Humane World for Animals™

Formerly called the Humane Society of the United States and Humane Society International

The business case for preimplantation group housing systems

Table of contents

Executive summary

Consumer demand for animal welfare changes faster than the investment life of animal production facilities. Therefore, capital investments must consider the future market, upcoming policy, new technologies, and scientific advances. Without this, the changing state of animal welfare requirements will put producers at risk of constructing unsuitable animal housing systems that lack lasting resilience. This business case for preimplantation group housing is a summary of animal welfare scientific, practical and policy changes that are poised to impact pork production and consumption in the coming decades.

Internationally, new initiatives, such as the “End the Cage Age” citizen initiative in the European Union and “Proposition 12”, the ballot initiative that became law in California in the United States have local, regional, and global implications. In 2020, a Brazilian normative was published setting a 25-year timeline to phase out the sole use of gestation crates and adopt group housing systems for pregnant sows instead. Trade agreements increasingly include animal welfare. Corporate buyers are becoming more aware of and interested in how their purchasing decisions impact the welfare of animals in their supply chains, and they are enacting new purchasing requirements. These often include a pledge to move away from gestation crates, narrow metal enclosures used to confine breeding females (sows) in pig production. Just in Brazil, over 30 large-scale buyers have committed to sourcing exclusively pork meat from group housing systems. To meet this growing international demand, pork producers are moving to preimplantation group housing systems, which do not confine the sows for more than a few days for breeding. Both research and practical experience demonstrate that production results are comparable or better than temporary confinement systems that still rely on 28-days or more in crates, and they are successful in multiple counties across distant continents. These are sound production investments, which consider emerging best practices in animal welfare and are part of a strategy to achieve more sustainable production.

Introduction

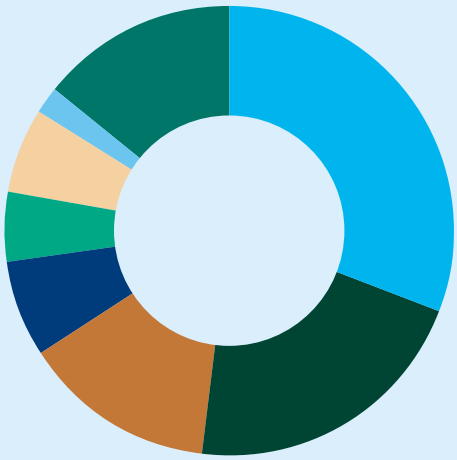
Animal welfare is an important topic for both business and finance decisions related to animal agriculture. Based on a well-established body of scientific research, it is now widely accepted that animals kept for farming purposes have requirements beyond nutrition, health, and basic housing, and pigs are no exception. These intelligent, social, active animals have complex behavioral needs that must be considered as well.

The predominant form of housing for female breeding pigs (sows and gilts) around the world is still gestation crates (also called "sow stalls"). These narrow, metal stalls are typically just 0.6 meters (approximately 2 feet) wide by 2.1 meters (approximately 6.9 feet) long,[1] barely larger than a sow's own body. She can take a step forward and backward, but she cannot turn around for the entire length of her gestation period, approximately 114 days.

Photo 1: Sows in gestation crates. Source: Jo-Anne McArthur/We Animals Media

Restrictive and barren, gestation crates have both physical and psychological impacts. In a natural environment, sows would normally spend about 31% of their time grazing, 21% rooting, 14% walking, and only about 6% of the time lying down (Figure 1).[2] However, when sows are locked inside gestation crates, the severe movement restriction and lack of exercise leads to reduced muscle weight and decreased bone density and strength.[3,4] In the crates, sows are also deprived of performing nearly all normal social behavior. The inability to express natural behavior leads to abnormal substitutes, including repetitive bar-biting, head-weaving, drinker pressing, and sham- or vacuum-chewing (making chewing motions with an empty mouth).[5,6,7] This stereotypic behavior of pigs is thought to indicate "...serious psychological and physical stress..."[8] and is considered an indicator of poor welfare.[9]

Behavior of unconfined pigs[10]



31% Grazing
21% Rooting
14% Locomotion
7% Social and agonistic
5% Nosing and manipulating
6% Lying
2% Standing
14% Other

Figure 1

With recent advances in housing designs, it is now commercially possible to accommodate more of the natural behavior of pigs without compromising productivity or profitability. Based on the science and growing public concern, gestation crates have been banned or restricted in several countries and regions of the world, including 11 U.S. states, New Zealand, the United Kingdom and throughout the entire European Union.

Gaining traction around the world, the alternative to gestation crate confinement is group housing. In group housing systems, sows are kept together in pens, rather than in gestation crates. Group housing designs vary widely, largely depending on the type of feeding system and the number of sows per pen, which may be small (4-6 sows per group) or ranging to more than 300 in large dynamic groups, as in European systems. However, in each case the sows have much more freedom of movement.

While group housing is becoming much more widespread, and the welfare of sows has improved substantially in these systems, some producers using group housing still confine sows in crates for up to 6 weeks or 45 days after breeding, before moving them into group housing. This is done to avoid mixing sows during the sensitive period in early pregnancy (see Text box 1), around 14-19 days after breeding.[11] Sows may lose their pregnancy if they become stressed during fighting to establish a dominance hierarchy in the group, so they are commonly not mixed until the second pregnancy check, at day 28 of gestation or later. The EU Directive that covers the welfare of pigs currently permits the temporary crate confinement of sows for 28-days and this practice is widely emulated around the world. However, a citizen initiative to "End the Cage Age" has been taken up by the European Commission, which would extend the ban on gestation crates and prohibit the 28-day period of confinement.[12] It is no longer best practice to confine sows for gestation, and new facilities must consider the potential for stranded assets and the long-term viability of investment in such systems. There are many successful cases around the world where the 28-days period of confinement has been eliminated. Future-proof systems are crate-free.

Photo 2: Group housing of sows in the Netherlands. Photo source: Humane World for Animals.

Porcine reproductive biology and the sensitive period.

Following insemination of the sow and successful fertilization, the developing conceptus spend 2-3 days in the proximal portion of the uterine horns. They reach the blastocyst stage at 5-6 days of age and 16-32 cells. By day 11-12, the growing blastocysts change shape, elongating from a sphere to a filamentous form while spreading evenly through the sow's uterus, becoming regularly spaced by day 12. Implantation is the attachment of the blastocysts to the uterine wall. Hormonal signals lead to continued function of the corpus luteum and rapid growth of the placentas (from day 20-70), in preparation for greater fetal growth between days 70 and 114 of gestation.[13,14,15] The implantation period is sensitive to stress, which can cause the sow to lose her pregnancy.

Text box 1

The improved alternative to 28-days or more in crates is a "preimplantation" group housing system, where sows are mixed *prior* to the sensitive period. The terminology for this system varies around the world and is also known as a "serve and let loose", "early mixing" or "inseminate and release" (these terms all refer to the same type of system). In preimplantation group housing systems, sows can be mixed directly after weaning their most recent litter of piglets or following breeding. Most commonly, the sow is released directly after artificial insemination is complete or shortly after when there are no behavioral signs of heat. In some cases, sows may be held in stalls for only a few hours for breeding or they may be bred in groups. Figure 2 illustrates how the holding period after breeding can impact the length of confinement for breeding females.

Length of gestation crate confinement in different types of group housing systems.*

Conventional

AI	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	15

Conventional systems: Sows are confined in gestation crates throughout the length of their pregnancy. The graphic above represents a typical sow pregnancy, where following artificial insemination (AI), the subsequent 16 weeks of pregnancy are endured in a gestation crate. (Yellow squares represent weeks confined).

