



# **Reducing aggression and stress between sows at mixing**

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**Sow stalls**



Confinement



Stress



**Group housing**



Aggression



Stress

So how do we best manage group housed sows ?

# Effect of mixing sows at weaning, after service or at 4 weeks post-breeding on fertility & fecundity

Time of mixing	Farrowing rate	Litter size – TB
Weaning	84	<b>11.8</b>
After preg. check	84	<b>12.4</b>
After service	84	12.1
After preg. check	86	12.6
After service	90	13.0
After preg. check	94	12.7

# Effect of mixing sows after service on fertility & fecundity

Time of mixing	Farrowing rate	Litter size – TB
No mix	93	12.4
3-7 days post AI	<b>83</b>	<b>11.9</b>
13-17 days post AI	89	12.4
35 days post AI	92	12.2

# Potential methods to reduce aggression & stress at mixing

1. Provide a specific mixing pen:
    - How much space/sow ?
    - How long do they stay in the pen ?
    - Does ‘enrichment’ improve response ?
  2. Provide ‘pheromones’ to reduce aggression
  3. Manipulate the diet to reduce aggression
- Change the time of mixing

# 1. Specific mixing pens – what is known ?

## **Too little space**

- Aggressive interactions, increased cortisol, negative reproductive performance

## **Too much space**

- Avoidance of other sows, weak dominance hierarchies, economically inefficient

## **Space just right**

- Research agrees that there is a minimum and a possible optimum space allowance for group housed sows... we just have not found what this is yet

# What previous research tells us

- Hemsworth *et al.* (2013) say 1.4m<sup>2</sup>/sow is too low
- + Weng *et al.* (1998) suggest 2.4m<sup>2</sup> /sow
- Hemsworth *et al.* (2011) say anything less than 3m<sup>2</sup>/sow is too little
- + Salak-Johnson *et al.* (2007) say 3.3m<sup>2</sup>/sow was best
- ++ Boyle *et al.* (2012) suggest 3.5m<sup>2</sup>/sow
- ++++ Docking *et al.* (2000) – suggest 9.3m<sup>2</sup>/sow

**Is this because we need more space provided JUST for around the time of mixing?**

# Current Pork CRC funded project

132 sows over 7 blocks allocated to:

2 m<sup>2</sup>/sow

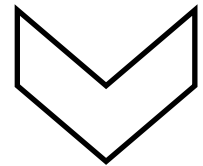
4 m<sup>2</sup>/sow

6 m<sup>2</sup>/sow

until day 4 following mixing when all= 2 m<sup>2</sup>/sow

day -1, 0, 1, 3 and 4

- Skin lesion counts
- Saliva samples (Cortisol)
- Behaviour (7am-1pm videos)





