GROUP HOUSING SYSTEMS

CASE STUDY 1

Production System

The business is a 6500 commercial farrow to finish unit.

Selected Group Housing System

Electronic sow feeders (ESF's) with dynamic groups of 58.

Building Modified

The converted building was the original dry sow shed with eight rows of stalls. This was converted to two rows of group-housed pens with a centre laneway. Each pen has 58 sows providing 1.8m²/sow. Pens in the retrofit shed have a partially slatted concrete floor with a solid partition (old laneway) running through the centre of the pen.

Figure 1. Stalled area converted to group-housed pens

The Layout

There are 24 feed stations/shed with 58 sows/pen to meet farrowing room targets (i.e. one double feeder/group of 58 sows). The feed station is situated in the middle of the pen away from the sleeping area, allowing open space for free movement around the feeder. Initially, feeders were placed on the solid concrete but this created problems with spilt feed and water creating slippery floors.

In the later conversion of sheds, the feeders were placed on slats at the concrete edge.

Figure 2. Electronic sow feeder in centre of pen

Ventilation

All sheds are climate controlled with tunnel ventilation.

Effluent System

The sheds have static effluent pits which are emptied regularly.

Feeding System

Sows are fed with a feeding station which is a smaller variation of the protected ESF that doesn’t have an individual crate to protect sows during their feeding session.

All sows have an ear tag (transponder) in the top of the ear which is identified via the aerial. If the sow has a feed claim, the conveyor delivers the feed directly into the sow’s mouth through a tube.
The feeding system allows sows to be fed individually as the computer can change the total amount of feed each sow receives. Some sows eat their entire meal in a single visit while others eat a number of smaller meals throughout the day.

Changes to individual feed rationing for sows in poor condition can be made on-the-spot with a hand held device but this can be difficult to use due to local signal interference. Any sows that cannot cope with the system are culled.

The consistency of feed is regulated through the dosage of water. Water is added to the mash so that it is dispensed as porridge. This consistency can be individually adjusted for each feed station. After a sow has eaten, it can take a number of seconds before the tube is closed after having delivered feed, making it attractive for waiting sows to chase away the eating sow and take that part of her ration. Aggression does occur while sows are waiting for their turn to enter the feeder, however the placement of the feeder in the centre of the pen allows the sow to walk away.

**Management**

After first heat detection, gilts are moved into the unit and group-housed in pens of 16 and fed through self feeders. They are artificially inseminated in the group pens and then after pregnancy testing, pregnant gilts are moved into new groups. Sows are housed in stalls for heat checking and insemination then moved to group housing pens five days post mating. A boar is walked in front of the pens each day for oestrus detection. Groups are static, made up according to mating date order. Groups remain together until farrowing.

Gilt Training

Gilts are introduced to the feed station in a purpose built shed. It has a slatted floor with 15mm gaps. During training, water is turned off through the nipple drinkers and run through the feeder pipe to encourage the gilts to put their mouth over it. The next day the water is turned back on to the drinkers.

A foot plate and eating plate are used on these feeders for training. The foot plate elevates the gilt to sow height and the eating plate catches any spilt feed which then encourages other gilts into the feed station. This also ensures the feeder is accessed from the front.

A large proportion of gilts (80%) train themselves. Only a small number cannot be trained. Any that do not adapt to the training are culled.

Staff who have worked previously with stalls struggle with managing a different feeding system. Some staff also find it difficult to draft small numbers out of big groups but have found that moving sows to the farrowing shed when the sows are hungry is easiest.

The computerised report is checked daily; any sows that are eating less than 75% of their feed allocation are noted and reasons established. Special attention is given to those that haven’t eaten for two days. Any sows that need to be removed are moved to the sick pen with self feeders.

**Costs**

The costs include the modification to the building including structural modification, feeding system, other equipment and furnishings, and labour.

**Table 1. Costs to retrofit the original dry sow shed to group-housed sows fed through ESF’s**

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost (per sow)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural Modifications</td>
<td>$14</td>
</tr>
<tr>
<td>Furnishings and Fittings</td>
<td>$60</td>
</tr>
<tr>
<td>Computer and Electrical</td>
<td>$22</td>
</tr>
<tr>
<td>Feed Stations</td>
<td>$180</td>
</tr>
<tr>
<td>Labour</td>
<td>$21</td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td><strong>$297</strong></td>
</tr>
</tbody>
</table>
System Benefits

- The feeding system is compact and can be used in most buildings.
- Sows can be fed according to their individual needs.
- Sows have the freedom to move around.

Operating Issues

- Aggression does occur around the feeding station.
- Management demands are greater than the stalled system and a dedicated staff member is required to resolve problems.
- Individual care can be lost as it is difficult to see all sows clearly when walking through the shed. A stockperson needs to get in the pen and check for sick sows.
- The reliability of transponders can be an issue and it is difficult to replace individual transponders in a group of sows.
- With a large number of feed stations, it is possible for one to shut down and not be noticed by a stockperson.
- During boar walks (in front of the pens), some sows do not get up and come to the pen division making heat checking difficult.
- Individual rationing is difficult to change with the hand held device due to local signal interference.
- Stockpeople need computer/technical skills.
- To be economical it is suggested that from 20-40 sows/feed station is needed.
- The retrofit shed has slats with a 20mm gap which causes problems with feet injuries during aggressive acts.
- The wide gap between the slats demands continual cleaning of the floors.

