 1997 and Barnett et al., 2001 for excellent reviews. Concerns over animal welfare combined with European based scientific data have led to gestation stalls being phased out in several European countries, and from 2013 the use of stalls will be restricted throughout the European Union. This action has increased pressure on the US swine industry and animal scientists to consider the advantages and disadvantages of the alternatives to gestation stalls.

Advantages of group housing

There are clear advantages for animal welfare when sows are housed in groups (SVC, 1997). Housing sows in groups provides sows with

- more room to move and exercise

- more control over their environment
- more opportunity for normal social interactions

Sows in groups are reported to have improved cardiovascular fitness (Marchant et al., 1997), improved muscle weight and bone strength (Marchant and Broom, 1996), decreased morbidity (Tillon and Madec, 1984) and less abnormal behavior (Broom 1983)

Disadvantages of group housing

Although there are clear animal welfare benefits to group housing, disadvantages also exist (SVC, 1997). These include:

- fighting
- injury
- embryo loss in extreme cases of fighting or as a result of mixing during implantation
- detection of injuries and poor health may be more difficult
- better stockmanship required

Characteristics of small pens for group housing

- Typically 4-12 animals per pen
- Individual feeding stalls are highly recommended
- Provision of laying area with solid floor is desirable
- Slatted floors should be provided for the dunging area
- Ability to lock animals that are being bullied within feeding stall allows for easy management of a difficult situation
- Feeding stalls which sows can close or open by entering and exiting, minimize the harassment, displacement and vulva biting while providing the sow with the option of spending time in isolation or with the group

Advantages of small pens

- Simultaneous individual feeding
- Ease of conversion from existing gestation stall facilities
- Ease of management compared to large groups
- Groups are relatively stable compared to large dynamic groups which should minimize sow aggression

Sow Aggression

Group housing is not without animal welfare concerns and sow aggression leading to injury is particularly problematic. Although group housing permits freedom of movement and increased social contact, the initial group formation often results in aggression between sows (Edwards 1992). Aggression is a natural behavior that is required to establish a dominance hierarchy, but may result in serious injuries (Lynch et al., 1984).

In addition to mixing, social stress leading to aggression can occur when stable groups are altered. This occurs commonly in the swine industry, when non-pregnant sows are removed from the group. The aggression that occurs during the initial mixing or when group composition is altered can result in decreased production, physical injury (which may lead to infection and food safety concerns), and a clear negative impact on an animal's welfare. Aggression can also impact the welfare of subordinate individuals within the group over the longer term, if system design is inadequate and animals are not able to isolate themselves.

The issue of sow aggression highlights one of the main advantages of small groups. In general small groups can be relatively stable in comparison with larger groups composed of sows at various stages of gestation. These large, dynamic, groups present producers with significant challenges with regards to sow aggression associated with the formation of stable social relationships.

Sow aggression is not limited to group housing. Sows kept in stalls often show aggressive behavior towards their neighbors (Barnett et al., 1987). In fact the aggression between stalled sows has been reported to escalate to a high level more often than in group-housed animals (Broom et al., 1995). Such aggressive interactions in confined sows will not normally result in injury but do involve fear and frustration which can impact sow productivity and welfare.

Behavior during farrowing

A significant amount of the discussion over gestation housing focuses on the welfare of the sow specifically during gestation. However, gestation housing can clearly effect the behavior and welfare of sows during farrowing and lactation. Improved bone strength and muscle tone as a result of group housing can be beneficial to sows during farrowing. However, gilts accustomed to freedom of movement during gestation, are reported to find farrowing crates to be more stressful than sows housed in stalls during gestation (Lawrence et al., 1994). Furthermore, gilts that experience close confinement for the first time when moved to farrowing crates are more stressed than gilts housed in crates during gestation (Beattie et al., 1995; Harris and Gonyou, 1998; Boyle et al, 2000). In contrast to Marchant and Broom (1993), Boyle (2002) reported that sows loose housed during gestation changed postures more during parturition and early lactation suggesting a negative effect on sow welfare in farrowing crates. Increased movement during parturition increases the probability of piglets being crushed (Thoberg et al., 1999) and has been association with aggression towards piglets (Harris et al, 2000). In fact, increased savaging of piglets has been reported for sow housed in groups during gestation compared to stalls (Beattie et al., 1995).

