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Social behavior and group growth of finishing pigs with divergent social breeding values¤

Comportamiento social y crecimiento grupal de cerdos en etapa de finalización con valores divergentes de crianza sociales

Comportamento social e crescimento grupal de porcos de engorda com valores divergentes de criação social

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Abstract

Background: Behavioral traits of pigs have been shown to be partly under genetic control, which raises the possibility that behavior might be altered by genetic selection, resulting in pigs with better growth performance. **Objective:** To evaluate the behavior and growth of finishing pigs and investigate pigs selected for high or low social breeding value (SBV) in relation to social behavior and group growth. **Methods:** Thirty-five females and 35 boars from five positive and five negative SBV groups of finishing pigs were grown from 30 to 90 kg and housed in 10 test pens (3.0 × 3.3 m, 7 pigs/pen). Pigs were recorded with video technology for nine consecutive hours on days 1, 15, and 30 after mixing. Pigs were weighed at approximately 90 kg body weight and the number of days to reach 90 kg was then calculated. **Results:** The frequency and duration of behaviors were present in the positive and negative SBV groups after mixing. On day 1 after mixing, agonistic behavior was significantly higher ($p=0.027$) for the –SBV group compared with the +SBV group. Feeding and feeding-together behaviors were significantly higher ($p<0.003$) in the +SBV group on days 1 and 30 after mixing. Moreover, growth performance to reach 90 kg body weight was significantly faster ($p<0.002$) in the +SBV group than in the –SBV group. **Conclusion:** Social interactions, such as feeding-together behavior, among pen mates might affect their growth rate and feed intake. Selection for SBV could be used as an indirect technique for improving growth performance of pigs.

Keywords: *agonistic, feed intake, growth performance, mixing, social interactions.*

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Resumen:

Antecedentes: Se ha demostrado que los rasgos conductuales de los cerdos están parcialmente bajo control genético, lo que plantea la posibilidad de que el comportamiento pueda ser alterado vía selección genética y resulte en cerdos con mejores rendimientos de crecimiento. **Objetivo:** Evaluar el comportamiento y crecimiento de los cerdos en etapa de finalización e investigar cerdos seleccionados por un valor alto o bajo de crianza social (SBV) en relación al comportamiento social y al crecimiento grupal. **Métodos:** Treinta y cinco hembras y 35 verracos, pertenecientes a cinco grupos positivos y cinco grupos negativos de SBV de cerdos en etapa de finalización, llevados hasta los 90, desde 30 kg de peso, alojados en 10 corrales de prueba (3,0 x 3,3 m, 7 cerdos/corral). Los cerdos fueron observados con la ayuda de tecnología de vídeo por nueve horas consecutivas en los días 1, 15 y 30 luego de ser mezclados. Además, los cerdos se pesaron a los 90 kg de peso aproximadamente y se calculó el número de días para alcanzar dicho peso. **Resultados:** La frecuencia y duración de los comportamientos de los cerdos en la etapa de finalización se presentaron en los grupos de SBV negativos y positivos luego de ser mezclados. El día 1 luego de la mezcla, el comportamiento agonístico fue significativamente mayor (p=0,027) en el grupo –SBV que en el grupo +SBV. Los comportamientos de consumo de alimento y de consumo en compañía fueron significativamente mayores (p<0,003) en el grupo +SBV en los días 1 y 30 luego de la mezcla. Además, el crecimiento para alcanzar 90 kg de peso corporal fue significativamente más rápido (p=0,002) en el grupo +SBV que el grupo -SBV. **Conclusiones:** Las interacciones sociales, tales como el comportamiento de consumo de alimento en compañía, entre los compañeros de corral, pueden afectar la tasa de crecimiento y consumo de alimento. La selección por SBV podría usarse como técnica indirecta para mejorar el rendimiento de crecimiento en cerdos.

