



Indoor free-farrowing systems for sows – practical options



Indoor free-farrowing systems for sows – practical options

The farrowing crate

Most indoor sows farrow in crates, originally designed to reduce the risk of sows crushing their piglets by limiting sow movement, particularly as they lie down. Farrowing crates limit the most basic of behaviours in the sow; they are unable to turn around, walk, nest build or form a good maternal bond with their young. In addition, there is an increased risk of piglets being born dead or savaged by their mothers (especially for first-time mothers), and piglet behaviour is severely restricted due to the barren environment.

Despite many years of research into alternative farrowing systems, clear recommendations for commercially viable alternatives have been limited, until recently. Practical alternatives to the farrowing crate are now in the final stages of development, and some are already in use on commercial farms.

The most comprehensive overview of the current situation is found at www.freefarrowing.org.uk produced by Scotland's Rural College (SRUC) and Newcastle University.

This booklet summarises some of the information provided on the website, particularly in relation to the key features of the farrowing accommodation, which contribute to sow and piglet welfare and evaluates a number of individual systems. The website is introduced and relevant links are provided throughout. However for the most recent production data and costs, please contact the website's authors. Compassion has then evaluated a number of individual systems based on these key features.

Alternatives to the farrowing crate

In general there are three indoor alternative farrowing systems to the crate: individual farrowing pens, individual temporary crates, or group systems. Here we focus on individual pen and temporary crating systems. Both provide commercially viable options in terms of production parameters and operator safety, and represent best and better options for sow and piglet welfare potential. Each system is evaluated according to how well the design features meet the needs of the sow and piglets.



Farrowing crate

SYSTEMS WHICH ALLOW THE SOW FREEDOM OF MOVEMENT AT ALL TIMES, INCLUDE:

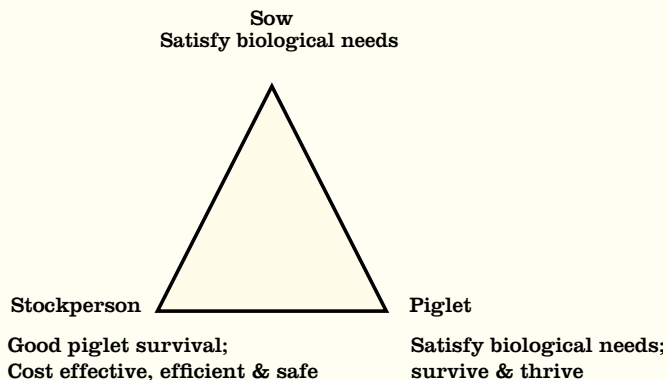
- PigSAFE (UK)
- Danish Free Farrower (Denmark)
- FAT2 (Switzerland)
- SowComfort Pen (Norway)
- WelCon farrowing pen (Austria).

SYSTEMS WHICH ALLOW TEMPORARY RESTRAINT OF THE SOW, INCLUDE:

- 360° Farrower (UK)
- SWAP (Denmark)
- Combi-Flex (Denmark).

Criteria of farrowing systems

All farrowing systems should be designed to satisfy the triangle of needs between the sow, her piglets and the stockworker.



Needs of the sow

These change throughout the different phases of farrowing:

Nest building prepares the sow for farrowing.

In this phase she needs:

- Space
- Substrate
- Isolation
- Thermal comfort.

During farrowing and early lactation, she needs:

- Undisturbed nest site
- Thermal comfort
- Udder comfort.

During late lactation, she needs:

- Space to gradually reduce contact with her piglets.

It is also important for her piglets to survive. Free-farrowing systems require the sow to exhibit good maternal behaviour. Incorporating this factor into breeding strategies is therefore important to the commercial success of new systems.

Needs of the piglets

Essentially piglets need to survive and thrive. Much of their fate is reliant on good maternal behaviour and system design.

During farrowing and early lactation, they need:

- Thermal comfort
- Colostrum and milk, so easy and almost constant udder access
- Protection.

During late lactation the piglets' and sow's needs begin to conflict. The piglets need:

- Thermal comfort
- Good milk provision, so easy udder access
- Protection
- Enrichment (nutritional and environmental)
- Social integration.

Needs of the stockworker

Stockworkers need appropriate training in the operation and management of any new farrowing system, and are required to have a positive attitude for change and to adapt their working practices to suit the new system. Stockworkers need to take ownership of a new system, but also need management support to resolve any issues arising.

Approach with an open mind:

- Alternative systems can be very different to conventional crates and trying to manage them as crates may slow progress.
- Sows can behave differently when unrestrained. But having a good human-animal relationship with the sow (including in the dry sow house) will benefit working routines, as well as piglet and sow welfare.

At all times, stockworkers need:

- Good piglet survival
- Efficient working environment
- Safe working environment
- Cost effective working environment.

Key features of farrowing systems

SPACE

Until recently, space requirements of sows and piglets were not investigated in a systematic way. Use of the allometric approach¹ has resulted in more detailed information.

For the sow

- A pen of 9.75m² will provide space for a nest area, separate feed area, space for growing piglets and a creep
- In practice, pens of 7-7.7m² are being used successfully
- A sow of 350kg needs 2.44m² to stand and feed, which can be incorporated into an overall space requirement of 3.17m² to get up, lie down, give birth, suckle and turn comfortably.