6 weeks or 42 days

AI	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	15

Group housing with 42 days of gestation crate confinement: Sows are mixed into groups only after 6 weeks or 42 days in crates. (Light green squares represent weeks in group housing).

4 weeks or 28 days

AI	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	15

Group housing with 28 days of gestation crate confinement: Sows are mixed after 4 weeks in crates. The confinement period is still significant, restricting the sow's movements and behavior for a quarter of her entire pregnancy.

Preimplantation

AI	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	15

Preimplantation system: The sows are confined only to a maximum of 7 days after breeding and grouped in collective pens for the remainder of their pregnancy.

Figure 2
*AI = artificial insemination.

Pregnancy is the longest part of a sow's reproductive cycle, but not the entirety of her productive year. In a simplified example illustrated in Figure 3, the sow's cycle will last at minimum 20 weeks, where in a conventional system she will spend up to 17 of those in gestation crates and 3 or 4 in farrowing crates. If the desired average number of litters per sow is achieved, this cycle will occur approximately 2.5 times per year. By adopting a preimplantation system, the time spent in gestation crates will be reduced to one week at the maximum, or as little as no time at all when the breeding is done in groups. This is a reduction of 80% of the sow's time in crates yearly.[a]

Sow production cycle

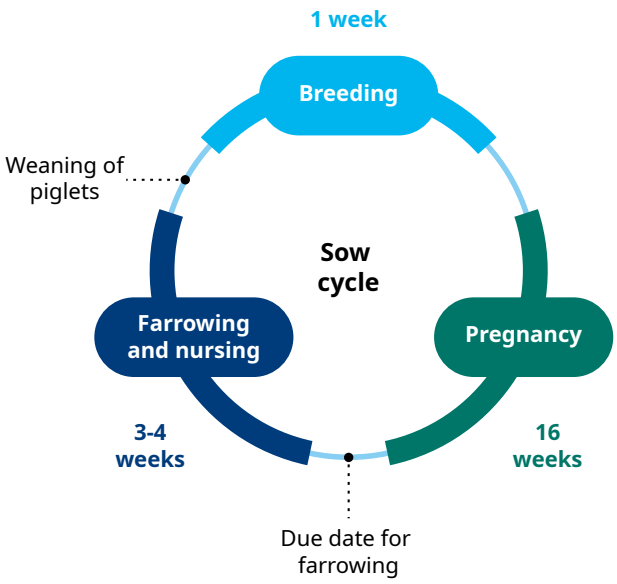


Figure 3

[a] Calculated as follows: 52 weeks / 20 week cycle = 2.6 cycles a year; 16 week reduction x 2.6 cycles a year = 41.6 fewer weeks in crates; 41.6 weeks x 100% / 52 weeks = 80% of the year.

Science and research

Production comparisons

With good management, the productivity of sows in preimplantation systems is as good as group housing with 28-days in crates, or even better. There are several published research comparisons from different countries, the results of which are summarized in this section.

Brazil

A 2020 study carried out on a commercial farm in Santa Catarina, Brazil, compared 524 female breeding pigs housed in groups either directly after breeding (the preimplantation treatment) or following 32 days of pregnancy in individual stalls and then group housed. Group size was 11 animals per pen with a partially slatted floor and space allowance of approximately 1.81m^2 per female. The feeding system used in the study was an automated drop feeder.[16]

The study measured pigs born per litter, pregnancy rate and farrowing rate. They found no statistical difference in any of these production parameters, but figures were numerically better for the preimplantation group housing system in each case (Table 1).

Table 1. Production results

Gestation housing system	Number of piglets born	Pregnancy rate (%)	Farrowing rate (%)
Preimplantation group housing	15.27	92.86	91.50
Group housing after 32 days	14.55	91.70	91.23
Pr > F	0.0696	0.8216	0.8438

Table 2. Production results

Mixing treatment of sows	Conception rate	Stillborn piglets
Early mixing (EM)	98%	0.95
Late mixing (LM)	87%	1.58

Canada

A 2015 Canadian study funded by the U.S. National Pork Board compared the effects of different mixing strategies in fully slatted group pens, with free-access feeding stalls. Sows were grouped with 14 individuals per pen and 2.2m^2 of space each. In the early mixing treatment, sows were mixed into groups directly following weaning of their last litter. They were fed, checked for heat, and bred in the free access stalls. In the late mixing group, sows were housed in individual stalls until five weeks of gestation prior to mixing in groups.[17]

The early mixing treatment had the highest conception rate (98%) and a significant reduction in the number of stillborn piglets. There were otherwise no differences in production performance among the treatments (Table 2).

Poland

In a study published in 2021, researchers in Poland were specifically interested in the period between weaning and estrus. They studied over 3,000 sow weaning events in a large commercial facility over two years and compared two groups: 1.) sows bred in individual stalls and confined for 28 days, and 2.) sows bred in groups, put back into stalls for 28 days and then moved back into groups. This allowed the researchers to isolate the specific effects of early grouping to breeding in stalls.[18]

For second parity sows (those in their second pregnancy), the proportion showing estrus within 7 days of weaning was significantly greater for those bred in group pens compared to those bred in individual stalls, with a pronounced seasonal effect (the better rate of return to estrus was mainly found in summer and fall). Except for the number of stillbirths, almost all reproductive measures improved when the sows were housed in groups directly after weaning (Table 3).

A key conclusion of the study is that group housing during the wean to estrus interval allows more social interaction and greater movement, which may stimulate behavioral estrus, improving (reducing) the weaning-to-effective service interval.[19] Moreover, this strategy allows the sows to establish a stable and cohesive group before the critical phase for embryo implantation. It also allows for early detection of estrus, as unrestricted behavior in pens facilitates accurate and timely estrous detection, because the behavioral changes are clearly visible.[20] This has implications for early mixing systems, generally.

Table 3. Production results

Variables	Individual stalls	Group pens
Conception rate (%)	84.2 ^{A}	87.4 ^{B}
Farrowing rate (%)	82.0 ^{A}	85.3 ^{B}
Weaning-to-first-service interval (days)	6.6	6.3
Weaning-to-effective-service interval (days)	13.9 ^{A}	10.8 ^{B}
Litter size (piglets/sow)	11.6 ^{A}	12.2 ^{B}
No. of live born piglets/sow	11.4 ^{A}	11.6 ^{B}
No. of stillborn piglets/sow	0.25 ^{A}	0.54 ^{B}
No. of mummified piglets/sow	0.02	0.01
Farrowing interval (days)	158.9 ^{a}	157.3 ^{b}
Farrowing index (litters/year)	2.33	2.34
No. of live-born piglets/sow/year	26.5 ^{A}	27.2 ^{B}

^{A,B} $P < 0.001$

^{a,b} $P < 0.05$

Table 4. Production results

Production measure	Mixing at 4 days	Mixing at 28 days	p-value
Pregnancy rate (%)	88	85	0.64
Farrowing rate (%)	84	81	0.52
Total pigs born	14.4	14.3	0.81
Piglets born alive	13.0	12.8	0.80
Stillbirths (%)	8	7	0.76

Italy

A study published in 2022 carried out at a 600-sow capacity farrow to finish farm in Northern Italy kept sows in breeding stalls for either 4 or 28 days. They were then mixed into static groups (with no further introduction of new animals) for the remainder of the gestation period until one week prior to farrowing. Each group had 21 sows per pen and provided a space allowance 2.25m^2/sow. Sows were floor fed by manually spreading feed in a wide clean area of the pen floor. Measures in the study included the number of fresh skin injuries and old scratches (indicators of fighting) and salivary cortisol concentration, a measure of stress. The only significant treatment effect was the number of old scratches, which was worse on day 3 after mixing, only in the 28-day stall treatment. They used pregnancy rate, farrowing rate and litter size as indicators of reproductive efficiency. There were no statistical differences in any of these measures (Table 4).[21]

United States

A study carried out at a demonstration farm in Kansas compared stalled sows to those in group pens with an Electronic Sow Feeding (ESF) system, which is an automated, gated stall that uses microchips to individually recognize each sow and provide a specific quantity of feed according to her body condition and gestation length. The flooring was half solid and half slatted. In this study, estrus detection was done in pens. Non-pregnant females were checked with a boar for standing estrus, were naturally mated, and then placed into stalls. Subsequent mating was with artificial insemination in the stalls. Next, the sows either remained in the breeding stall for the duration of gestation or were moved into group pens within 2-4 days. The pens measured 11.99 x 7.32 meters and group size varied between 30-60 sows, depending on the production schedule.

