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**

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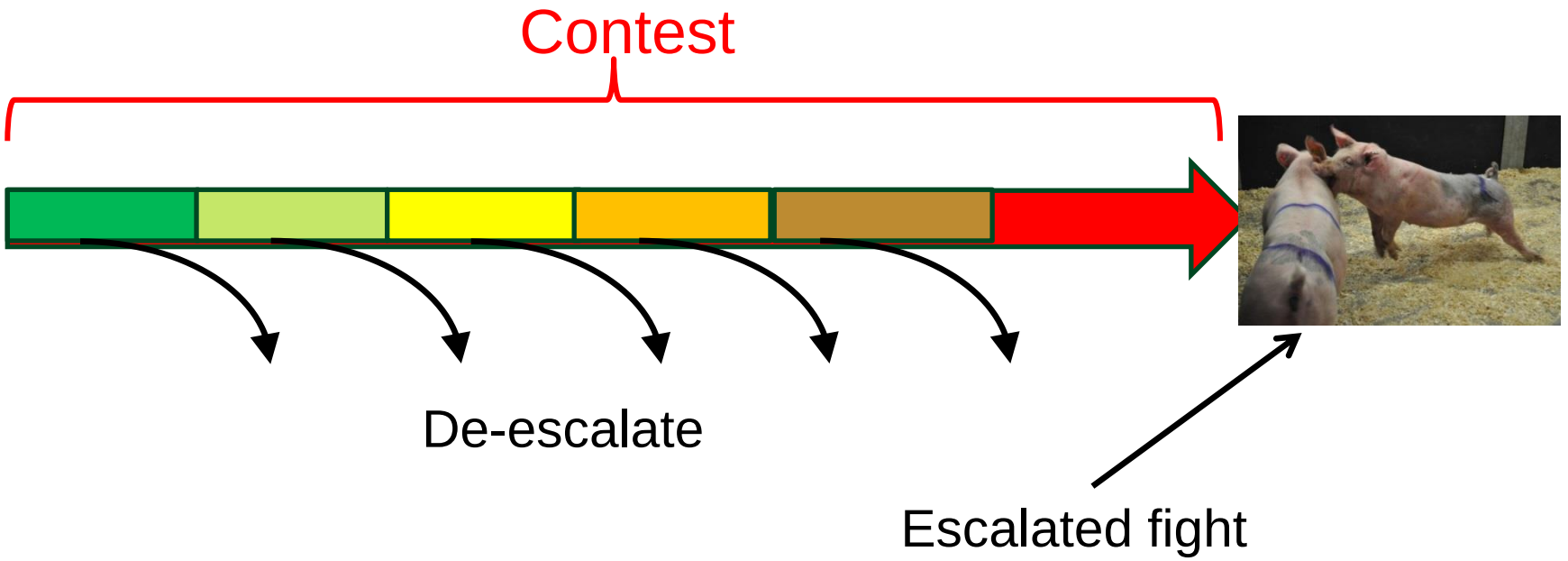
1. Aggression in pigs

- 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.

Nature	Pig husbandry
Stable groups	Mixing of unfamiliar pigs
Conflicts solved with threat	Lack of space to signal threat
Ritualized display	Lack of space to perform display
Almost no fights	Intense fights at mixing
	Possible selection on aggressiveness


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

	No fight (*n*=15)	Fight (*n*=37)	*P*-value
Non-damaging investigation	5.8 ± 1.1	3.8 ± 0.4	0.06
Parallel walking	4.3 ± 0.6	2.6 ± 0.3	0.01
Heads up	1.2 ± 0.2	2.8 ± 0.3	0.009
Nose wrestling	3.8 ± 0.6	2.9 ± 0.3	0.19
Shoulder to shoulder	12.4 ± 1.4	14.3 ± 1.1	0.35
Pushing	3.1 ± 0.9	8.6 ± 1.4	0.04
Unilateral biting (*n* bites)	8.0 ± 2.9	12.8 ± 2.0	0.10
Fight	0.0 ± 0	14.7 ± 1.1	-
Bullying	23.6 ± 5.0	8.5 ± 1.3	0.0006
All non-agonistic behaviour	45.9 ± 4.9	41.9 ± 1.8	0.37