Recent Research

Few published North American studies on the effects of gestation housing exist, and evaluation is complicated by the lack of direct comparisons under controlled conditions.

Our recent research compared gilts housed for one parity in conventional stalls or small groups of 4. All conditions, except for housing type, were identical for the two systems.

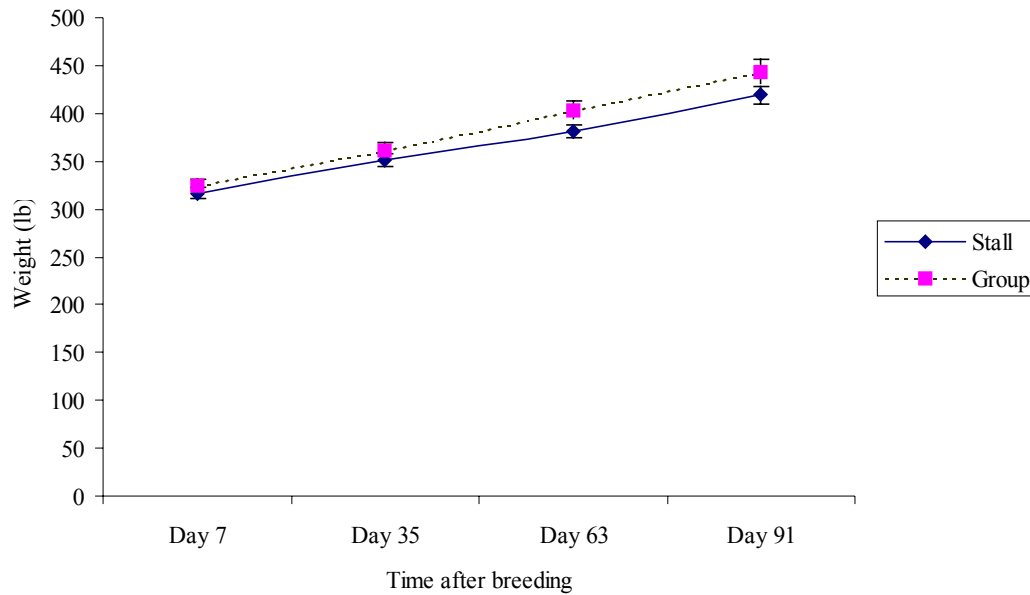


Figure 1. Weights on d 7 to d 91 after breeding for pregnant gilts housed in stalls and groups.

There was no overall effect of housing on the amount of weight that gilts gained during gestation, although sows in groups gained on average 20% more weight during pregnancy (Fig. 1). There were no differences in backfat measurement between gilts housed in stalls and those housed in groups on any of the four measurement days

There was no significant difference in skin health between gilts allocated to groups and stalls at the time of transfer to gestation. From d 21 after breeding (2 wk after entry to gestation housing) to d 91 after breeding, body skin health was consistently poorer in group-housed than stall-housed gilts. Fig. 2 shows differences between skin health scores for the six body regions on d 91.

We also examined a number of physiological measures (Sorrells et al, 2000). There were no significant differences in hematocrit, lymphocyte, or AGP concentrations (Table 1).

