Applied Animal Behaviour Science 144 (2013) 108–115

Contents lists available at SciVerse ScienceDirect

Applied Animal Behaviour Science

journal homepage: www.elsevier.com/locate/applanim

Interaction between sows' aggressiveness post mixing and skin lesions recorded several weeks later

Björn Tönepöhl[a,*], Anne K. Appel[a], Barbara Voß[b], Uta König von Borstel[a], Matthias Gauly[a]

[a] Department of Animal Science, Livestock Production Systems, Georg August University Göttingen, 37075 Göttingen, Germany
[b] BHZP GmbH, 21368 Dahlenburg-Ellringen, Germany

ARTICLE INFO

Article history:
Accepted 4 January 2013
Available online 31 January 2013

Keywords:
Aggressiveness
Skin lesions
Indicator trait
Individual behaviour
Sow
Reproductive traits

ABSTRACT

Group housing of pigs leads inevitably to more or less serious agonistic interactions during the establishment of the social rank order of the group. In order to reduce the number of severe agonistic interactions and thus the negative effects on well-being and performance, the use of genetic selection of calm sows maybe a possible strategy. Therefore, in this study the behaviour of 112 German Landrace sows was observed after the animals were brought together in a group of 10–20 sows. After this initial period, the sows were integrated into a large dynamic group in the dry sow area where the animals were housed for 71 days. Before moving the sows into the farrowing area, skin lesions scores for three body regions (front/middle/rear) on both sides were recorded using a scoring system from 1 (no lesions) to 4 (wounds, lesions all over the body area). After farrowing, sows' reaction towards the separation from their litter was recorded to analyse relationships between aggressiveness and handling. Earlier research suggests that skin lesions recorded shortly after mixing are associated with agonistic interactions at mixing and might therefore be a useful indicator for the evaluation of recent aggressiveness of animals. However, results of the present study show that an individuals' frequency of being initiator of agonistic interactions post mixing do not affect ($p > 0.1$) the extent of skin lesion recorded 10 weeks later. Conversely, animals being attacked frequently were evaluated with higher scores in the anterior region ($p = 0.0435$). These findings indicate that a higher skin lesion score does not represent generally more aggressive sows under commercial housing systems, but it is still an indicator for overall aggressiveness within pens or groups. Between the different groups significant differences in the extent of skin lesions were found (e.g. skin lesion score front: $p = 0.0228$). A negative relationship was found between skin lesion score in caudal region and sows' reaction towards stockperson when handling their piglets ($r = -0.28$, $p < 0.01$). Furthermore, behaviour traits related to aggressiveness correlated with later reproductive performance. While sows recorded frequently as aggressors post mixing gave birth to more total and live born piglets, sows with higher skin lesion scores had a lower reproductive performance (e.g. skin lesion score front vs. total born piglets: $r = -0.28$, $p < 0.01$). Taken together, these results suggest that more severe skin lesions are indicative of low-ranking and less vital sows, but skin lesions are not useful to identify the generally more aggressive individuals.

1. Introduction

Due to considerable changes in pig housing systems (McGlone, 2001; Hoy, 2005), the behaviour of pigs towards human beings and conspecifics becomes more important

* Corresponding author. Tel.: +49 551 39 5612; fax: +49 551 39 5587.
E-mail address: btoenep@gwdg.de (B. Tönepöhl).

0168-1591/$ – see front matter © 2013 Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.applanim.2013.01.004

and the need for calm and docile pigs increases. Especially the group housing of pigs previously housed individually or in small groups will increase due to animal welfare issues. However, group housing of animals implies the establishment of a hierarchy by fighting to avoid permanent conflicts for feed or partners in the social group (Arey and Edwards, 1998; D'Eath and Turner, 2009; von Borell, 2009). Under commercial pig housing conditions unacquainted pigs form a social hierarchy within 48 h post mixing (Meese and Ewbank, 1973; Arey and Edwards, 1998). The presence of very aggressive animals could extend the time for establishing the hierarchy (Erhard et al., 1997). The resulting, repeated initiation of aggressive behaviour and restlessness in the group, especially for lower-ranking animals, will increase stress (Simmins, 1993; Hoy, 2009; Spoolder et al., 2009), which may reduce animal welfare and performance (Varley and Stedman, 1994; Kongsted, 2004; von Borell et al., 2007). Earlier results showed that sows housed individually during gestation had better reproductive performances (e.g. less mummified or stillborn piglets) compared to sows housed in groups (Broom et al., 1995; Cronin et al., 1996).