For the piglets

- A litter of 14 piglets requires a creep area of approximately 1m² at 4 weeks of age, if all piglets lie in the creep at the same time.



Sloped wall in PigSAFE

DESIGN

Pen design is a crucial determinant for sow and piglet welfare. See the detailed sections of www.freefarrowing.org/info/17/specific_pen_features for more information.

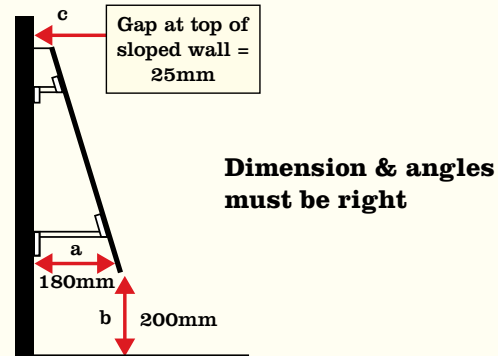
Optimising pen design Details matter

- Pen size and nest site
- Seclusion and functional areas
- Comfortable flooring suitable for hygiene maintenance
- Substrate to promote nest building
- Appropriate piglet microclimate, accessed early in life
- Sloped walls for piglet protection

For the sow

Sows have a behavioural need to nest build, and prefer enclosed areas in which to farrow. It is important that the nest area has:

- 2-3 solid walls (minimum 1m height) to provide an attractive enclosure
- Sloping walls to support the sow as she lies down smoothly, and allow piglets to escape being trapped, perform teat seeking behaviour safely, and even improve udder access.



For pens with separate dunging areas, part-barred walls make this area unattractive for farrowing, provide a cooler environment, and allow sows social contact with their neighbours.

For the piglets

Piglets require a warm environment, particularly when newly born and young. They also need a safe area that is inaccessible to the sow, where they can lie without risk of crushing. A creep area provides for these needs by providing:

- A supplementary heat source (preferably with light) to make the creep area attractive and encourage piglets inside while the sow stands
- Sawdust or shavings for a comfortable lying area; if using such substrates in conjunction with a heat lamp, make sure that rigorous fire prevention measures are in place
- Ability to lock-in piglets for management observation when needed, and ability to provide supplementary solid feed and/or supplementary milk if necessary.

Corner or side creeps are recommended, as they are closer to the udder, and all creeps should be accessible from the passageway for ease of use.

For the stockperson

The needs of stockpeople managing the farrowing environment also need to be taken into account in the design of the pen. A system will be successful, welfare-friendly, hygienic, safe and profitable if the staff running it can:

- Access all areas easily and safely
- Clean throughout the pen
- Observe sows and piglets effectively
- Separate sows and piglets for management tasks.

FLOORING AND BEDDING

Lying areas for the sow and piglets should provide thermal and physical comfort, while dunging areas should be separate and easily cleaned to reduce the risk of disease and contamination of the lying areas.

For the sow

- Provide a minimum of 2kg of long straw for the sow to adequately perform her nest building
- From 24 hours post-partum, this can be reduced to small quantities of chopped straw or sawdust for bedding material
- Solid flooring with drainage slots is preferable for the nest area, with a 2% slope away from the nest/creep.

For the piglets

- During and shortly after birth, straw in the nesting area should provide a depth of around 10-12 cm to encourage piglets to dry off and warm up
- Outside the nest area, slatted flooring with a void space of 10mm or less should be provided
- Provide foraging material such as chopped straw, wood shavings or peat for recreation, which may also help to discourage behaviours such as belly-nosing.

Materials used for nesting, bedding and occupation should be complex, changeable, hygienic, relatively destructible, safe, manipulable (to encourage chewing, rooting and exploration), edible (non-toxic, with a gut fill or nutrition value), practical, and should be locally available and satisfy the needs of the sow and piglets.

Remember to:

- Adhere to regulations for slat widths and voids (so safe for piglets)
- Have strong support structures under any raised floors
- Make the floor non-slip, non-abrasive, and hygienic; have good drainage and preferably a flushing slurry system if straw is used with slats.

THERMAL ENVIRONMENT

Sows and their litters have very differing thermal requirements.

For the sow

- Temperature in farrowing houses should not exceed 18-23°C, as heat stress in the sow can lead to reduced feed intake and lower milk output
- Providing bedding however, allows sows to create a warmer micro-climate for her piglets, and encourages her to make fewer postural changes
- As lactation continues, consideration should be given to cooling the sow in order to maintain feed intake and milk output. Floor cooling systems can increase nursing time, feed intake and piglet weight gain, and evaporative cooling is recommended in hot climates.

For the piglets

Newly-born piglets are wet, cannot thermoregulate and have no active immunity. They need to dry off, warm up and ingest colostrum as soon as possible.

- New born piglets require temperatures of 34-35°C, but by 3-4 weeks of age they can thermoregulate more effectively
- Access to long straw in the nest at birth, and access to a heated creep until weaning, should ensure that piglets do not become chilled
- If piglets are observed huddling, then the creep is too cold; if they are lying outside the creep, then it is too hot.