Financial Information

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GROUP HOUSING SYSTEMS
CASE STUDY 2

Production System

The 550 sow nucleus breeding herd produces breeding gilts for the owner’s main commercial unit. Surplus pigs are transferred to a grow-out site at approximately eight weeks of age.

Selected Group Housing System

Electronic sow feeders (ESF’s) with dynamic groups of 120 sows.

Building Modified

The converted building was previously a naturally ventilated, partly slatted finisher shed flushed with fresh water with a floor area of 72m x 9.6m. Some of the finisher pens had been demolished prior to the decision being made to convert the building to dry sow accommodation. The building was probably 20-25 years old. The decision was made to convert the building to hold 360 sows in groups of 120, fed through two ESF’s per group in pens of 24m x 12.4m.

The Layout

To assist in sow selection and movement to and from the dry sow area, a 1.5m passage running the length of the building was installed on one side. The extension on the other side incorporated a sleeping area with block barriers and dividers to allow sub groups to be established within each large pen (Figure 1).

Figure 1. Layout of converted building

Approval

Approval to meet local council requirements and Environmental Protection Authority (EPA) legislation was obtained to extend the width of the building to 12.4m. The legislators cooperated fully and approval for the extension was a painless procedure.

Ventilation

Natural ventilation based on the stack effect through a raised ridge cap was retained but manually operated fans with a demister were installed for sow comfort in summer. Sprinklers were installed over the slats to encourage the sows to vacate the area around the feeder and use the solid concrete lying bays provided. In addition, the sprinklers provide extra cooling during summer.

Effluent System

The roof was extended to cover the additional floor area. The existing floor was replaced with a fully slatted floor flushed with recycled water.

Feeding System

Each group of 120 sows were provided with two ESF’s. The feeders allow the feeding of two diets and a liquid doser of micronutrients.

Management

The feeder allows selected sows to be diverted into a sow movement lane 1.5m wide running the length of the building. Sows required for treatment and sows due to be moved to the farrowing pens can be identified and or selected with little or no stress. In each pen there are three lying areas, 7.71m x 5.85m deep with block wall divisions at the opposite side of the building to the feeders and movement lane. Within each lying area is a division wall 2m long, subdividing each pen. The lying areas are escape areas for timid sows and opportunities for sub groups to be established.
The pens provide 2.02m² per head for the dynamic groups which are formed by the introduction of 30 sows every fourth week. Pen 1 receives 30 sows in weeks 1, 4, 7 and 10. Sows due to farrow are removed in week 13 (89-93 days of gestation) allowing the new group of served sows to be introduced.

Pen 2 is filled in weeks 2, 5, 8 and 11, and sows are removed in week 14. Pen 3 is filled in weeks 3, 6, 9 and 12 and sows are removed in week 15.

**Figure 2. ESF's and movement lane**

**Figure 3. Lying area with sub divisions**

Between each group pen is a boar pen 3m x 2m adjacent to the movement lane which assists in the identification of returns to oestrus.

**Sow Training and Staff Training**

The owner spent considerable time with training sows and the staff to adapt to the system.

**Costs**

The costs include the modification to the building including base work, structural modification, feeding system, other equipment and furnishings, and labour.

**Table 1. Costs to retrofit a finisher shed to group-housed sows fed through ESF's**

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost (per sow)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Work</td>
<td>$276</td>
</tr>
<tr>
<td>Structural Modifications</td>
<td>$228</td>
</tr>
<tr>
<td>Furnishings and Fittings</td>
<td>$61</td>
</tr>
<tr>
<td>Computer and Electrical</td>
<td>$34</td>
</tr>
<tr>
<td>Feed Stations</td>
<td>$219</td>
</tr>
<tr>
<td>Labour</td>
<td>$32</td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td><strong>$850</strong></td>
</tr>
</tbody>
</table>
System Benefits

- Sows in groups.
- Sows individually fed according to condition.
- Identification and selection facility to implement management decisions.

Operating Issues

- Reliance on computer technology.
- Sow aggression.
- Questionable slat quality can cause feet problems.
- Technical support time lines.
- Training animals to the system takes time.
- An ongoing rodent control policy is necessary to avoid frustrating cable damage.

Financial Information

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GROUP HOUSING SYSTEMS
CASE STUDY 3

Production System

The two-site, batch farrowed, 550 sow commercial piggery uses intensive indoor housing at its breeder site and straw-bedded shelters at its grower site. The recent construction of a weaned sow/mating shed to loose-house 102 sows in groups of 11-13 and the removal of gestation stalls from an adjoining mating shed has enabled this farm to become totally stall-free.

Selected Group Housing System

Group-housed weaned sow/mating shed, using free-access feeder stalls.

