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SUMMARY

To the average consumer, a pound of bacon looks much the same as it did 50 years ago. But the hog farms that produce that bacon bear little resemblance to the small-scale, family operations of yesteryear. Now, hog farms are large, intensive businesses holding thousands of pigs in conditions that might shock today’s consumers. One of the most controversial and disturbing developments of modern hog farming is the emergence of the sow stall.

Sow stalls are 1.2 square metres (approx.) metal-barred cages designed to keep labour costs low by isolating female pigs and thus reducing the need to manage problems such as aggression and competition for food. They are also used to increase sows’ pregnancy rates and litter sizes. Sows are kept in stalls for up to five years.

The extreme restriction of space prevents the sows from engaging in even the most basic natural behaviours, such as rooting, or even turning around. They are also denied more complex behaviours such as building communal nests or forming social bonds — activities pigs naturally engage in if given adequate space. The psychological effects of the confinement include stress, increased aggression and mental suffering. Evidence of stereotypes — repetitive movements serving no function, such as bar biting — point to such suffering. As one scientist puts it, stereotypes can indicate the animal is “being driven insane.”

Worse still, the use of sow stalls leads to a range of physical injuries and ailments. These include joint damage, urinary tract infections, lameness, bone weakness and muscle atrophy. Not surprisingly, the sows’ general fitness is diminished, indicated by higher basal heart rates, less muscle and lower mobility compared to sows in freer environments.

These conditions, though demonstrably compromising the sows’ well being, are considered acceptable under the Recommended codes of practice, a set of voluntary standards for the keeping of farm animals in Canada. Despite the availability of viable alternative (and more humane) systems, Canada continues to use stalls. This contrasts sharply with policy in several other places that have banned, or are planning to ban, sow stalls. In 2013, sow stalls will be banned throughout the entire European Union.

This report, reviewing available scientific literature on the subject, sheds light on a practice that many Canadians would find abhorrent. It makes a strong case for changing an inhumane system and following the lead of other places toward more compassionate treatment of pigs raised for food.
INTRODUCTION

Farming has changed dramatically in Canada over the past 50 years. Historically, farms were self-sufficient and diverse, with small numbers of animals relative to land area. Animals spent most of their time intermingling with others while roaming and foraging for food. On modern farms, large numbers of animals are contained within a small area (known as "intensive agriculture" or "factory farming"), with greater productivity and efficiency taking precedence over animal welfare. Due to the specialization of farming practices, most farms raise a single species. Hog farming, specifically, has increased levels of:

- Sores from rubbing against metal bars (Anil et al., 1994)
- Urinary infections (O'Brien, 1997)
- Frustration (Broom et al., 1995)
- Access to bedding, rooting or nesting material (Matthews and Ladewig, 1994)

Sow stalls are concrete-floored, rectangular, metal-barred cages measuring on average 0.6 metres wide by 2.0 metres long (BC Ministry of Agriculture, Food and Fisheries, p.1), giving each sow approximately 1.2 square metres of space. According to the Recommended code of practice for the care and handling of farm animals: Pigs. (Agriculture and Agri-Food Canada, 1993) "the length of a holding unit should allow a centrally positioned pig at least enough room to move forward and backward, and lie down unhindered by a raised trough or rear gate."

This means that a sow should be able to stand up, sit or lie down and move a few steps forwards or backwards. Approximately 75% of sows raised in Canada are raised in stalls (Manitoba Pork Council and Sask Pork, 2004).

At around one year of age, sows are placed in stalls and kept there for between three and five years. They are artificially impregnated and remain in these stalls until just before giving birth (parturition), when they are transferred to farrowing crates. Once the piglets are weaned, the sow is re-impregnated and returned to the stall (Rollin, 1995). The purpose of sow stalls is to increase the farming intensity, pregnancy rate and litter size, while decreasing the human labour costs and to mitigate the problems associated with sow agression (Weaver and Morris, 2004) and competition for feed (BC Ministry of Agriculture, Food and Fisheries, p.1). However, many animal welfare groups and scientists have criticized sow stalls because they do not provide sows with:

- Adequate space to turn around or to perform many other natural behaviours observed in less restricted environments (Broom, Mendil and Zanella, 1995)
- Access to bedding, rooting or nesting material (Matthews and Ladewig, 1994)

In addition, sows in stalls typically display increased levels of:

- Chronic stress (Barnett et al., 1991)
- Depression (Mendil, Zanella and Broom, 1992)
- Frustration (Broom et al., 1995)
- Urinary infections (O'Brien, 1997)
- Sores from rubbing against metal bars (Anil et al, 2003)
- Foot injuries (Anil et al, 2002; Marchant and Broom, 1996)

Ironically, many of the studies cited to support the use of sow stalls are also used to condemn them. Fraser (2003) suggests this may be a result of the differences in the motivation, philosopher and/or values of the researcher interpreting the studies. Duncan and Fraser (1997) also suggest differences in approaches to studying animal welfare could play a factor.

