

### COMPASSION Food Business

## DRY SOWS The business case for a cage-free transition



We are witnessing a global transition away from caged production for multiple farmed animal species, driven by increasing consumer demand, legislative reform and corporate policies. This document outlines the case for companies to commit to ending the use of sow stalls and implement sow stall-free sourcing. Business considerations, animal health and welfare, consumer and farmer attitudes, product quality, and environmental impact are considered.

#### **Definitions of terms (EFSA, 2022)**

'Sow': a female pig after the first farrowing.

'Gilt': a female pig after puberty and before farrowing, reared to replace sows in the breeding herd.

'Dry pregnant sow': also referred to as breeding sow, a sow from weaning her piglets to the perinatal period / farrowing.

'Sow stall': also referred to as 'gestation crate'. Individual housing in stalls, from service and the observation period, throughout gestation, to when the sow is moved to farrowing accommodation – usually one week prior to farrowing.

Throughout this document, 'sow stall free' refers to the period from immediately after weaning (for sows, or upon entering service for gilts) to one week prior to farrowing and includes service and the observation period (confirmation of pregnancy). Sows are permitted to be confined for insemination for a maximum of 4 hours.

Dry pregnant sows and gilts, from entering service, throughout gestation until one week prior to farrowing, will be synonymously termed 'dry sows'. Individual housing, sow stalls and gestation crates will be synonymously termed 'sow stalls' or just 'stalls'.



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### 1. BUSINESS

#### **1.1. Global production and legislation for dry sows**

#### **Production systems**

There are approximately 80 million breeding sows globally<sup>1</sup>. The main housing system for dry sows are individual crates called sow stalls<sup>2</sup>; in these stalls, sows are unable to walk, turn around and rest comfortably. Sow stalls are mainly used for management purposes, allowing for individual feeding, artificial insemination and pregnancy checks, and to reduce aggression between sows. The length of time that sows can spend in stalls will vary dependent on the country's legislation (see Table 1). Sows enter the service phase where they are inseminated either artificially or with a boar. Sows are usually kept in stalls for service and can remain in stalls until pregnancy is confirmed (i.e. the observation period, around 4 weeks). If pregnancy is not confirmed, sows may remain in stalls until they have returned to heat (ovulation) and can be served again. If pregnancy is confirmed, sows may be moved to group housing or remain in stalls throughout their gestation period. If sow stalls are permitted for the whole of gestation, sows will spend around 108 days out of the average 150-day production cycle in sow stalls, which equates to ~77% of their productive life. One week before farrowing, sows will then move into farrowing crates for the duration of farrowing and

lactation, until weaning when they are moved back into sow stalls, meaning sows may spend their entire productive life in stalls and crates. CIWF estimates that 88% of sows worldwide are kept in caged systems (farrowing crates and/or sow stalls).

#### Legislation

Some countries have banned the use of sow stalls during the entire gestation / dry period (e.g. the UK, Sweden, Norway, Switzerland and two US states), while others have partial bans in place (e.g. sow stalls are prohibited in the EU after the first 4 weeks of gestation; see Table 1 and Appendix A for more details). In the US, 60% of dry sows are housed in stalls, while the remaining 40% are now group housed in pens during part of the gestation period<sup>3</sup> (most are grouped after confirmation of pregnancy, i.e. after 28-35 days on average<sup>4</sup>, but can be up to six weeks after service under state law - see Table 1). Australia has implemented a voluntary industry phaseout of sow stalls, with >90% of the industry using sow stalls for a maximum of 5 days post service.

#### **TABLE 1** Summary of complete, partial or proposed legislation regarding the use of sow stalls.

Countries	prohibiting	sow sta	alle
Countries	promoting	2011 210	1112

Complete ban (inclusive of the observation period)	
Partial ban (number of days / weeks post-service permitted in stalls)	
Proposed ban	

Following the successful European Citizen's Initiative "End the Cage Age" signed by 1.4 million European citizens, the European Commission committed in 2021 to revising its animal welfare legislation, and to introducing legislative proposals to phase out the use of cages for all farmed species in Europe, including sows, which is expected to be tabled from 2026.

**F** Keeping sows in individual stalls is inevitably associated with poor welfare; stalls severely restrict sow movement to the extent that they have difficulty lying down and standing up (EFSA, 2007). Against this background, the European Citizens' Initiative (End the Cage Age, 2018) calls for an end to the use of stalls for pregnant gilts and sows. EFSA<sup>32</sup>



UK (1999), Norway (2000), Sweden (1988), Switzerland (1997), California (2015), Massachusetts (2022)

EU (4 weeks), US states (6 weeks; Florida, Maine, Oregon, Arizona, Rhode Island, Colorado, Michigan, New Jersey & Ohio), Austria (10 days), Netherlands (4 days), New Zealand (7 days)

Germany (2028), Canada (2029), Denmark (2035)

Given this fast-evolving legislative landscape in several parts of the world, especially in Europe, it is crucial for producers and food companies to anticipate and adapt early on to those changes across their entire global supply. In geographies where there is no existing or forthcoming legislation, companies should still be looking to eliminate sow stalls from their supply through voluntary standards, to drive change and fall in line with the wider global trend towards cage-free production.

#### 1.2. A global movement towards sow stall-free sourcing

GOOD

PIG

AWARD

There is a growing global movement towards sow stall-free production; with increasing consumer perception of animal welfare in general and the welfare of breeding sows, and the need to address welfare issues in all geographies, companies are beginning to move towards sow stall-free sourcing across their entire supply chain.

CIWF's award programme is helping to drive this global movement, by celebrating and promoting sow stall-free commitments:

#### **Good Pig Award**

The **Good Pig Award** includes criteria for both sows and meat pigs to be implemented within 5 years. The Good Sow Commendation covers sows only and requires:

- No confinement in sow stalls during the dry period (including the observation period)
- No confinement during farrowing and lactation (farrowing crates)
- Provision of adequate manipulable material and bedding throughout life.

See our Good Pig Award Winners here.

#### **Good Pig Production Award**

The Good Pig Production **Award** is specifically for Chinese pig producers. It has criteria covering meat pigs and sows; for sows, one of the minimum requirements for entering the award is:

• No sow stalls (except for the observation period)

Additional criteria for sows are:

- No use of sow stalls (including the observation period)
- No use of farrowing crates
- Provision of appropriate manipulable material throughout life.

See our Good Pig Production Award Winners here.

#### **Sow Stall Free Award**

The **Sow Stall Free Award**, launched in 2024 and intended for companies in the Asia region, specifically focuses on ending the use of sow stalls and asks for:

- No confinement in sow stalls during the dry period (i.e. from weaning to 1 week prior to farrowing, with short occasional confinement allowed for management purposes, for a maximum of 4 hours at a time)
- No sourcing from multi-storey farms

See our Sow Stall Free Award Winners here.