# Data presented

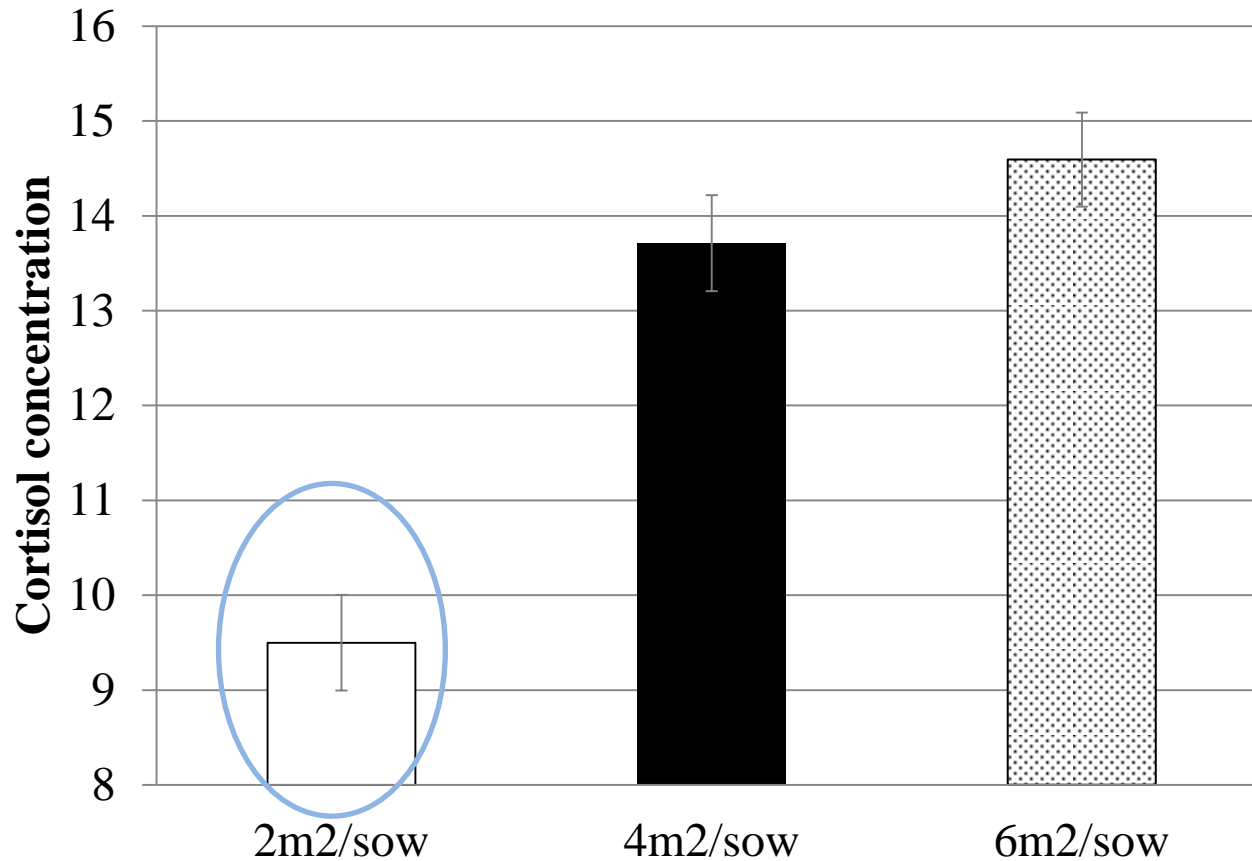
- As the data were not normally distributed most of data is displayed as transformed means
- When this is the case, non-transformed means have also been presented, for ease of understanding

# Injury number

	Injury number per sow			Injury numbers non transformed data		
	2 m <sup>2</sup> /sow	4 m <sup>2</sup> /sow	6 m <sup>2</sup> /sow	2 m <sup>2</sup> /sow	4 m <sup>2</sup> /sow	6 m <sup>2</sup> /sow
Day 0	5.22±0.269 <sup>a</sup>	4.14±0.280 <sup>b</sup>	5.17±0.282 <sup>a</sup>	<b>33</b>	<b>20</b>	<b>33</b>
Day 1	4.50±0.235 <sup>a</sup>	5.66±0.243 <sup>b</sup>	4.98±0.243 <sup>a</sup>	<b>26</b>	<b>38</b>	<b>29</b>
Day 3	5.62±0.249 <sup>b</sup>	5.10±0.259 <sup>a</sup>	5.09±0.259 <sup>a</sup>	<b>37</b>	<b>29</b>	<b>30</b>
Day 4	5.63±0.249	5.77±0.259	5.43±0.259	<b>37</b>	<b>37</b>	<b>34</b>