The purpose of this report is to examine the use and applicability of sow stalls in Canada through a review of the current scientific and industry literature. The focus of this paper is on animal welfare and excludes economic or political motivation.


In 2013, stalls will be banned for the entire European Union.

Due to the industrialization of farming, pigs, like other intensively farmed animals, are bred for maximum production. Sows are specifically selected for maximum weight and back length (Whittemore, 1994). With these larger bodies however, the act of standing up or lying down has consequently become more difficult (Marchant and Broom, 1996). In stalls, where space is already limited, larger body sizes cause an overall reduction in usable space, making it even more difficult or, in some cases, impossible to move (Marchant and Broom, 1996). For sows, limitations on movement lead to stress (Barnett et al, 1991) and injury (Anil et al, 2003).

SPACE LIMITATIONS

Despite their reputation for being dirty and lazy, pigs are actually very clean and have a wide range of natural behaviours. Although they may spend a large portion of their day resting, given unlimited space, pigs will forage, root, build nests and, if they are farrowing sows, aggressively protect and take care of their young (Stolba and Wood-Gush, 1989). The location of their various activities will include sunny, shady, wet (marshy/muddy), dusty or grassy areas depending on the needs of the sow. They will have separate dunging and feeding areas as well. But on modern intensive farms, achieving high stocking densities and lower maintenance costs have resulted in sows being housed in stalls with the minimum space required. Confined in stalls, sows are unable to perform many of their natural behaviours (Anil et al, 2002) and therefore Marchant and Broom (1996) concluded that the current system of sow stalling is inadequate.

Additionally, there are few laws in Canada governing the size of stalls. The Recommended code of practice for the care and handling of farm animals: Pigs, the text used by the pork industry to set general husbandry standards, gives voluntary recommendations on stall floor space allowances for sows ranging in size from 100 to 250kg.

Unfortunately, not all sows fit into these guidelines. Whittemore (1994) found that sow sizes have been increasing to over 300kg. Gonyou (2005) pointed out that, as market prices fluctuate, so do the slaughter dates for a sow at the end of her typical four-year production period. This means that some sows will be kept longer than expected and will grow larger than the stall was intended to accommodate. As a result, her space will be even further restricted, and in some cases, she may protrude from the stall.

For sows in stalls, the limitation of space is one of the major causes of injuries observed in the pork industry (Anil et al, 2003).

References

Agriculture and Agri-Food Canada. 1993. Recommended code of practice for the care and handling of farm animals: Pigs. Publication 1898/E.


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Some sow wills be kept longer than expected and will grow larger than the stall was intended to accommodate.
Two of the most convincing indicators of sow well-being on farms are injuries and ailments (Anil et al, 2002). Physical injuries most often observed in confined sows include joint damage (Fredeen and Sather, 1978), external injuries (Anil et al, 2002) and lameness (Marchant and Broom, 1996). Ailments include decreased bone mass (Petersen et al, 1998) and urinary tract infections (Broom et al, 1995).

Because of their lack of movement, sows in stalls tend to have weaker bone structures and greater joint damage in their legs than sows housed in freer environments (Weaver and Morris, 2004; Fredeen and Sather, 1978). When movement is restricted, cartilage within joints tends to thicken, causing pain, which consequently makes movement more difficult and exacerbates the problem (Petersen et al, 1998). The result is even less movement and greater difficulty standing up or lowering their bodies.

External injuries appear consistently on sows in stalls. Most stalls are too small to allow unrestricted standing and lying down and have static designs which do not adjust to the changing spatial needs of movement and growth (Anil et al, 2002; Marchant and Broom, 1996). As a sow’s size increases, the time taken to stand up or lie down also increases as a result of, among other reasons, the compounding spatial restrictions (Marchant and Broom, 1996). This means that sows are forced to rub against the bars while raising or lowering their bodies (Anil et al 2003). In some cases, because of inadequate stall width, larger sows have to put their limbs into adjacent stalls when lying down and are subsequently injured by being stepped on (Anil et al, 2002). Such injuries tend to be observed less in sows housed in outdoor systems with larger amounts of space (Barnett et al, 2001).