Building Modifications and Construction

The existing mating shed (34m x 15m) was built in 2008 to house 192 sows in stalls between weaning and four weeks post-AI/mating. To convert this shed into group housing, the existing four rows of stalls were removed and replaced by two rows of full length feeder stalls (0.6m x 2.2m) within pens holding 11-13 sows.

The shed is now divided centrally into two, with four pens (sized 5.2m x 6.0m) along one side accommodating 11-13 sows/pen (2.4-2.8m²/sow), and six smaller pens holding 5-11 re-mate/stale sows along the other side.

A slatted concrete area (2.15m in depth) runs behind the feeder stalls, with an additional (1.6m) solid area completing the pen’s floor profile. All pen divisions are built from vertical-run pipework.

Sows are batch-weaned into half the shed, heat checked, inseminated and by day 8-9 post-weaning, moved into an adjoining mated sow shed. Any unmated sows are moved across the shed into smaller pens with previously batched sows.

A 36m x 12m shed has recently been constructed to loose-house up to 102 mated sows for four weeks.

The shed features a shelter-type roof construction (white tarp over curved steel purlins), poured on-site concrete sidewalls and vertical-drop poly sidewall blinds. Eight pens accommodate 12-13 sows/pen and are fitted with free-access feeder stalls (0.6m x 2.2m), a concrete slatted area behind (2.5m depth) and a solid concrete area (1.6m depth) completing the pen’s floor profile.

Sows housed in both facilities are fed a pelleted diet twice daily, released from volumetric feed drops into a below-floor level poly-lined feed/water trough running the length of the building and alongside sidewall passageways. Trough water levels are automatically maintained using diaphragm water levellers.

The Layout

Both sheds provide sows with access to full length feeder stalls, and slatted and solid floor lying areas. The feeding system can facilitate individual feed drop adjustments in each stall but the stalls are free access and sows can ‘feed pinch’ from neighbouring sows. A single swing chain attached to the rear of each stall can be used to restrain sows but are used sparingly, due to sows either pushing under, or rearing back over them.

Approval

Construction approval for the mating shed in 2008, and its recent conversion from stalled to penned accommodation, was given by local Council without delay or conditions. Building approval for construction of the new mated sow shed was delayed for a period of seven months while building design engineers debated the adequacy of roof bracing with Council’s engineers (despite other Councils approving similar works applications without delays).

Ventilation

The weaned/mated sow shed is tunnel ventilated, with Automatically Controlled Natural Ventilation (ACNV) capacity provided through sidewall vertical drop (1.6m) poly blinds (no central roof ridge vent). Roof is insulated panel. The mated sow shed is ACNV, with 1.2m drop sidewall poly blinds and a tarp roof. All sliding entry/exit doors in both buildings are of insulated panel construction.
**Effluent System**

Effluent is removed from the mating shed by central pull-plug drainage into a 250mm diameter poly pipe, emptying into a 22.5kL poly storage tank before being pumped through a fan separator. Extracted solids are stockpiled for spreading on neighbouring paddocks and the liquid fractions are pumped to an evaporation pond.

Effluent is removed from the new mated sow shed through two central, flat-bottomed drains running the length of the building, each 1.0m wide and 0.55m deep. A sluice gate fitted at the end of each allows effluent to accumulate for approximately four weeks, before removal of the sluices and flushing of each drain using 400L of fresh water. The effluent then follows the same path as the adjoining shed, through the fan separator.

The solid floor sections to pens in the mated sow shed were domed during construction to encourage pen cleanliness, but this has not proven as successful as hoped, and a sprinkler system is now planned to be installed over slatted pen areas, to encourage correct dunging patterns.

**Feeding System**

Sows in both sheds are fed a pelleted diet twice daily in free-access stalls. Drinking water levels in the troughs are maintained using diaphragm water levellers and feed is dropped into the troughs.

**Management**

Sows are weaned into the mating shed in group pens of 11-13, according to body size/parity. Boars are restricted to head-to-head access with six to seven weaned sows along sidewall passages with permanent gates during once/day heat checks. No sows receive more than two inseminations. By day 8-9 post-weaning, all mated sows are moved into the adjoining mated sow shed, into groups of 12-13/pen. Ultrasound pregnancy checks are conducted at four weeks post-AI, with pregnant sows then moved into group housing on older parts of the site while not-in-pig sows are returned to the wean/mating shed to join the next mating batch (or are culled).

Farm staff have observed an increase in sow injuries and timidity/nervousness since changing from stalled to group housing at weaning, with dew claw, foot, shoulder and back injuries occurring during the first week post-weaning associated with sow riding.

**Costs**

Total refit cost for the weaned sow/mating shed was $28,000 (including internal equipment fit-out, drain re-alignments, and owner’s labour).

**Figure 1. Mated sow shelter with feeder stalls**

![Image](image1.jpg)

Total construction costs for the new mated sow shed were $140,000 ($1,372/sow); this includes the structure, internal equipment and fit-out, floors, concrete, walls, drainage, electrical fittings but not the piggery owner’s and farm staff labour. Farm staff labour was seconded from other daily piggery tasks as required.

