



Group Housing: Systems, Science & Behaviour





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Outline

- Group versus Stalled sows
 - Social interaction and aggression
- Key management factors
 - feeding system
 - space allowance, pen design
- Mixing aggression
 - timing, group selection, barriers
- Enrichment
- Relief/Hospital pens

Social Sows

- Unlike stalls- sows in groups must form *social relationships* with other sows
- This adds a new layer of management...
- Daily observation & response:
 - Are all sows feeding?
 - Are some being bullied/falling back?
- Responses: adjust feeding, pen environment, or social group to fix the problem




Aggression in Sows

Two main periods where aggression occurs:

Mixing Aggression

- Fighting when sows are mixed
- First 24- 48 hrs; establishment of group social order
- Regardless of management system

Ongoing Aggression

- After social order is established
- Competition for resources-
Eg. food, feeder access, lying areas
- Varies greatly with management




Why do they fight?

- At mixing- to establish social status/ dominance hierarchy
- *What happens in the wild?*
 - Stable matriarchal groups
 - Different groups avoid each other
 - Do not mix...



Management tools-

- Familiarity, previous experience, genetics
- Pen design, feeding, odour, group size/ composition, time of day



Why do they fight?

- During gestation- competition for resources (space, food, drinker)
- *What happens in the wild?*
 - Social hierarchy is clear
 - Space is unlimited
 - Food resources are dispersed



Management tools-

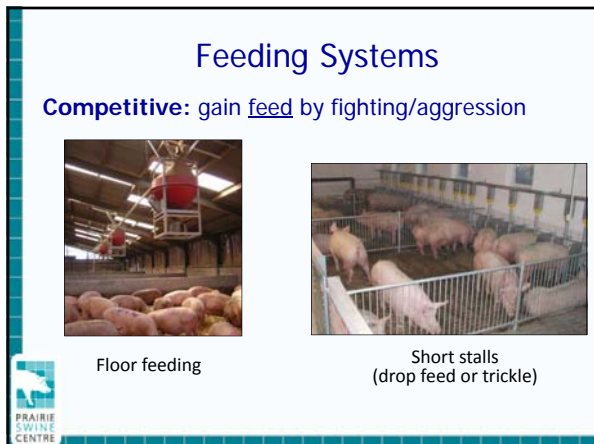
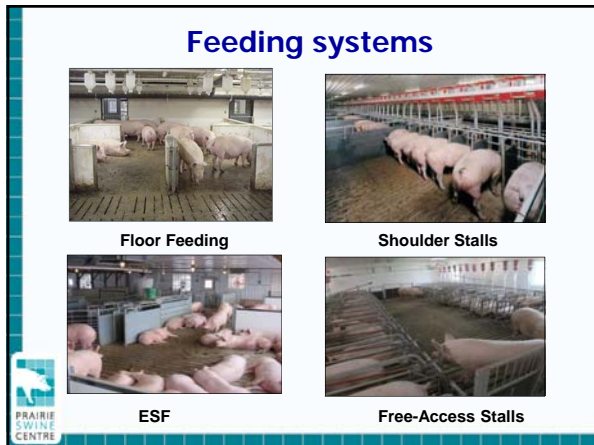
- Feeding system
- Space allowance, pen layout/design
- Group size and composition





Group housing comes in many flavors...

Feeding	Floor	Grouping	Timing	Total
Floor			Weaning	
Short stall	Slat	Static	Pre-Impl.	
Gated-stall	Partial	Dynamic	Post-Impl.	
	Bedded			
ESF				
4	x 3	x 2	x 3 =	<u>72!!</u>



Media Reports

- Beware of system & management differences...
- **Eg. National Hog farmer-** Transitioning Staff to Pen Gestation
<http://nationalhogfarmer.com/facilities/transitioning-staff-pen-gestation>



Before a farm transitions to group housing, it is best for all employees to mentally prepare that it will be different...



Media Reports- *read with care!*


National Hog farmer- Transitioning Staff to Pen Gestation
Tips for selecting and managing groups:

- It is important to know which sows not to put into pens
- No exception: Gilts go with gilts
- Group the animals by body condition, and keep younger parity sows together
- It is necessary to take into consideration breed dates and gestation lengths
- Watch older parity sows that are going into pens for the first time carefully, because you cannot backfill pens or remix pens

- **Use caution** when seeking information & advice!