The muscles of sows in stalls are affected by the lack of movement (Marchant and Broom, 1996). As with most mammals, lack of use causes muscle atrophy and reduced strength. This, combined with joint damage and weaker bones, leads to secondary injuries that result from sows slipping because of a lack of control standing up or sitting/lying down (Boyle et al, 2002; Marchant and Broom, 1996). These injuries can include abrasions, damaged ligaments, broken bones and bruising.

Flooring in stalls is usually slatted, partially slatted or solid bedded. Marchant and Broom (1996) concluded that these types of flooring might cause lameness in confined sows. O’Brien (1997) also blamed these types of flooring for the increase in urino-genital infections observed in stalled sows. Marchant and Broom (1996) concluded, however, that using a less slippery, warmer and drier flooring substrate such as straw could easily rectify such flooring problems.

Reduced Fitness

Maintaining fitness in any animal requires movement. But for sows in stalls, movement is severely limited. The result is decreased muscular tissue and lower cardiovascular strength (Marchant and Broom, 1996).

To quantify fitness, basal heart rate, mobility and muscle development are often measured. For basal heart rate, a lower rate typically implies better fitness. Sows in stalls, however, tend to have higher basal heart rates compared to sows in freer environments (Marchant et al, 1997). For mobility measurements, the ease and ability to stand up or lie down are usually measured. Sows in stalls typically take significantly longer to perform these tasks compared to group-housed sows (Marchant and Broom, 1996). Muscle development is physically examined and sows in stalls tend to have less muscle, particularly in third and fourth pregnancies (Broom et al, 1995). Interestingly, Marchant...
**CONCLUSION**

Whether sows should be raised in stalls or not is both a scientific and an ethical question (Weaver and Morris, 2004) and therefore interpreting behavioural and physiological measures in terms of animal welfare is extremely controversial. There are great discrepancies over the relative importance of different measures (Broom et al, 1995). For this reason, Broom et al (1995) suggest that any one measure on its own should provide evidence that welfare is poor (Broom et al, 1995).

“While it is not always obvious what causes pain in animals, common sense and the argument from analogy would suggest that, unless it can be proved otherwise, anything that is physically painful for humans must be assumed to be painful to animals” (Weaver and Morris, 2004).

**PUBLIC PRESSURE & INTERNATIONAL/GLOBAL TRENDS**

In recent years, the public has been demanding assurance that animals on farms are treated humanely (Anil et al, 2003). Sow stalls do not meet this demand and many places have banned the use of sow stalls in favour of other, less confining systems such as group housing. Sweden, the United Kingdom and Denmark have already banned stalls. Finland will ban stalls in 2006. The Netherlands and the state of Florida (USA) have bans that will come into place in 2008. In 2013, stalls will be banned throughout the entire European Union.

To assume that simply changing the method of housing will solve all the welfare problems is incorrect. Although Broom et al (1995) found there were more welfare problems for sows housed in stalls than in group housing, they cautioned: for sows in stalls to be effective, sows need a space of 5m by 2.2m or larger. Gonyou (2005) suggested that sows need a space of 5m by 2.2m or larger. Gonyou (2005) suggested group housing to be effective, sows need a space of 5m by 2.2m or larger. Gonyou (2005) suggested that choosing a feeding system that was both suitable to the pigs and easy to understand and operate by the producer was also critically important. Any method of housing requires modification to make it more humane and care must be taken to ensure that changes in housing systems do not improve some aspects of welfare while making others worse (Anil et al, 2003).

But viable alternatives to sow stalls are already available in Canada. In an interview in the February 3rd 2005 edition of the Western Producer, Peter Brooks of the University of Plymouth said:

“There’s no doubt about it: we have got systems which are every bit as good, as cheap to operate, as easy to operate, as cheap to build, as sow stalls.”

As have people in other countries, Canadians must decide what housing system is acceptable.

**PREVENTION OF NATURAL BEHAVIOURS**

When domestic pigs are given sufficient space or raised in wild environments, they behave almost identically to wild pigs (Stolba and Wood-Gush, 1989). This includes having separate dunging and feeding areas, spending significant amounts of time rooting, building communal nests and forming complex social bonds. Sows in stalls are prevented from engaging in these behaviours and, like most animals placed in barren environments, show repetitive and destructive behaviours instead (Weaver and Morris, 2004). These include stereotypies, which are repetitive movements that serve no function other than filling time and are an indication of mental suffering (Webster, 1995; Spedding, 2000). They can also mean an animal is being driven insane (Spedding, 2000). Like most animals kept in captivity, sows in stalls show distinct stereotypic behaviour (Lawrence and Trelouw, 1993).

