



# Analysis of the phenotypic link between behavioural traits at mixing and increased long-term social stability in group-housed pigs



Suzanne Desire<sup>a,\*</sup>, Simon P. Turner<sup>a</sup>, Richard B. D'Eath<sup>a</sup>,  
Andrea B. Doeschl-Wilson<sup>b</sup>, Craig R.G. Lewis<sup>c</sup>, Rainer Roehle<sup>a,\*</sup>

<sup>a</sup> Animal Breeding & Genomics and Animal Behaviour & Welfare Teams, Animal and Veterinary Sciences Group, SRUC (Scotland's Rural College), West Mains Road, Edinburgh EH9 3JG, United Kingdom

<sup>b</sup> The Roslin Institute, R(D)SVS, University of Edinburgh, Division of Genetics and Genomics, Easter Bush, Midlothian EH25 9RG, United Kingdom

<sup>c</sup> PIC Europe, Alpha Building, London Road, Nantwich CW5 7JW, United Kingdom

## ARTICLE INFO

### Article history:

Accepted 22 February 2015

Available online 1 March 2015

### Keywords:

Aggressive behaviour  
Long-term social behaviour  
Mixing aggression  
Pigs, Skin lesions

## ABSTRACT

Mixing of growing pigs results in aggressive contests between group members. As aggression serves to establish dominance relationships, it is possible that increased initial aggression may facilitate the formation of social hierarchies. The objective of the study was to investigate whether there is a phenotypic link between behavioural traits of aggression at mixing and increased long-term group social stability. Aggressive behavioural traits were recorded for 24 h after mixing, whereas the numbers of skin lesions (anterior, central and posterior) were obtained 24 h (SL24h) and 3 weeks post-mixing (SL3wk) for 1,166 pigs. At the group level, aggressive behavioural traits were positively correlated with anterior SL24h (0.34 to 0.67;  $P < 0.01$ ) at mixing, and negatively with central SL3wk ( $-0.28$  to  $-0.38$ ;  $P < 0.01$ ) in the stable group. At the individual animal level, most behavioural traits of aggressiveness correlated positively with SL24h (0.09 to 0.53;  $P < 0.001$ ), whereas the opposite associations were found for SL3wk ( $-0.06$  to  $-0.14$ ;  $P < 0.05$ ). Within aggressive cohorts, animals with a high fight success rate received slightly fewer SL24h than equally aggressive, but unsuccessful pen mates, while animals that avoided aggression received the fewest SL24h. Corresponding associations were reversed in the stable group. These results provide evidence that increased aggression at mixing may aid stable hierarchy formation. This raises an ethical dilemma in pigs production, but potentially also in other species, that increased acute aggression during mixing may actually decrease chronic aggression in groups and thus benefit the long term welfare of the group.

© 2015 Elsevier B.V. All rights reserved.

## 1. Introduction

Repeated mixing of livestock species that adopt social systems characterised by dominance hierarchies disrupts

social relationships and results in aggressive contests between group members. This kind of aggressive behaviour serves to establish dominance hierarchies (Meese & Ewbank, 1973) but may be associated with high stress and injury levels, especially in pigs, where the costs of aggression can be particularly significant. These effects make social aggression a known welfare and economic concern in pig production, affecting growth, reproduction, and carcass quality (Faucitano, 2001; Marchant et al., 1995; Stookey

\* Corresponding authors Tel.: +44 131 651 9326.

E-mail addresses: [suzanne.desire@sruc.ac.uk](mailto:suzanne.desire@sruc.ac.uk) (S. Desire), [rainer.roehle@sruc.ac.uk](mailto:rainer.roehle@sruc.ac.uk) (R. Roehle).

& Gonyou, 1994). As well as the physical and metabolic demands of prolonged fighting, an uncertain hierarchy position may be stressful to individuals (DeVries et al., 2003). In pigs, individuals that were involved in aggression upon mixing but only achieved moderate fight success have been shown to have higher baseline salivary cortisol levels than bottom and top ranking group members (Coutellier et al., 2007; Mendl et al., 1992) implying that these animals may feel more stressed than their subordinates. Methods of reducing aggression have been studied for over 30 years (Fraser, 1984); however to date no practical, socially acceptable, low cost, high impact solution has been found.

Physical aggression between pigs can cause injuries in the form of skin lesions. Lesions to the anterior and central regions of the body have been shown to correspond with the duration of reciprocal fighting, while lesions to the posterior region of the body are associated with the receipt of non-reciprocal bullying (Turner et al., 2006a). The number of lesions has been found to moderately correlate with the duration of time spent engaged in aggression, and combining the location and number of skin lesions has been shown to be a useful proxy measure of aggression (Turner et al., 2006a).