**Figure 2. Drop feeders in feeder stalls**

![Image](image2.jpg)
An additional $40,000 capital investment (above the $140,000) was required to enable remaining parts of the original breeder site to be converted into group (from stalled) accommodation, as sows needed to be moved at weaning into the renovated mating shed, then into the new mated sow shelter, before a final move into group pens of varying sizes to complete their gestation.

**System Benefits**

- All sows on-site are now housed stall-free.

**Operating Issues**

- Management of sow aggression and resultant injuries, especially during the first week post-weaning, as sows within weaned groups enter oestrus at different times/days.
- An emerging sow mastitis issue, possibly associated with pen hygiene immediately post-weaning.
- Variable AI fertility results (conception rates in particular).
- Loss of control with individual sow feeding (daily intakes).
- Farm staff now have to manage and fine tune a ‘new’ production system.
- Extra sow movements.

**Financial Information**

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GROUP HOUSING SYSTEMS

CASE STUDY 4

Production System

The unit is a 630 sow nucleus and commercial unit producing breeding gilts and bacon pigs. The producer has invested in group housing of mated gilts and sows with electronic sow feeders (ESF’s). One pen holds 140 selected and mated gilts with three feeders (G1), and a second pen (G2) holds 342 sows with seven ESF’s. Both pen systems operate as dynamic groups with sows added and removed weekly in groups of 30-35.

Building Modified

The converted building was previously a naturally ventilated, part slatted, fully flushed with fresh water shed holding 490 sows in stalls built in 1996. The shed had a floor area of 1446m². The G1 pen is 13.4m x 26.5m providing 2.5m²/gilt. The G2 pen measures 13.4m x 62m providing 2.4m²/sow.

Modification

The decision was made to convert the existing 13.4m x 88.5m dry sow shed which held four rows of sow stalls. The stalls were removed and the building re-roofed. The existing part-solid partly-slatted floor remained in place with no modifications.

The Layout

The sheds are split centrally along their length by steel divisions sat on concrete blocks. The partition which runs almost the length of the building dictates that sows enter the feeder from one side of the shed and exit the feeder on the other side of the shed. To re-visit the feeder, the sow has to walk the length of the shed to rejoin the sows waiting to re-enter the feeder.

To allow sows to form sub groups within the building the lying areas are divided by open steel partitions on the outside walls of the building. The open area between the central partition and the lying area protected on three sides doubles as a walk way for the sows to return to the feeding side.

Sows identified for individual treatment can be selected and drafted into a holding area. Similarly, sows that are recorded as frequently visiting the meshed front area of the boar pen can be selected and drafted to a holding area following a feeder visit.

Approval

Approval was not required as the effluent system was not modified and the building was not increased in size.

Ventilation

The ventilation of the shed was not modified when the building was re-roofed. The building had a raised ridge cap for stack effect, automatic curtains in the side walls and spray and stirring fans to assist environmental control.

Effluent System

The original effluent channel arrangement has been retained. The channels are flushed daily by flush tanks located between the two pens, G1 and G2. The effluent therefore flows away from the flush tanks between the pens to the end walls and is picked up in drains at either end of the shed.

Feeding System

The producer has invested in 10 ESF’s. In one pen (G1) three feeders service 140 selected and mated gilts. In the second larger pen (G2), seven ESF’s meet the needs of 342 sows. The ESF allows the sows to be fed to scale with an unlimited number of feed curves. The computer program includes facilities to blend feeds and select sows for specific tasks by utilising a built-in three spray marking system.

Management

Both pens are run as dynamic groups. Each week around 30 sows are weaned, and 5-7 days post weaning and immediately after service, are introduced into the group (G2). Previously, around 30 sows will have been drafted out automatically and then moved to the farrowing facilities.
Each week a number of selected and mated gilts are moved into the G1. The selected gilts are introduced to the system for training before being mated. Sows returning to service are identified electronically by their activity around the boar pen grill which is within the group pens. Sows and gilts showing high interest in the boar can be identified and drafted to a catching pen for attention and re-mating.

Training of the herd to use the feeders was a time consuming task. However, training the selected gilt portion of the herd is manageable with patience and dedication. Staff training is ongoing and demands that staff read the computer print outs to identify sows and gilts which have not fed. In addition, sick or injured gilts and sows need to be identified and the computer promptly programmed to draft those animals to the holding area.

**Costs**

The costs include re-roofing of the building, internal block work, pen divisions, the electronic feeding system and labour.

**Table 1. Costs to retrofit the original dry sow shed to group-housed sows fed through ESF’s**

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost (per sow)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Re-roof Building (panels and labour)</td>
<td>$230</td>
</tr>
<tr>
<td>Structural Modifications</td>
<td>$24</td>
</tr>
<tr>
<td>Furnishings and Fittings</td>
<td>$48</td>
</tr>
<tr>
<td>Feeders</td>
<td>$206</td>
</tr>
<tr>
<td>Labour (internal modifications)</td>
<td>$79</td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td><strong>$584</strong></td>
</tr>
</tbody>
</table>

* Re-roofing of the building would have been necessary even if the sow stalls had been retained.