In August 2024, we awarded our first Sow Stall Free Award to KPS Farm Nongpai Farm, a Thai pig producer, for implementing a 100% sow stall-free system throughout their pig farm operations.



GOOD

PIG

RODUCTION

AWARD







#### 1.3. Costs of the transition and mitigation strategies

It is inevitable that converting a breeding farm operating with sow stalls to group housing facilities involves new capital expenditure, although this will vary due to different factors and the region of the world where producers operate. However, there are a number of ways to mitigate upfront costs.

#### **Capital costs**

One of the major costs of transition is the capital investment of sow stall-free housing. Rossi et al.<sup>5</sup> estimated that, in Italy, transition costs for renovated buildings range from EUR 682 per sow place to EUR 955 per sow place in 2021. Using two scenarios of retrofitting a building, capacity of the gestation housing is reduced by 27-38% depending on current building layout and group systems installed. New builds with a larger footprint could avoid reducing the herd size and were estimated at EUR 2,245-2,818 per sow place.

Lammers et al.<sup>6</sup> analysed the costs associated with different sow housing systems in the United States in 2007 and found that:

- The cost to build sow stalls was 32% higher per sow space compared to group housing systems. This means that if you were constructing a new sow housing system, choosing group housing would result in lower upfront costs.
- The total fixed costs (which include depreciation, interest, repairs, taxes, and insurance) for group housing were 83% of the total fixed costs for sow stall systems. This further supports the idea that group housing is more cost-effective in the long run, as it is cheaper to maintain and operate.

It was concluded that group housing is cheaper to build (lower initial investment) and run (lower fixed costs) compared to sow stalls.

A study in Canada in 2020 estimated that transition costs from sow stalls to group housing ranged from 250 to 750 CAD [Canadian dollar] per sow place (at the exchange rate of 1 CAD equals EUR 0.67, this is equivalent to EUR 168-503), but the cost of transitioning will vary depending on the type of design, use of existing infrastructure and producer input for labour<sup>7</sup>. The project also estimated that the cost of a renovation to existing buildings would be around 50-75% of the cost of a new group housing building<sup>7</sup>.

Overall, the cost of transitioning from sow stalls to group housing will vary significantly depending on whether existing barns are retrofitted or new facilities are constructed, the size of the herd, and geographical location, as factors such as construction costs, labor expenses, and regulatory requirements differ across regions.

#### Production costs and impact on production levels

The impact of a transition on production costs will mainly vary in terms of whether producers have maintained or decreased their herd size. Increasing the herd size can help maintain production output but would also require additional capital investment. Running costs between stall and group housing systems are mainly affected by the use of straw and the feeding system<sup>8</sup>. Differences in running costs may also include energy, feed, veterinary bills, land management, certification costs etc<sup>9</sup>. However, in the long-term, labour costs and time requirements in indoor alternative systems are not estimated to vary greatly from conventional systems with sow stalls, which may reduce some production costs over time<sup>10</sup>.

Research indicates that when properly implemented and managed, group housing systems provide similar levels of production to stalls. A project in Canada in 2020 found that producers moving from sow stalls to group housing reported no significant changes in production once the group housing system was established, and some producers reported that they had comparable conception rates and litter sizes before and after conversion<sup>7</sup>.

Similarly, Mitchell et al.<sup>11</sup> compared different forms of housing on 8 farms in the Netherlands (2 farms), Spain (2 farms), and Brazil (4 farms), and found that group housing systems weaned more piglets than stall systems. Overall, they showed that group housing systems were as productive, if not more so, compared to stalls. Interestingly, they found that costs, as well as specifically feed costs, were on the whole lower in group housing systems compared to stalls, and that the group housing systems analysed had better net profits than the stall systems. They also concluded that the longer the farm is operating group housing systems, the better the system performs in terms of economics and profitability<sup>11</sup>. Reporting on Mitchell et al.<sup>11</sup>, a study<sup>12</sup> carried out for Copa-Cogeca (an organisation representing farmers and agri-cooperatives in the EU) states:

**G** These case studies... demonstrated that group sow housing systems are viable in terms of economics and productivity. Often-cited perceptions of a negative impact on efficiency, higher operating costs or lower profits were not found. Investment costs are affected as the adoption of group housing implies several changes in the system, but some of these changes, such as the introduction of electronic sow feeding, could also increase efficiency. Evidence from the individual case studies showed better productivity for group housing, with more piglets at higher weights. In general, because of higher productivity and roughly similar / slightly lower feed costs and labour input across group housing systems, group housing offered a higher level of profitability.

#### **Cost mitigation strategies**

There are a number of strategies that can be implemented by the producer and the company to mitigate the increase in costs associated with a sow stall-free transition and maintain the economic viability of group housing systems.

It is vital that for transitioning out of stalls farmers are supported financially, such as receiving higher prices and long-term commitments from their buyer, market premiums



Potori et al.<sup>12</sup>

for higher welfare products, Government support and promotion through marketing and certification schemes<sup>10</sup>. Market prices are an important determinant of farm revenue and profitability. Premiums are often available for products from cage-free / higher welfare systems. They vary greatly and can be sensitive to local market conditions but can be used to offset some costs of moving to cage-free production.

#### 1.4 Invest in the best: Our recommendations for group housing of dry sows

There has been decades of research and commercial experience of how to successfully house sows in groups throughout service and gestation. Group housing systems should be designed and managed to minimise aggression and meet the welfare needs of dry sows by maintaining stable groups if possible and taking steps to reduce aggression when sows are mixed. This includes adequate space and opportunities for sows to escape from aggressive interactions, design of feeding systems to minimise competition, ad libitum feeding in the early mixing phase, high-fibre diets or permanent access to roughage, and good quality flooring with a substantial bedded area.

Dry sows should be kept in groups throughout the dry period, from weaning to one week prior to farrowing, including the observation period. Short duration confinement may be allowed for management purposes such as feeding and conducting artificial insemination but must be restricted to 4 hours or less at a time.

#### Recommendations for the successful group housing of dry sows

- Providing sufficient space (>3m<sup>2</sup> /sow), to allow sows to move away from each other. A higher space allowance will improve welfare, reduce aggression and piglet stillbirths.
- Managing aggression through good mixing practices (e.g. use of a specialized mixing pen with extra space and physical barriers for hiding, keeping a boar in the group, preventing competition at feeding, gradually familiarizing individuals via fence contact).
- Providing solid floors and bedding. Solid flooring with sufficient dry and clean bedding will positively impact thermal comfort, hoof condition, lameness incidence and skin lesions.
- Providing dietary fibre and manipulable materials, to satisfy hunger and fulfil foraging and exploratory needs. An appropriate diet and the provision of manipulable materials will reduce aggression and increase resting behaviour.