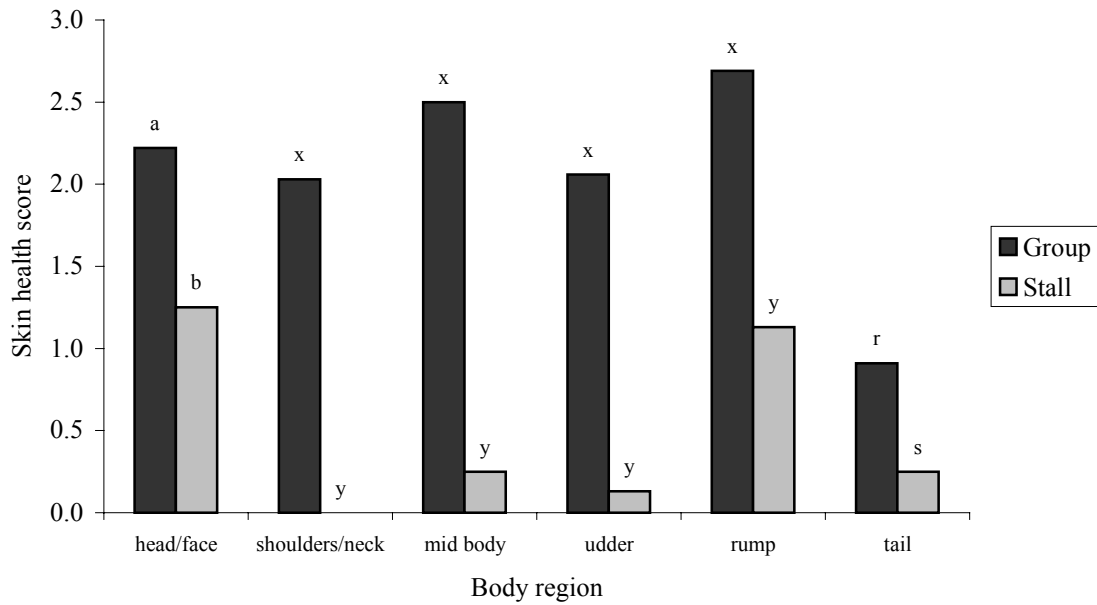


Figure 2 Skin health scores (head and body) for group and stall-housed gilts on d 91 after breeding.

Table 1. Blood parameters for gilts housed in groups of 4 or individual stalls (Sorrells et al., 2000).

Variable		Stalls		Groups		Level of significance
		Time	n*	mean	n**	
Hematocrit	1	16	40.4	8	41.5	> .10
(%PCV)	2	13	40.3	8	40.9	> .10
	3	14	38.7	8	40.6	> .10
Granulocyte	1	16	9.29	8	9.20	> .10
(x10 ⁹ /L)	2	13	8.80	8	8.79	> .10
	3	14	10.7	8	11.3	< .003 Time
Lymphocytes	1	16	6.08	8	6.16	> .10
(x10 ⁹ /L)	2	13	5.81	8	5.66	> .10
	3	14	5.70	8	5.19	> .10
Fibrinogen	1	16	0.32	8	0.32	> .10
(g/dL)	2	13	0.26	8	0.30	> .10
	3	14	0.38	8	0.40	< .002 Time
∇ ₁ -acid Glycoprotein	1	16	467	8	379	> .10
(ug/ml)	2	13	406	8	435	> .10
	3	14	460	8	426	> .10
Haptoglobin	1	16	1433	8	1308	< .06 Trt.
(ug/ml)	2	13	1617	8	1297	< .06 Trt.
	3	14	1824	8	1724	< .002 Time

* value indicates number of individuals tested

** value indicates number of groups of four tested

Group housed and stall housed sows did differ significantly in the occurrence of stereotypic behavior, with sows in stalls performing more stereotypies than sows in groups (Figure 3).

These results indicate no difference in production between gilts housed during their first pregnancy in stalls or small groups. Group-housed females had more scratches, cuts and wounds on their head, face and body than did those housed in stalls. Although some of these lesions were a result of aggression between group members, injuries may also have been caused by individuals being stepped on, or contact with sharp pen fittings. These accidental wounds may also have contributed to the higher lesion scores for group-housed females' feet and legs. While higher feet and leg lesion scores did translate into higher average lameness scores for grouped females, this difference was not significant.

We found no differences in production, reproductive performance or behavioral time budget, although group-housed gilts had poorer skin health and higher lameness scores at the end of gestation but performed fewer stereotypies (Harris et al., 2002).