**Perceived System Benefits**

- No change in sow numbers due to dynamic groups.
- Pleased to date with herd performance trends.
- Little aggression – no vulval biting.
- Flexible system.
- Clever software, no computer in office, uploads to mainframe.

**Operating Issues**

- Pregnancy testing and vaccination in group pens is difficult.
- Only in stalls for 2-3 days so some sows don’t show oestrus.
Financial Information

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GROUP HOUSING SYSTEMS

CASE STUDY 5

Production System

The business is a 1500 sow farrow to finish unit.

Selected Group Housing System

Automatic floor feeding in pens with shoulder divisions.

Building Modified

The unit’s original eight rows of dry sow stalls were removed and the area they occupied converted into two rows of group-housed pens with an outside lane. The centre of each row of pens is slatted. The area under the shoulder stalls is solid concrete to provide a solid lying area and a solid area for floor feeding. Each pen measuring 5m x 6m, holds 15 mated sows providing 2.0m²/sow including the feeding stall (500mm x 500mm).

The Layout

Ten shoulder stalls run the length of the pen with five more stalls on the opposite side next to a gate, which allows the sows moved in from or out to a movement passageway. There is a solid partition in front and to the side of the feeders so the sow is not able to see another sow when feeding. Drop feeders with a tube reaching about 40mm from the concrete, automatically dispenses feed slowly onto the concrete.

Ventilation

All sheds are climate controlled with tunnel ventilation.

Effluent System

All sheds have static effluent pits which are emptied regularly.

Feeding System

Each sow has an individual feeding stall with solid shoulder divisions (500mm x 500mm) to separate them during feeding.

Sows are fed once a day and it takes about 20-30 minutes for a sow to lick the feed out from the bottom of the tube. This reduces the chance of a dominant sow bullying a less dominant sow in the group to gain access to additional feed.
Also, sows do not seem to leave the feeder to cross the pen for more feed and the more dominant sows tend to feed closer to the mesh pen divisions. Feeding twice per day has been tried but wasn’t successful.

Every fortnight the routine is to adjust the feeding level according to a feed curve. Sows can only be fed the average for the group and not according to their individual needs. Some aggression does occur but after the first two to three days, the hierarchy is settled and the sows express less aggressive behaviour.

Table 1. Costs to retrofit the original dry sow shed to group-housed sows fed automatically on the floor with shoulder stalls

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost (per sow)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural Modifications</td>
<td>$14</td>
</tr>
<tr>
<td>Furnishings and Fittings</td>
<td>$25</td>
</tr>
<tr>
<td>Shoulder Stalls/Penning</td>
<td>$162</td>
</tr>
<tr>
<td>Labour</td>
<td>$13</td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td><strong>$214</strong></td>
</tr>
</tbody>
</table>

System Benefits

- Lower set up cost compared to electronic sow feeders (ESF’s) installed in other sheds within the business.
- The system will fit most existing dry sow housing.
- Smaller groups of sows are easier to manage, vaccinate, check for oestrus and remove when necessary.
- Smaller groups are easier to establish according to body condition and parity.
- There is no feeder training required as with an ESF.
- As the feed is dropped at one time, all sows get up to eat together which makes it easier to check for sick/injured sows.
- Staff like it, easy to manage.
- No electricity wiring cost, computers, technical problems, moving parts etc.

Operating Issues

- Aggression does occur when groups are established.
- Sows can only be fed the average for the group, not according to their individual needs.
- When sows are removed for returning to oestrus or for any other reason, groups cannot be restructured resulting in a waste of pen space.

Financial Information

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GROUP HOUSING SYSTEMS
CASE STUDY 6

Production System
The unit is a 350 farrow to finish unit.

System
Floor feeding in groups of six with shoulder stalls.

Building Modified
To make the transition from sow stalls to group housing the producer plans to convert a shelter with slatted floors currently used for grower pigs into group housing with six sows/pen. To accommodate the grower pigs, a new shelter with slats will be erected adjacent to the current buildings.

Figure 1. Existing grower shelter

Modification
A naturally ventilated fully slatted shelter 42m x 10m currently housing grower pigs in 28 4m x 3m pens will be modified to hold sows in groups. Each pen in the modified shelter will hold sows in groups of six. The slatted area will be reduced by 275cm and replaced with solid concrete to enable the shoulder stalls to be anchored. Feed will be dispensed automatically through down tubes into the front of each feeding space. To accommodate the displaced grower pigs, a new fully slatted shelter 51m x 10m will be erected.

The Layout
One hundred and sixty eight pigs will be housed in groups of six in 4m x 3m pens, with 14 pens either side of the central passage. Sows will be fed in a trough with shoulder stalls at 500cm centres installed to reduce aggression at feed time.

Figure 2. Existing grower pens

Approval
A formal application was made to the Department of Employment, Economic Development and Innovation (DEEDI) to erect the new shelter for the grower pigs and change the use of the shelter currently used for grower pigs.

Approval was obtained to erect the new building providing the very old building holding the existing sow stalls was decommissioned and there was no increase to the number of Standard Pig Units (SPU’s) stated in the current licence.