Palabras clave: *agonista, consumo de alimento, desempeño de crecimiento, interacciones sociales, mezcla.*

Resumo

Antecedentes: Os traços comportamentais dos porcos demonstraram estar parcialmente sob controle genético, o que aumenta a possibilidade de que o comportamento possa ser alterado pela seleção genética e resulte em porcos com melhor comportamento de crescimento. **Objetivo**: Avaliar o comportamento e o crescimento dos porcos de engorda e investigar os porcos selecionados para alto ou baixo valor de reprodução social (SBV) em relação ao comportamento social e crescimento do grupo. **Métodos**: Trinta e cinco fêmeas e 35 machos, pertencentes a cinco grupos de SBV positivos e cinco negativos de porcos de engorda, foram engordados até 90 de 30 kg e alojados em 10 currais de teste (3,0 × 3,3 m, 7 porcos/curral). Os porcos foram observados com o auxílio de tecnologia de vídeo durante nove horas consecutivas nos dias 1, 15 e 30 após a mistura. Além disso, os porcos foram sopesados em aproximadamente 90 kg de peso corporal e o número de dias para atingir 90 kg foi então calculado. **Resultados**: A frequência e a duração dos comportamentos dos porcos de engorda foram apresentadas com grupos de SBV positivo e negativo após a mistura. No dia 1 após a mistura, o comportamento agonístico foi significativamente maior (p=0,027) no grupo –SBV do que no grupo +SBV. Os comportamentos de alimentação e alimentação conjunta foram significativamente maiores (p<0,003) no grupo +SBV nos dias 1 e 30 após a mistura. Além disso, o comportamento de crescimento do grupo para atingir 90 kg de peso corporal foi significativamente mais rápido (p<0,002) no grupo +SBV do que no grupo –SBV. **Conclusão**: As interações sociais, como o comportamento de alimentação conjunta, entre companheiros de curral podem afetar a taxa de crescimento e a ingestão alimentar. A seleção para SBV pode ser uma técnica indireta para melhorar o comportamento de crescimento dos porcos.

Palavras-chave: *agonístico, desempenho de crescimento, ingestão de alimentos, interações sociais, mistura.*

Introduction

Pigs raised in the same pen sometimes show aggressive behaviors toward each other. Aggression is acknowledged as a critical problem, especially after mixing, in commercial pig farming (D'Eath *et al*., 2009; Turner, 2011). Increases in stress levels, physical activity, and injuries generally occur because of aggression after mixing. This aggression is associated with a reduction in the rate and efficiency of body mass gain, poor meat quality, and low carcass grading (Turner *et al*., 2009). Despite these disadvantages, mixing at various ages is commonly practice in many countries (Turner *et al*., 2008).

The estimated breeding value based on individual performance and pedigree information is generally used in genetic evaluation and selection of livestock

(Muir, 2005). Genetic selection has mainly focused on reproductive traits and production, such as litter size and daily body mass gain in pigs (Løvendahl *et al*., 2005). New breeding models include not only individual performance, but also social breeding values (SBV) regarding performance with pen mates. The genetic effects of an individual on the phenotypes of its social partners (for example, pen-mates) are known as SBV (Moore *et al*., 1997). Moreover, SBVs represent specific traits such as growth rate or feed conversion (Bijma *et al*., 2007; Reimert *et al*., 2014). Social breeding values have been observed in several livestock species, including pig (Bergsma *et al*., 2008), chicken (Ellen *et al*., 2008), quail (Muir, 2005), deer (Wilson *et al*., 2011), and mink (Alemu *et al*., 2014).

Social interactions between individuals have been ignored in animal breeding so far. However, behavioral traits of animals have been shown to be partly under genetic control, which raises the possibility that behavior might be altered by genetic selection, resulting in better adapted animals (D'Eath *et al*., 2009). The individual growth performance of a pig is affected by its own genes and the genes of its pen mates (Grandinson *et al*., 2003; Ellen *et al*., 2008; Reimert *et al*., 2013a). Social breeding value is related to behaviors such as aggression and competition (Muir, 2005; Wilson *et al*., 2009). Our hypothesis is that pigs can affect the growth of their pen mates by their own social behavior and through social facilitation of feeding and drinking, increasing food intake and growth.

This study evaluated the behavior and growth of finishing pigs and investigated pigs selected for high or low social breeding value (SBV) in relation to social behavior and group growth.

Materials and methods

Ethical considerations

The experimental protocols describing the management and care of the animals were reviewed and approved according to the Guide for the Care and Use of Laboratory Animals (Institutional Animal Care and Use Committee, National Institute of Animal Science, Republic of Korea) on March 7, 2014 (approval number: NIAS 2014-289). Care was taken to minimize pain or discomfort during animal procedures. Drugs commonly administered to deal with animal pain or discomfort -such as tranquilizers, analgesics and anesthetics- were not used in this study.