One possibility to enhance animal welfare is the direct breeding for calm and less-aggressive pigs to reduce agonistic interactions (Erhard et al., 1997; D'Eath et al., 2009). Results of genetic studies on this subject reported evidence of moderate heritabilities of traits related to aggressiveness (e.g. Grandinson, 2005; Løvendahl et al., 2005; Turner et al., 2009; Velie et al., 2009). Prerequisite for a successful genetic selection is a standardised and practical assessment of behaviour traits (Turner et al., 2009). Various tests for the assessment have been studied (e.g. Grandin, 1993; Le Neindre et al., 1995; van Erp-van der Kooij et al., 2000; Turner et al., 2006a, 2006b; Cassady, 2007).

Skin lesion scores seem to be a convenient indicator of aggressiveness and are thus used in various studies to evaluate for instance, the extent of post mixing aggressiveness in groups of pigs and to compare the effects of different pig housing systems on behaviour (e.g. Barnett et al., 1993; Weng et al., 1998; Spoolder et al., 1999; Turner et al., 2000, 2006a). The results by Stukenborg et al. (2011) indicated that more aggressive pigs (more fights per pig, longer overall fight time and more initiated fights) have more skin lesions post mixing. Under the condition of relatively stable groups the number of skin lesions is a useful indicator for selecting docile animals, especially after the establishment of the social order (Turner et al., 2009). In a resident intruder test individual aggressiveness was more persistent for highly aggressive piglets than for the less aggressive conspecifics (D'Eath, 2002). Taken together, these results suggest that skin lesions are associated with agonistic interactions, and that aggressiveness of pigs can be reliably measured.

In further studies associations were found among aggressiveness and reactivity towards other challenging situations (e.g. Thodberg et al., 1999; Ruis et al., 2000; D'Eath et al., 2009). For example, more aggressive pigs received higher handling scores indicating more active behaviour at weighing (D'Eath et al., 2009). Thus, an interaction between behaviour towards conspecifics and handling or human beings seems to be possible.

In order to integrate behaviour traits into breeding programmes (except 'program' in computers), correlations between the aggressive behaviour of pigs measured by direct observations and simple, indirectly measured parameters related to aggressiveness must be identified. In previous studies the relationship between aggressions and skin lesions recorded immediately after mixing has been investigated (Turner et al., 2006a, 2006b, 2009; Stukenborg et al., 2011). However, little is known about the long-term consistency of this relationship, i.e. whether skin lesions recorded at any point in time reflect the individual's aggressiveness displayed at mixing. We hypothesised that more aggressive sows would show generally a higher number of skin lesions compared to less aggressive sows, and that the pattern of skin lesions would differ between more aggressive and less aggressive sows. Furthermore, the aim of this study was to investigate phenotypic correlations between aggressive behaviour post mixing, handling and reproductive performance to obtain indications of potential side-effects when breeding for less aggressive individuals.

2. Materials and methods

2.1. Animals and housing

One hundred twelve German Landrace sows were used in the study. They were housed under commercial conditions at the research farm Relliehausen of the University of Göttingen. The animals descended from 43 dams and 15 sires. The commercial piglet production followed a 3-week cycle with a 28-day lactation period. The sows, which had farrowed once to seven times, were randomly mixed into seven groups of 10–20 animals. Due to repeated breeding, integration of primiparous sows, and culling of sows the group size varied. Each group included sows which farrowed within the same period of time. Four weeks after artificial insemination the sows were tested for pregnancy and the pregnant animals were moved from the service centre with individual housing into the dry sow area. There, the sows were housed in a large dynamic group with up to 52 animals. However, before a new group of pregnant sows was included into the large dynamic group, the animals were kept separately for 3–4 days in an adjacent integration pen. Usually three sow groups were housed in the dry sow area, but for the first 4 days after each mixing, four groups were housed together until one group of sows in advanced pregnancy was moved into the farrowing area after 71 days. The need to integrate the observations into the daily workflow led to repeated measurements in some but not all sows. Therefore, 18 sows were observed three times, 40 sows two times and 54 sows once (behaviour observations $n = 188$).

The total space allowance in the integration pen was 69 m^2. After the initial period the integration pen was included into the dry sow area and the total space allowance there was 170 m^2. Due to different group sizes the space allowance per sow varied from 3.3 to 4.1 m^2. The area was equipped with two electronic sow-feeding stations (En-Sta GmbH, Beckum, Germany). For enrichment two scratch brushes, two balls and four chains were