Space Allowance

- **Important consideration:** what can be achieved with existing barn space?
- **Experience shows:** do not provide too little space 
- **Science is lacking:** 16 sqft is too small, 24 sq ft is sufficient
 - *What happens in between???*
- **EU guidelines:** Gilts: 1.64m² (18 sqft) Sows: 2.25m² (24 sqft)
 - Groups of < 6 sows; 10% more space
 - Groups of > 40 sows; 10% less space

- **Code of Practice** gives similar recommendations...



Space Allowance

Code of Practice Recommendation: Minimum floor space allowances for gilts and sows

Group type	Partial slats		Bedded floor	
	m ²	ft ²	m ²	ft ²
Gilts	1.4 - 1.7	15 - 18	1.5 - 1.9	16 - 20
Sows	1.8 - 2.2	19 - 24	2.0 - 2.4	21 - 26
Mixed	1.7 - 2.1	18 - 23	1.9 - 2.3	20 - 25

Small groups: larger allowances
Large groups: smaller allowances



Space Allowance: ideal vs real

- **Commercial setting-** space costs \$\$
- important to find break point above which sows experience adverse effects

- Increased aggression



- Increased drop outs: Sows failing to maintain condition
- Sows not maintaining pregnancy to term.



Space Allowance- Research

Example: Johnstone and Li, 2013

- Documented sow production comparing stalls to floor feeding (815 sows; parities 1-8)
- **Methods:**
 - Same floor space 'footprint' as stalls
 - 1.5 m² (16.1 sq ft)/sow
 - Stalls: standard 24" stall (326 sows)
 - Large pens: 26 sows/group (13 pens; 338 sows)
 - Small pens: 6 sows/group (26 pens; 156 sows)



Space Allowance- Research

- Results: Large pens gave poorest performance, stalls were best
- No effects on litter size

	Stalls	Large pens	Small pens
Weight gain (kg)	41.5	33.4	39.5
Farrowing rate (%)	98	92	95
Removal rate (%)*	9.2	15.8	11.7

*Removals: due to reproduction (NIP) or mortality



Space Allowance

- Conclusions:
- Sow welfare and performance were reduced in groups
- Inadequate floor space (16 sq ft/sow)
 - Code recommended minimum: 19 sq ft
- High drop-outs/removal rate
 - Competitive feeding, sows were not sorted by size/parity
- Staff were unfamiliar with group management- skeptical and unprepared
 - A good example of **What NOT TO DO!!!**



Pen Design

The Basics...

- Space allowance
- Feeders and drinkers- ratio, placement
- Layout- avoidance distance, partitions
- Separation of dunging, feeding, resting areas
- Quality of space is as important as **quantity**
- "Pen design is as important for reducing aggression as pen space" (Barnett et al. 1992)



Pen Design- for quality

- Partitions
 - Divide pen space to provide options and isolation
- Flooring- solid areas for lying (sloped)
 - Encourage correct use of alleys, lying areas
 - Alternative flooring- rubber mats, slat gap covers
- Enrichment and satiety
 - Encourage positive behaviours & reduce negative behaviours
 - Wood on chain, wood in holder, fibrous feeds



Pen Design

- Short partition wall, straw rack enrichment



Pen Design

- Solid flooring



Pen Design

- Enrichment & satiety






Group Size

Small groups

- More common with competitive feeding
- From 10 to 30 sows
- Static groups- same stage of gestation
- Smaller groups- allow formation of more *uniform* groups (similar size, parity, backfat)
- Uniformity important- sows have similar needs, can compete equally for feed



Group Size


Large groups

- Common with ESF (not possible with competitive feeding)
- From 45 to >300 sows
- In large groups- animals learn to adopt more tolerant behaviours (Samarakone and Gonyou, 2009)
 - Dynamic groups can be formed, adding new sub- groups periodically
- Individual feeding- for different parities
 - Keeping gilts separate *is still recommended!*



Mixing Aggression

- Mixing effects on sow welfare & productivity (Einarsson et al, 2008; Soede et al, 2007)
 - Injury & lameness
 - Disruption of estrus expression
 - Impact of stress on conception rate, litter size
- Implantation (1-4 weeks)
 - sensitive time for mixing




Reducing Aggression at Mixing

- Timing of mixing
- Group formation- social factors
 - Social experience: Gilt development
 - Static vs dynamic groups
 - Uniform vs diverse parities
- Management- physical factors
 - Mixing pens, pen design
 - Full feeding, odours, boars, time of day



When to mix?