Ventilation
The modified dry sow accommodation will rely on natural cross-flow ventilation.
**Effluent System**

The flush system in the current grower shelter will not be changed when it is converted to hold sows.

**Feeding System**

Sows will be fed on the floor by drop feeders on a standard feed level throughout the shed. To maintain favourable sow body condition, sows will be grouped according to size and when necessary, pens of disadvantaged sows will be given extra feed.

**Management**

The provision of 168 places for sows in groups will dictate that dry sows will spend up to six weeks in stalls during gestation as allowed by the *Model Code of Practice for the Welfare of Animals – Pigs, 3rd Edition* (the Model Code).

**Costs**

In determining the cost of meeting compliance with the Model Code, the total cost of the new building for growers and the cost of modifying the existing grower shed has been allocated to the project.

**Operating Issues**

- Sows cannot be fed according to their needs.
- Potential for aggression.

**Financial Information**

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**System Benefits**

- Sows are in groups.
- Simple system to operate, does not rely on technology.
- Sows can be easily observed, treated or removed from the pen.

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**Table 1. Costs to retrofit the original dry sow shed to groups of 6 sows fed on the floor with shoulder stalls**

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost (per sow)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Work</td>
<td>$92</td>
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<tr>
<td>Structural Modifications</td>
<td>$265</td>
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<tr>
<td>Furnishings and Fittings</td>
<td>$48</td>
</tr>
<tr>
<td>Computer and Electrical</td>
<td>$7</td>
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<tr>
<td>Feeders</td>
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<tr>
<td>Labour</td>
<td>$185</td>
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<tr>
<td>Freight</td>
<td>$31</td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td><strong>$670</strong></td>
</tr>
</tbody>
</table>
GROUP HOUSING SYSTEMS

CASE STUDY 7

Production System

The 250 sow, batch farrowed, farrow to finish, single site commercial piggery has commenced a program of converting all its stalled accommodation to stall-free group housing. The recent construction of a 144 sow capacity straw-bedded facility has enabled batches of 24 mated sows to be group-penned from four weeks post-AI, through until farrowing. It is planned that once all remaining stalls at this site have been removed these batch groups will be formed immediately post-AI/mating.

Selected Group Housing System

Straw-bedded shelter-type building, with free-access feeder stalls.

Building Construction and Layout

A 40m x 15m building was constructed to house batches of 24 mated sows in pens providing 3.6m²/sow (includes raised feed pad plus bedded area). Individual feeder stalls (2.27m x 0.51m) are constructed along both sides of a 0.8m wide central walkway. A 0.4m wide flat bottom drain, covered with 400mm x 400mm concrete slat blocks (70mm solid x 40mm gap width) runs the length of the raised feed pad behind the feeder stalls, to reduce the volume of waste water/urine reaching the bedded area and to extend the useful life of the bedding. Step-down height from the feed pad to the bedded floor area is 270mm.

Sidewalls are poured concrete (1.2m high) fitted with Automatically Controlled Natural Ventilation (ACNV) vertical drop, poly blinds (width 2.0m). The roof structure is white, trimdeck-profile steel, with insulation panels on its internal surface.

Drinking water is provided in a 190mm deep poly trough set below floor level, with water depth automatically maintained in each pen's trough using diaphragm water levellers. Feed is dropped onto solid flooring behind the trough.

Ventilation

The structure is ACNV controlled, with no central roof ridge vent. Spray cooling using 180 degree demisters along a 10mm polyline over the bedded area is directed towards the sidewalls.

Effluent System

A 90mm stormwater pipe is located within the feed pad drain and connects back to the end of each pen's water trough, enabling troughs to be emptied without wetting the bedding. Barley straw is purchased locally for use as bedding ($30/400kg bale, as at March 2012), with 2.0T/batch of 24 sows (7kg/sow/week) required during housing between weeks 4-16 post-mating/AI. Used bedding is stockpiled on-site before collection and broadacre spreading by neighbouring farmers. Cleanout of one half of the facility (removal of bedding, washdown and disinfection) takes one person approximately 6-8 hours.

Costs

The building cost $180,000 in total to construct (includes design and approvals, construction, internal equipment fit-out). A 60hp tractor with bucket was purchased ($30,000) to add/remove straw bedding.

Feeding System

Sows are trickle-fed a pelleted diet once daily. Feed is trickle-dropped onto solid floor at a speed that takes about 30 minutes for sows to receive their daily allocation; this significantly reduces the incidence of 'stall swapping' and 'feed pinching' which occurs with single feed-drop systems.

Management

Sows are formed into groups of 24, largely based on body size/parity, although gilts/P1's are sometimes mixed with older parities. Ventilation and feeding requires minimal stockperson intervention due to automation.
Blocking of the 400mm x 400mm concrete blocks covering the drain at the rear edge of the raised feed pad with a mixture of bedding and dung has forced owners to consider replacing the slatted drain cover with solid concrete blocks.

**Figure 1. Trickle feeding system**

Sows can be restrained in feeder stalls for vaccinations or individual veterinary treatment by dropping feed and connecting a single swing chain across the rear of the stall/s.