Camerlink et al 2015

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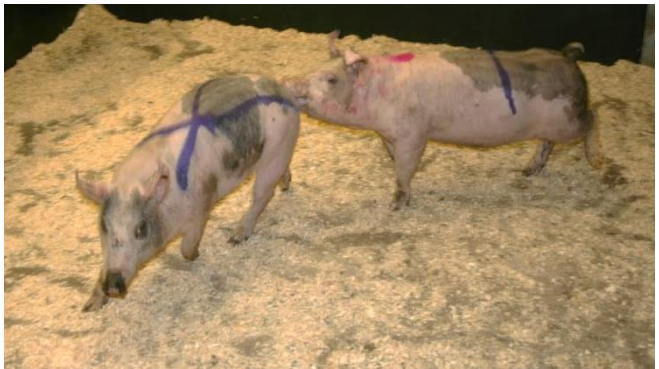
Contests without fight 2.8x more bullying (winner chases loser)

Possible reasons:

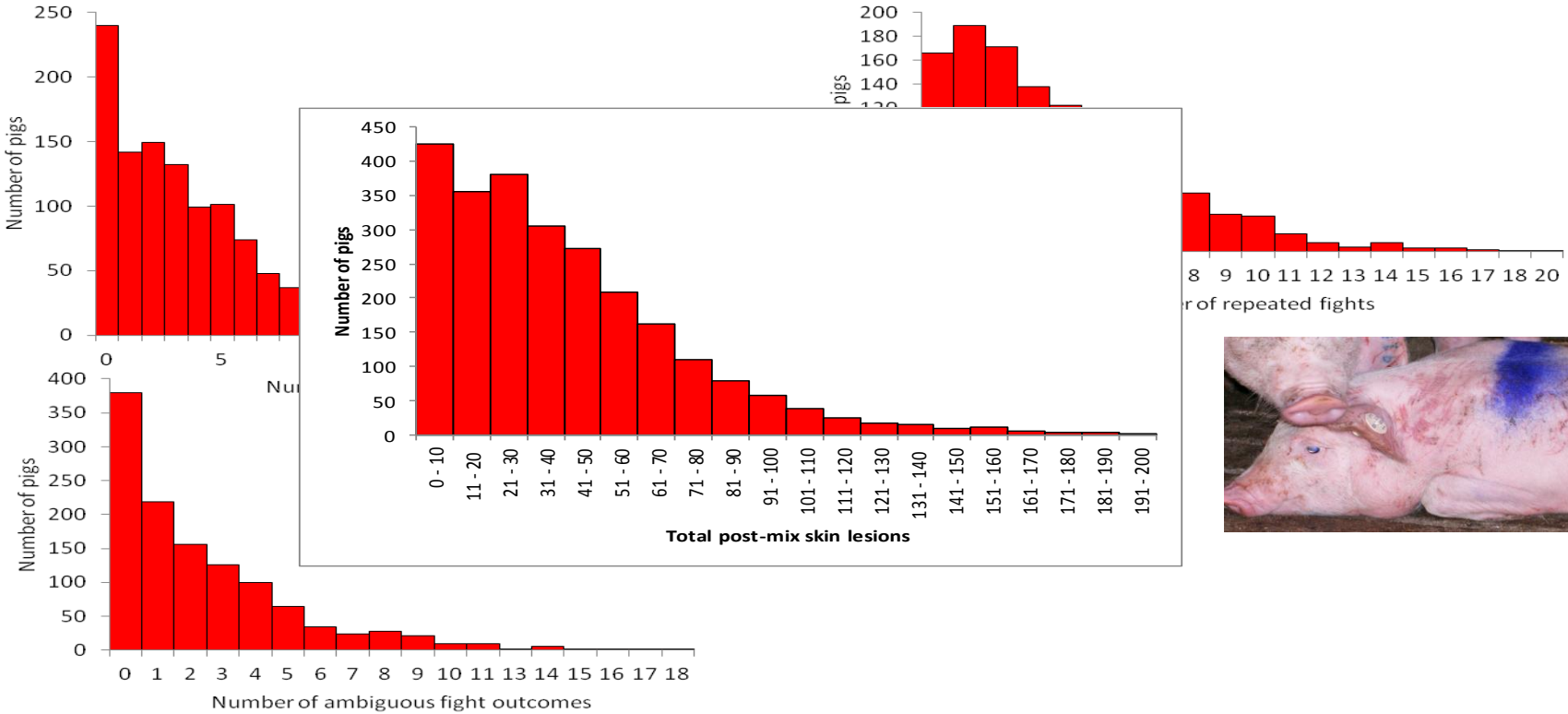
- more energy reserves
- heightened need to affirm the outcome



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?