Better production results were achieved in the group housing treatment. Group housed sows had improved return to estrus within 7 days post weaning and better farrowing rate, higher litter birth weight and higher litter wean weight compared to those confined to stalls (Table 5). There was no overall difference in the number of piglets born alive or weaned.[22]

The study concluded that sows in groups with ESF systems had either similar or improved performance compared to sows confined to gestation crates.

Table 5. Production results

Production measure	Gestation crate	Group pen
Return to estrus (%)	91.7	94.5
Return to estrus within 7 days post-weaning (%)	68.4 [c]	72.0 [d]
Farrowing rate (%)	89.4 [c]	94.3 [d]
Litter birth weight (kg)	16.7 [e]	17.7 [f]
Litter weight at weaning (kg)	56.2 [e]	57.1 [f]

[c,d] Percentages with different superscripts differed, $P < 0.05$.
[e,f] Percentages with different superscripts differed, $P < 0.001$.

Current scientific understanding

European Food Safety Authority

The European Food Safety Authority (EFSA) is an agency of the European Union that appraises and integrates scientific evidence to answer questions about risks in the food supply chain. As part of its evaluation of animal welfare legislation, through the 2020 Farm to Fork strategy,[23] the European Commission requested EFSA to give an independent view on the welfare of pigs kept in different types of husbandry systems, including breeding females. EFSA reviewed the relevant literature, including in languages other than English, finding 20 studies that reported reproductive outcomes depending on the time of sow grouping. The report was published in 2022. They concluded that "In general, if grouping takes place immediately or in the first days after service, reproductive performance can be as good as that with grouping at 4 weeks after service".[24] They further recommend: "To avoid the welfare consequences of stall housing and the possible consequences of stress during early pregnancy for reproductive performance, sows should be grouped at the time of weaning..."[25]

Since the housing conditions in the studies reviewed by EFSA differed widely (different group sizes, static vs dynamic management, flooring type, space allowance, etc.) there was large variation in the results. The conditions that result in superior performance and the reproductive benefits of permitting animals more freedom of movement will become better elucidated as more practical experience and continued research accumulates.

However, many ways of managing the mixing of sows to reduce aggression and improve success are well established. These include providing adequate space, providing straw or other bedding, keeping familiar groups together, providing fiber-rich diets, reducing competition during feeding, and positive human interactions.[26]

Research on piglet immunity

The environment in which sows are kept has an impact on the fetuses developing in her womb. While the research is in an early stage, a study published in 2021 found compelling evidence that there may be benefits for the immunity of piglets if the sow has more freedom of movement. Researchers collaborating in the United Kingdom and Poland compared sows kept in crates from day 1 through day 100 of pregnancy to those group housed from day 1. They measured stress indicators and immune-based indexes in the piglets and found that "... piglets delivered by sows kept under movement restriction conditions exhibited higher cortisol and acute phase protein levels as well as a lower lymphocytes proliferation index. This suggests that lack of movement in sows during the gestation period influences piglets' physiology and indicates that the piglets are suffering from prenatal stress caused by insufficient housing conditions of their mothers potentially leading to poor health and welfare of their offspring."[27]

Practical experience

Cost

Capital and operating costs for sow housing vary greatly between regions, and depend on farm size, design and layout options and whether the project is a new building or a renovation. For an update to an existing barn, the ability to reuse equipment, the flooring, the manure handling system, among many other factors, will have large impacts, so generalizations regarding cost differences are difficult. However, when the layout is well planned, some preimplantation designs can house more sows in the same building footprint as a stall barn.

According to Jyga Technologies,[b] a manufacturer of software and automated equipment for electronic feeding systems (ESF) based in Canada with equipment sold around the world, the reduction in gating (steel or iron needed) in a group housing system with *Gestal* 3G (photo 3) is a cost savings compared to a house with sows fully confined in crates throughout pregnancy. It's not only the materials, but the labor costs of installing each crate and the upkeep and maintenance, particularly if they are not constructed from quality materials and break down over time. Additionally, in a stall barn, each sow space requires plumbing for a nipple drinker, which substantially adds to the cost. While a feeding station with ESF does have an initial investment cost, each station can feed up to 20 sows, spreading the expense over many animals. Depending on the layout of the barn, and the space provided per sow, some group housing designs can house up to 18% more sows in group housing pens than they can in a fully crated system, because the aisleway space between rows of stall is better utilized. One layout, which includes free-access stalls with ESF, has lower capital costs to build. For an average farm with more than 5,000 sows, the cost per sow space can be reduced by up to 35% (depending on the space allowance per sow).All these factors result in substantial cost savings. Jyga customers who have received quotes from different equipment manufacturers shared that the ESF system is less expensive to build (Table 6).

[b] Entrevista realizada el 30 de agosto, 2023.

Table 6. Three cost estimates for a new build from different equipment providers.[c]

Category	Gestation stalls	Shoulder stalls	Gestal
Total sow spaces	4610	5528	5454
Total sow spaces	100%	120%	118%
Gating	100%	118%	24%
Electronic feeders			100%
Feed system	100%	60%	13%
Plumbing	100%	98%	40%
Install labor	100%	73%	99%
Total	100%	98%	77%
Cost/sow space	100%	81%	65%
Space allowance/sow	18.8ft^2 or 1.75m^2	20.4ft^2 or 1.89m^2	19.6ft^2 or 1.82m^2[d]
Cost/square foot	100%	75%	62%
Cost/sow space (USD)	490.30	399.12	318.66

Photo 3: Gestal 3G group housing system.
Photo source: Jyga Technologies.

[c] Information provided by Midwest U.S. Pork producers. 2023, Q1. Interview conducted August 30, 2023.
[d] Note that this system would not comply with the space requirements of Proposition 12.

Photo 4: Sows in preimplantation group housing at Hartos Agropecuária

Case studies

Case study: Brazil

Hartos Agropecuária, Granja Miunça is located in Basília, Federal District of Brazil. The farm has 4,000 breeding females and is a full cycle (farrow to finish) operation.

Interest in animal welfare at Hartos Agropecuária started with the former owner in 2010-2011, and continued when the new owners took over the operation in 2018. The former owner valued technology, and at that time he heard about group housing systems, including automatic feeding stations, and that these systems were already being adopted in Spain. Interest in the concept led him to visit farms in Europe where he studied the possibility of bringing these systems to Brazil to promote

Hartos Agropecuária is a 4,000-sow breeding farm in the Federal District of Brazil started in 2010. They use static groups of 80 sows with an Electronic Sow Feeding (ESF) system. Sows are confined to breeding stalls for just 4 days, on average.

Text box 2

higher welfare for the animals. The farm at that time used 100% gestation crates. An expansion project began, however the initial system was designed around keeping the females for 35-40 days post-breeding in crates. After the initial transition, it took time to learn to work with the new equipment, since only manual or semi-automated feeding systems had been used before, and there were some initial challenges. Some of the important points learned were about preventive maintenance and ensuring a backup power source. Following improvements to the Spanish system for Brazil, Hartos Agropecuária achieved even better production results than the same system in Spain.