**System Benefits**

- Sows are housed stall-free and in mated batches.
- Sows are quiet and relaxed; little sow aggression.
- Trickle feeding system manages sow aggression at feeding.
- Minimal sow mortalities reported during first eight months of operation.
- Used bedding is a useful by-product in local winter cropping programs.
- Perceived high sow welfare.

**Operating Issues**

- Feeding stalls don’t have front exit gates, reducing sow movement options.
- Cleanout times may be reduced with planned purchase of a larger loader bucket.
- Straw purchase costs are on-going and variable.
- Drainage of feeder pad remains unresolved.

**Figures 2 & 3. Straw-bedded shelter with free-access feeder stalls**

**Financial Information**

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GROUP HOUSING SYSTEMS

CASE STUDY 8

Production System

The unit is a 200 farrow to finish selling pigs at 105kg LW.

System

Group housing with full length divisions and floor feeding.

Building Modified

Until recently, the unit was run as a 500 sow breeder unit transferring weaners to contract grower sites. Dissatisfaction with contract grower performance, particularly relating to feed wastage and poor selection for marketing, convinced the producer to convert this unit to a 200 sow farrow to finish enterprise. At the same time, he decided to replace sows stalls with group housing to meet the Model Code of Practice for the Welfare of Animals – Pigs 3rd Edition (the Model Code).

Modification Implemented

The number of sow stalls in buildings was reduced by more than 50%. Where two banks of stalls were back to back, one row was left in place, and with the tail gates removed, became full length divisions to reduce the aggression at feeding time. The other row of stalls was removed to provide the lying area. Pen divisions were installed to allow groups of seven to nine sows to be established.

The Layout

The 13.2m wide building has been converted from a four row sow stall system to a three row group penning system. The two outside rows of stalls were modified to hold seven to nine sows in pens 3.1m x 6.3m. The existing sow stalls were removed and each pen was fitted with 12 shoulder stall divisions (0.8m long and 0.53m apart). The centre two rows of stalls were modified by removing one bank of stalls and modifying the other bank of stalls to shoulder divisions 0.53m apart. Each pen now measures 6.4m x 5.4m holding seven to nine sows.

Approval

Approval for this modification was not necessary because the number of Standard Pig Units (SPU’s) on the unit were not increased. The Department of Employment, Economic Development and Innovation (DEEDI) has indicated that the producer will be allowed to erect a specialist service centre in close proximity to the dry sow shed.
Ventilation

The building is fitted with a controlled environment system with four external fans (2 x 900mm and 2 x 1200mm) and two cool cells.

In addition, there are six 900mm fans in the shed to assist with air movement in periods of high temperature.

Effluent System

The system relies on flush buckets.

Feeding System

The sows are currently fed manually on the floor. The cableway feed line does allow automatic feeding through down tubes to within 140mm of the water in the trough.

Management

The unit weans sows fortnightly. Currently, sows are moved from the farrowing shed to the mating area and then into stalls for six weeks prior to moving into the group pens. On completion of the modification program sows will be moved from the mating pens at five days after service directly to the group pens. Approximately 20 sows are moved into the group housing system into four pens, selected on condition or age every two weeks.

Costs

The costs include the modification to the building including structural modification, feeding system, other equipment and furnishings, and labour.

Table 1. Costs to retrofit the original dry sow shed to group housing with full length divisions and floor feeding

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost (per sow)</th>
</tr>
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<tbody>
<tr>
<td>Base Work</td>
<td>$24</td>
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<tr>
<td>Structural Modifications</td>
<td>$16</td>
</tr>
<tr>
<td>Furnishings and Fittings</td>
<td>$72</td>
</tr>
<tr>
<td>Feeders</td>
<td>$7</td>
</tr>
<tr>
<td>Labour</td>
<td>$17</td>
</tr>
<tr>
<td>Total Cost</td>
<td>*$136</td>
</tr>
</tbody>
</table>

* It is estimated that a further $10,000 is required for the unit to be completely stall-free.

Perceived System Benefits

- Higher farrowing rate and increased litter size.
- Meets the Model Code.
- Sick sows can be identified readily at feeding time.

Operating Issues

- Slight increase in feed used/sow/year.
- Not always to easy to establish groups of similar size and parity in a small herd.

Financial Information

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GROUP HOUSING SYSTEMS

CASE STUDY 9

Production System

The business is a 730 commercial sow farrow to finish unit.

Selected Group Housing System

Electronic sow feeders (ESF's) with dynamic groups of 34.

Building Modified

A naturally ventilated, part-slatted building (44.7m x 17.6m) holding sows in stalls and small groups of sows in pens, was modified to incorporate ESF’s. The sow stalls on either side of the building were retained to hold sows from four to eight weeks of pregnancy. Further developments will take place in the future to reduce the time in stalls to six weeks.

During the retrofit, the number of pens was reduced to seven, each holding 34 sows with access to a double sided feeder. Each pen holding a feeder is 5.5m long x 9.8m wide, providing 1.8m²/sow. At each end of the shed are areas to hold sows for individual attention.