For more details, see our resource on Indoor housing for dry sows – practical options.





#### A meaningful sow stall-free commitment should:

- Be a commitment to only sourcing pork from producers that operate without sow stalls. Temporary confinement of sows is permitted for up to four hours for management procedures, such as insemination.
- Unless otherwise stated, group housing may still use sow stalls, from service to when pregnancy is confirmed. Therefore, it is key to explicitly state in the commitment to only source sow stall-free pork (i.e. no sow stalls throughout the dry period, inclusive of the service and observation period before confirmation of pregnancy).
- Cover a company's entire pork supply. All pork products should be covered by the company's sow stall-free commitment. If not, it is imperative to list which products are included to improve transparency.
- Have a clear, meaningful timeline for full implementation. CIWF recommends working to fully transition within five years of establishing a commitment.
- Be public facing with annual progress reporting towards meeting the commitment.

#### **Example commitment:**

"We are committed to sourcing 100% of our pork from supply chains that do not use sow stalls during the dry period (including the service and observation period before pregnancy confirmation) by 2028. To ensure full transparency, we will report this progress in our annual responsibility reports. As of 2024: 25% of our supply was produced without the use of sow stalls. Our supply is third-party audited to ensure compliance and traceability."

#### **1.5 Marketing and communications opportunities**

It is important to communicate about your commitment at an early stage and be proud of it:

- Ensure it is positioned clearly on your company's animal welfare policy pages.
- Clearly state what you will do and by when.
- The geographical boundaries of the commitment should be clear.
- Include any supportive quotes from other relevant partners such as NGOs.

A variety of marketing tactics can be explored to help communicate with customers on farm animal welfare and take them on the journey with you. It is important to share each challenge or success throughout the process and bring your consumer with you on the journey via regular updates. Don't just communicate at the start and the end of the process. Options to consider include:

#### Market research:

- Gather market analysis data to assess what your competitors are doing, which you can use in your marketing to highlight yourself as a leader in this space
- Understand consumer awareness of farm animal welfare and the drivers for purchasing higher welfare products
- Use surveys and focus groups to identify marketing strategies for increasing/supporting the demand for higher welfare products and to assess the willingness to pay for them

#### **Messaging:**

- Bring the consumer on the journey through regular public updates. When customers understand what cage-free really means for sow welfare, they are much more likely to choose higher-welfare products
- The messenger is as important at the message, so use 'trusted messengers' that consumers will respond positively to
- Focus on what's gained for both the animals and the consumer
- Keep messaging simple and positive
- Use language that consumers are using be on the same page as them
- Communicate with the consumer of tomorrow

#### Animal welfare promotional campaign:

- Better for the animals
- Better for your health
- Better for the environment

#### Marketing channels:

- Shelf barkers and in-store communications
- On pack use QR codes linking to the company website
- Social media
- TV and media
- Celebrity endorsement
- Outdoor advertising
- Leaflets explain your animal welfare journey and highlight the work done by farmers that care for their animals in order to connect consumers and farming practices
- Recipe cards and associated promotions/ coupons for higher welfare products

#### Labelling:

- Ensure clear labels on products
- Include relevant certifications
- Help to drive consumer choice

Investors and NGOs are examples of other stakeholders that companies need to communicate with on their animal welfare policies, management and performance. There are tools created specifically to communicate with these stakeholders, for example the **Business Benchmark for Farm Animal Welfare** (BBFAW) and **CIWF's PigTrack** in the US which is a compliance tracking tool to measure company progress towards a higher welfare crate-free supply.

### 2. ANIMALS

Animal welfare encompasses both the physical and mental wellbeing of an animal as well as their ability to engage in behaviours that are important to them. To ensure good welfare, animals must be free from negative states, such as hunger, pain and fear, while also being able to experience positive states, such as pleasure and contentment. Sows have a number of innate behaviours that they are highly motivated to express, such as wallowing, exploration and foraging, and nest building. The ability to perform those innate behaviours is dependent on the provision of adequate space and access to diverse resources, such as manipulable materials like straw, in the housing system. While systems with a low welfare potential, i.e. sow stalls, will never be able to deliver good welfare due to their intrinsic limitations, systems with a higher welfare potential do not guarantee good welfare if they are not well managed. Therefore, it is important to manage group housing systems for dry sows appropriately, so that the welfare potential of the system can truly result in improved welfare for dry sows. Particular attention should be given to management risk factors that are associated with aggression around mixing and at feeding and with lameness, as well as providing opportunities for sows to express highly motivated behaviours such as foraging and rooting, and providing sufficient fibre to ensure satiety.



#### 2.1. Health and physical welfare

#### 2.1.1. Space restriction

Confinement is a serious welfare concern for dry sows. Sow stalls are on average 200-250cm in length and 50-70cm in width<sup>13</sup>. This means that, in a sow stall, the sow is provided with only enough space to stand up, lie down and move one or two paces back and forth; she is unable to turn around<sup>14–16</sup>. This restriction also means that sows cannot regulate their body temperature properly by moving to a more comfortable thermal environment<sup>17</sup>.

Restriction in movement due to confinement causes sows' muscles and bones to weaken, leading to sows having difficulty standing up or lying down due to lack of exercise<sup>15</sup> and problems farrowing<sup>18</sup>. Restriction in movement also results in reduced cardiovascular fitness<sup>19</sup> and increases the risk of lameness<sup>20,21</sup>, urinary tract infections<sup>14,17</sup> and limb injuries<sup>21,22</sup>. Limb injuries and lameness are also confounded by inappropriate, poorly maintained and slippery flooring<sup>23</sup>.

Dry sows spend around 80% of their time lying down<sup>24</sup>. In stalls, dry sows are unable to adopt comfortable lying positions (i.e. lateral lying where pigs lie on their side with all legs stretched out<sup>25</sup>). Space restriction is increasingly exacerbated by increasing size of sows due to genetic selection which further reduces the amount of space for resting<sup>26,27</sup>. CIWF's recommendation is to use an allometric equation to calculate the space allowance per sow, and by accounting for the size of largest sows in the group or herd (for more information on the allometric curve calculation, see our resource **here**). CIWF recommends a minimum of 3m<sup>2</sup>/sow in group housing systems; increasing space allowance in dynamic groups from 2.25 to 3.0m<sup>2</sup> per sow led to a significant reduction in one-way aggressions and lower mean number of injuries when sows were observed 3 and 8 days after mixing<sup>28</sup>. Sows housed at a space allowance of 3.3m<sup>2</sup> per sow had the fewest skin lesions and had the largest litters compared to sows provided with 1.4m<sup>2</sup> and 2.3m<sup>2</sup><sup>29</sup>. Therefore, providing sufficient space allowance reduces aggression and injuries<sup>28</sup>.