While there was already a well-structured group housing system in place when the new owners took over in 2018, the farm made further animal welfare improvements and moved to a 100% early mixing (or preimplantation) system.

Description of the system

Sows are transferred to groups on average 4 days after keeping them in breeding stalls, where they are artificially inseminated.

The group size has varied over time and between different facilities, depending on the type of feeding station and genetics used. The group housing started with pens of 80 animals (which was the group size dictated by the electronic feeding equipment), but currently 40% of the facilities now have smaller groups of 15, 30 or 45 animals.

The stocking density is adjusted according to the size of the pen, the size of the animals (whether gilts, adult sows, heavier genetic strains, etc.), and the availability and placement of feeding stations. The flooring is 40-50% slatted and the rest is an area for resting.

The current practice is to use static groups (this was another change adopted with the higher welfare improvements). The static group needs more available space to work, but Hartos Agropecuária believes it is essential for the well-being of the animals at their farm. In the previously used dynamic groups, there was more fighting among the sows, which sometimes led to loss of productive performance. In the previous dynamic group management system, females were introduced in sets of 10 at a time and this caused fights throughout the housing period. For this farm, static groups work better as the group composition remains stable until the transfer to the farrowing ward. Sanitation is another benefit of static groups, as when all the animals are removed for farrowing, the pens can be washed and disinfected, reducing the infection pressure. From the employees' point of view, the static group is easier to work with as well, because removing and inserting small sets of animals into the dynamic group was a lot of work. The static system is much easier for the employees and the sows are calmer. Production results at Hartos Agropecuária are good (Table 7).

Table 7. 2022 Production results for Hartos Agropecuária

Production measure	Farm result
Average weaning-to-estrus interval (days)	3.69
Average conception rate (%)	93.84
Average farrowing rate (%)	92.43
Average number of total piglets born/litter	16.34
Average litter weight (kg)	20.64
Average weight at birth/piglet (kg)	1.36

Case study: Brazil

BRF has an all-encompassing animal welfare program that proposed adopting group housing systems in all new constructions as early as 2012. In 2014, this commitment was made public and BRF has since been converting existing barns to group housing systems. In 2023, the company celebrated 55.9% implementation of its commitment and in 2023, updated its policy language to include a pledge to adopt preimplantation group housing in all new units or expansions.

BRF is the largest pig producer-processor in Brazil, with owned and contract farms all over the country. With a herd of approximately 400 thousand sows in production, the company began phasing out gestation crates in 2012 and currently adopt both preimplantation group housing and late mixing systems.

Text box 3

Description of the system

BRF prefers to work with smaller groups, in average of 40 sows, with a space allowance of 2.03m² or 21.85ft² per animal. The company had a few trials with electronic sow feeders (ESF) but noticed other feeder designs improved sow behavior, employees' work conditions and construction projects. In most projects the company now adopts the so-called "minibox" system, a type of shoulder stall commonly used in Brazil that can repurpose parts of old gestation crates. Throughout its own and contract farms, BRF has both early and late mixing systems, depending on each barn project's immediate possibility. At the preimplantation farms, sows are inseminated in breeding stalls and transferred to the group pens 3 to 7 days after the insemination protocol. For late mixing systems, this transfer occurs only 28 days after breeding.

As a pioneer in this transition in Brazil, BRF needed to adapt the scientific knowledge available to the Brazilian production model, which is notoriously different from the European and American systems. There are also geographical and cultural challenges to overcome, especially when engaging the contract farms. About this transition process, BRF's team shared: "When proposing the adoption of the group housing

Photo 5: One of BRF's ESF barns.

Photo 6: A typical group housing barn in BRF.

system, it is necessary to adapt the dialogue to each of our partners, respecting their desires, social and cultural aspects. It is also crucial to constantly invest in training, considering the behavioral aspects of pigs, the formation of hierarchies and the establishment of new handling standards to best work with our sows." BRF reports that there is an average increase of 5% in the space necessary to house the same number of sows and confirms that all retrofits involve changes in the production flow and financial investments to be implemented.

The company also highlights differences between the preimplantation and late mixing systems, and the major improvements group housing systems provide in comparison to gestation crates. "Sows housed in group pens present less stereotypies, a lower prevalence of stress indicators, and increased positive interaction with the employees, who in exchange also share a more positive perception of the work in non-confined systems." According to BRF, preimplantation systems present slightly more complex management for females and lower productivity at first. However, as with any learning curve, these challenges are being overcome and zootechnical performance is equivalent to the traditional system.

Financing the conversion projects is still the biggest challenge when phasing out gestation crates. In Brazil, there are few credit lines that can be applied to this type of project, and regular resources currently have interest rates that make the project unfeasible, especially after the COVID-19 pandemic and its economic impacts. All cost increases were absorbed by BRF, so there was no increase in the final product's cost due to the transition to group housing systems. There was also a need to increase the number of employes, and like several sectors of the economy, agriculture faces challenges with labor shortages and high turnover. These aspects increase the need for recycling knowledge to ensure the welfare of farm animals is a constant priority.

Case study: Spain

Albesa Ramadera is a commercial farm and research and training center in Catalonia, Spain. Construction started in 2009, after the owners received European funding to compare 3 breeding systems ("serve and let loose", 4 weeks or 28-days in crates, and 6 weeks or 42 days) in a large-scale production environment. Other important areas of focus were the promotion of transparency and a system that was successful in animal welfare. To facilitate teaching and education, Albesa Ramadera partners with universities and was built with a separate visitors' center. To ensure biosecurity, visitors can view the group housing system through windows in the classroom (Photo 7), which has a separate entrance from the animal buildings.

Albesa Ramadera combines a commercial farm with a research and training center in Catalonia, Spain, with 3,300 sows. Built in 2009, Albesa Ramadera was one of the first farms to begin trialing preimplantation systems. The consulting arm of the business, Optimal Pork Production (OPP) has assisted farms in Spain, Brazil, Guatemala and other countries to also install preimplantation group housing systems.

Text box 4

Albesa Ramadera uses an ESF system and decided on groups of 160 animals (Photo 6). Flooring in their barns follows EU requirements combining solid and slatted floor with a space allowance of 2.025m^2 per sow in semi-static groups (one mixing). EU Directive restricts stocking density to 2.25m^2/sow, but a 10% reduction is permitted in larger group sizes.

Albesa Ramadera prefers working with bigger groups because the larger pens, and the separations with walls inside the pen offer more opportunities for sows to avoid negative interactions (Photo 8). With the ESF, even in bigger groups, there is still control of the animals, because each sow is fed individually.

ESF also offers the most opportunity for precision feeding. Piglet mortality is reduced with micronutrition through intrauterine effects. The ESF system is a good option for providing supplements in the diet, to improve colostrum quality or bone density, for example.

Another benefit of ESF is that the technology that comes with the system is attractive to young people entering the field, and this helps bring in and keep bright new employees.

For enrichment, logs of wood were tried, and this worked, but the sows went through it fast, and it "bumped" and bruised the sows. The logs also rolled into the feeding stations if they were loose. They also tried compacted straw, compressed wood, herbal mixes, plastic balls, among others. These enrichments were student thesis projects. Now they are using chains and chewable plastic that are durable. Labor to provide the enrichment is a challenge, during summer people leave, so the farm is seeking something practical and viable to be applied

Photo 7: Classroom viewing area at Albesa Ramadera

Photo 8: Gestation barn at Albesa Ramadera

throughout the integration chain. Environmental enrichment is important to Albesa Ramadera and they are committed to finding a good solution.