Figure 1. Group pens with ESF’s fitted

Ventilation

The building is naturally ventilated relying on stack effect through a raised ridge cap. It is proposed to install four fans to assist air movement in periods of high temperature.

Effluent System

The area under the group housing pens is flushed five times a week while the area under the stalls is flushed twice weekly.

Feeding System

Sows are fed with an electronic feeding station. All sows have an ear tag (transponder) in the top of the ear which is identified via the aerial. If the sow has a feed claim, the conveyor delivers the feed as a porridge directly into the sow’s mouth through a tube.

The feeding system allows sows to be fed individually and a number of feed curves are used to manage sows in varying body condition.
After a sow has eaten, it can take a number of seconds before the tube is closed after having delivered feed, making it attractive for waiting sows to chase away the eating sow and take that part of her ration.

Aggression does occur while sows are waiting for their turn to enter the feeder; however the placement of the feeder in the centre of the pen allows the sow to walk away.

Management

Sows are moved into the group six weeks post weaning. Each pen holds one week’s weaning or one week’s mating production. Gilts are trained to use the feeders in another building where three pens (3.9m x 8.5m) are each fitted with feeders.

Approval

Approval was not required as the effluent system was not modified and the building was not increased in size.

Costs

The costs include the modification to the building including feed stations, computer and labour.

Table 1. Costs to retrofit an existing group-housed shed to incorporate ESF’s

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost (per sow)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer and Electrical</td>
<td>$10</td>
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<tr>
<td>Feed Stations</td>
<td>$170</td>
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<tr>
<td>Labour</td>
<td>$7</td>
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<tr>
<td><strong>Total Cost</strong></td>
<td><strong>$187</strong></td>
</tr>
</tbody>
</table>

System Benefits

- The feeding system is compact and can be used in old buildings.
- Sows can be fed according to their individual needs.
- Pens are cleaner.
- Less feed wastage.

Operating Issues

- Aggression does occur around the feeding station.
- Slippery around feeders on slats.
- Minimal training is required with gilts.

Financial Information

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GROUP HOUSING SYSTEMS

CASE STUDY 10

Production System

The unit is a 3200 breeding unit transferring pigs off site at weaning.

System

Sows are run in groups of up to 84. Feed is dispensed by a simple trickle feeding system into four rows of feeding spaces with the sow protected at feeding time by shoulder divisions.

Building Modified

The transition was made to group housing by removing sow stalls from naturally ventilated, part-slatted sheds and replacing with four rows of feeding stalls with shoulder divisions.

Modification

Five naturally ventilated, partly-slatted sheds were modified to hold sows in groups. Sows are moved from the farrowing area into pre-mating pens holding 20 sows. Sows are fed on the floor with shoulder stalls for protection and to reduce aggressive interactions. For 24 hours after the onset of oestrus, sows are housed in individual AI bays. For the first five weeks post mating, sows are held in pens of 84. After pregnancy testing at 35 days post mating, pregnant sows are moved to a range of buildings in groups of 73 or 18 for the remainder of gestation. The minimum space allowance provided is 2m² per sow.

Feed is dispensed through a down tube from a small hopper. The down tube reaches almost to the floor and the feed only trickles down the tube. The trickle feed system dictates that sows eat slowly and gain no advantage by moving aggressively from feeding space to feeding space.

In a second bay, there are six smaller pens holding a total of 18 sows or gilts to assist management, and two boar pens providing 6m²/boar.

To achieve the required space allowance an external walkway on one of the buildings, 1.5m in width has been installed with the approval of the Department of Employment, Economic Development and Innovation (DEEDI). At the end of the modification program, sows will be housed individually for only 24 hours in the AI bays.

The Layout

The dry sows are housed in groups. They are fed in banks of nose to nose feeding spaces with shoulder divisions at 550cm centres. The sows are fed by a simple trickle feeding system to reduce still further aggressive interactions at feeding time.

Approval

Approval was obtained from DEEDI to modify the buildings providing there was no increase in the number of Standard Pig Units (SPU’s). To provide a minimum space allowance of 2m²/sow, DEEDI allowed the producer to install a 1.5m wide external walkway on one of the buildings.

Ventilation

The modified dry sow accommodation will rely on natural ventilation.

Effluent System

The effluent is stored in static pits, emptied at regular intervals.

Feeding System

Sows are fed on the floor though down tubes which are placed close to the floor to allow trickle feeding to be practiced.
Management

Sows will no longer be housed in stalls for any part of their production cycle. The automated feeding system should provide more time for skilled staff to manage sows.

Costs

The cost of replacing the sow stalls is estimated at $600 to $900 per sow. The cost includes modifying the floor, installation of the feeding system and the construction of the external pathway. The steel work was recycled and there were no modifications to the shed structure.

System Benefits

- Sows are in groups.
- Simple system to operate, does not rely on technology.
- More skilled team.
- Sows can be easily observed, treated or removed from the pen.

Operating Issues

- Sows cannot be fed according to their needs.
- Aggression.
- When groups are established.
- More training for staff to be vigilant at feeding time with an automatic drop feed system.

Financial Information

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