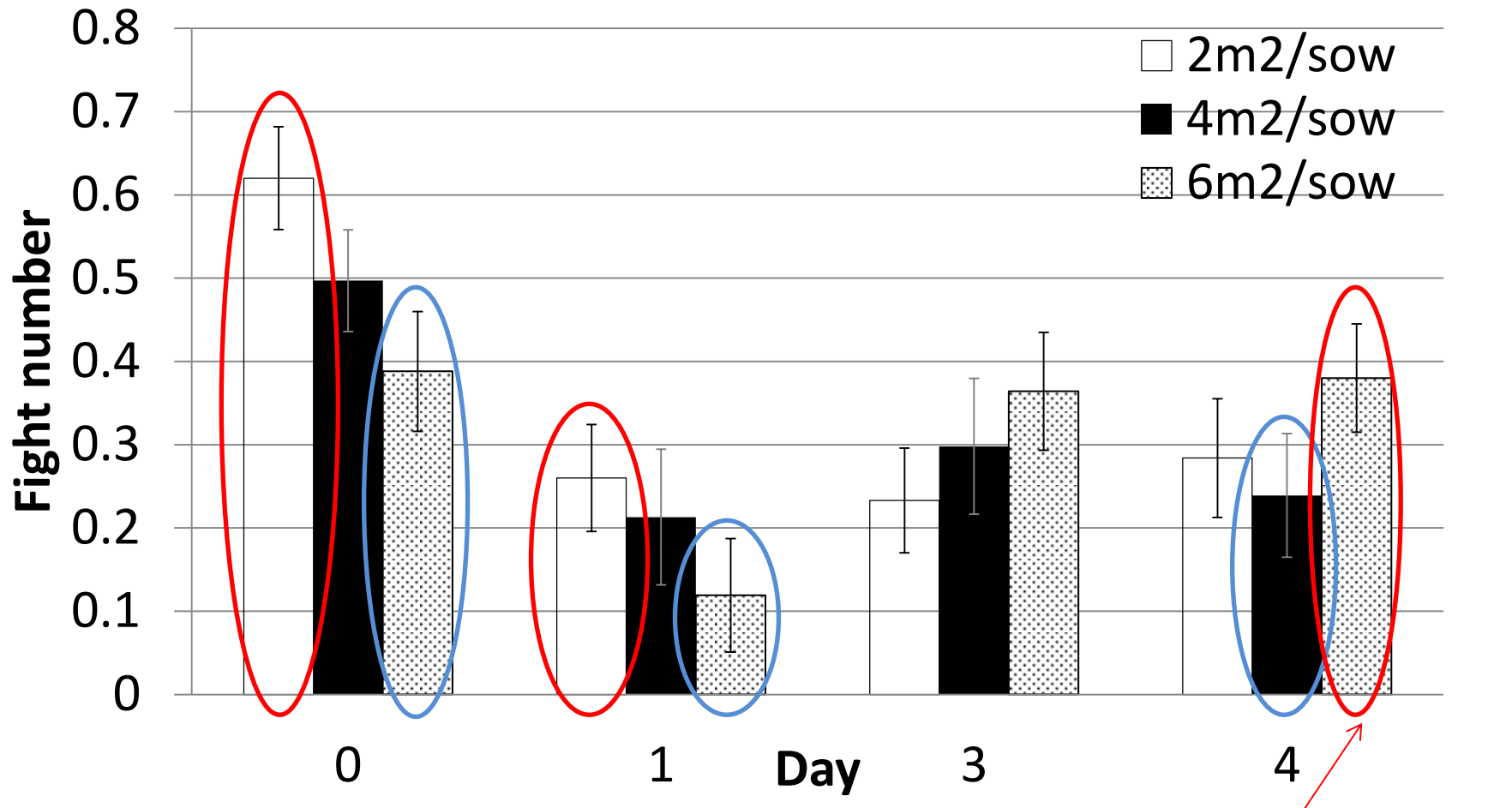
Across rows, significant differences are indicated by different superscripts; <sup>a,b</sup> P < 0.0001

