



# Dynamic Grouping: Impact on sow aggression and lameness

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# Outline

- ▶ What is Mixing?
- ▶ Characteristics of Mixing aggression
- ▶ Which factors affect mixing aggression?
- ▶ Types of grouping systems: static and dynamic
- ▶ Some effects of dynamic systems on aggression, lameness and injuries
- ▶ How can we mitigate the effects of repeated mixing in dynamic systems?
- ▶ Conclusions

# Sow housing systems

- ▶ 2014: Code of Practice for the Care and Handling of Pigs:
  - ▶ July 2014: new holdings need to consider group housing
  - ▶ Complete transition by July 2024: not all producers can meet this deadline
  - ▶ 2020: deadline extended to 2029



# Mixing

- ▶ Separated at farrowing
- ▶ Changes in group composition
- ▶ Re-establish social ranks and relationships
- ▶ Aggression at mixing 24-48 h after mixing event
- ▶ Once social ranks are established, aggression is minimal in well managed and designed systems:
  - ▶ Proper space allowance
  - ▶ Good allocation of resources
  - ▶ Enrichments



# Mixing aggression

- ▶ Aggression to establish social ranks:
  - ▶ Less frequent
  - ▶ More intensive
  - ▶ Fights that last several minutes
- ▶ Fights:
  - ▶ Head, neck and ears
  - ▶ Parallel or parallel inverse pressing
  - ▶ Chasing
  - ▶ Forcing another pig to leave and avoid certain places



# Mixing aggression

- ▶ Skin lesions
  - ▶ front third of the body
  - ▶ flanks when delivered in a reverse parallel posture
- ▶ Lameness
  - ▶ slipping and falling on slatted floors
  - ▶ Increased risk of claw and leg lesions = lameness
    - ▶ Painful
    - ▶ Abnormal movement
    - ▶ Not fit to compete with healthy sows for food and water = hunger and thirst



# Factors influencing mixing aggression

- ▶ **Production stage:**
  - ▶ Critical period: 2 - 4 weeks of pregnancy
    - ▶ Implantation: around day 11-16 after insemination
    - ▶ Maternal recognition: hormonal changes associated with pregnancy
  - ▶ Mixing: weaning or first week after insemination is preferred
    - ▶ 1 week after insemination: more skin injuries' vs 5-6 weeks (Stevens et al., 2015)
    - ▶ Early mixing (D3) increased lameness and decreased conception and farrowing rates (Knox et al., 2014)
    - ▶ Aggression similar for mixing at 2 to 9 d or 35 to 46 d after insemination (Strawford et al., 2008; Knox et al., 2014)
    - ▶ Type of group-housing system and individual characteristics may be influential



# Factors influencing mixing aggression

- ▶ **Competition for resources**
  - ▶ Aggression increases when food is scarce
  - ▶ Fights short in duration but high in frequency
  - ▶ Aggression can continue even after social ranks have been set
  - ▶ Collective and individual feeding systems
  - ▶ Floor feeding:
    - ▶ Extremely competitive
    - ▶ Creates under and over feeding (Spoolder et al., 2009).
  - ▶ Trough feeding:
    - ▶ Dominants monopolize large parts
    - ▶ Uneven food distribution





# Factors influencing mixing aggression

- ▶ Individual feeding stalls:
  - ▶ better control in feeding
  - ▶ Vulva lesions are possible
- ▶ Electronic Sow Feeding (ESF) system:
  - ▶ Sequential feeding
  - ▶ Feeding order
  - ▶ Used in large dynamic groups
  - ▶ Aggression during queuing



# Factors influencing mixing aggression

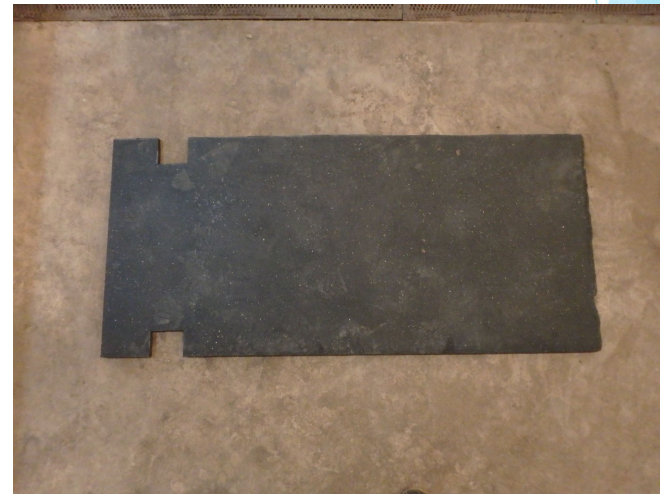
## ▶ Space allowance

- ▶ Great effect on behaviour and welfare
- ▶ Decreased space allowance increases aggression
- ▶ Types of space:
  - ▶ Static: space required for standing and lying
  - ▶ Behavioural: feeding, drinking, dunging
  - ▶ Interaction: fighting and fleeing
- ▶ Resting pace: dominant sows will have more access than subordinates
- ▶ Manure on the body as indicator of social rank