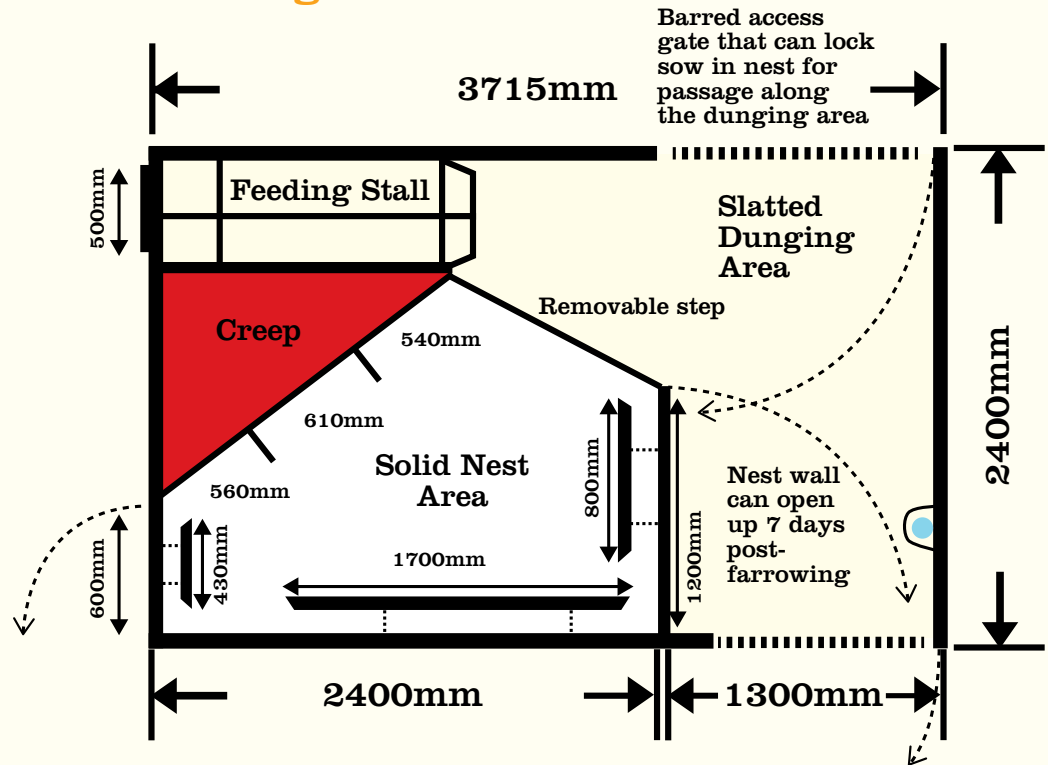
FigSAFE system

INDIVIDUAL PENS: SYSTEMS WHICH ALLOW THE SOW FREEDOM OF MOVEMENT AT ALL TIMES

See www.freefarrowing.org/info/5/individual_farrowing_pens for more information. System evaluations were conducted by Compassion in World Farming.

PigSAFE

This system was designed by researchers at SRUC and Newcastle University, with input from industry and NGOs. The pen can be designed with or without a separate voluntary feeding stall. The most important concept of PigSAFE is that it is designed to stimulate good maternal behaviour, giving the sow optimal, functional spaces whilst still providing for stockperson safety and piglet protection.



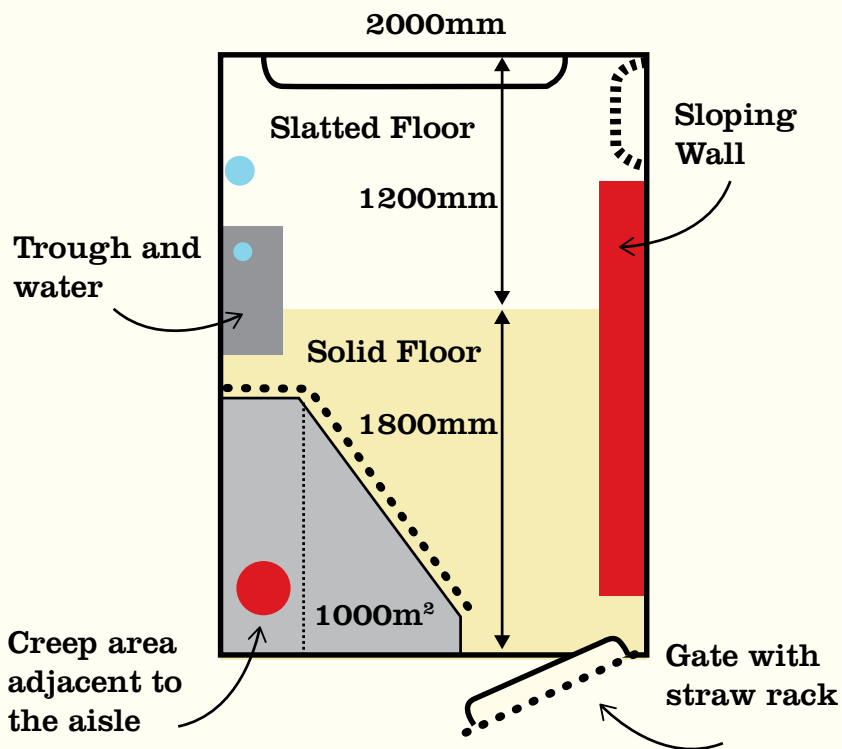
Evaluation matrix:

Key Design Feature	Sow	Piglet	Comments
Space (m ² per sow, approx)	+++		7.9m ² (with separate feeder) 7.0m ² (without feeder) Footprint of 8.9m ²
Freedom of movement	+++		Freedom of movement at all times
Nest site design	+++	+++	Straw provided, enclosed nest site, sloping walls – good piglet protection; nest area ~3.0m ² , adjustable after 7 days
Creep environment		+++	1m ² , enclosed heated corner creep
Social contact	+++		“Chat holes” to contact neighbouring sows
Flooring and bedding	+++	+++	Solid floor in nest with drainage slots, separate slatted dung area
Thermal environment	+++	+++	Bedded nest, heated creep, cooler dunging area for sow
Safety, hygiene and ease of management	+++	+++	Safe, easy access from multiple points; ability to separate sow from piglets using creep, feeding stall and slatted dunging area.

Key: - (not provided), + (adequate), ++ (improved), +++ (best practice)

Danish Free Farrower system

The Danish Free Farrower (FF) system is based on collaborative research between a number of research, industry and welfare organisations in Denmark.



Danish Free Farrower

Evaluation matrix:

Key Design Feature	Sow	Piglet	Comments
Space (m ² per sow, approx)	++		Footprint of 6m ² (5m ² available to the sow)
Freedom of movement	+++		Freedom of movement at all times
Nest site design	++	+++	Nest building using straw rack, nest not enclosed, sloping wall for piglet safety and udder access
Creep environment		+++	1m ² , heated corner creep
Social contact	+++		Barred area over dunging passage allows visual and nose-to-nose contact of neighbouring sows
Flooring and bedding	+++	+++	Solid bedded nest, slatted dung area
Thermal environment	+++	+++	Bedded nest, heated creep, slatted area to cool sow
Safety, hygiene and ease of management	+++	+++	Safe, easy access; ability to separate piglets in creep, slatted dung area

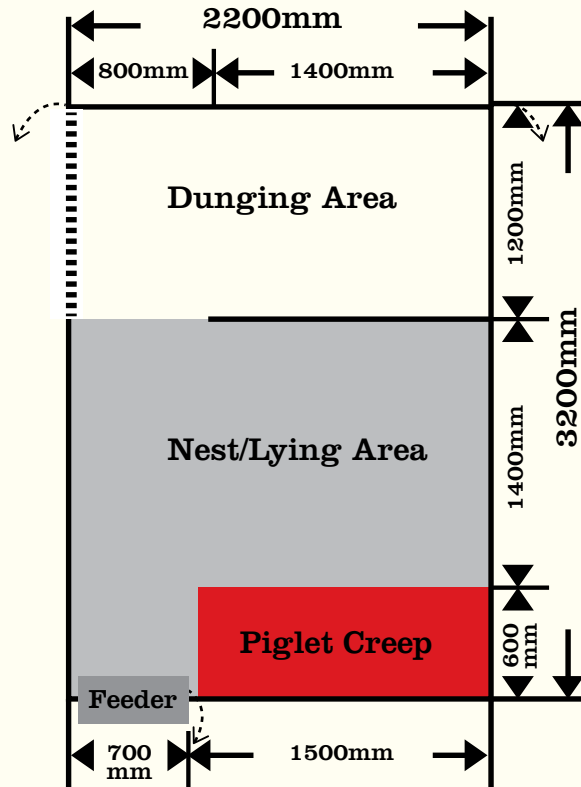
Key: - (not provided or inadequate), + (adequate), ++ (improved), +++ (best practice)

FAT2 system

This system was developed in Switzerland, where farrowing crates have been banned since 1997.