# Cortisol concentration (nmol/L)



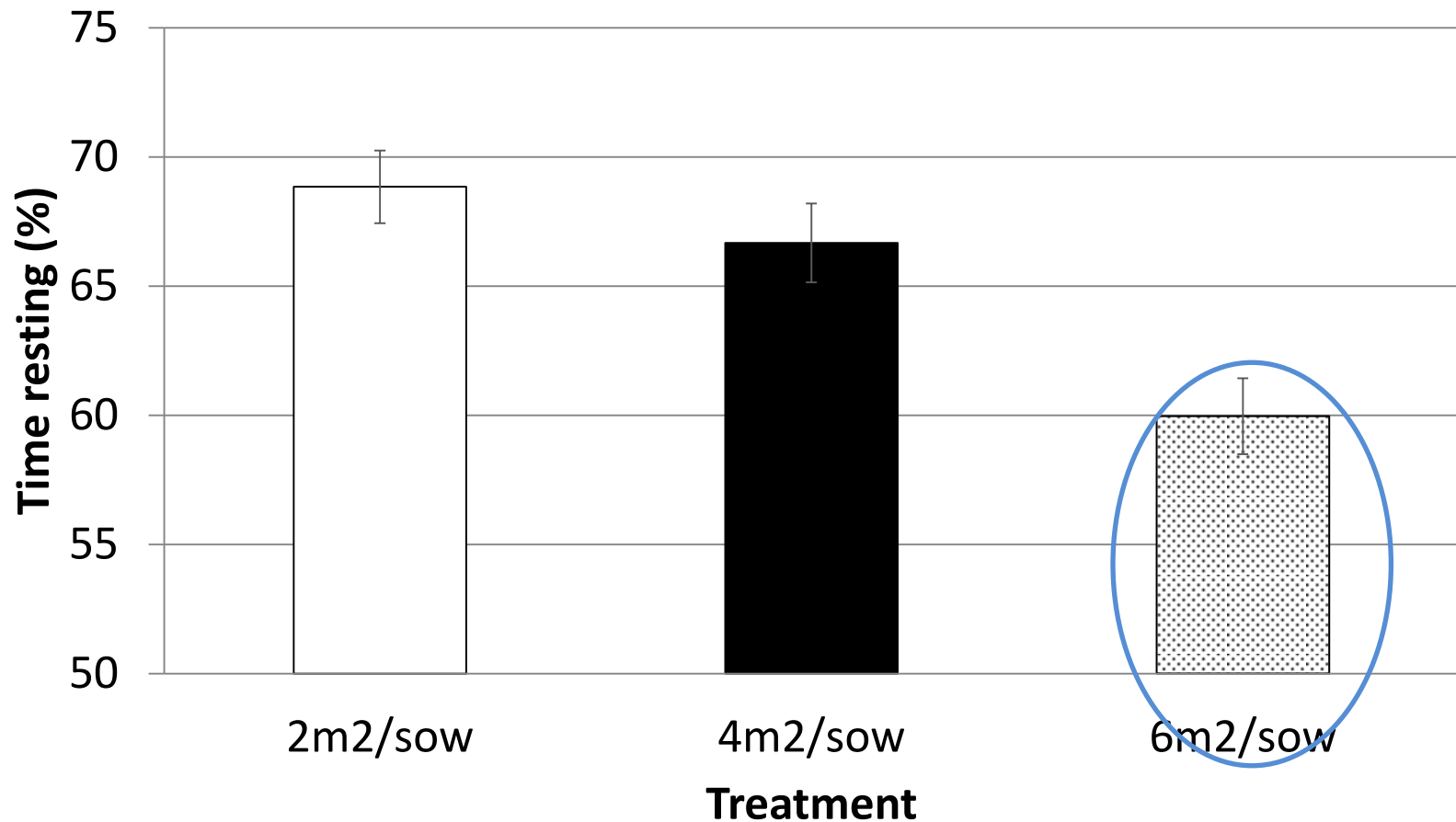
P=0.0002

# Number of fights



All pens made equal at 2 m<sup>2</sup>/sow

# Time spent resting (% of total)



The time that sows spent exploring the pen had a significant opposite relationship, with the 6m2/sows exploring their environment a significant percentage more

P < 0.0001

# Reproduction

- No effect of treatment on :
  - Conception rates (mean  $89 \pm 0.9$  %)
  - Litter sizes (mean  $12 \pm 1$ )