In commercial farming, once pigs are mixed for growing they will usually remain in these groups for several months until regrouped again or marketed. As aggression serves to establish dominance hierarchies, it is possible that increased aggression upon first mixing may actually lead to more stable dominance relationships in the long-term. Indeed, there is some evidence that initial increased aggression at mixing results in lower aggression and improved productivity over the entire growing-finishing period (Canario et al., 2012; D'Eath, 2005; Turner et al., 2009). If this is the case, aggressiveness at mixing would be essential to improved long term welfare and production.

Efforts to reduce aggression in commercial pigs either through different management strategies, environmental manipulations, or via genetic improvement are on-going. If reduced aggression in new social groups is found to be detrimental to long-term group stability, then it will be important to quantify any continual welfare or production concerns that arise as a consequence of reducing mixing aggression. Although this study focuses on pigs due to the costs of aggression in this species, the existence of a trade-off between acute aggression at mixing and subsequent chronic aggression may have implications for other species reliant upon dominance relationships.

Many pig aggression studies use information taken from small group sizes or staged interactions between individuals. Often they focus on one aspect of aggression, for example the effects of body weight or previous fight success (Andersen et al., 2000; Francis et al., 1996). This study utilises a dataset comprised of extremely detailed behavioural observations taken from more than 1,100 animals under commercially relevant conditions after 24 h post mixing. This has provided an opportunity to study the behavioural repertoire of the pig when placed in an unstable social environment, with no human interference. These behavioural traits were

compared to skin lesions at mixing (SL24h) and in the social stable group (SL3wk).

This study investigated whether there is a phenotypic link between aggression at mixing and increased long-term group stability in the form of reduced skin lesions, and if so, to identify mixing behaviours that improve long-term social behaviour. In particular it was of interest to identify specific behaviours associated with skin lesions at mixing and three weeks post mixing.

## 2. Methods

### 2.1. Animals and housing

The study comprised 1,166 pigs on a commercial farm in Ransta, Sweden, between October 2005 and January 2007. Information gathered on all individuals included pen identity, sex, breed, litter identity, and unique pig identification (ear tag or notch number). Single sex (intact males, castrated males, and females) and single breed (703 pure-bred Yorkshire and 463 crossbred Yorkshire x Landrace) groups of 15 were created by mixing 3 pigs from 5 different litters, resulting in 78 groups. Effort was made to standardise within-pen variation in body weight across groups. Animals were weighed 24 h post-mixing and showed an average live weight of 27.6 kg (SD=5.6) and an average age of 72 days (SD=4.3). Pigs were housed in 4.0 × 3.2 m partially slatted pens (30% slats, 70% lightly bedded solid flooring) with a floor space allowance of 0.85 m<sup>2</sup> per pig. Pigs were fed dry pelleted food *ad libitum* from a single space feeder and had constant access to water via a nipple drinker.

### 2.2. Skin lesion traits

Lesions were counted immediately prior to mixing, and again 24 h post-mixing by a single observer, and were grouped by location on the body: anterior (head, neck, front legs, and shoulders), central (flanks and back), posterior (rump, hind legs, and tail). The pre-mixing lesion count was subtracted from that taken 24 h post-mixing for each pig. This served to ensure that only those lesions that occurred as a result of mixing aggression (SL24h) were included in all analyses. Recently received lesions were counted again three weeks post-mixing (89.8 days (SL3wk) [SD=5.2]). One uninterrupted scratch was classed as a single lesion, regardless of length or severity. A lesion was considered to be recent if it was vivid red in colour or recently scabbed.

### 2.3. Behavioural traits

Groups were video recorded for 24 h post-mixing. Time, duration (s), and outcome of reciprocal (RA) and non-reciprocal (NRA) aggression were recorded. Reciprocal aggression was defined as a fight that lasted more than one second where both pigs were involved in pushing, head knocking or biting. Non-reciprocal aggression involved the delivery of these behaviours with no retaliation from the receiver. Non-reciprocal aggression could occur as a unique event independent of a reciprocal fight, as a component of a reciprocal fight, or at the end of a reciprocal fight as

Download English Version:

<https://daneshyari.com/en/article/6379584>

Download Persian Version:

<https://daneshyari.com/article/6379584>

[Daneshyari.com](https://daneshyari.com)