FAT2 system



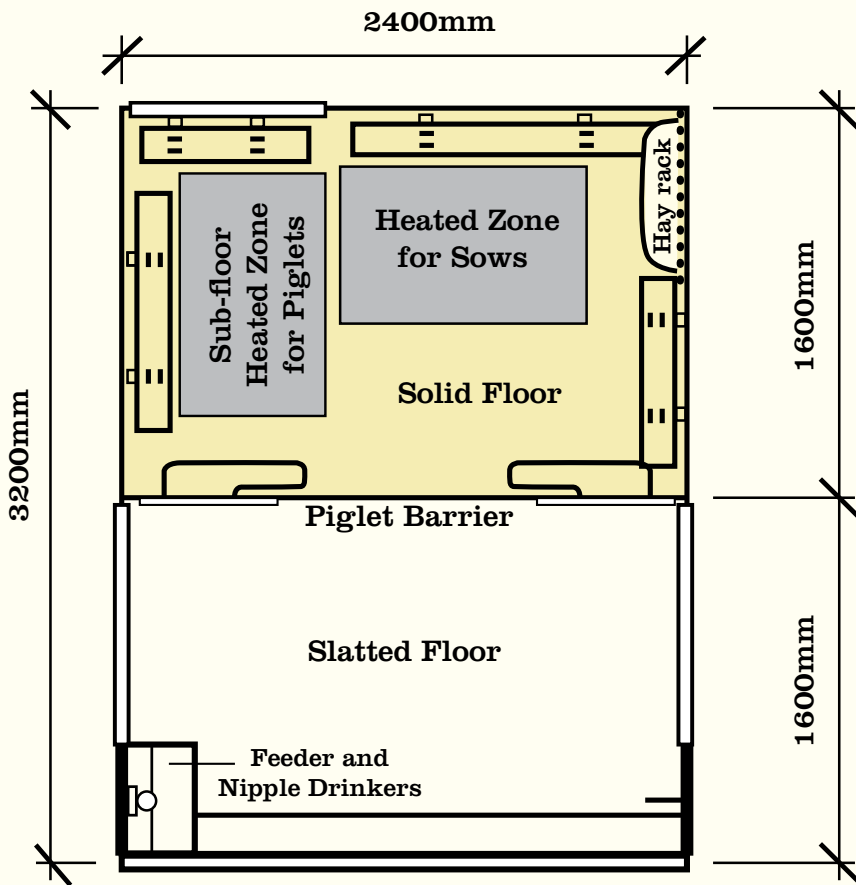
Evaluation matrix:

Key Design Feature	Sow	Piglet	Comments
Space (m ² per sow, approx)	+++		Footprint of 7m ² (6.14m ² available to the sow)
Freedom of movement	+++		Freedom of movement at all times
Nest site design	++	++	Solid bedded enclosed nest, no straw rack or sloping walls
Creep environment		++	Creep at front of nest, 0.9m ²
Social contact	+++		Barred area over dunning passage allows visual and nose-to-nose contact of neighbouring sows
Flooring and bedding	++	+++	Solid bedded nest, separate scrape through dunning area
Thermal environment	+++	+++	Bedded nest, heated creep
Safety, hygiene and ease of management	++	++	Access to front creep, easy provision of straw and feed, no slatted dunning area

Key: - (not provided or inadequate), + (adequate), ++ (improved), +++ (best practice)

SowComfort farrowing pen

The SowComfort farrowing pen (originally called UMB pen) was designed by researchers at the Norwegian University of Life Sciences and developed together with Fjossystemer Sor and cooperating pig farmers.



SowComfort farrowing pen

Evaluation matrix:

Key Design Feature	Sow	Piglet	Comments
Space (m ² per sow, approx)	+++		Footprint of 7.68m ²
Freedom of movement	+++		Freedom of movement at all times
Nest site design	+++	++	Straw rack provided, sloping wall, rubber mattress, under-floor heating, partially enclosed
Creep environment		-	No separate creep. Under-floor heated area in nest with rubber mattress
Social contact	+++		Opportunity to contact neighbouring sows
Flooring and bedding	+++	+++	Solid, soft, heated floor in nest, separate dunging area
Thermal environment	+++	+	No separate creep, warm area in nest
Safety, hygiene and ease of management	++	+	Easy provision of nest building materials, but no separate creep or ability to separate sow for safe access; drained/slotted dunging area for good hygiene

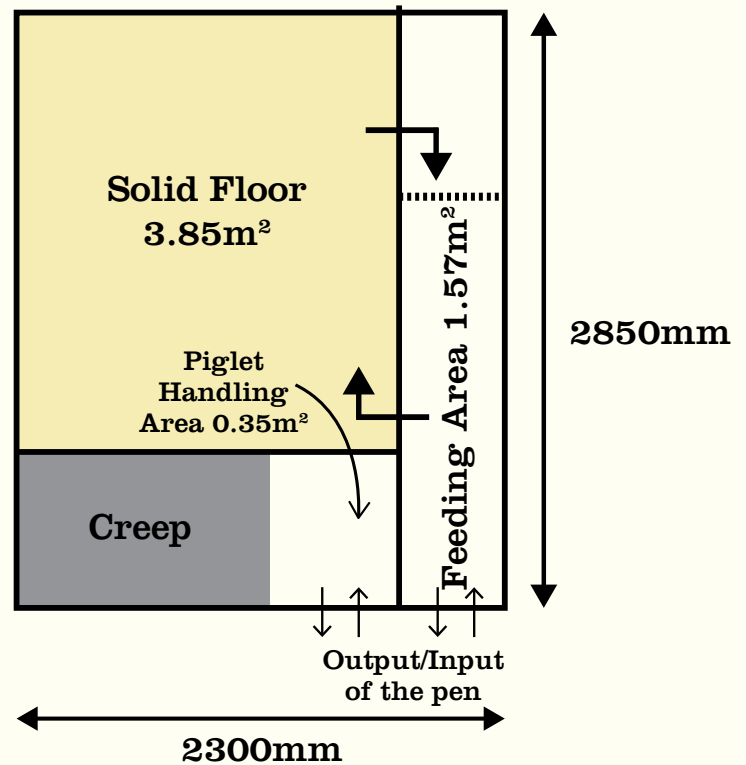
Key: - (not provided or inadequate), + (adequate), ++ (improved), +++ (best practice)

WelCon farrowing pen

This system was designed and subsequently patented by Schauer® and has an organic version that allows outdoor access for the sows and piglets.



