How to solve a conflict without getting into a fight?

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Two unfamiliar opponents during a contest, **situation A**
Two unfamiliar opponents during a contest, **situation B**
Why do most pigs fight intensely while others can establish dominance without fighting?

1. Aggression in pigs
2. Is fighting necessary?
   – How important are the earlier stages of a conflict in preventing damaging escalation?
   – Is aggressiveness necessary for success?
   – What behaviours are performed by pigs that minimise lesions from fighting?
3. How can we practically minimize aggression
4. On-going and future work
1. Aggression in pigs

- Mixing is routine
- Post-mixing aggression:
  - ↑ injury, disease, activity
  - ↓ food intake, FCE, growth rate, reproductive success
- Is a source of pre-natal stress
Natural behaviour?

Aggression is a natural behaviour, but the way it is expressed in commercial farming is far from natural.

<table>
<thead>
<tr>
<th>Nature</th>
<th>Pig husbandry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stable groups</td>
<td>Mixing of unfamiliar pigs</td>
</tr>
<tr>
<td>Conflicts solved with threat</td>
<td>Lack of space to signal threat</td>
</tr>
<tr>
<td>Ritualized display</td>
<td>Lack of space to perform display</td>
</tr>
<tr>
<td>Almost no fights</td>
<td>Intense fights at mixing</td>
</tr>
<tr>
<td></td>
<td>Possible selection on aggressiveness</td>
</tr>
</tbody>
</table>
Contest

De-escalate

Escalated fight
Natural behaviour?

common

rare
2. Is fighting necessary?

A. How important are the earlier stages of a contest in preventing damaging escalation?

B. Is aggressiveness necessary for success?

C. What behaviour characterises pigs that minimise skin lesions from fighting?
A. How important are the earlier stages of a conflict in preventing damaging escalation?

- 52 contests: ♂♀ 10 wk age, opponents unfamiliar to each other
- Dyads of equal body weight
- In test until A) clear winner, B) 30 min, or C) end-point (e.g. fear)
- Duration, outcome, and detailed behavioural ethogram
Where fights occurred, amount of display did not affect the duration of escalated fighting.

But, 28% of contests ended without a fight:
- A clear winner was still present.
- Loser clearly identified by head-tilt movement followed by retreat.
<table>
<thead>
<tr>
<th>Behaviour</th>
<th>No fight (n=15)</th>
<th>Fight (n=37)</th>
<th>P-value</th>
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<tbody>
<tr>
<td>Non-damaging investigation</td>
<td>5.8 ± 1.1</td>
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<td>Shoulder to shoulder</td>
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<td>Pushing</td>
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<td>8.6 ± 1.4</td>
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<td>Unilateral biting (n bites)</td>
<td>8.0 ± 2.9</td>
<td>12.8 ± 2.0</td>
<td>0.10</td>
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<tr>
<td>Fight</td>
<td>0.0 ± 0</td>
<td>14.7 ± 1.1</td>
<td>-</td>
</tr>
<tr>
<td>Bullying</td>
<td>23.6 ± 5.0</td>
<td>8.5 ± 1.3</td>
<td>0.0006</td>
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<td>All non-agonistic behaviour</td>
<td>45.9 ± 4.9</td>
<td>41.9 ± 1.8</td>
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Camerlink et al 2015
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Camerlink et al 2015
Contests without fight 2.8x more bullying (winner chases loser)

Possible reasons:

- more energy reserves
- heightened need to affirm the outcome
Conclusions so far

• Fighting not essential to solve dominance in all weight matched dyads
  – A few extra seconds of non-contact assessment seems to mark a threshold between dyads that have an escalated fight and those that don`t

• Ritualized behaviours frequently observed in arena while seen less under commercial stocking densities
  – Space for conflict resolution should not be regarded as an unnecessary luxury
B. Is aggressiveness necessary for success in a contest?

Desire et al. 2015
But does this aggressiveness lead to winning in weight-matched pigs?