#### 2.1.2. Lack of comfort

Bare concrete floors with partially or fully slatted flooring cause injuries to the legs and claws while the sow gets up or lies down and becomes more severe throughout pregnancy<sup>16</sup>. Additionally, sores are caused by pressure on parts of the body while lying on bare concrete or slatted flooring with no bedding<sup>30,31</sup>.

While sows prefer solid flooring over slats, sows cannot rest completely comfortably on bare concrete floors. The provision of deep bedding on top of solid flooring is important to improve sow comfort, including thermal comfort, reducing skin lesions <sup>32,33</sup> and leg injuries<sup>34</sup>, and is generally considered to be the most appropriate flooring set up for group housing sows<sup>35</sup>. However, alternative substrates, such as rice husks and wood chip bark may be appropriate in warm climates where it is more important for the sow to keep cool. Lying mats have been shown to improve sow lying comfort compared to bare concrete and may be a suitable option in different regions and climates<sup>24</sup>.





#### 2.1.3. Lameness

Lameness is a major problem in commercial systems and is considered one of the main welfare issues for sows<sup>36</sup>. Lameness results in pain and discomfort<sup>37–39</sup>, as well as increasing lying times which may cause increased prevalence of pressure lesions. Lameness can also impair reproductive performance<sup>40,41</sup>, increase veterinary costs and increase workload for staff<sup>36,42,43</sup>.

Claw injuries can be sustained on slatted floors where the slat width is too narrow, putting pressure on the sole, or the gap width is too large and claws get trapped, or the dew claw can be torn. One of the most common claw abnormalities is overgrowth of the weight bearing claws<sup>30,44</sup>. Damage to feet can also be caused by sharp edges or abrasive flooring. Poor hygiene on floors can make flooring slippery, increasing the risk of injuries from slipping, and will weaken the hoof, increasing the risk of infections<sup>32</sup>. There is a risk of lameness in group housed sows, particularly on slatted floors<sup>45–47</sup>, therefore ensuring solid flooring and provision of deep bedding and effectively managing mixing in group housing systems is crucial<sup>32</sup>.

#### 2.1.4 Disease

Diseases pose an important health risk for confined sows. In intensive systems, higher stocking densities and poor ventilation can facilitate the spread of endemic diseases<sup>48</sup>, and result in higher concentrations of air pollutants (e.g. dust and ammonia). Respiratory and digestive tract diseases are common in intensively reared sows. Stress associated with intensive production may also lead to an increased likelihood of pigs contracting disease<sup>49</sup>, may shed more pathogens, such as zoonotic Salmonella<sup>50</sup> and develop gastric ulcers which are a prevalent and significant welfare issue in sows<sup>51</sup>.

Disease control usually includes replacing ill or dead animals, vaccination programmes, or the use of antimicrobials for treatment or prophylaxis. The use of antimicrobials is more likely in intensive systems than in organic and free-range production<sup>52</sup>, with possible long-term consequences for human resistance to antibiotics and other drugs. Antimicrobial resistance (AMR) is one of the greatest threats facing the human population. Overuse of antimicrobials in farming exposes bacterial populations in the environment to antimicrobial drugs, driving the development of resistant microbial populations<sup>53</sup>. There is strong evidence for animalhuman transmission of antimicrobial resistance<sup>54</sup>, thereby undermining the treatment of serious human disease<sup>55</sup>.

#### 2.1.4.1 African Swine Fever (ASF)

ASF is a serious viral disease. Pigs are mainly infected via the oro-nasal route through contact with infected pigs; slurry, vehicles, or equipment; workers or visitors; or by consuming contaminated pork or feed products (reviewed in<sup>56, 57</sup>).

The only real link between ASF infection risk and housing is in outdoor reared pigs coming into contact with wild boar<sup>58</sup>. To our knowledge, there are no studies showing a link between ASF infection and either group (indoor) housing or stalls; either system carries the same risks from the aforementioned routes of transmission. Therefore, anecdotal claims that housing dry sows in groups impacts the risk of ASF infection are not supported by the scientific literature. Focussed efforts to reduce the risk of ASF being brought into a group housing system is recommended.

Bedding is often removed due to the perceived risk of introducing ASF virus into the system. While bedding can be a risk factor<sup>59</sup>, this can be reduced through proper storage and treating bedding and other enrichment materials in a specific way to kill any potential virus [reviewed in <sup>59–61</sup>].





#### 2.2 Behavioural expression

#### 2.2.1 Space limitations

Sow stalls do not provide sufficient space for sows to be able to behave normally. Curtis et al.62 estimated that for sows to get up and lie down comfortably, a 300kg sow needs around 220cm in length and 86cm in width. Thus, a stall measuring less than 220 × 86cm will impede natural lying down and getting up behaviour<sup>63</sup>. Anil et al.<sup>64</sup> showed that the size (length and breadth) of sow stalls relative to the size of the sow has a negative association with standing time and the number of times sows moved from standing to sitting, indicating that the freedom of movement is impaired for sows housed in stalls. Confined sows show unresolved aggression (due to not being able to establish dominance hierarchies) and inactivity associated with unresponsiveness (reviewed in <sup>14,17</sup>). Confinement also prevents pigs from their naturally clean excretory behaviour where they create functional areas, including a specific dunging site<sup>65</sup>. This may result in sow discomfort while lying in sow stalls as they are unable to distance themselves from their urine and faeces. Finally, in stalls, sows do not have the space (or resources) to carry out exploratory or foraging behaviours, which leads to abnormal behaviours

including stereotypic and re-directed oral behaviours (e.g.<sup>66</sup>).

Research shows that increased space allowances have a positive impact on sow behaviour, indicating an improvement on sow welfare (e.g.<sup>67</sup>). Providing sufficient space means sows can exhibit normal behaviours such as exploration<sup>68</sup> and resting<sup>46</sup>. Liu et al.68 showed that group housed sows, provided with 5.04m<sup>2</sup>/sow, exhibited more exploratory behaviour and less vacuum chewing (sham-chewing, a stereotypic behaviour), and lower concentrations of stress-related hormones (adrenocorticotrophic hormone and adrenaline) compared to sows housed in stalls throughout gestation. Weng et al.<sup>69</sup> compared the behaviour of sows housed in pens with 4 different space allowances: 2m<sup>2</sup>/sow, 2.4m<sup>2</sup>/sow, 3.6m<sup>2</sup>/sow and 4.8m<sup>2</sup>/sow. They found that the time spent rooting increased as the space allowance increased, while the time spent being inactive (sitting and standing) decreased in an inversely proportional relationship to space allowance<sup>69</sup>. Greenwood et al.<sup>70</sup> found that sows housed at 4m<sup>2</sup>/sow and 6m<sup>2</sup>/sow were more active, spent more time exploring and had more non-aggressive social interactions compared to sows housed at 2m<sup>2</sup>/sow.