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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

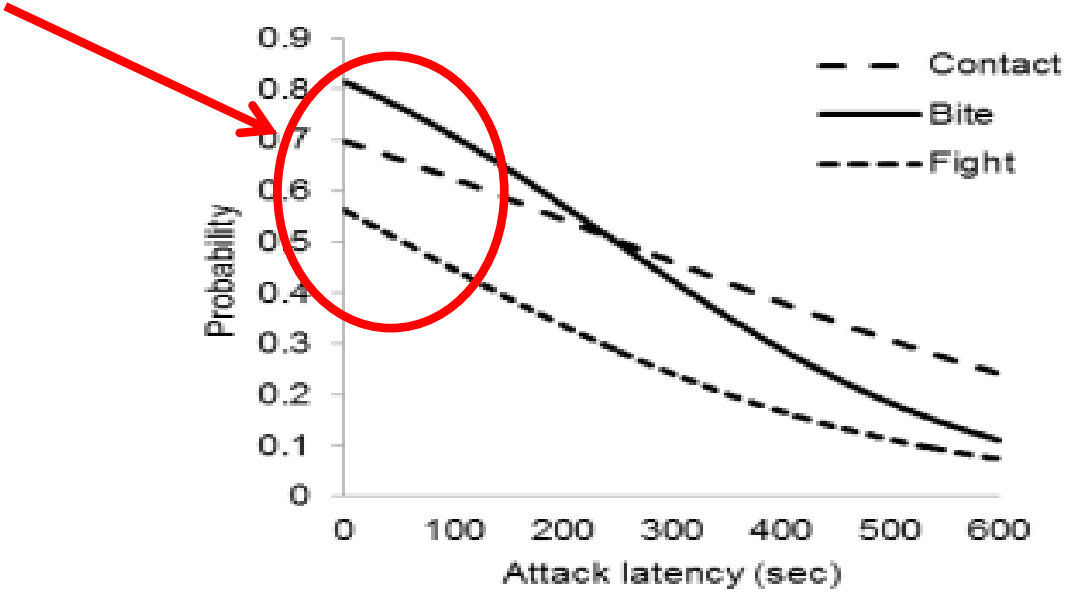
Then:

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

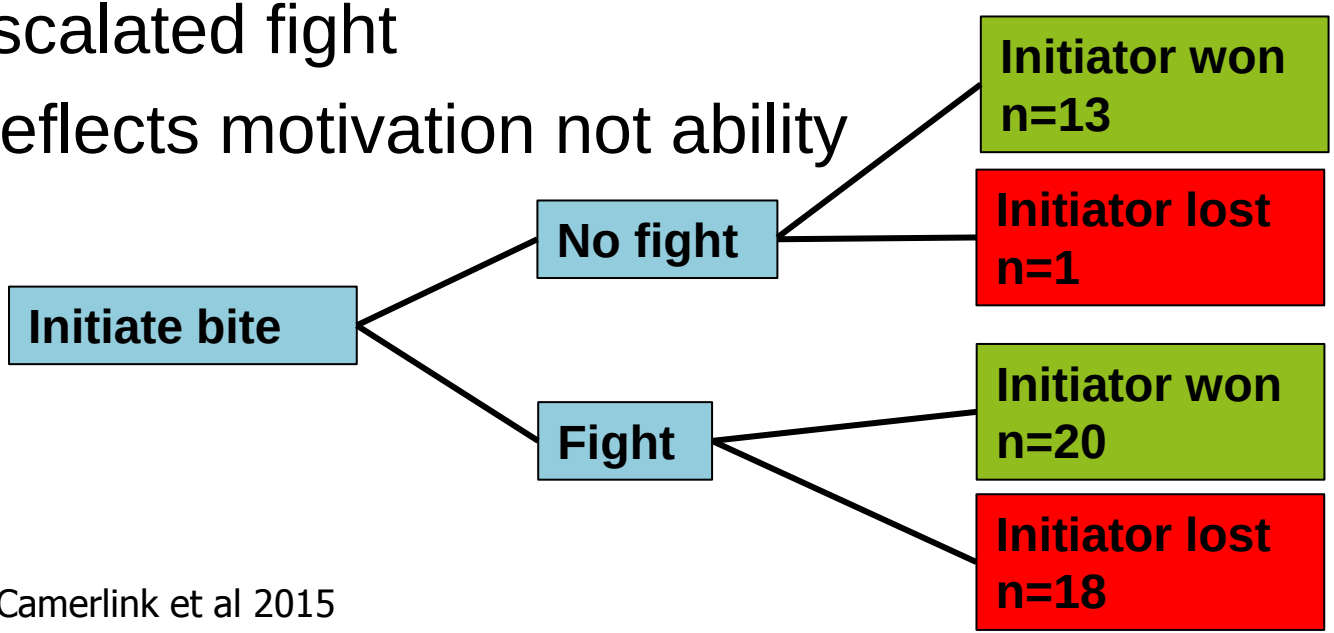
Resident-intruder test to establish aggressiveness