- 2x **resident-intruder test** (9 wk age) to determine aggressiveness
  - Attack latency reflects aggressiveness: short latency = aggressive
Then:

- 52 contests ♂♀ 10 wk age, opponents unfamiliar
- Dyads of equal body weight but difference in aggressiveness

Resident-intruder test to establish aggressiveness

Dyadic contest until clear winner established between pigs of known aggressiveness
• Fast attackers in RI test initiate contact, bite and fight in later contest
• Aggressive pigs win contests, but only if there is no escalated fight
• Reflects motivation not ability

Camerlink et al 2015
What behaviour characterises pigs that minimise lesions from fighting?

- Lesions result from mixing AND chronic stable group aggression.
- Pigs that don’t fight at mixing receive:
  - Few mix lesions 😊
  - Many lesions from chronic aggression 5 weeks later 😞

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<th>Behaviour at mixing</th>
<th>Mix lesions</th>
<th>Lesions 5 weeks post-mixing</th>
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<tr>
<td>Fights initiated</td>
<td>0.49</td>
<td>- 0.14</td>
</tr>
<tr>
<td>Bullying initiated</td>
<td>0.29</td>
<td>- 0.12</td>
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Not entirely a result of dominance. Also present at group level.

P<0.001. Residual correlations after accounting for systematic and pen effects, n=1166

Desire et al 2015
• So, we have a trade-off
• But, skin lesions are a problem both at mixing AND in stable social groups

Stable group lesions

Mixing lesions
What are these pigs doing?
• Cluster analysis identified 5 clusters with >80% similarity in behaviour using 31 aggression traits.
• There seems to be no optimum behavioural strategy that results in few mix AND few stable lesions
  – Looking at the wrong traits? (e.g. appeasement)
  – Looking at the wrong level? (e.g. social networks)
So…

- Initial stages of a contest may be of crucial importance
- Aggressiveness leads to winning only if a contest stops before an escalated fight
- We haven’t identified any clever strategies that reduce lesions across contexts and time
3. How can we practically minimize aggression?

- Dominance hierarchies have a function
  - pigs are highly motivated to establish them
  - methods that help them get through this process efficiently will have more success than those that try to prevent it altogether
• Provide space and opportunities to show ritualised behaviour and escape to facilitate resolution of contests
• Minimise competition around feeders, drinkers and lying areas

Photo credits: Sandra Edwards, University of Newcastle
Role for breeding?

- Low mix lesions are genetically associated with low stable lesions.
- Selection against mix lesions will reduce stable lesions.

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<tr>
<th>Mix</th>
<th>Front</th>
<th>Middle</th>
<th>Rear</th>
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<tr>
<td>Front</td>
<td>0.76</td>
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<td>0.68</td>
</tr>
<tr>
<td>Middle</td>
<td>0.82</td>
<td>0.81</td>
<td>0.80</td>
</tr>
<tr>
<td>Rear</td>
<td>0.53</td>
<td>0.64</td>
<td>0.46</td>
</tr>
</tbody>
</table>

All standard errors <0.23

Turner et al 2009; Desire et al 2015
4. On-going and future work

- Do pigs need fight experience to be able to assess their opponent?
  - Can early life socialisation fundamentally alter assessment abilities?
- How crucial is the flexibility of behaviour over group mixing in determining fight costs?
• We have identified the lesion trait that will respond best to selection
  – Now examining its genomic determination
Conclusions

• Pigs of similar weight do not have to fight
  – Investment in non-contact assessment may be highly valuable
  – Need the space to perform this
• Aggressiveness doesn`t lead to success if there is an escalated fight
  – Aggressiveness signals motivation, but not ability
In general, avoiding aggression at mixing leads to more aggression in stable groups
  – Some pigs avoid this trade-off
  – No obvious behavioural strategy(ies) being played by these pigs
  – What else is different about them?
Genetically, it is possible to breed for these pigs
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