# Effect of mixing day on cortisol

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Day	Cortisol concentrations	Adjusted non-transformed mean (nmol/L)
0	4.597±0.187 <sup>ac</sup>	26.13
1	4.989±0.178 <sup>a</sup>	30.18
3	4.239±0.187 <sup>bc</sup>	21.48
4	3.865±0.203 <sup>b</sup>	18.55

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Down columns, significant differences are indicated by different superscripts; <sup>a,b,c</sup> P <0.0001

# Effect of mixing day on fights

Day	Fight number	Non-transformed (number)	Fight duration	Non-transformed (sec)	Total of time spent fighting	Non-transformed (%)
0	$0.509 \pm 0.045^a$	5	$1.161 \pm 0.066^d$	20.49	$0.99 \pm 0.08^f$	0.20
1	$0.197 \pm 0.047^b$	1	$0.769 \pm 0.074^e$	7.01	$1.496 \pm 0.08^g$	0.04
3	$0.298 \pm 0.048^c$	2	$0.899 \pm 0.072^e$	9.59	$1.374 \pm 0.08^g$	0.09
4	$0.301 \pm 0.046^c$	2	$0.803 \pm 0.069^e$	9.07	$1.523 \pm 0.08^g$	0.05

Down columns, significant differences are indicated by different superscripts; <sup>a,b,c</sup> P < 0.0001, <sup>d,e</sup> P < 0.0001, <sup>f,g</sup> P < 0.0001



# Points of interest

- Fighting is increased in 2 m<sup>2</sup> compared to 4 and 6 m<sup>2</sup> per sow, on the day of and day after mixing ...but is no different following this
- Lower cortisol in 2 m<sup>2</sup>/sow pen is likely due to increased resting / inactive time (or higher cortisol in other pens due to increased movement and interest in the environment)
- Mixing pens using a large space allowance, of 6 m<sup>2</sup>/sow, result in increased aggression with the change to the smaller pen size (suggesting that mixing pens closer to the final pen size, 4 m<sup>2</sup>/sow may have more success)
- Sows low in the hierarchy are more stressed and have more injuries in smaller pens compared to those housed in 6m<sup>2</sup>/sow pens
- Cortisol in the most dominant sows is higher in the smallest pen, perhaps suggesting that the hierarchy is more difficult to rule

# Conclusions on Specific Mixing Pens

If planning mixing pens, 4 m<sup>2</sup>/sow was better than the larger 6 m<sup>2</sup>/sow, as aggression is low in the first few days and does not change when the space is decreased

Aggression in 2m<sup>2</sup>/sow housing is brief, as is the rise in cortisol, and does not significantly alter sow productivity ... so why choose a mixing pen setup?