Most successful times to mix:

- At weaning
- After insemination
- After implantation (approx. 28 days)
 - Following pregnancy check in stalls



Mixing- four weeks after breeding

- Sows commonly mixed at confirmation of pregnancy (21-35 days)
 - Stalls allow close management
 - Monitor estrus, feed consumption, BCS, breeding, preg checking
 - Mixing aggression is delayed until after implantation

But:

- More space required for stalls
- What if stall use becomes more restricted?
- Potential for impact on pigs in the pre-natal environment?



Mixing- at Weaning

- At weaning
 - Mixing aggression **resolved before** estrus/implantation
 - Evidence that early mixing helps to bring sows onto heat (Pearce and Hughes, 1992)
 - Sow-to-sow contact may help to synchronize estrus

Concerns:

- Estrus behaviour (mounting) may lead to injury & lameness
- Mixing aggression may disrupt return to estrus, or inhibit estrus expression (eg. in subordinate sows)
- Added work- handling sows at breeding, preg checking in groups



Mixing- after insemination

- After insemination
 - Mixing aggression is **resolved before** implantation
 - Saves on space: Renovations- fewer stalls needed

Concerns:

- Mixing must take place shortly after breeding (eg 5 days)
- Li and Gonyou (2013)- mixed at 8 days after insemination
- Farrowing rate was reduced by 5%
- Added work- preg checking in pens
- Solved by adding heat detection units (Eg ESF systems)



Social Experience

Considerations for gilt development:

- Genetic selection for low aggression, and passive temperament
- Socialized with other litters by 12 days
- Multiple movements and mixing events



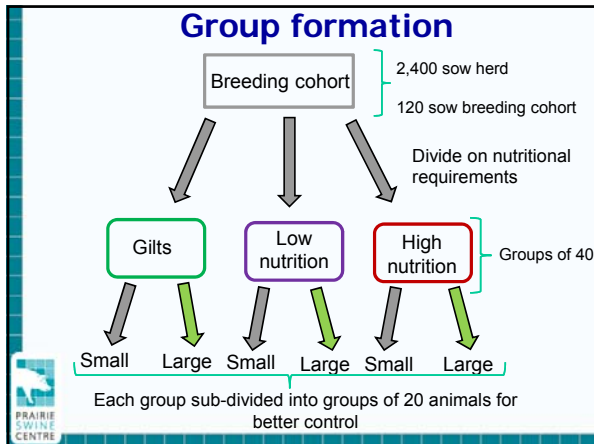
Static groups

- Beneficial to reduce competition between sows
- Sows of unequal size show less aggression (Arey and Edwards, 1998)

However.....

- With competitive feeding, smaller and thinner sows more risk to be disadvantaged (Brouns and Edwards, 1994)
 - Group by age, size & body condition
 - Use time in breeding stalls to even out sow condition
 - Daily checks at feeding
 - Be prepared to remove timid/injured/thin sows





Physical management

- **Example: Floor feeding**
- Dividers: separate pen into multiple feeding zones
- Distribute feed widely in the pen
- Bulkier diets slow eating and can increase aggression (Whittaker et al., 1999)
- Provide ad lib (low nutrient) diets
 - Low ranking sows can increase intake (Brouns and Edwards, 1994)
- Or, more frequent feed drops
 - Sows fed 6 x per day, lower body lesions, fewer leg, feet and hoof problems (Schneider et al., 2007)

Hospital pens/Relief pens

- Secure place for animals not coping with group
 - Thin, bullied, injured sows
- Pens should provide:
 - Individual feeding
 - Ensure sow comfort
- Individual or group pens
 - Including stalls

- Relief pen: sow needing extra feed/bullied but well.
- Hospital pen: Sow requiring medical attention, recovery

Location of hospital pens – close to the gestation pen

Hospital pens - recommendations

10 %

5 %

3-5 %

Hospital and Relief pens

- Recommended: 1 – 3% of gestation place units are provided as relief pens
 - i.e. 900 dry sow places= 9 – 27 relief places
- Hospital pens: 2% extra gestation place units
 - i.e. 900 dry sow places require 18 hospital pens
- Herds with high drop out levels:
 - 5% allowance for relief pens
 - 5% allowance for hospital pens

Conclusions

- Group housing is more complex and challenging from a management perspective
- Can benefit sow health and longevity- *when done well!*
- Requires more regular observation- animal husbandry skills
- Sows show their 'social side'- *Individual differences and personality*
- Improved human-animal interaction



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Questions?