WelCon farrowing system



Evaluation matrix:

Key Design Feature	Sow	Piglet	Comments
Space (m² per sow, approx)	+++		Footprint of 6.55m ² (5.42m ² available to the sow)
Freedom of movement	+++		Freedom of movement at all times. Organic version available with outdoor access
Nest site design	++	+	Solid bedded enclosed nest site, protection rail on one side, no straw rack
Creep environment		++	Creep at front of nest (0.73m ²) with separate piglet feeding area
Social contact	+		It is possible to have visual contact with the neighbouring bay, but will depend on design selected
Flooring and bedding	++	++	Solid bedded nest, with possibility of adjacent perforated flooring for drainage
Thermal environment	+++	+++	Bedded nest, heated creep; sow can let herself into the feeding area
Safety, hygiene and ease of management	++	+++	Safe access to front creep, easy provision of straw and feed, no slatted dunging area, ability to separate sow from piglets using creep and separate feeding area

Key: - (not provided or inadequate), + (adequate), ++ (improved), +++ (best practice)

TEMPORARY CRATES: SYSTEMS WHICH ALLOW TEMPORARY RESTRAINT OF THE SOW

See www.freefarrowing.org/info/8/temporary_crating for more information.

360° Farrower

This pen was designed by Midland Pig Producers and has a dedicated website (www.360farrower.com). It is built on the same footprint as a conventional crate with a fully slatted floor, and flexible design. The moveable restraining bars give the sow space to turn around in the pen but also enables close confinement when necessary. As with all systems with optional sow restraint, freedom of movement depends on limiting the use of the restraining bars.



Creep area of the 360° Farrower



360° Farrower

Evaluation matrix:

Note: Evaluation matrix is based on system with a heated creep area and good straw provision. 360 Farrower systems without these provisions would be marked down. Systems may be available with optional cooling pads under the sow which will aid her thermal comfort during lactation.

Key Design Feature	Sow	Piglet	Comments
Space (m ² per sow, approx)	+		Footprint of 5m ² (3.9m ² available to the sow)
Freedom of movement	+		Sow can turn when restraining bars are open; movement is limited to nest site
Nest site design	++	++	Small amounts of straw can be provided, more with flushing slurry systems. Barred sections provide for piglet protection and some support for the sow as she lies down. Nest dimension good for performance (number of piglets reared and piglet weight), but no separate dunging area; slatted floor helps to maintain hygiene
Creep environment		++	Front open roofed creep with heated floor mat provided
Social contact	+		No direct contact between sows, but can see each other between pens
Flooring and bedding	+	+	Slatted floor can cope with small amounts of straw and adequate amounts of straw if combined with a flushing slurry system
Thermal environment	++	++	Adequate for sow if house environment is suitable. Open creep may not be as good as enclosed creep at maintaining temperatures for piglets especially when young
Safety, hygiene and ease of management	+++	+++	Safe sow access for staff via narrow vertical bars. Slatted floor easy to clean

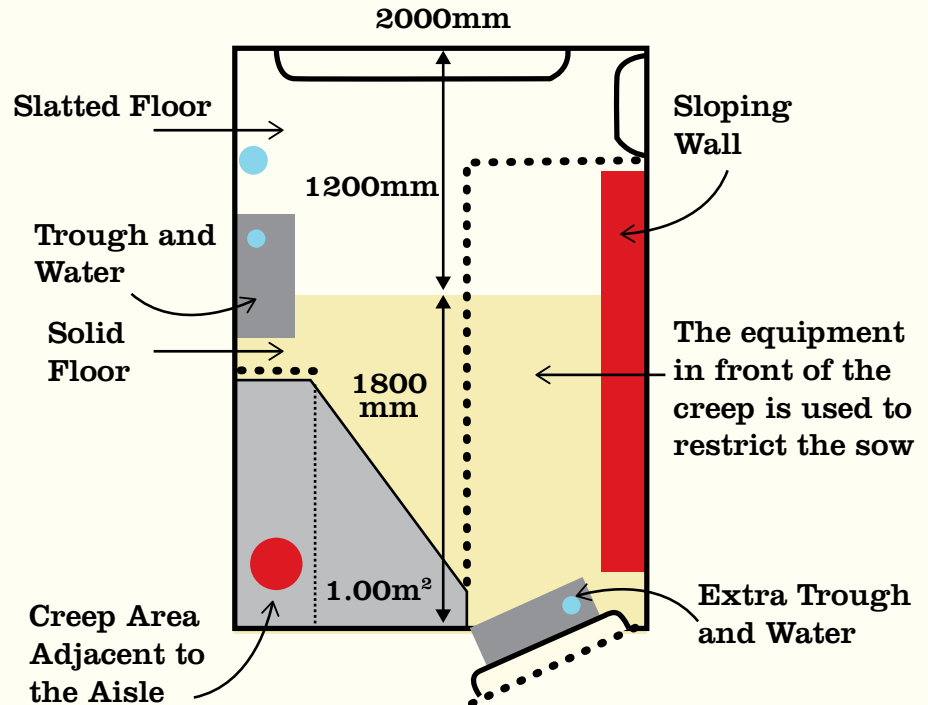
Key: - (not provided or inadequate), + (adequate), ++ (improved) +++ (best practice)

SWAP (Sow Welfare And Protection) system

The SWAP system is a version of the Danish Freedom Farrower pen, where the front of the creep serves as a customised swing side, used to restrict the sow during farrowing and early lactation when the risk of piglet crushing is high. The pen was developed as part of a collaborative project between University of Copenhagen and Danish Pig Research Centre (with Jyden).