#### 2.2.2 Barren environment

Sows are highly motivated to explore and forage<sup>71,72</sup>. In addition to physical confinement in stalls, sows are severely restricted in their exploratory and foraging behaviours due to the barren nature of stalls; stalls typically have slatted or solid concrete floors with no bedding which further restricts opportunities for foraging, exploring, and nest building in the run up to farrowing. As a result, they redirect this motivation into other oral behaviours, e.g. nosing, licking and biting towards the floor, trough, bars etc, and these behaviours may become stereotypic where they are performed in a routinised and repetitive way<sup>73–75</sup>. These stereotypies are associated with frustration due to the lack of stimulating environment<sup>73,76,77</sup>. Sows housed in stalls without straw were found to carry out stereotypical oral behaviours and motionless standing and sitting, and these behaviours were almost completely eliminated by the provision of deep straw bedding<sup>78</sup>. Similarly, Stewart et al.<sup>79</sup> also found that sows who had access to straw showed fewer stereotypic behaviours (head-thrusting, shamchewing and bar-biting).

Deep straw bedding is most recommendable as bedding for dry sows (dependent on climate). For example, pregnant sows housed throughout gestation (3 days prior to insemination to one week prior to farrowing) with deep straw and 3.5m<sup>2</sup> had improved survival (within 12 hours after birth) of piglets compared to sows housed in pens with 2.4m<sup>2</sup> and slatted flooring and sows housed in pens with 2.4m<sup>2</sup> and manipulable wood and provision of straw pellets after meals<sup>80</sup>. Sows with deep straw also showed more positive social interactions, investigated and explored the straw more and had the fewest number of stereotypies<sup>80</sup>.

It is important to note that even if forms of enrichment, such as straw or ropes, are provided, due to the very limited space in stalls, enrichment is mostly inadequate to meet the behavioural needs of the sows<sup>32</sup>. Therefore, group housing sows with sufficient space (i.e. >3m<sup>2</sup>/sow) as well as provision of bedding and manipulable materials is crucial for improving the welfare of dry sows.

In order to effectively meet the needs of the sows, enrichment must be:

- Investigable so that sows can root through it with their snout;
- Manipulable so that sows can move it, and manipulate its appearance and structure;
- Deformable / destructible so that sows can bite and chew it;
- **Edible** so that sows can ingest the material;
- Provided in a way that ensures it remains interesting to the sows, regularly replenished, is accessible to all of the sows in the pen, and is hygienic and safe.<sup>32,81</sup>

#### 2.2.3 Feed restriction and chronic hunger

Dry sows experience chronic hunger due to the type of feed given, quantity and the frequency of feedings. Sows are subject to feed restriction (up to 70% their ad libitum intake<sup>82</sup>) during pregnancy to avoid obesity and joint problems. Dry sows are fed a restricted diet typically of concentrates in the form of highly digestible pellets. While this feed can provide the necessary nutrients for good health, pigs will not feel satiated due to the short time spent eating, small feed portions and lack of fibre<sup>73,83</sup>. In these circumstances, feeding motivation will remain high and, if this cannot be expressed in an appropriate form of appetitive behaviour (searching, rooting, chewing), then abnormal behaviours (restlessness, aggression, oral stereotypies<sup>73,84</sup>), a high prevalence of stomach ulcers and frustration in sows can result<sup>14</sup>.

Restrictive feeding during early pregnancy, beyond the first few days after mating, may adversely affect embryo survival and maintenance of pregnancy<sup>85</sup>. A Finnish study found that provision of roughage increased the likelihood of sows becoming pregnant<sup>86</sup>. Feeding high-fibre diets to sows during gestation has been found to have multiple benefits to productivity, including more successful insemination, larger litters, with more viable piglets, as well as benefits for piglet performance (reviewed in <sup>87</sup>). For example, Guillemet *et al.*<sup>88</sup> found that piglets from sows fed high-fibre diets during gestation showed improved growth rates during their first week of life and tended to be heavier at weaning.



Feeding should be modified; dietary fibre should be increased by changing the concentrate diet, and by providing additional fibre-dense feedstuffs, for example, straw, haylage, and root vegetables. This extra substrate will also provide opportunities for foraging behaviour.

#### 2.2.4 Social stress and aggression

In sow stalls, sows are in close proximity to other sows, which allows for visual contact but they cannot show signs of subordinance such as moving away from each other, meaning there is no effective way of establishing the hierarchy and tension between individuals is sustained<sup>19</sup>. Due to the inability to resolve the dominance rank order, such stress has a continuous effect throughout the period animals are kept in individual stalls.

Part of the rationale for keeping dry sows in stalls post-insemination, particularly for the first few weeks of gestation, stems from the concern of the negative impact of stressors during the early phase of pregnancy, and to promote embryo survival<sup>89</sup>. However, a large body of research has been published showing that housing sows in groups need not have any adverse effects on reproductive performance (e.g.<sup>90–93</sup>). In fact, a number of published reviews<sup>13,94</sup> and recent studies<sup>95–97</sup> indicate that reproductive performance in group housing systems (where group housing occurs either at the point of insemination or following some level of confinement) is comparable with that in stalls. Studies show that productivity is as high – or higher - in group housing as in sow stalls. Bates et al.<sup>98</sup> found that litter birth weight was higher in sows housed in groups with electronic sow feeders than in sows kept in stalls. Morgan et al.99 found that group housing management during gestation was associated with better reproduction and productivity, as compared with the use of sow stalls. Fighting for social dominance in a newly formed group is a temporary activity, and while it is inevitable that there will be some fighting while the social hierarchy is formed within the group, the social hierarchy should be established before service is carried out, and the effect of this associated aggression can be effectively minimised.

From studies showing no adverse effects on reproductive performance of mixing during early pregnancy, it appears that sows are able to adapt to the transient stress of mixing<sup>100-104</sup> and that reproductive performance is unlikely to



be adversely affected unless stress is prolonged, for example if there is severe competition at feeding<sup>105,106</sup> or inadequate space to allow sows to escape aggressive interactions<sup>107,108</sup>. It is therefore likely that any adverse effects on reproductive performance reported in group housing systems are the result of inadequate design or management of systems rather than the result of mixing *per se*.