Location and animals

The study was conducted at the experimental farm of the National Institute of Animal Science in Cheonan (Chungnam Province, South Korea) using Landrace pigs (Chookjin Land/Republic of Korea). Estimated SBVs were based on growth rates during the finishing phase (from approximately 30–90 kg). Social breeding values were estimated with a random regression model for social breeding values in WOMBAT version 1.0 (Meyer, 2007), using the following model that accounted for social genetic effects (Arango *et al*., 2005; Bijma *et al*., 2007):

$$y = \boldsymbol{X}b + \boldsymbol{Z}_D a_D + \boldsymbol{Z}_S a_S + \boldsymbol{W}l + \boldsymbol{V}g + e,$$

where, y is the vector of average daily gain observations; b is the vector of fixed effects, which included batch (year-month), sex (male or female), age at the end of the test, group size, and number of full siblings within the group; a_D is the vector of random direct additive genetic effects; a_S is the vector of random social genetic effects; l is the vector for the random non-genetic litter effects; g is the vector of random non-genetic group effects (accounting for the group in which the pigs were penned during the finishing period); e is the vector of residuals, and $\boldsymbol{X}$, $\boldsymbol{Z}_D$, $\boldsymbol{Z}_S$, $\boldsymbol{W}$, and $\boldsymbol{V}$ are the corresponding incidence matrices.

Assumptions for the probability distributions were $g \sim N(0, I\sigma_g^2)$, $l \sim N(0, I\sigma_l^2)$, and $e \sim N(0, I\sigma_e^2)$, in which N indicates a normal distribution; I is an identity matrix of the appropriate dimension; and σ_g^2 (403 g^2/day^2), σ_l^2 (95 g^2/day^2), and σ_e^2 (3,875 g^2/day^2) are the variances of the corresponding effects. Both direct and social additive genetic effects were fitted, which had the following multivariate normal distribution:

$$\begin{bmatrix} a_D \\ a_S \end{bmatrix} \sim MNV(0, C \otimes A), \text{ in which } C = \begin{bmatrix} \sigma_{a_D}^2 & \sigma_{a_D\,a_S} \\ \sigma_{a_D\,a_S} & \sigma_{a_S}^2 \end{bmatrix},$$

where, $\sigma^2_{a_D}$ (2,513 g^2/day^2) is the variance of direct genetic effects, $\sigma^2_{a_S}$ (9 g^2/day^2) is the variance of social genetic effects, $\sigma_{a_D\ a_S}$ (55 g/day) is the covariance between direct and social genetic effects, and ⊗ denotes the Kronecker product.

Dams and sires with the most extreme high and low SBV (+SBV and –SBV, respectively) were selected from the available population to create the test population. Dams (11 sows) were selected form a total of 161 sows and sires (6 boars) were selected form a total of 129 boars (Table 1). Mating between dams and sires was conducted within the same SBV group and pregnant sows were managed under the same conditions (individual housing). The pregnant sows were reared in separate farrowing crates.

Piglets were reared in farrowing crates with solid plastic flooring and a heat lamp. At 28 days of age, piglets were weaned and reared in eight weaning pens (1.8 × 2.4 m, 8–12 piglets/pen) per SBV group. At 30 kg, 70 pigs were allocated to 10 test pens (3.0 × 3.3 m, 7 pigs/pen) that consisted of five pens for each SBV group and were mixed randomly with the SBV groups from the weaning pens. Therefore, there was mixing within SBV groups; however, there was no mixing between +SBV and –SBV groups. The ratio of females/males was 35/35. The males were not castrated. The environmental conditions were the same in all pens. The temperature was controlled by ventilation fans and heater, and maintained at 28 ± 1 °C. Each pen was provided with a stainless-steel feeder (125 × 35 × 80 cm) and a nipple drinker that allowed the pigs *ad libitum* access to feed and water throughout the experiment (Rhim *et al*., 2015).

Wide-angle video cameras were installed at the corners of the test pens (four cameras per pen), so all areas of the pen could be observed. The behaviors of the pigs were video recorded continuously for 9 h/day. All behavioral data were obtained from video images that were digitally recorded from 09:00 to 18:00 h on days 1, 15, and 30 after mixing. Instantaneous scan sampling was carried out at 10-min intervals with the software Vegas Pro ver. 13.0 (Sony, Tokyo, Japan). All video recordings were viewed by trained observers who were blinded to the treatments to eliminate subjective bias and inter-individual discrepancy (Li and Wang, 2011; Rhim, 2012).