Gilt pens are outfitted for training, so the young animals learn to use the ESF while they are in holding pens, from 110 to 130kg, before they are ready for breeding. The training period takes from 2-5 weeks. The training starts with the gate to the feeding stall open, then it is half closed to encourage the gilts to start pushing open the doors.

When gilts are ready for breeding or sows have weaned last batch of piglets, they are moved to crates for breeding. After coming into heat (within 4-5 days on average), they are bred according to the artificial insemination protocol, typically once a day. Heat detection is done by passing the teasing boar. Employees are trained to look at the ears, stance and vulva coloring and swollenness. One to two days after the inseminations are done, they are moved into the groups in weekly batches.

At Albesa Ramadera, it is believed that animal welfare and productivity go together. Better production results (Table 8) can be achieved with a preimplantation ESF system, because precision feeding can start earlier. Micronutrition programs start immediately after breeding, and this produces healthier piglets with more stable immunity. Precision feeding results in feed savings cost and helps keep sows in correct body condition with better reproduction.

When this farm was built, it was the first of its kind. Albesa Ramadera concedes they made mistakes at first, but every farm that came after improved. Because the project was funded by the EU and the proposal was to test the 3 systems, the facility has more crates than they would like. If they were to do it again today, they would only keep the crates for insemination and expand the space available for pens. Preimplantation (serve and let loose) systems are now widespread and in big farms all over Europe, and many other farms inspired by Albesa Ramadera and their consulting company are successful internationally.

Table 8. Production results for Albesa Ramadera*

Production measure	Farm result
Average farrowing rate (%)	88
Average number of total piglets born/year	32.2
Average number of weaned piglets/year	28.5
Average weight at birth/piglet (kg)	1.38

* Note: Farm positive for Porcine Reproductive and Respiratory Syndrome (PRRS).

This case study was developed in 2023. Since then, Albesa Ramadera no longer belongs to OPP Group.

Case study: Canada

Hog-Tied Farms Ltd. is located in the province of Ontario, Canada.

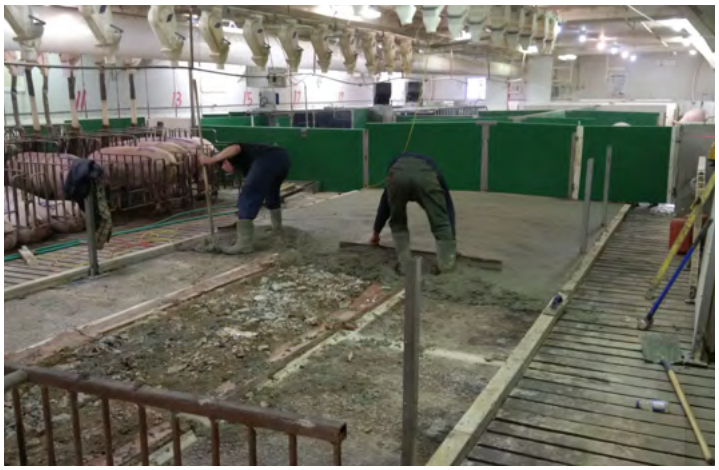
The farm has 350 breeding females under a full cycle (farrow to finish) operation. Currently, the farm has three connected sections: the first and oldest section houses the gestating sows and weaning/breeding area, the second and newest section is farrowing and nursery, followed by a third section of housing acclimatizing gestating gilts, grower and finisher pigs. John Van Engelen, the owner, is very enthusiastic about what they have achieved at Hog-Tied Farms, and he is keen to share his knowledge with other farmers and consumers.

In 2013, Hog-Tied Farms was invited to participate in the National Sow Housing Conversion Project. John was already interested in the conversion at this point as he and his family frequently travelled to Holland, where they saw group housing farms working with the ESF system. During their trips, they learned more about the benefits of ESF, and this is what they were interested in implementing at their farm. The retrofitting project was divided into four phases to facilitate sow management. Each phase involved removing a portion of the gestation stalls, pouring concrete to create solid areas for resting, adding partitions to provide separation or hiding areas, and setting the ESFs. The first phase included building a sorting area and an automatic heat detector system with a large boar pen. The work was completed within two weeks. In this phase, the largest number of stalls were removed (64 stalls).

Text box 5

By then, John learned that training the animals prior to introduction to the ESF pen would ease management. In 2014, an ESF gilt training room was built in the former nursery and grower rooms. The retrofitted gilt training room included entrance and exit zone gates like the ones animals may encounter in an ESF, but not the actual ESF. Retrofitting conversion continued with phases 2, 3 and 4, all completed in 2014. Phase 4 included an ESF section for gestating gilts. At the end of these phases, approximately 114 stalls were removed.

Photos 9 and 10: Phase 1 photos, when the work started and once it was completed.



Photos 11 and 12: Work carried out during phase 3 and phase 4.

In 2015, a “pre-mix ”pen was built within the gestation room, which included removing 16 stalls. This pen was planned to facilitate sow integration into the herd to reduce aggression and for animals to get used to the environment. In the pre-mix area or pen, they can eat, lay, and socialize while getting used to their environment, particularly for sows in their second parity who are new to this room. New gestating sow groups are moved into the group housing room once a week.

The whole retrofitting of the sow gestating room was an ongoing process that was completed in two years. The last remaining stalls were removed in late 2018 after gestating gilts were moved to a retrofitted room exclusive for this group that included two ESF units.

Photo 13: Pre-mix area.

Managing the groups in pens

New gilts (150 days old) arrive from a breeding farm and are put into the acclimatization/training room for two months. This room has two one-way gates, entry and exit, at either end of the divided room. One side of the room has feed, the other has water, forcing the gilts to go back and forth. Springs are added after a month, and the tension is periodically increased, until it reaches actual ESF gate tension. At approximately 210 days old, they are moved to the ESF gilt room where they are kept separate from the other gilts until the ESF training is complete, about 1 week. After the week of training, all separation gates are removed, and all the gilts can co-mingle.

Gilts are inseminated using non-gated stalls located within the ESF pen. Animals are free to go as soon as the procedure is completed. Once the gilts are close to farrow, they are moved to the farrowing room. After weaning, the gilts are transferred to the breeding room for the first time and enter the ESF sow pen. In both gestating rooms, ultrasound is used to confirm pregnancy on approximately day 28 after breeding. Gilts are temporarily held in a stall and immediately released for pregnancy checking

Photos 14 and 15: Gilt acclimatization and training room.

Photos 16 and 17: Group gilt housing.

or, if the gilts allow it, the procedure is done in the pen. For the sows, the ultrasound is done in the pen. Animals that lose the pregnancy are marked after ultrasound confirmation or by the automatic heat detector and segregated accordingly.

The farm uses dynamic groups with early mixing approximately 13 days after weaning. At weaning, sows are moved to the breeding area where they mix with their weaned group, free to go in and out of free-access stalls. They are locked in the stalls four days post weaning, bred the next day, then let back out 3 days later to interact again, for 4-5 days total of confinement. Thirteen days post weaning they are moved to a pre-mix pen, located off the sow dynamic group. In this space they are floor fed upon arrival. The following morning, the pre-mixed group is opened up and they can begin eating from the ESF before the feeding day starts.

The group housing pen has 4 ESFs and can house up to 180 sows. They prefer to have fewer sows/ESF than recommended (this helps lower aggression). The stocking density is maintained at 24ft^2 (2.22m^2) per sow as this provides more space for the sows, reducing the risk of lameness and aggression. The stocking density is similar in the gilt gestating room.

Photos 18 and 19: Sow breeding room with free-access stalls.