Good management and system design around mixing is paramount in ensuring reproductive performance is not negatively impacted, and to reduce the risk of injuries to sows, in particular subordinate sows. Key factors to manage potential aggression are gradual familiarisation of unfamiliar animals (via fence contact), sufficient space (e.g. a pen of 2.9m<sup>2</sup> was found to effectively reduce aggression during mixing compared to smaller pens<sup>109</sup>) and pen layout during mixing, and minimising opportunities for dominant sows to steal food from subordinates<sup>33</sup>. Using temporary specialised mixing pens which provide more space to escape aggressors<sup>109–111</sup>, barriers to hide behind<sup>112</sup>, and square pens (rather than circular, triangular or rectangular pens)<sup>113</sup> can be effective at reducing aggression at mixing. Providing

manipulable material such as straw or other organic materials like mushroom compost or rice husks may also reduce aggression by offering opportunities for rooting and foraging, minimising frustration which can exacerbate aggression<sup>114</sup>. *Ad libitum* feeding at the time of mixing is effective at reducing aggression<sup>115,116</sup>, as well as providing high satiety (high fibre) diets<sup>117,118</sup>. The use of dynamic groups should be avoided where possible, but if they are used, aggression should be managed by minimising the number of mixing occasions, using specialised mixing pens and grouping sows of similar sizes<sup>32</sup>.

Therefore, there is no justification for the individual housing of sows in the period from weaning of the piglets, for the first one to four weeks after service, or for the whole of gestation until one week prior to farrowing (when they are moved into farrowing housing). Indeed, aggression and stress are likely to be minimised if sows are returned to groups as soon as possible after any period of separation (e.g. during farrowing and lactation or for service), and appropriate design and management of group housing systems are ensured.

#### 2.3. Mental welfare

Pigs are intelligent and social animals, with a complex range of behaviours and needs. Sows can experience complex negative and positive emotional states, such as fear, stress, frustration, contentment and pleasure, which are measured by behavioural<sup>119</sup> and physiological changes<sup>120,121</sup>. When confined to a sow stall, sows are unable to perform highly motivated behaviours, such as foraging, or interacting socially with other pigs. As a result, confined sows can show higher incidences of aggressive behaviours and abnormal behaviours, such as stereotypies (e.g., repetitive bar biting or head swaying) due to frustration, boredom, stress and hunger<sup>122</sup>. These behaviours can indicate poor mental welfare outcomes because they are considered to occur when pigs are attempting to cope in an inappropriate environment<sup>123,124</sup>.

Positive experiences are equally as important as the absence of negative experiences in order for animals to have a good life<sup>125–127</sup>. In sows, behavioural indicators of positive affective states include rooting and foraging, exploration, resting and nest building in the lead up to farrowing. Therefore, promoting these behaviours, for example by providing straw or outdoor areas, are important for promoting positive affect so that sows can have a good life.



#### 2.4 Assessing welfare

Welfare outcomes are an animal-based method of assessing an animal's physical wellbeing and increasingly their behavioural expression and mental wellbeing. Whilst provision of certain resources (inputs) in the sow's environment is necessary to increase the welfare potential of a system, measuring animal-based outcomes indicates whether that potential has been met, and so is still important to carry out in cage-free systems. Regularly scoring appropriate outcome measures can help to identify welfare problems and be used to set targets or benchmark for improvements through an active programme.

The main welfare measures recommended for dry sows are:

- Lameness
- Ear and flank biting
- Body condition
- Shoulder and vulva lesions
- Mortality and longevity
- Behaviours including rooting/foraging, aggression, redirected behaviours e.g. bar biting.

#### **EXAMPLE: Dongnong Sanhua Pig Farm**

Dongnong Sanhua Pig are a group enterprise which owns three pig breeder-tofinishing farms in Harbin, China. They set out to design and implement a completely stall free system whereby the farm does not use stalls or crates at any stage of service, observation, pregnancy, farrowing or lactation of sows.

Sows are moved into groups of 15-20 once weaning has finished. After 5-7 days, artificial insemination is undertaken in groups, and observation / confirmation of pregnancy takes place. Sows remain in these static groups for the duration of the pregnancy until 1 week prior to farrowing. Aggression is monitored by staff and reported to peak within 3-5 hours of mixing and subsequently reduces in the following 24 hours. Although minor lameness can still occur at mixing due to aggression, it is reported that it does not reach high levels of severity. Lameness and mortality are both reported as an average of 1-2% per year.



Sows are housed on solid floors and straw is added into each pen at mixing and topped up once a day for the duration of the pregnancy. Manipulable materials, such as straw, as well as adequate space provision (3.5m<sup>2</sup>/sow), also contribute to reduced aggression within the groups, as they promote more positive exploratory behaviours.

When comparing sows reared in group housing to those in sow stalls, the farm has seen no detrimental impact on production. The farm also reports a 90% successful farrowing rate in their free farrowing pens, higher than the industry average on farrowing crates of around 85%. They attribute this success to reduced stress levels throughout the pregnancy.

Other benefits of group housing recorded include: a longer production life (average 8-10 litters per sow) and a reduction in staff labour due to the Electronic Sow Feeding (ESF) system installed in 2015. Since replacing trough feeders with the ESF system, the farm has seen an improvement in body condition of sows owing to the precise feed amount in relation to individual weights.

Management of sows has become easier where labour is not being spent on manual feeding. It is also reported that sows appear more resistant to health challenges, likely due to improved space allowance and reduced stress levels, in comparison to sows confined in stalls.

For more information on Dongnong Sanhua Farm, see our detailed case study here.





### **3. PEOPLE** 3.1. Consumer attitudes

Consumers are increasingly concerned about how their food is produced and the welfare of the animals involved. Studies across the EU, North America, Latin America, Asia and Australia indicate that animal welfare concerns have become more important to consumers over the past two decades<sup>128</sup>.

According to the latest Eurobarometer on Animal Welfare<sup>129</sup>, the vast majority (91%) of EU citizens believe it is important to protect the welfare of farmed animals, eight in ten (84%) believe the welfare of farmed animals should be better protected than it is now, and six in ten (60%) are willing to pay more for products from animal welfare-friendly production systems. Around a quarter (26%) would be ready to pay up to 5% more, 6% would be ready to pay more than 20% more but 37% (nearly 4/10 respondents) are not ready to pay more. Additionally, 89% of EU citizens surveyed believe that it is important that farm animals are not kept in individual cages.

Consumers around the world (across Asia, Europe and North America) show concern for animal welfare, including pigs<sup>130</sup>. Consumers' main concerns regarding pig welfare relate to living conditions<sup>131,132</sup> including outdoor access<sup>133–136</sup>, space allowance<sup>132,133,136,137</sup>, freedom of movement<sup>2,133,136,138</sup>, provision of a littered floor/straw bedding<sup>133,135,139</sup>, and avoidance of pain/mutilations<sup>134,136,140</sup>. Consumers show widespread opposition to the confinement of sows in stalls (US and Canada<sup>2</sup>, Germany and Poland<sup>138, 141</sup>). Provision of additional information about housing systems increases opposition to confinement systems and support for group housing systems<sup>2</sup>. 83% of surveyed Chinese consumers said they wanted sows to be given freedom to move (preferring group housing to stalls) and more than 75% said they would be willing to pay more for this<sup>141</sup>.