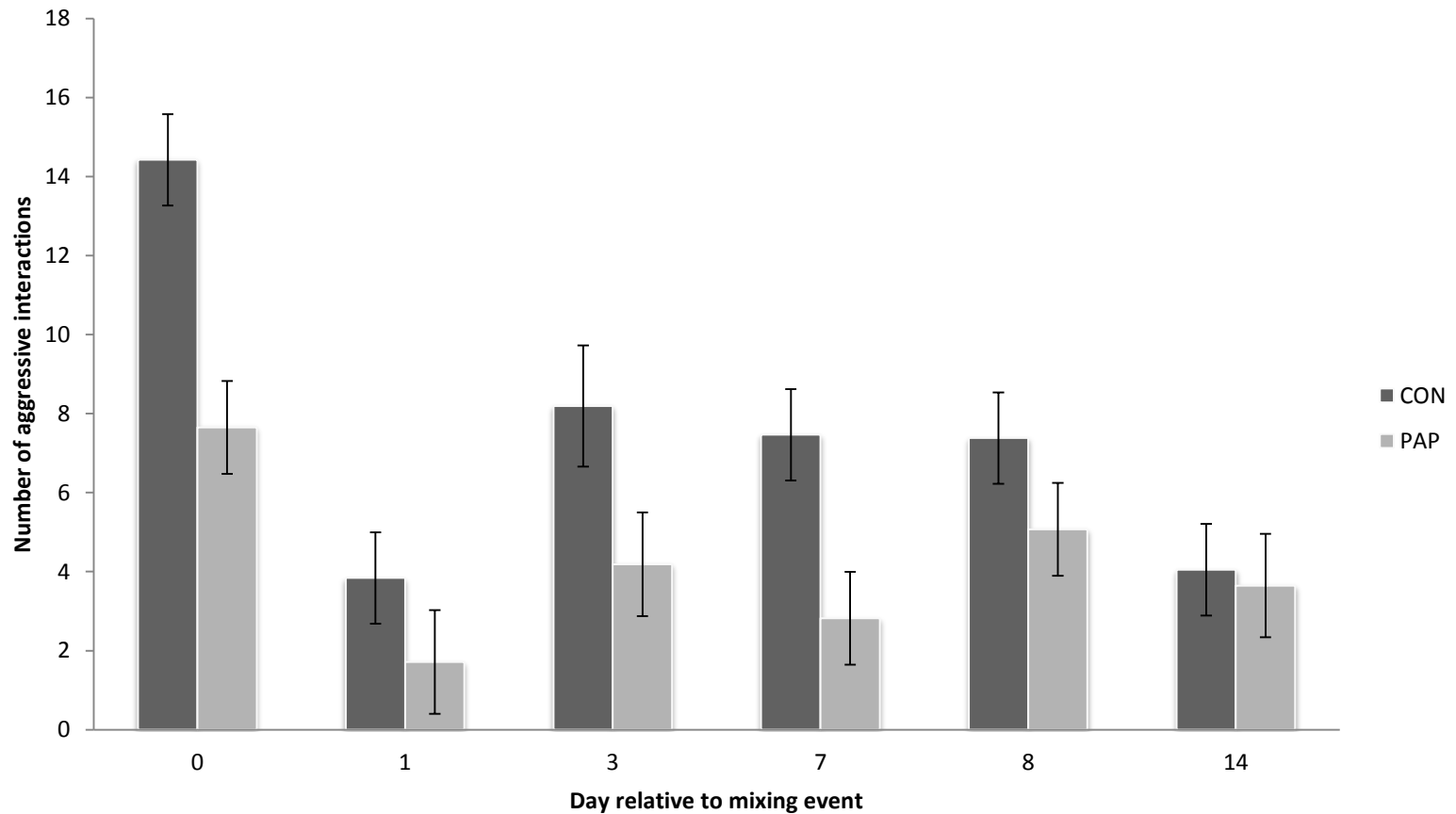
It may be relevant to determine low dominance sows and house in higher space allowances

## 2. Providing ‘pheromones’ to reduce aggression

Porcine Appeasing Pheromone (PAP) is a synthetic mixture that has been used successfully to reduce aggression in grower/finisher pigs.

Does it work on sows ?

# Effects of PAP on sow aggression following mixing



# 3. Feeding fibre in gestation to reduce aggression

## Use of fibre / roughage to reduce aggression

- Recent Irish research suggests increased fibre content of diet may be a solution
- Our recent trial, compared the effects of two dietary fibre contents on sow-sow aggression and pregnancy outcomes
  - 2 housing systems: stall versus group (d4 - 30 post-AI; 6 sows/pen at 1.8 m<sup>2</sup>/sow)
  - 2 diets: standard (2.5 kg/d; 13.1 MJ, 4.8 CF) versus High fibre (4.7 kg/d; 6.9 MJ, 25% CF)
  - Diets floor fed, once daily

	Stalls		Groups	
	Control	High Fibre	Control	High Fibre
Pregnancy rates	0.89	0.89	0.91	0.96
Aggressive encounters (prop. time)			0.08 <sup>b</sup>	0.02 <sup>a</sup>

<sup>ab</sup> within row indicate significant difference; P < 0.05

**Thank you**