Using basal heart rate, mobility and muscle development as a measurement for fitness, sows in stalls are generally viewed as having lower physical fitness than sows in other housing systems (Marchant et al, 1997). Broom et al (1995) found that stall-housed sows developed more stereotypies than group-housed sows. The stereotypies tended to be oral movements, with bar biting being the most common (Vieuille-Thomas et al, 1995). Chewing on bars is a sign of a lack of oral satisfaction (Lawrence and Trelouw, 1993), but it can also reflect a lack of environmental stimulation (Whittaker et al, 1998) or inappropriate housing since, unlike other stereotypies, bar biting is not reduced by the addition of straw (Vieuille-Thomas et al, 1995).

The long-term confinement of sows has also led to some modification of the animals’ posture-changing behaviours, as a result of being unable to exercise (Marchant and Broom, 1996). For example, while raising or lowering her body, a sow may interrupt the action several times before completing the task.

**Animals under human care should not be subjected to environments where such coping mechanisms (stereotypies) are required.**

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**Sows in stalls generally find their conditions more aversive than any other housing system.**

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**Sows are kept in stalls for 3 to 5 years. Photo courtesy of Global Action Network.**
Most sows in Canada are on food-restricted diets to prevent excessive weight gain and to maintain lower production costs, yet food restriction may be one of the most significant factors in the development of stereotypies (Terlouw et al, 1991). But it is not the only factor. Stolba and Wood-Gush (1989) found no evidence of stereotypies in food-restricted sows in semi-natural environments, leaving Terlouw and Lawrence (1993) to conclude that food restriction does not function independently of housing condition. The development of stereotypies, therefore, is often the result of a complex interaction among food deprivation, food ingestion and housing (Terlouw and Lawrence, 1993).

Sows have a strong instinct to nest before giving birth and will work very hard to access appropriate bedding material (Mathews and Ladewig, 1994). In stalls, however, sows are unable to build nests, which inevitably leads to stress and frustration and may be a further cause of stereotypies. Correspondingly, group-housed sows have significantly lower incidences of stereotypies than sows in stalls (Vieuille-Thomas et al, 1995).

In their paper titled *Science, pigs, and politics: a New Zealand perspective on the phase-out of sow stalls*, Weaver and Morris (2004) wrote:

“Animals under human care should not be subjected to environments where such coping mechanisms [stereotypies] are required.”

Measuring stress can be difficult since the stress hormone cortisol is released for both physical pain and excitement (Fisher, 1998). Yet even with these limitations, Barnett et al. (1991) concluded that stalls cause sows chronic stress, and Jarvis et al. (2001) concluded the inability to nest while in stalls causes acute stress. Like all animals, pigs feel stress when placed in conditions that are new, limiting or contain unfamiliar sounds, smells or objects. For sows in stalls, space and food limitations, the inability to turn around and the inability to nest are often viewed as the most common causes of stress.

**STRESS**

Another stressor for pigs is the restriction on their ability to stay clean. Despite their association with mud and general uncleanliness, pigs are extremely clean. They even have separate dunging, eating and sleeping areas. One of the signs of discomfort is “dunging and eating in sleeping areas” (Agriculture and Agri-Food Canada, 1993). In stalls, pigs are forced to dung, sleep and eat all in the same area, and this in itself causes some level of stress.

**AGGRESSION**

Being social animals, pigs display varying levels of aggression depending on their environment. Schroder-Peterson and Simonson (2001) concluded that some of the causes for aggression include overcrowding, lack of straw or other bedding materials, lack of environmental enrichment, inappropriate temperatures, inadequate ventilation, hunger, poor nutrition and stress.

Sows in stalls live in confining, barren environments lacking environmental enrichment. It should come as no surprise then that overt and antagonistic aggression is higher in stalls than in freer systems, with aggression tending to escalate because sows can’t use active avoidance strategies (Broom et al., 1995). When space is reduced, incidences of aggression between neighbouring stall-mates cause injuries (Anil et al, 2002) and stress (Broom et al, 1995).

Sows in stalls generally find their conditions more aversive than any other housing system (Broom et al, 1995). As a result, aggression tends to be less of a problem in outdoor-housed sows with large amounts of space (Barnett et al, 2001). However, because sows are not well adapted to interruptions in social hierarchy or the introduction of strangers to a group (Giersing and Andersson, 1998), the mixing of unfamiliar pigs into groups can cause aggression (Turner et al, 2001). This is easily rectified, however, by introducing small groups of pigs into larger groups at a young age, or by providing large areas for escape for less dominant pigs (Turner et al, 2001). Interestingly, when returning from farrowing crates, sows in groups showed lower levels of overt aggression than those in stalls (Broom et al, 1995). This may be a result of becoming accustomed to other pigs during their pre-farrowing period.