Stiftung Tierärztliche Hochschule Hannover
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Sow behaviour towards humans - an important trait in loose farrowing systems

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Introduction

Loose farrowing systems and free-movement pens for lactating sows gain importance

- ⇨ **more space, movement possibility, natural behaviour of sows**
- ⇨ **switch to free-movement pens for lactating sows: new challenges for both sows and humans**
- ⇨ **sows' protective instinct during lactation: risk for humans**
- ⇨ **definition of new traits and breeding goals**

Aim

Project „FreeSow“

⇨ **development of tests characterising sow’s behaviour towards humans during lactation**

⇨ **potential consideration of these behaviour traits of lactating sows in breeding goals**

Material & Methods

- ⇨ nucleus farm BHZP GmbH Germany, 10/2016 -12/17 (n=21 batches)
- ⇨ purebred landrace db.01 sows (35-40 sows/batch) in single free-movement pens, 4 weeks lactation

Behavioral-Tests (two observers)

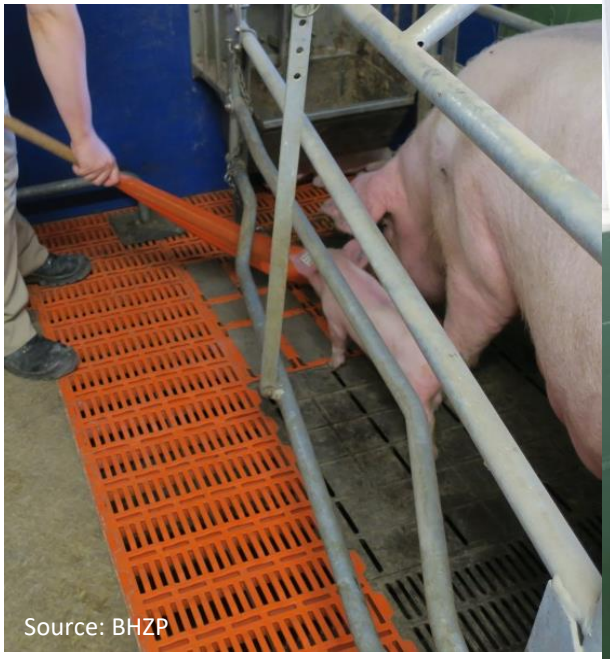
1. **Dummy Arm Test (DAT)** — 4th day *p.p.*, pens closed
   824 observations, 525 sows
2. **Towel-Test (TT)** — 3th day *p.p.*, pens closed
   1,642 observations, 531 sows
3. **Trough Cleaning Test (TCT)** — 10th day *p.p.*, pens open
   1,602 observations, 530 sows

Material & Methods

Test	Reaction	Procedure	Scores
DAT	**aggression** towards human interaction	with dummy-arm (plastic hand imitation) located near the sow's head piglet was animated to squeak	1- no reaction 2- slight reaction, without serious background 3- strong reaction, sow tries to bite 4- strong reaction with bite
TT	**nervousness** and **fear** of novel objects	by throwing a towel in the direction of the sow's head during a resting period	1- no reaction 2- slight reaction, sow stays lying 3- middle reaction, sow sits down or stands up 4- defensive reaction, sow stands up
TCT	**routine situations**	trough cleaning was simulated	1- no reaction 2- slight reaction, without serious background 3- strong/defensive reaction

Material & Methods

Dummy Arm Test



Trough Cleaning Test

Material & Methods

Statistical analysis

⇨ **analysis of fixed effects** (phenotypic level): SAS 9.4 (SAS Institute Inc., USA)

⇨ **variance component estimation**: univariate animal models – ASReml (Gilmour et al., 2009)

DAT: $y_{ijkl} = \mu + batch_i + animal_j + pe_{sowk} + e_{ijkl}$

TT: $y_{ijklmn} = \mu + batch_i + s\_pen_j + parity_k + animal_l + pe_{sowm} + e_{ijklmn}$

TCT: $y_{ijklmn} = \mu + batch_i + s\_pen_j + observer_k + parity_l + animal_m + pe_{sown} + e_{ijklmo}$

Effect of parity of sows → class effect
1. class = 1st parity sow
2. class = 2nd parity sows
3. class = ≥ 3rd parity sows

Status of pens (s_pen):
1=closed
2=open

Random effects: *animal*=additive genetic effect of animal
pe=permanent environmental effect of animal

Results & Discussion

Dummy Arm Test

⇨ 90.4 % calm reaction (Score 1+2), 7.4 % strong reaction (3) and 2.2 % bit the dummy arm (4) → score 3+4 summarized

Towel Test and Trough Cleaning Test

⇨ 62.4 - 75.1 % calm reactions, 4.1-6.0 % attacks

Effects on behaviour traits of sows:

Traits	Effects			
	batch	status_pen	observer	parity
„Dummy Arm Test“	p=0.0313	-	not significant	not significant
„Towel-Test“	p=0.0013	p<0.0001	not significant	p<0.0001
„Trough Cleaning Test“	p<0.0001	p=0.0299	p<0.0001	p<0.0001

Results & Discussion

Effect of status of pens on score behaviour traits

status_ pen	TT N	TT lsm ± se	TCT N	TCT lsm ± se
closed	824	2.00[a] ±0.03	824	1.34[a] ± 0.02
open	818	2.23[b] ± 0.03	778	1.40[b] ± 0.02

a:b-p<0.05

Effect of parity class of sows on score of behaviour traits

parity-class	TT N	TT lsm ± se	TCT N	TCT lsm ± se
1.	619	1.93[a] ± 0.03	601	1.28[a] ± 0.02
2.	453	2.16[b] ± 0.04	446	1.32[a] ± 0.03
3.	568	2.26[c] ± 0.03	554	1.52[b] ± 0.02

a:b:c-p<0.05

Results & Discussion

Additive genetic (σ^2_a), permanent environmental (σ^2_{pe}), residual (σ^2_e) variance components and heritabilities (h^2) for behaviour traits of sows

Behaviour traits	σ^2_a	σ^2_{pe}	σ^2_e	h^2
Dummy Arm Test	0.051	0.058	0.303	**0.124** (0.063)
Towel Test	0.119	0.115	0.450	**0.174** (0.057)
Trough Cleaning Test	0.053	0.065	0.194	**0.171** (0.059)

⇨ **similar to heritabilities in other studies**
(***Vangen et. al 2005; Hellbrügge, 2007)***

Conclusions & Outlook

- ⇨ results of the study suggest that a measurable response of sows towards humans exist
- ⇨ most of the sows showed a calm reaction; percentage of detected attacks ranged from 4.1 to 6.0% (TT and TCT)
- ⇨ influence of batch (DAT, TT, TCT), status of pen (TT, TCT), parity of sows (TT, TCT) and observer (TT) on behaviour traits were determined
- ⇨ estimated heritability → implementation of behaviour traits in breeding programs is possible
- ⇨ <u>Outlook:</u> investigations of relationship between behaviour traits of sows and rearing performance of sows

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