SWAP Farrowing System - closed position



Evaluation matrix:

Key Design Feature	Sow	Piglet	Comments
Space (m ² per sow, approx)	++		Footprint of 6m ² . 5m ² available to the sow when crate is open. Sow can nest build when swing side open
Freedom of movement	++		Sow can turn and nest-build from straw rack if swing side is open
Nest site design	++	++	Straw rack, solid floor, sloping wall available when sow lies down. Movement is restricted when swing side closed
Creep environment		+++	Appropriate creep environment provided
Social contact	++		No direct contact with other sows when swing-side closed. Barred area in dunging passage allows visual and nose-to-nose contact for sows
Flooring and bedding	+++	+++	Solid bedded nest, slatted dunging area
Thermal environment	+++	+++	Solid bedded nest for sow, separate heated creep for piglets
Safety, hygiene and ease of management	+++	+++	Good piglet safety when swing side closed and easy piglet access for tasks such as cross-fostering. Slatted dung area

Key: - (not provided or inadequate), + (adequate), ++ (improved), +++ (best practice)

Combi-Flex

This pen with a temporary farrowing crate option has been designed by Vissing Agro. The pen occupies a larger footprint than a conventional crate with a fully slatted floor. The farrowing crate can be opened up to allow the sow to turn around in the pen but also enables close confinement.



Combi-Flex Farrowing System - closed position



Combi-Flex Farrowing System - open

Evaluation matrix:

Key Design Feature	Sow	Piglet	Comments
Space (m ² per sow, approx)	++		Footprint of 5.76m ² (4.92m ² available to the sow when crate open)
Freedom of movement	+		Sow can turn when swing side opened during lactation
Nest site design	+	+	No separate nest, fully-slatted floor; bars on crates afford some form of piglet protection as well as a lateral protection bar. No straw provided for nest building.
Creep environment		+++	Side (0.84m ²), roofed creep provided, with heated floor and with LED lighting
Social contact	+		It is possible to have visual and nose contact with the neighbouring bay
Flooring and bedding	-	-	Fully slatted with little ability to provide small amounts of straw for nesting, or suitable material for bedding or occupation
Thermal environment	++	+++	Fully slatted, so building temperature needs to be suitable for sow. Piglets have an enclosed heated creep
Safety, hygiene and ease of management	++	++	Safe staff access to sow and piglets when the swing side is closed; can contain piglets in creep area with a sliding barrier. Fully-slatted floor easy to clean

Key: - (not provided or inadequate), + (adequate), ++ (improved), +++ (best practice)

SUMMARY

Systems which are designed to fulfil all the needs of the sow and her litter will be more acceptable from a welfare point of view, but require more space and are more expensive to build and maintain.

Conversion of existing farrowing systems can be acceptable, if the design takes into account the sow's need to nest build, and her piglets need for safety in early lactation.

Restraining the sow prior to farrowing, then allowing her freedom to move after birth, works against these needs. Temporary restraint of the sow should not become permanent. It may result in a system which is easier to manage, but would not offer an improvement in sow welfare compared to the traditional farrowing crate.