# Factors influencing mixing aggression

- ▶ Other factors include:
  - ▶ Restrictive feeding
  - ▶ Climatic conditions
  - ▶ Resting comfort



# Types of group housing: effects on aggression, injuries and lameness

- ▶ Types of group housing:
  - ▶ **Static**
    - ▶ Remain stable during gestation
    - ▶ No sows added or removed after group formation
    - ▶ **One mixing event**
  - ▶ **Dynamic**
    - ▶ Sows at different stages of gestation
    - ▶ Sows close to farrowing are removed
    - ▶ Sows in early gestation added
    - ▶ **More than one mixing event**



# Types of group housing: effects on aggression, injuries and lameness

- ▶ Why dynamic mixing?
  - ▶ *flexibility for group management and space utilization*
  - ▶ *However... repeated grouping!*



# Types of group housing: effects on aggression, injuries and lameness

- ▶ Bos et al., 2016: ESF system
  - ▶ Static: lower lameness scores and prevalence of skin lesions vs dynamic at the end of gestation
  - ▶ Lameness and injuries peaked on D3 for both groups



# Types of group housing: effects on aggression, injuries and lameness

- ▶ Li and Gonyou (2013): effect of grouping and mixing stage, ESF system
  - ▶ Dynamic groups: increased chronic skin injuries (cuts, swellings, and wounds) and lameness
- ▶ Anil et al. (2006): effect of group structure in sow welfare
  - ▶ Dynamic groups presented greater skin injury scores vs static
  - ▶ No effects of dynamic mixing on cortisol concentrations, farrowing performance and longevity and the proportion of time queuing for ESF access.



# Types of group housing: effects on aggression, injuries and lameness

- ▶ Pluym et al. (2011): Dynamic in ESF vs Static in free access stalls
  - ▶ Lameness prevalence not different between grouping styles
  - ▶ High rates of lameness for group housing overall
- ▶ Verdon et al., (2015): not enough evidence that sow welfare is affected by dynamic grouping

Interaction of type of group housing and factors that influence mixing aggression



# Management of aggression and injuries in dynamic grouping Types

## ▶ Parity grouping

- ▶ Li et al. (2012): effects of grouping by parity on aggression towards gilts and first-parity sows in dynamic groups
  - ▶ Grouping gilts and first parities vs grouping low and high parities
  - ▶ reduced skin lesions
  - ▶ more frequent fights, but less intense
  - ▶ Parity one sows with higher farrowing rates
- ▶ Social ranks: old sows > first parities > gilts



# Management of aggression and injuries in dynamic grouping

## ▶ Space allowance:

- ▶ 4 - 5 body lengths from one another when new sows are regularly introduced (Baxter, 1985)
- ▶ Newly introduced sows: chased for an average of 20m by resident sows in a dynamic system (Edwards et al, 1986)
- ▶ Dynamic ESF system: more space reduced one-way aggression for new sows, although two way aggression was unaffected (Remience et al., 2008)



# Management of aggression and injuries in dynamic grouping

## ▶ Mixing frequency

- ▶ Li and Gonyou (2013): 40 sows replaced every 5 weeks:
  - ▶ post-implantation sows only experienced one mixing event in early gestation
  - ▶ no effects on farrowing rate, weight gain, or litter size vs static
- ▶ Strawford et al. (2008): 105 sows mixed every five weeks mixed at 5-wk:
  - ▶ No difference in skin injuries, and cortisol concentrations vs static



# Management of aggression and injuries in dynamic grouping

- ▶ **Premixing**

- ▶ Kranz et al., 2022

- ▶ Sows allowed to interact with other sows post-weaning for 7 days prior to introduction as a batch to a larger group:
  - ▶ more inactive
  - ▶ more time lying in proximity to other sows
  - ▶ More nosing
- ▶ Unmixed sows that were not allowed to interact prior to pen mixing:
  - ▶ More aggressiveness (chase, side press, bite, displacements)
  - ▶ More active than premixed sows
  - ▶ More aggressive interactions and for a longer period post-entry



# Management of aggression and injuries in dynamic grouping

## ▶ Enrichment use

- ▶ Jensen et al., 2000: unchopped straw bedding in a dynamic ESF system
  - ▶ straw bedding reduced activity and aggression
  - ▶ rooting and other behaviours that diminish the effect of hunger
- ▶ Elmore et al. (2011): rubber mat, straw, compost, and cotton ropes
  - ▶ dominant and medium sows: more access vs subordinates
  - ▶ Motivation unchanged
- ▶ If not enough, it can result in competition for enrichment
- ▶ Enrichment for sows requires careful planning and management to reduce mixing aggression



# Conclusions

- ▶ Many factors affect mixing aggression
- ▶ Dynamic mixing can produce lameness and injuries
- ▶ The interaction between mixing factors and grouping systems matters
  - ▶ Mixing stage
  - ▶ Mixing frequency
  - ▶ Space allowance
  - ▶ Parity
  - ▶ Premixing
  - ▶ Enrichment
- ▶ More research is necessary!
- ▶ PSC Dynamic Mixing project: outcomes on behaviour, production and prenatal stress



# Thank you!