The whole farm is characterized by the embrace of technology, housed throughout a well-maintained, clean, and ventilated building. The farm has different performance monitoring systems feeding into a central computer and cell phones, all connected through Wi-Fi. Computerized feeding systems in the gestation, farrowing, and finishing areas track RFID ear tags, technology which monitors weight and adjusts feed allotment to individual nutritional needs. In addition to group sow housing with Electronic Sow Feeders (ESF) and automated heat detection, the farm has a state-of-the-art ventilation and heat recovery system, auto-sort finishing, farrowing lift crates and open farrowing pens.

Economic investment and experience

Hog-Tied Farms retrofitted their existing facilities to accommodate the group housing rooms (sows and gilts) without needing to strengthen the building's foundation. They maintained the same number of gestating animals throughout the project. Through the years, new buildings connected to the original have been added to accommodate the number of animals kept for fattening. Their experience has shown them that having a full-cycle farm works better from the economic and welfare perspective. They carried out the facilities retrofitting using their operating loan at approximately CAD$ 60,000 or CAD$240 per animal (considering that they had 250 breeding animals); they went from 220 stalls to a 180 sows group housing room. Even when the sow herd was reduced, they did not notice any loss in performance or income. This is in part because the farm receives a CAD$2.00 premium on top of each hog, for open pen gestation from their packing plant (the farm is part of a cooperative that owns a packing plant). The initial investment has also been paid back through the years, as they have been saving through an efficient feeding system using the ESF. When sows are culled, they are in excellent shape; therefore, he can also sell them at a premium. The sow mortality at this farm is at approximately 3.8% (the average mortality rate in Canada in 2022 was12.8%). The expenditure for the conversation was seen as an investment that needed to happen. It was an opportunity to keep doing better and to listen to the consumer.

Production results

Table 9. 2022 Production results for Hog-Tied Farms.

Production measure	Farm result
Average weaning-to-estrus interval (days)	8.57
Average conception rate (%)	88.7
Average sow weight at transfer to farrowing (kg)	275
Average farrowing rate (%)	85.8
Average number of total piglets born/litter	14.5
Average number of piglets liveborn/litter	12.7
Average number of stillbirth/litter	1.3
Average lactation length (days)	24
Average litter weight at weaning (kg)	87.9

Case study: United States of America

Niman Ranch is a branded network of small- and mid-size family farms in the United States, including more than 500 hog farmers producing upwards of 300,000 pigs annually. All producers are compliant with California's Proposition 12 and Massachusetts' Question 3 requirements. Niman Ranch has been successful in implementing high welfare systems for pig production due to buyer partners such as Whole Foods Market, Harris Teeter and Natural Grocers and restaurant chains including Chipotle, Pret A Manger and Shake Shack.

Text box 6

Niman Ranch has had strong commitments to sustainability and animal welfare since it was founded in the 1970s. The company adopts outdoor and deep bedded housing systems that are fully crate-free in both gestation and farrowing stages. All the farms in this network have been certified by Humane Farm Animal Care since 2016. In addition to being audited by this respected third-party entity, the company has its own set of protocols and regular audit process by the company's field agents to ensure the best practices are adopted. According to the Niman Ranch Pork Protocols, farmers are required to provide at a minimum of 3.25m^2 (35ft^2) total space allowance required per gestating sow. Gilts can be housed in a higher density, yet still spacious, with 2.2m^2 (24ft^2) per gilt. No facilities should use fully slatted floors, and bedding should always be provided in the solid flooring area.

Photo 20: Paul Willis, Niman Ranch's founding hog farmer, uses huts on pasture for gestating sows.

The Niman Ranch pork protocols also include providing opportunity for the sows to care for their piglets. They ensure sows have enough space and resources to build nests, turn around and move about easily at all times. During farrowing, the required space allowance is 5.9m² (64ft²) in individual farrowing pens, or 4.4m² (48 ft²) in pen designs with daily access to a larger common area in addition to the individual farrowing pens. All kinds of crates are prohibited within the Niman Ranch system, with an exception for short confinement (up to 2 hours) in stalls for procedures such as veterinary care or artificial insemination.

While all Niman Ranch hog farmers follow the same strict protocols, the program looks different on each farm. Many Niman Ranch farmers raise their pigs farrow to finish, but the program is finding growing interest in more specialization with farrow to wean and wean to finish options. Housing types can vary depending on the farm type, buildings on site, land available, and the season. Popular housing types include hoop barns, open front sheds, and retrofitted barns.

By providing low stocking densities, bedding and other enrichments, fresh air and extra care and attention, Niman Ranch producers create a low-stress environment where routine antimicrobials are not necessary. Not only is this model preferred for promoting pig welfare, but it is also a way to ensure resilience of family farmers, who are paid a stable premium based on the cost of inputs, helping ensure cost margins are attained. Farmers have an annual agreement with the company with an estimated number of pigs the farmer plans to sell to Niman Ranch. This agreement helps Niman Ranch with annual planning and forecasting to ensure sufficient supply for its customers. Additionally, it provides farmers with a great deal of assurance knowing that they have a place to sell their pigs at a premium price. Farming inherently carries a lot of risk, and Niman Ranch helps provide stability and more secure economics.

While labor intensive, many farmers appreciate the quality of farm life the Niman Ranch system offers with fresh air and managing lower stress animals. These benefits have proven successful in attracting young farmers, which Niman Ranch believes is critically important for food security and building a future workforce in the agriculture sector. The average age of a Niman Ranch farmer is 43, more than 15 years younger than the average farmer in the United States.

Raising pigs with Niman Ranch requires much lower overhead costs than a large-scale confinement building for commodity pork production, making the program more accessible for young and beginning farmers. Many farmers joining Niman Ranch are able to retrofit infrastructure already on their farm to meet Niman Ranch standards, something not feasible with commodity production. A recent economic analysis found that the Niman Ranch model produced more than 50% more economic value and 150% more jobs in rural communities compared to conventional hog production, per 100,000 hogs.

Photos 21 and 22: Many Niman Ranch farmers use open-air barns for group gestation.

Photo 23: Lactating sows with their piglets getting some fresh air.

Niman Ranch considers itself a partner to its farmer network. Niman Ranch provides farmers with regular support to help improve their farm's production and operations. New farmers to Niman Ranch are provided extra support through a farmer mentor program helping the new producer avoid common challenges or issues they may face. Additionally, Niman Ranch is committed to helping the next generation of farmers continue the family legacy of humane animal care. Since 2006, Niman Ranch has awarded scholarships and grants to farm families helping cover the cost of college for their children and on-farm investments for young farmers to make their enterprise more efficient, profitable and sustainable. In total, the company has distributed more than $1.5M to hundreds of farm families.

Farmers often say that Niman Ranch allows them to focus on what they do best and enjoy most – raising pigs. Niman Ranch manages the rest of the logistics including processing, sales, marketing and distribution. While the brand is higher priced than conventional pork, it has developed a competitive model by achieving a level of scale and efficiency through its large network of smaller farms and supplying a premium product to values-driven customers. Even through the COVID-19 pandemic that disrupted restaurant purchases across the country, Niman Ranch farmers were able to maintain sales by diversifying supply to grocery stores, butcher shops and their virtual "farmers' market" sales. In addition, Niman Ranch has built a network of buyers and distributors that ensure their farmers' production flow. Chipotle for example, one of the largest fast-food chains in the country, has been a proud buyer of the company's crate-free pork for over 20 years. Chipotle has distinguished itself in the marketplace through its Food With Integrity program that prioritizes sustainably and more humanely raised products, including crate-free Niman Ranch pork.

Education and storytelling are critical for Niman Ranch's success by helping consumers understand the value the brand offers, despite its higher price point. In addition to on-package labeling claims like the Certified Humane logo, No Antibiotics and Sustainably Raised, Niman Ranch relies on farmer narratives to showcase the brand difference. Niman Ranch regularly shares farm photos on social media, sends farmers out to meet with chefs and grocers, and hosts farm tours for customers. Niman Ranch is committed to transparency and building connections with consumers from farm to table.