The behaviors recorded were drinking, feeding, agonistic, and activity including drinking-together and feeding-together (Table 2). Duration and frequency of behaviors were recorded and the individual pig performing the behavior, as well as the individual pig receiving the agonistic behavior, was noted. The behavioral time values presented are the means and standard errors of the relative frequencies of each behavior, calculated from the results obtained from each observation of each group (Rhim *et al*., 2015; Hwang *et al*., 2016).

Table 1. Social breeding value (SBV) of parents and test pigs with positive (+) or negative (–) SBV in a Landrace nucleus herd.

Selection		N	Mean	SD
Dam (estimated breeding value)		161	–0.15	0.18
Selected dams	–SBV	7	–0.39	0.28
	+SBV	4	0.26	0.19
Sire (estimated breeding value)		129	–0.11	0.11
Selected sires	–SBV	3	–0.25	0.13
	+SBV	3	0.67	0.22
Test pigs (predicted breeding value)	–SBV female (–SBV sire × dam)	21	–0.45	0.21
	+SBV female (+SBV sire × dam)	21	0.44	0.19
	–SBV male (–SBV sire × dam)	14	–0.61	0.26
	+SBV male (+SBV sire × dam)	14	0.31	0.17

N: number of individuals; SD: standard deviation; –SBV: negative social breeding value; +SBV: positive social breeding value.

Table 2. Ethogram of behavioral categories and their respective definitions (adapted from Statham *et al*., 2011; Rhim, 2012).

Behavior	Description
Drinking	Drinking water or manipulating the drinker with or without ingestion of water
Drinking-together	Drinking behavior together with pen mates
Feeding	Head positioned in the feeder or chewing food displaced from the feeder
Feeding-together	Feeding behavior together with pen mates
Inactive	Lying down, not moving, and sleeping
Agonistic	Biting, head-thrusting, ramming, or pushing another pig
Locomotion	Any movement including walking, running, scampering, and rolling
Excretion	Defecating or urinating
Other social	All other social behaviors not listed above

Pigs were weighed at approximately 90 kg body weight and the data was transformed to the number of days to reach 90 kg using the following calculation (Choi *et al*., 2013):

$$\text{Days to 90 kg} = \text{age at weighing} + \frac{(90 - \text{body weight}) \times (\text{age at weighing} - 38)}{\text{body weight}}$$

Statistical analysis

Data analysis was performed with RStudio version 0.99.892 (http://www.rstudio.com). The behavioral data were analyzed by a Mann-Whitney *U* test between the +SBV and –SBV groups using R package coin (Hothorn and Zeileis, 2015). The behavioral differences between days after mixing within each group were assessed with the Kruskal–Wallis test. Days to reach 90 kg were analyzed by a *t*-test between the +SBV and –SBV groups.

Results

The frequency (Table 3) and duration (Table 4) of behaviors were present in positive (+) and negative (–) SBV groups after mixing. For frequency and duration of drinking behavior, there were no significant differences between the +SBV and –SBV groups during the study period. However, the –SBV group had lower frequency compared with the +SBV group (Mann-Whitney U test, $Z = -4.36$, $p<0.001$) in drinking-together at day 30 after mixing.

On day 1 after mixing, the feeding frequency ($Z= -2.93$, $p=0.003$) and duration ($Z= -2.85$, $p=0.004$) were lower in the –SBV group compared with the +SBV group. On day 15 after mixing, the feeding duration was higher ($Z=1.88$, $p=0.06$) in the –SBV group than in the +SBV group. However, feeding frequency was not significantly different between the two groups ($Z=0.86$, $p=0.392$). Results reported on day 30 were similar to those obtained on day 1 after mixing, i.e., feeding frequency ($Z= -2.91$, $p=0.003$) and duration ($Z= -2.43$, $p=0.014$) were lower in the –SBV group than in the +SBV group.

For feeding-together behavior, similar results were obtained as for feeding behavior. The feeding-together frequency (Table 3; days 1 and 30 after mixing) and feeding-together duration (Table 4; days 1 and 30 after mixing) were lower in the –SBV group than in the +SBV group ($Z= -5.11$ to -4.22, $p<0.001$). On day 15 after mixing, the feeding-together duration was higher in the –SBV group than in the +SBV group ($Z=4.31$, $p<0.001$). There were significant differences in frequency (Kruskal-Wallis test, $H=20.87$, $p<0.001$) and duration ($H=25.14$, $p<0.001$) of feeding behavior over the three observed days in the –SBV group.