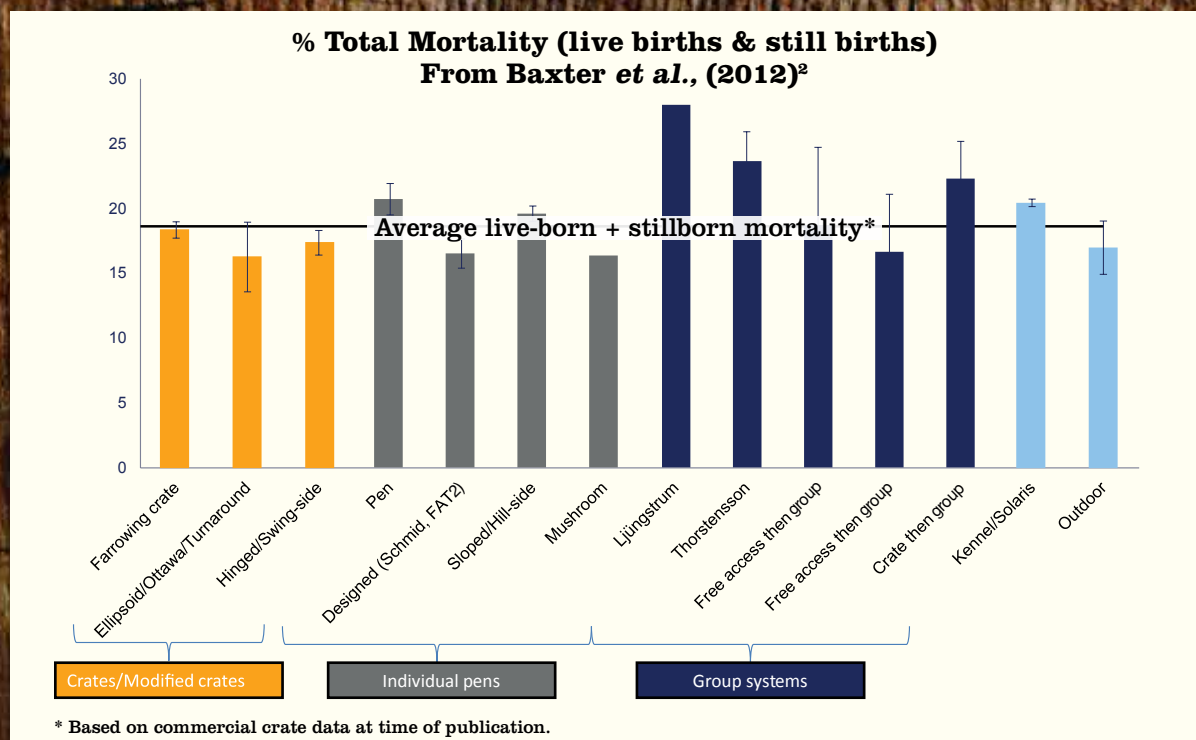
It is clear that a number of projects in several countries have now addressed the design of farrowing accommodation using basic behavioural needs as the starting point of the design process. As these are tested and modified on farm, there is a real possibility of several practical alternatives to the farrowing crate being commercially viable in the near future.

Barriers to adopting free farrowing:

- Concerns about piglet mortality
- Concerns about practicality (management ease, labour and hygiene)
- Concerns about cost.

Piglet mortality

Recent data comparing mortality of different systems indicates individual free-farrowing systems can operate at similar levels to the farrowing crate.



- Group systems are the most inconsistent and have relatively high mortality (unless initially crated)

- Designed pens are the most consistent with relatively low mortality

In addition mortality increases:

- With litter size and lower birth weights associated with hyperprolific breeds
- At low body temperatures, and extended birthing processes.

See: www.freefarrowing.org/freefarrowing/download/downloads/id/37/risk_factors_for_piglet_mortality_and_how_to_target_them

Piglet survival can be influenced by the sow:

- Select for high survival lines, particularly from sows that take care when lying, and are calm in the post farrowing period and relaxed towards the stockperson.

Good stockmanship is essential:

- Mortality may be high when new system first installed, but good training and a positive attitude will reduce mortality.

COST

Free farrowing systems have a higher capital cost than crates:

- Estimated at: plus 15% (360° Farrower), plus 20% (Danish FF), plus 36% (PigSAFE)

Higher capital costs can be offset by:

- Higher weaning weights and lower rates of mortality through good management
- A market premium, estimated average 1.6% required for PigSAFE.

See: www.freefarrowing.org/info/4/farmer_resources/27/free_farrowing_economics



Creep area with straw and heated lamp

CONCLUSIONS

Free farrowing can:

- Improve pig welfare
- Give acceptable performance
- Be practical to use
- Have better consumer perception.

Critical success factors are:

- Good design
- Selecting the right sows
- Good management
- Market differentiation of higher welfare production.

REFERENCES

This booklet was produced from the wealth of information available on farrowing systems at www.freefarrowing.org produced by Scotland's Rural College and Newcastle University. Compassion has then evaluated a number of individual systems based on this information. Our kind thanks to Dr Emma Baxter and Professor Sandra Edwards.

1. Baxter, M.R. and Schwaller, C.E., 1983. Space requirement for sows in confinement. In Baxter, S.H., Baxter, M.R. and MacCormack, J.A.D. (eds.) Farm animal housing and welfare. Martinus Nijhoff Publisher, the Hague, the Netherlands, pp. 1481-1495.
2. Baxter, E. M., A. B. Lawrence, and S. A. Edwards. "Alternative farrowing accommodation: welfare and economic aspects of existing farrowing and lactation systems for pigs." *Animal* 6.01 (2012): 96-117.



Indoor free-farrowing systems for sows – practical options



Compassion in World Farming

Compassion is recognised as the leading international farm animal welfare charity. It was founded in 1967 by Peter Roberts, a British dairy farmer who became concerned about the development of intensive factory farming.

For more information visit ciwf.org

Food Business Programme

Compassion in World Farming's Food Business programme is generously supported by The Tubney Charitable Trust; a grant-making charity seeking to support activities that have a long-term, sustainable, positive impact on biodiversity and welfare of farmed animals in the UK and internationally.

For more information visit compassioninfoodbusiness.com

Contact us:

Food Business Team

Compassion in World Farming

River Court
Mill Lane
Godalming
Surrey
GU7 1EZ
UK

Tel: +44 (0)1483 521 950

Email: foodbusiness@ciwf.org.uk

Web: compassioninfoodbusiness.com

Compassion in World Farming is registered as a charity
in England and Wales (Charity Number 1095050)
and a company limited by guarantee
(Company Registered Number 4590804).