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



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C. 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 ☹

Behaviour at mixing	Mix lesions	Lesions 5 weeks post-mixing
Fights initiated	0.49	- 0.14
Bullying initiated	0.29	- 0.12

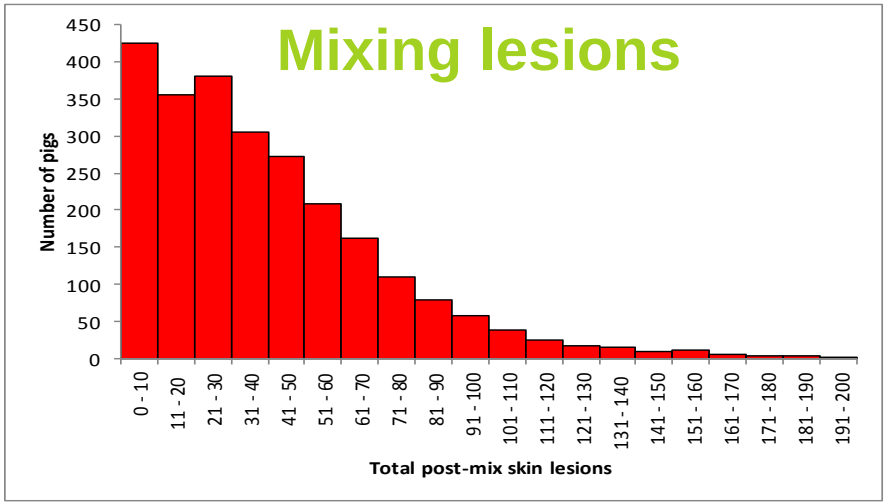
Not entirely a result of dominance

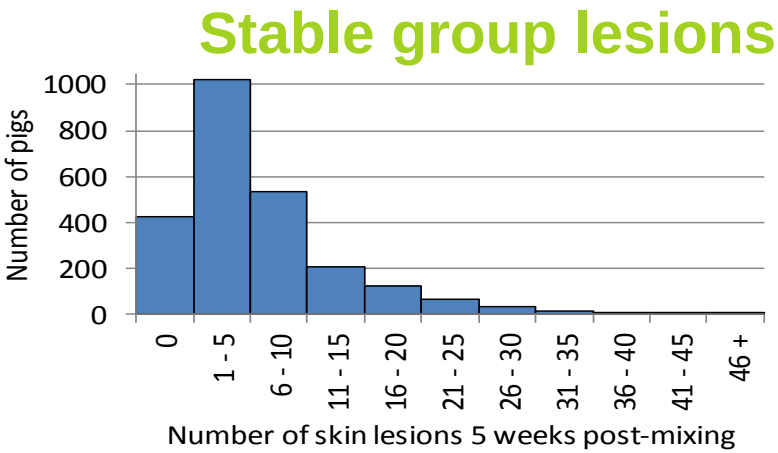
Also present at group level

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