Motivation to purchase higher-welfare pork is influenced by consumer perceptions that animal welfare is positively related to product quality (Europe<sup>142</sup>; China<sup>143</sup>; Poland, Italy, Japan and South Korea<sup>144</sup>), taste (Europe<sup>142</sup>; China<sup>143</sup>), healthiness (Europe<sup>142</sup>), and food safety (China<sup>139,143</sup>). Seven in ten urban Chinese consumers surveyed in Shanghai and Beijing believe animals that are treated well taste better and are safer to eat<sup>143</sup>.

Studies in various countries have demonstrated that consumers are willing to pay for better pig welfare; around half of consumers surveyed in China (54.5%) and Italy (47%) are willing to pay more for higher welfare pork (China<sup>139</sup>; Italy<sup>145</sup>) while the majority of those surveyed in Denmark (75%), Germany (69%) and Sweden (55%) were willing to pay a price premium for welfarelabelled Danish pork (the lower proportion for Swedish consumers is likely because the welfare standards for the label were similar to legal standards in Sweden)<sup>161</sup>.



#### **3.2 Farmers**

There are sometimes negative perceptions around labour efficiency in group housing systems due to the increased need for monitoring social interactions, maintaining cleanliness, and ensuring all sows receive adequate feed. However, producers can reduce these requirements through improved facility design, automation, and staff training, ultimately enhancing efficiency over time. For instance, electronic sow feeding systems can significantly improve labour efficiency by minimising the need for manual feeding<sup>11</sup>.

In Australia, pork producers began a voluntary phase out of sow stalls in 2010. By 2020, the majority (>91% of dry sows) of Australian pig producers had transitioned to group housing systems (sows can be housed in stalls for the first five days following insemination). The CEO of Australian Pork Limited stated that one of the biggest motivations for farmers was

the industry's relationship with consumers<sup>147</sup>, highlighting the importance of consumer demand for higher welfare products. This is a clear example of how pig farmers can successfully lead a voluntary transition to group housing of dry sows.

Training of staff is vital to ensuring a successful transition to group housing to reduce the risk of problems arising, mainly around mixing and aggression. Group housing systems require different skills, knowledge and experience to sow stalls. Training of staff to recognise when issues are occurring, particularly during mixing and during handling around service and pregnancy diagnosis, is crucial<sup>32</sup>. Proper training will aid performance, production, animal health and welfare, and worker safety, leading to economic benefits and job satisfaction for workers. Companies should provide support for their producers in the form of education and training in how to set up and manage a sow stall free system.

### **4. PLANET**

Aspects of housing and management can have a direct impact on the environmental footprint of the farm, including level of animal confinement, stocking density, housing design, scale of the operation, composition and sources of feed and waste disposal. High numbers of livestock in a small area increased the amount of waste and nutrient run-off into the local environment, leading to pollution. While waste management can still be a concern in smaller systems, for example due to the cost-effectiveness of some technologies, or nitrogen losses in outdoor systems, good management can mitigate these effects<sup>9</sup>. Different methods can be employed to mitigate the effects of pig production on the environment and climate targets. While there is limited research on the direct environmental impact of moving from sow stalls to group housing, in this section we discuss how to mitigate environmental impacts of pig farming in general.

#### Waste management

Changes to slurry storage have been found to reduce methane emissions; frequently moving slurry from pig houses and into outside storage, thereby reducing slurry retention time, and combining with an anaerobic digestor can reduce methane emissions by over 50%<sup>148</sup>. The use of anaerobic digestors is also effective in improving the sustainability of farms by mitigating greenhouse gas emissions, producing biogas for on-farm heat, electricity, and fuel, as well as fertilisers<sup>149</sup>.



#### Feed

Feed (source, composition and transport) is crucial in improving the sustainability of pig production; feed has been identified as the largest source of environmental impact associated with pig production<sup>150,151</sup>. Feed production, including each ingredient life cycle, fabrication and transport, has been found to account for as much as 76% of the total greenhouse gas emissions for pig production<sup>151</sup>. Alternative feed sources that do not compete with food that can be consumed directly by humans need to be used, such as waste or by-products of the food industry and certain household waste<sup>152-155</sup>.

#### **Alternative systems**

A broader approach to sustainability needs to ensure good animal welfare while also minimizing the environmental impact of farming systems. In particular, regenerative systems provide environmental opportunities e.g. increased biodiversity from more complex habitats displacing intensively fertilised grassland, while also offering a high welfare potential for the pigs. While outdoor housing systems are often found to have an overall lower eutrophication potential than indoor systems per kg of output (e.g.<sup>120</sup>), careful management is required outdoors to lower the impact of nitrogen losses and soil damage<sup>121</sup>. Furthermore, to minimise the risk of over-fertilisation and over-rooting, outdoor housing should regularly be moved to a new area of land<sup>122</sup>.

There are also other broader sustainability benefits to higher welfare systems, such as lower risk of disease outbreak and zoonotic pandemics, and lower use of antibiotics and therefore lower risk of antibiotic resistance, which have critical implications for human health.

#### **Meat consumption**

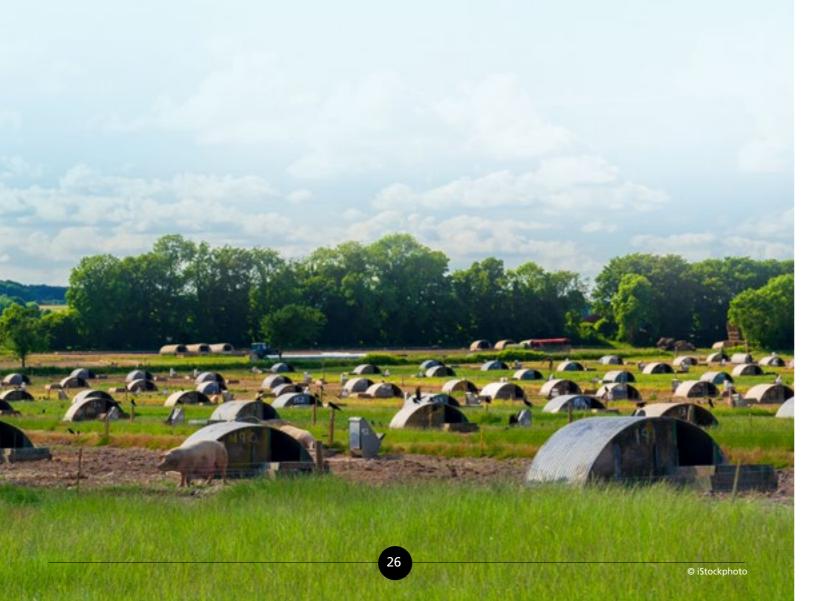
In addition to reducing the environmental impact of farming practices, a rebalancing of protein, away from a reliance on intensively produced animal sourced foods to a more diverse and sustainable diet with less reliance on animal sourced products (by promoting the consumption of natural based proteins (such as fruit, vegetables and pulses), plant-based meat alternatives, fermented protein alternatives, and cultivated (cell-based) alternatives), will be key to a future-fit, humane and sustainable food system<sup>156,157,158,159,160</sup>.