On day 1 after mixing, frequency of agonistic behavior was higher in the –SBV group than in the +SBV group (Mann-Whitney U test, $Z=2.21$, $p=0.027$, Table 3) and duration of agonistic behavior was significantly different between the –SBV and +SBV groups ($Z=1.81$, $p=0.050$, Table 4). The duration of agonistic behavior of the –SBV group was higher than the + SBV group. However, the frequency and duration of agonistic behavior were not significantly different between the two groups on days 15 and 30 after mixing.

In the –SBV group, the frequency (Kruskal-Wallis test, H=26.68, p<0.001) and duration (H=23.76, p<0.001) of agonistic behavior were significantly different over the three observed days. There were higher frequency and duration of agonistic behavior on day 1 compared with days 15 and 30. Moreover, there were significant differences in the frequency (H=11.41, p=0.003) and duration (H=12.10, p=0.002) of agonistic behavior among days in the +SBV group. Agonistic behavior was higher on day 1 than in days 15 and 30 of the +SBV group (Tables 3 and 4).

Table 3. Frequencies of different behaviors of pigs after mixing for groups with positive (+) or negative (–) social breeding value (SBV) in a Landrace nucleus herd; comparisons between groups (n = 5 for +SBV, and n = 5 for –SBV) are based on a Mann-Whitney U test.

Behavior	Day	–SBV	+SBV	SEM	Z	p-value
Drinking	1	9.5	9.4	1.07	–0.30	0.769
	15	9.4	8.7	0.86	0.57	0.568
	30	5.5	7.9	0.68	–1.61	0.110
Feeding	1	9.5	18.0	1.48	–2.93	0.003
	15	23.1	22.5	1.93	0.86	0.392
	30	9.8	16.5	1.11	–2.91	0.003
Drinking-together	1	56.7	56.6	3.00	–0.27	0.790
	15	56.6	52.5	2.87	0.31	0.758
	30	32.9	47.6	1.56	–4.36	< 0.001
Feeding-together	1	56.7	108.0	6.12	–4.49	< 0.001
	15	138.9	134.7	4.36	0.46	0.647
	30	58.6	99.0	3.74	–5.11	< 0.001
Agonistic	1	22.4	5.8	2.81	2.21	0.027
	15	3.0	4.6	0.80	0.05	0.612
	30	0.7	0.4	0.25	0.24	0.859

–SBV: negative social breeding value; +SBV: positive social breeding value; SEM: standard error of the mean; Z: value of Mann-Whitney U test.

Days to reach 90 kg was significantly different between the –SBV (135 days) and +SBV (128 days) groups (t-test, t=3.20, p=0.002, Table 5). This means growth was faster in the +SBV group than in the –SBV group. Moreover, there were significant differences in the summation of the days to reach 90 kg of pen mates between the –SBV (812 days) and +SBV (771 days) groups (t = 5.75, p<0.001).

Table 4. Total duration (sec) spent on different behaviors of pigs after mixing for groups with positive (+) or negative (–) social breeding value (SBV) in a Landrace nucleus herd; comparisons between groups (n = 5 for +SBV, and n = 5 for –SBV) are based on a Mann-Whitney U test.

Behavior	Day	–SBV	+SBV	SEM	Z	p-value
Drinking	1	276	259	33.7	–0.30	0.769
	15	232	254	36.3	0.57	0.573
	30	386	297	66.2	–0.81	0.421
Feeding	1	641	1297	124.1	–2.85	0.004
	15	2850	1912	229.3	1.88	0.060
	30	1159	1904	144.6	–2.43	0.014
Drinking-together	1	1657	1553	75.4	0.83	0.412
	15	1392	1522	118.0	0.55	0.590
	30	2317	1784	153.1	0.93	0.358
Feeding-together	1	3848	7781	483.9	–4.22	< 0.001
	15	17102	11472	585.2	4.31	< 0.001
	30	6954	11423	443.9	–4.68	<0.001
Agonistic	1	1062	503	136.6	1.81	0.050
	15	211	201	54.2	0.26	0.800
	30	83	17	29.6	0.24	0.789

–SBV: negative social breeding value; +SBV: positive social breeding value; SEM: standard error of the mean, Z: value of Mann-Whitney U test.