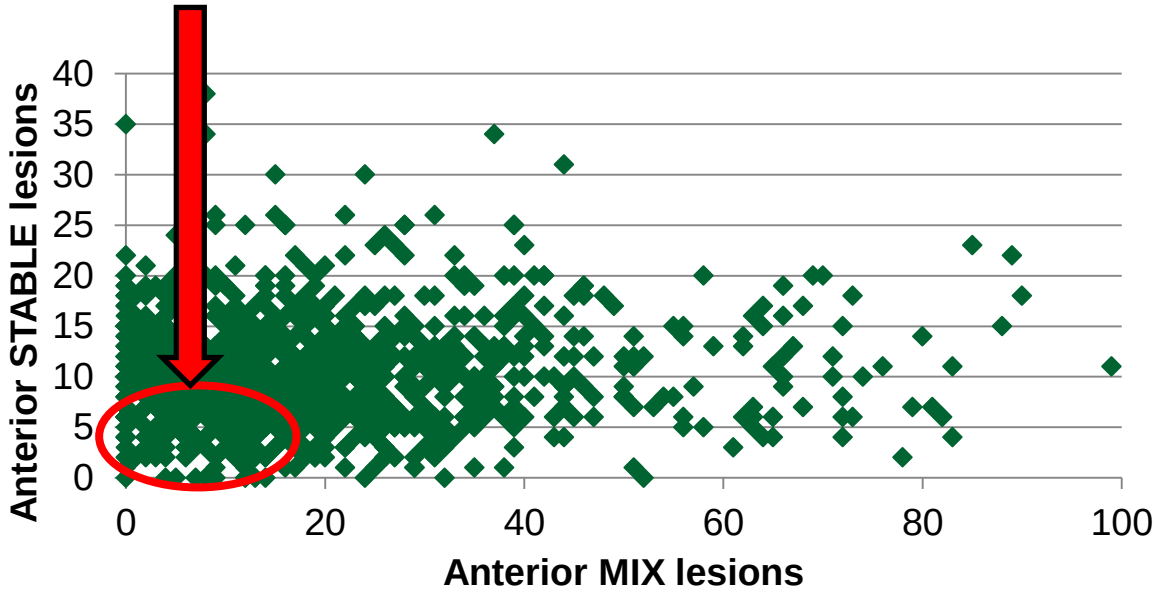
Desire et al 2015

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

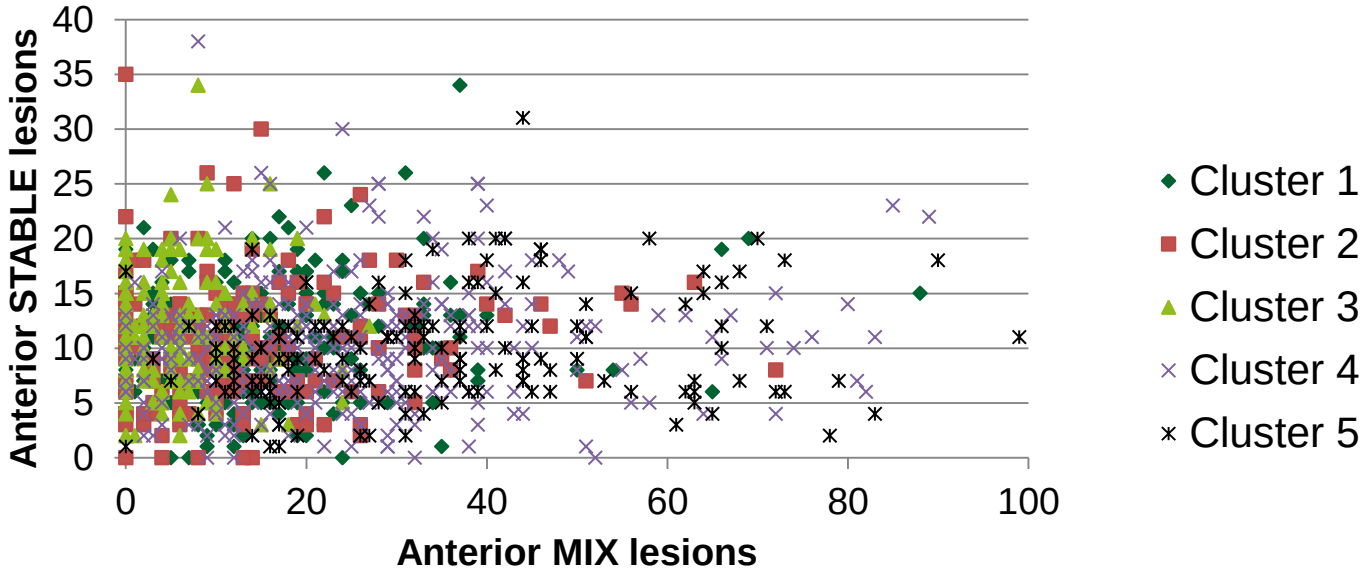




- What are these pigs doing?



- 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 ☺

n=2413

		Stable		
		Front	Middle	Rear
Mix	Front	0.76	0.76	0.68
	Middle	0.82	0.81	0.80
	Rear	0.53	0.64	0.46

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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