#### **EXAMPLE: Zonvarken Pig Cooperative**

Zonvarken is a Dutch farming cooperative established in 2018. The Zonvarken concept aims to have a farming system which benefits pigs, the farmer, and the environment. They operate higher welfare systems where sows are never confined; instead, sows are group housed with access to an outdoor grass covered orchard area (~1 Ha) with trees and a wallowing area. Zonvarken uses an innovative 'Separate Floor' system (patent-pending), which separates the solid faeces and urine directly. The solid manure is removed several times a day by means of a moving floor system (devised by Tangelder Techniek). This process has reduced ammonia emissions by about 70%. This manure management process has resulted in a large reduction (up to 90%) in methane. Additionally, by incorporating straw in the solid manure, the manure can be converted into bokashi, a high-quality fertiliser made of fermented organic material which can be used to improve soil health.

Zonvarken uses feed made from return flows and residual flows (waste products and by-products) from the human food industry. Their supplier 'Voerwaarts' specialises in making animal feed from residual food waste. They obtain a large part of the raw materials from FeedValid, a leading party in the collection of food return flows such as stale bread and broken crackers. Thus, no agricultural land is used to grow feed specifically for the Zonvarken pigs, resulting in feed that has an approximately 60% lower CO<sup>2</sup> footprint than conventional pig feed. Additionally, as the feed is made from waste, there is no direct or indirect food competition with people.

For more information on Zonvarken, see our detailed case study here.





### CONCLUSION

Individual companies, governments, and consumers are increasingly driving a global market shift to sow stall-free pig production. There is a large body of evidence showing the welfare benefits of cage-free group housing systems for dry sows, while studies show no adverse effect of group housing on reproductive performance, if appropriate pen design and management of group housing systems are ensured. Producers who have made the transition show that sow stall-free production is economically viable. Animal welfare is an integral part of a sustainable model of pig production, and only cage-free systems have the potential to deliver good welfare while improving brand reputation and meeting societal demand for ethical food.

There are also other broader sustainability benefits to higher welfare systems, such as lower risk of disease outbreak and zoonotic pandemics, and lower use of antibiotics and therefore lower risk of antibiotic resistance, which have critical implications for human health.

#### **Further reading**

- Indoor housing for dry sows practical options
- Case study on Zonvarken Cooperative farm
- Case study on group housing sows in China
- US Pigtrack report tracking US company commitments to gestation crate-free pork
- Report on Food Businesses paving the way for a cage-free Europe



## ANNEX I

### Summary of legislation on the use of sow stalls

EU					
	EU	EU	EU	EU	EU

Minimum standards for the protection of pigs in the EU are laid down in Council Directive 2008/120/EC (codified version, which includes a partial ban on sow stalls – stalls are permitted for the first 4 weeks post-service, and covers space allowances, provision of manipulable materials and mutilations. Some individual Member States and some other European nations (Norway, Sweden, Switzerland, forthcoming ban in Germany (2028) and Denmark (2035)) have completely prohibited sow stalls (inclusive of the observation period).

Other countries have partial bans: in Austria, the use of sow stalls has been limited to ten days since 2013. In the Netherlands, the use of sow stalls is limited to four days since 2013.



Minimum standards for the protection of pigs in the UK are laid down in The Welfare of Farmed Animals (England) Regulations 2007 (as amended, and related Regulations in other parts of the UK), which include a full ban on sow stalls and requirements for space allowances and provision of environmental enrichment.



There is no federal legislation protecting the welfare of pigs during rearing (only during transport and slaughter). Eleven US States have restricted the use of sow stalls for sows (year of full implementation in parentheses). Florida (2008), Maine (2011), Oregon (2012), Arizona (2013), Rhode Island (2013), Colorado (2018), Michigan (2020), New Jersey (2023) and Ohio (2026) only require group housing following confirmation of pregnancy, so dry sows may be kept in crates up to six weeks. California (2015, further measures in 2022) and Massachusetts (2022) have passed the strongest policies prohibiting both the production and sale of pork produced with any gestation crates use. California also requires dry sows are provided a minimum of 2.2 m<sup>2</sup> (24 ft<sup>2</sup>) of floor space per sow, surpassing the industry standard of 1.3 m<sup>2</sup> (14 ft<sup>2</sup>) in crates.

	Canada made a commitment to end the upper pushed back to 2029 due to industry interest of the second
BRAZIL	Brazil has general anti-cruelty legislation establishing minimum welfare standards
CHINA *	There is currently no specific legislation end rearing of pigs in China (only some basic
	There is a voluntary phase out of sow stal ban was 2017. In 2020, around, around 9 <sup>-</sup> Sows can still be crated in mating stalls fo
NEW ZEALAND	Sow stalls were banned in 2015 under the are permitted for the first 7 days post-ser

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use of sow stalls by 2024, but the deadline has been ervention and it does not include existing installations.

but there is currently no specific legislation for pigs in Brazil.

establishing minimum welfare standards for the requirements on slaughter).

alls in Australia – the deadline for this voluntary 01% of production was completely sow stall-free. or the first 5 days after service.

ne Animal Welfare Act in New Zealand, although stalls rvice.

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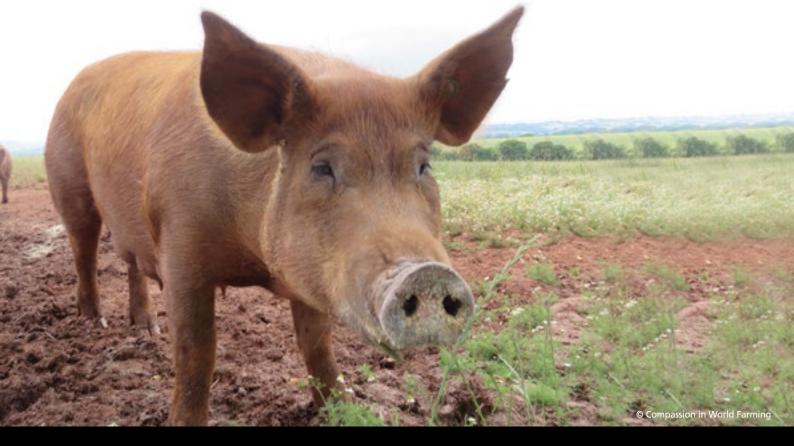
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