The changing market

Consumer awareness and concern regarding farm animal welfare is increasing and is not limited to high income countries. A study published in 2022 surveyed over 4,000 members of the general public in 14 countries on their perceptions of animals and animal welfare. Most participants agreed that the welfare of farm animals is important, without distinction between developed and developing regions (Table 10).[28]

Corporate pork buyers, aware of consumers' evolving values, stay ahead of customer concerns. Most major corporations now have responsible sourcing practices integrated into their business models and entire departments devoted to sustainability. Animal welfare is a top concern for corporations with responsible sourcing objectives. Over 70 major brands have public-facing commitments to improve the welfare of pigs in their supply chain, by phasing in crate-free pork. Brazil holds 30 of those commitments, from big retail groups such as Grupo Pão de Açúcar, Grupo Carrefour, Grupo DIA and large restaurant, hotel and manufacturing groups, such as Marriott International, Grupo Trigo, Arcos Dorados and Brazil Fast Food Corporation. These commitments are summarized at cratefreeworld.org.[29] For instance, in 2022, the U.S. based retail chain, Target, renewed their commitment, stating:

"In 2022, we launched a system to raise all Good & Gather fresh pork, which represents the vast majority of our fresh pork sales, in an open pen environment. ***We expect all pork suppliers to further reduce, and eventually eliminate, the number of days sows are housed in gestation crates****."* [30]

Not only are buyers attentive to the shifting market, but producers are taking matters into their own hands. In Brazil, the largest producers in the country have already pledged to phase out the use of gestation crates. Big names such as JBS, BRF, Pamplona and Alibem issued clear commitments to adopt preimplantation group housing for all new projects in their welfare policies. This strong and voluntary market shift sends a strong message that the future of pig production is crate-free, and that the global south has good examples to follow.

Compassion is a cross-cultural value.
Public polling shows that concern for animal welfare is not limited to developed countries.

Text box 7

Table 10. Survey responses

"The welfare of farm animals in my country is important to me"			
Country	**Proportion of respondents agreeing**	**Country**	**Proportion of respondents agreeing**
Australia	91.2	Nigeria	77.8
Bangladesh	82.5	Pakistan	95.2
Brazil	90.2	Philippines	87.7
Chile	96.8	Sudan	85.0
China	81.5	Thailand	83.0
India	85.0	United Kingdom	88.6
Malaysia	85.4	United States	86.5

Global policy

Laws and legislation

Many countries already use preimplantation group housing including in the United Kingdom,[31] Sweden, The Netherlands,[32] and New Zealand.[33] In Germany, there is a gradual phaseout of gestation crates by 2029 and in Denmark by 2035.[34] In Australia, there is a voluntary ban on the use of crates for more than 5.[35]

In Brazil, a normative (Instrução Normativa nº113/2020) was published in 2020 by the Ministry of Agriculture, Livestock and Supply (MAPA), establishing best practices and minimum welfare standards on commercial pig farms.[36] Among the new requirements, this publication set a 25-year deadline for the adoption of group housing systems for all Brazilian producers, tolerating a maximum of 35 day-period for confinement after breeding. In addition to this phase-out, the normative forbade fully slatted flooring for group pens and set a minimum space allowance of 1.30m² for gilts, 1.50m² for pregnant gilts and 2m² for all sows in collective housing.

Direct comparisons of productivity between specific countries are available through the Agriculture and Horticulture Development Board of Great Britain. In the Netherlands, just 4 days are permitted in crates for breeding,[37] yet in 2022 producers reached over 32 piglets weaned per sow per year. The same year, in the United States, where preimplantation group housing is not the dominant form of production, the number of piglets weaned per sow per year was only 27.81 (Table 11).[38]

Table 11. Production figures in The Netherlands and The United States[39,40]

	Netherlands				United States			
	2019	2020	2021	2022	2019	2020	2021	2022
Pigs weaned/sow/year	30.1	30.82	32.11	32.47	27.91	27.29	27.35	27.81
Pigs reared/sow/year	29.38	30.11	31.31	31.65	26.79	26.03	26.23	26.63
Litters/sow/year	2.33	2.34	2.35	2.34	2.47	2.40	2.40	2.38

End the Cage Age

The "End the Cage Age" proposal was a European citizens' initiative, which gathered over 1.3 million signatures in 2019. It called on the European Commission (EC) to propose new legislation to prohibit the use of all cages for farm animals, including gestation crates for sows. Revising the animal welfare legislation was supported by multi-national food companies (Unilever, Nestle, Mondelez)[41] and other major food brands. In 2021, the EC, responding to the Initiative, pledged to introduce new legislation. This legislation would prohibit the 28-day period of temporary confinement now permitted under the EU Directive on the welfare of pigs (Council Directive 2008/120/EC) along with cages for other farm animals including hens, rabbits, and quail. The EU Commission is additionally exploring trade measures.[42]

"End the Cage"

Future legislation in the European Union is expected to prohibit the 28-day period of temporary confinement in gestation crates that is currently permitted, throughout the European Union. Trade measures are expected to follow.

Text box 8

Animal welfare is increasingly being integrated into bilateral trade agreements, including the EU-Vietnam Free Trade Agreement (FTA), the EU-Australia FTA, and the EU-Chile FTA. To lexport animal products into Europe, animal welfare will continue to be a matter of concern, and investments in housing systems should consider the evolving landscape of animal welfare requirements in the EU and other countries.

Proposition 12 in California

Proposition 12 was a citizen initiative in California that created a law requiring enough space for egg-laying hens, veal calves and breeding pigs to stand up, lie down and turn around. Proposition 12 passed in 2018. It requires 24ft^2 (2.25m^2) of space for sows and gilts at all times.[43] The law applies not only to pork products sold in California, but to products originating from other states that are sold in California. Since California imports most of its pork, the law impacts production throughout the country.

The law was challenged by the U.S. pork industry, advancing through the lower courts all the way to the U.S. Supreme Court. In May of 2023, the Supreme Court upheld Proposition 12, ruling that the law is consistent with the United States constitution.

In practical terms for pork producers, the California law means that systems using gestation crates, or even group housing with 28-days in crates, must change their animal housing if they want to access the California market. The exceptions to the space requirements in Proposition 12 are for the five-day period before the expected birth of the piglets and for temporary "husbandry procedures" lasting no more than 6 hours in a 24-hour period. The only option for producers to comply is with preimplantation systems. A similar law is also in effect in the U.S. State of Massachusetts.

Proposition 12

A 2023 ruling by the Supreme Court of the United States upholds the 2018 California law prohibiting confinement in gestation crates. The law applies not only to pork produced in California, but also to pork sold in California, even if produced in another state. U.S. producers must use preimplantation group housing to comply.

Text box 9

Investors' awareness

In view of the changing market and legislation, financial institutions are also taking a stand for farm animals and changing their policies and procedures to include animal welfare standards.

Standard Chartered Bank, one of the leading global banks with branches in over 70 countries around the world, includes a robust animal welfare and protection language in its 2024 Agribusiness Policy Statement: "*Key avoidable welfare risks arise from confinement of livestock and poultry in cages, painful and mutilating interventions without anaesthesia, irresponsible breeding techniques, excessively long transportation in cramped conditions, slaughter using unnecessary painful or ineffective techniques, and where training and infrastructure are not designed with animal behaviour or welfare in mind*." [44] Not only does the bank highlights confinement as a key point of concern, but also committed on the same statement to no longer finance systems that continue to adopt these outdated housing practices stating that they will not provide financial services directly towards "*Production systems using layer cages for poultry or caged rearing systems for livestock, including gestation and farrowing crates for sows*..."