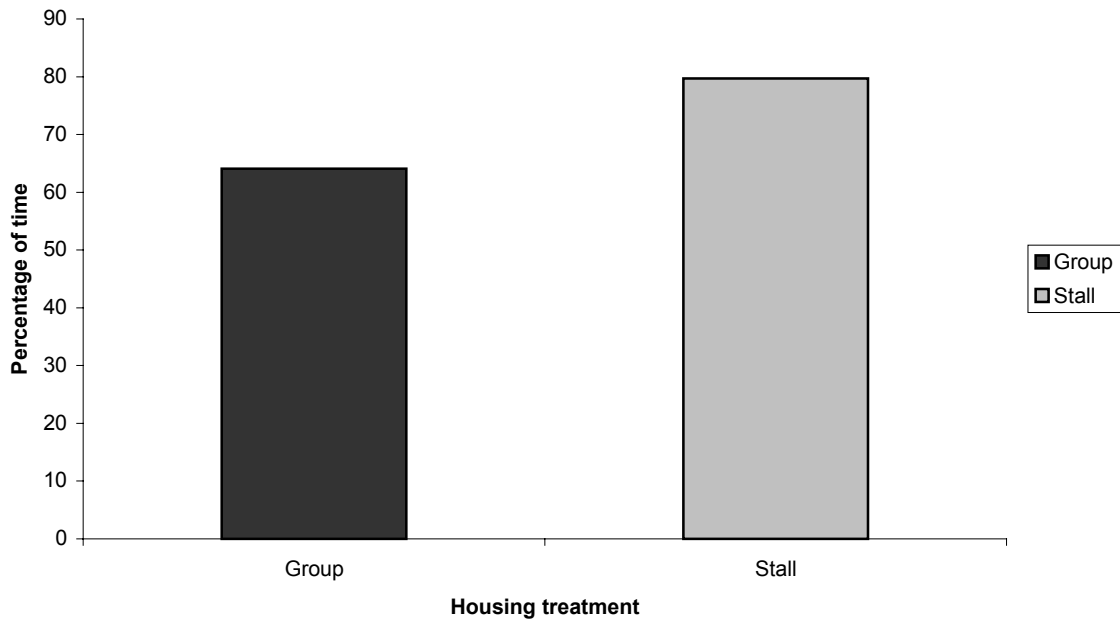


Figure 3. Percentage of time spent performing repetitive oral/nasal/behavioral behaviors (stereotypies) during a 2 hour period after consuming feed, by gilts housed in groups of four and gestation stalls

Future Research

Although substantial research on sow housing has been done, there are numerous issues that still need to be addressed. For example, it is clear that different genetic lines respond differently to various environments and stressors (Pajor et al., 2000, Torrey et al., 2000). It is probable that different genetic lines of swine will vary in their performance in different types of housing systems. Despite the importance of different genetic lines to the swine industry research in this area is seriously lacking. Research on sow aggression, or social development is required. Initially, this needs to be done at a fundamental level followed by applied research. This will ensure that new management practices or housing systems are based on scientific evidence and a thorough understanding of the issue. Finally, research and education in the area of human-animal interaction and stockmanship is required. Interactions between stockpeople and their animals can limit the productivity and welfare of livestock (Hemsworth and Coleman, 1998). For example, studies in pigs indicate that high fear of humans through a chronic stress response, can limit growth and reproduction (Hemsworth and Coleman, 1998). Intervention studies in the pig industry have demonstrated that education material targeting the attitude and behaviors of the stockpeople can have a direct effect on animal fear and productivity. Additional research development and implementation of these training programs is needed.

Much of the previous research has taken the form of comparing one housing system with another. Many studies comparing housing systems are difficult to interpret since they fail to use adequate scientific controls and/or a multi-disciplinary approach to investigating the impact on animal welfare (for a review see Rushen and De Passille, 1992). Although there is some value in continuing this approach, perhaps most notably in the area of economics where comparative data or even the models to initiate comparative studies between housing systems seem absent, in general, the comparative approach is limited due to the lack of adequate controls. In lieu of comparative studies, there needs to be a shift in research priorities towards solving the management challenges of alternative housing for gestating sows, be they real or perceived.

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