Table 5. Mean days needed for pen mates to reach 90 kg for groups with positive (+) or negative (–) social breeding value (SBV) in a Landrace nucleus herd; comparisons between groups (n = 5 for +SBV, and n = 5 for –SBV) are based on a t-test.

Traits	–SBV	+SBV	SEM	p-value
Day 90 kg reached	135	128	1.1	0.002
Summation of day 90 kg reached for pen mates	812	771	4.4	< 0.001

–SBV: negative social breeding value; +SBV: positive social breeding value; SEM: standard error of the mean.

Discussion

Commercially-housed pigs are selected for fast growth rates and maintained in competitive and aberrant behavioral conditions (Rodenburg and Turner, 2012). Aberrant behavior is known to harm health and growth of pigs, and is considered an welfare problem in swine husbandry (Schrøder-

Petersen and Simonsen, 2001). In addition, social interactions of group-housed pigs are important for their health, productivity, and welfare (Camerlink *et al*., 2013). Social interactions among pen mates might affect their welfare and performance considerably, in both negative and positive ways (Reimert *et al*., 2014). In previous studies, positive SBVs for growth were shown to fear-related behavioral traits in suckling piglets (Reimert *et al*., 2013b). Moreover, pigs selected for SBVs on the growth of their pen mates exhibited less non-reciprocal biting (Camerlink *et al*., 2015).

Behavior was affected by SBVs for growth in the present study. Pigs in the +SBV group affected the growth of their pen mates more than those in the –SBV group did. SBVs might have profound effects on response to selection and heritable variation in traits (Moore *et al*., 1997; Camerlink *et al*., 2013). Behavioral observations revealed differences in agonistic behavior between negative (–) and positive (+) SBV groups. There was higher frequency and duration of agonistic behavior on day 1 in the –SBV than in the +SBV group. Agonistic behavior was not different at later time points once the groups had settled in this study.

However, Canario *et al.* (2012) found that the more intense aggression was observed at mixing in the +SBV groups with more stable dominance relationship later and faster growing. Moreover, mixing aggression was not different, but on return to a familiar group after 24 hours away while mixed with unfamiliar pigs, the aggression at reunion was less (Camerlink *et al*., 2015). This may suggest that social memory is improved. Genetic relationships seem to show that high aggression at mixing can subsequently lead to more stable groups (Desire *et al*., 2015).

A tentative hypothesis for why +SBV pigs showed less agonistic behaviors when they were mixed with unfamiliar pigs than –SBV pigs could be related to dominant relationships (Canario *et al*., 2012; Camerlink *et al*., 2013). Therefore, +SBV pigs could establish their dominant relationship with less agonistic behaviors after mixing. In the present study, +SBV pigs showed less biting, head thrusting, ramming, and pushing other pigs especially on day 1 after mixing. In addition, fearfulness is known as an important factor for social interactions. If pigs with reduced aggression and fearfulness of their pen mates are selected, this might have positive consequences in terms of welfare (Reimert *et al*., 2014).

We hypothesized that SBV could be related to social behavior and growth performance of finishing pigs. The results suggest that pigs with +SBV and –SBV for growth differed in their social behavior response (Camerlink *et al*., 2015), and +SBV had a positive effect on the growth of their pen mates. In addition, feeding-together and drinking-together behaviors were observed in this study. A real direct effect could be a greater social facilitation of feeding and drinking in the +SBV animals. Decisions to engage in feeding, feeding-together, and agonistic behaviors might be made by pigs based on the relative benefits and costs of behavior, which will vary depending on production efficiency and animal welfare. Moreover, selection for SBVs that have a positive effect on group growth with pen mates could be used as an indirect technique for improving growth performance and animal welfare (Reimert *et al*., 2014).

Pigs with divergent SBVs showed differences in social behavior. Social interactions, such as feeding-together behavior, among pen mates might affect their growth rate and feed intake. Selection for SBV could be used as an indirect technique for improving growth performance of pigs. In the present study, only a small-scale experiment was applied to behavioral differences in pigs. Knowledge regarding the mechanisms of social genetic effects might assist with optimal breeding and farming of pigs. Further research is needed using +SBV or –SBV pigs to investigate the behavior and growth of their pen mates.

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Conflicts of interest

The authors declare they have no conflicts of interest with regard to the work presented in this report.

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