Another example is the Emerging Markets Investors Alliance (EMIA), an organization dedicated to supporting good governance, promoting sustainable development, and improving investment performance in the governments and companies in which they invest. EMIA dedicates continuous engagement focused on farm animal welfare. Nadine Cavusoglu, former EMIA's Managing Director, has stated: "*Animals suffer immensely in global agriculture systems and financial institutions are uniquely positioned to reduce suffering by supporting supply chain best practices. This is important because poor animal welfare practices are risky for businesses and their financiers. One risk is the use of gestation crates, since it is clear that there is no place for extreme confinement in the future of pig production. Thankfully preimplantation group housing is an already-successful alternative that makes financial sense. Gestation crate-free systems reduce animal suffering and financial risk – it's a win-win*." [45]

To support financial institutions on the adoption of high welfare standards to their policies and procedures, a coalition called the FARMS Initiative was established to provide guidance though Responsible Minimum Standards for each species or production category. For pig production, the standards require that sow gestation stalls or crates must not be used.[46]

International standards and reporting

The World Organization for Animal Health

The World Organization for Animal Health (WOAH) is the leading global veterinary authority. Comprised of 182 member countries, WOAH issues international guidelines for disease control and animal welfare through its Terrestrial Animal Health Codes. The Codes are adopted by consensus of the General Assembly of Delegates. Article 7.13.12 of the chapter on animal welfare and pig production systems chapter states: *"Sows and gilts, like other pigs, are social animals and prefer living in groups, therefore pregnant sows and gilts should preferably be housed in groups."* [47]

Organization for Economic Cooperation and Development (OECD)

In 2023 the Organization of Economic Cooperation and Development issued updated Guidelines for Multinational Enterprises on Responsible Business Conduct. The Guide covers key areas, including climate change, biodiversity, technology, business integrity and supply chain due diligence. The updated guidelines were adopted by the Adherents to the Declaration on International Investment and Multinational Enterprises. The OECD Guidelines for Multinational Enterprises on Responsible Business Conduct now include a statement on animal welfare: *"Enterprises should respect animal welfare standards that are aligned with the World Organisation for Animal Health (WOAH) Terrestrial Code. An animal experiences good welfare if the animal is healthy, comfortable, well nourished, safe, is not suffering from unpleasant states such as pain, fear and distress, and* ***is able to express behaviours that are important for its physical and mental state****. Good animal welfare requires disease prevention and appropriate veterinary care, shelter, management and nutrition, a stimulating and safe environment, humane handling and humane slaughter or killing. In addition, enterprises should adhere to guidance for the transport of live animals developed by relevant international organisations."* [48]

The International Finance Corporation

The International Finance Corporation (IFC) is the private sector arm of the World Bank Group. The IFC finances private sector projects in developing countries. The IFC works with clients to apply sustainability principles, including animal welfare standards. In 2014 the IFC published its Good Practice Note (GPN): "Improving Animal Welfare in Livestock Operations". This GPN was written to complement the IFC's 2012 Performance Standards on Environmental and Social Sustainability, particularly the animal husbandry requirements in Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources.[49] The GPN states:

- *Animal accommodation should be designed, constructed, and maintained to allow all animals space to stand, stretch, turn around, sit, and/or lie down comfortably at the same time.*
- *Accommodation should allow all animals to directly interact with herd or flock mates, unless isolated for veterinary or nursing reasons*.[50]

International Sustainability Standards Board (ISSB)

The Sustainability Accounting Standards Board (SASB), now part of the ISSB, publishes standards that companies use to disclose relevant sustainability information to their investors. The SASB Standards identify sustainability-related risks that are most likely to affect an entity's cash flow, disclosure topics, and metrics for investors. They are available for 77 different industries. The 2018 SASB Food and Beverage Sector standard for Meat, Poultry and Dairy contains a section on animal care and welfare, which states: *"Consumer demand has driven shifts in industry practices, such as eliminating the use of gestation in hog production and eliminating caged enclosures for poultry. Companies that are prepared to anticipate or adapt to these trends may be able to increase their market share by capturing this changing demand and being first to market with products that comply with new regulations*."

Among its accounting metrics is disclosure of "…the percentage of pork produced without the use of gestation crates" which is defined as "… an enclosure for housing an individual breeding sow, where the enclosure fulfills the animal's static space requirements but does not allow for dynamic movement such as turning around, and is typically non-bedded, with concrete floors and metal stalls." [51]

Global Reporting Initiative (GRI)

The 2022 Global Reporting Initiative (GRI) sector standard for Agriculture, Aquaculture and Fishing includes animal welfare as a material sustainability topic and recommends several reporting line items related to animal welfare (including confinement). The standard states: *"The conditions that animals are kept in can cause negative impacts on animal health and welfare. For example, terrestrial animals can be confined to small spaces, cages, or crates, preventing their movement and inhibiting normal behavior."* [52]

Further resources

Technical support for the construction and management of preimplantation group housing systems is widely available. Experts from academic research institutions, equipment manufacturers and independent consultants are available to assist. Humane Society International can facilitate contacts.

Text box 10

Sources of technical support and consulting on preimplantation group housing

- Prairie Swine Center, Canada: prairieswine.com
- EU Reference Center for Animal Welfare: The Netherlands, Germany, and Denmark: food.ec.europa.eu/animals/animal-welfare/eu-reference-centres-animal-welfare_en eurcaw-pigs.eu/
- Optimal Pig Production, Spain: oppgroup.com/en
- Rotecna, Spain: rotecna.com/en
- Jygy Technologies, Canada: jygatech.com
- Akei Animal Research, Brazil: akei.agr.br
- VDL Agrotech bv, Netherlands: vdlagrotech.com
- Veldman Group, Netherlands: veldmangroup.com/en

Certification

Unfortunately, most certification schemes fail to meaningfully address key animal welfare issues. Some of these schemes do not require every standard to be met, allowing farms to be certified by meeting only a certain proportion of the requirements and permitting poor welfare practices to continue. In other cases, certification schemes do not include any animal welfare standards, but rather are focused on, for example, product quality or food safety (which are important, but irrelevant to animal welfare).

While there are many inadequate schemes, there are also some very comprehensive, meaningful programs. The farm animal welfare certification programs listed below have meaningful standards to improve welfare and ensure preimplantation group housing. Others can be reviewed on a case-by-case basis to ensure their requirements are aligned with global animal welfare concerns. The certification programs mentioned below are all science-based, prohibit intensive confinement systems (cages and crates) and go further by including dozens of additional animal welfare requirements. Every standard must be met, and they are administered by non-profit organizations aimed at protecting animals rather than promoting industry interests. Because these certifications set a higher bar for pig welfare, not all producers will readily meet every requirement, especially on housing for sows during farrowing and lactation, but these should be viewed a goal to work towards among suppliers, buyers and investors.

Animal welfare certification programs that require preimplantation group housing include:

Global Animal Partnership (G.A.P.)

Website link

- Label: Animal Welfare Certified
- Available globally

Humane Farm Animal Care (HFAC)

Website link

- Label: Certified Humane
- Available globally

Produtor do Bem

Website link

- Label: Produtor do Bem
- Available in Brazil

Beter Leven

Website link

- Label: Beter Leven
- Available in the Netherlands

RSPCA Assured

Website link

- Label: RSPCA Assured
- Available in European countries

A Greener World

Website link

- Label: Animal Welfare Approved
- Available in the United States

More information

For more information on pig welfare or preimplantation group housing systems or to obtain authorization to use photos or graphics from this report, please contact our HSI Farm Animal Welfare and Protection team of experts. Contact: farmanimals@humaneworld.org

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