

Engel F. Hessel and Urte Kolweyh, Göttingen, with Herman Van den Weghe, Vechta

# The free-movement pen for suckling sows

## Animal behaviour, production data and working time

*The most important economic parameter in piglet production is the number of weaned piglets per sow and year. Directly and indirectly responsible for piglet losses are the housing conditions for the animals. Just under half of all piglet losses during suckling can be traced to the sow laying on and squashing the piglets. For this reason, the strawless farrowing pen with the sow held in a crate has established itself. The system is not, however, accepted as animal welfare oriented. The following work compares in terms of animal behaviour, performance and labour requirement a farrowing crate system with farrowing pens giving free-movement for the sow.*

For the investigations, a farrowing pen department was made available by the Schleswig-Holstein Chamber of Agriculture, Research Institute for Agriculture, Futterkamp. The feeding and supply passage was situated in the middle of the force-ventilated department. Four free-movement pens were situated on the left. On the right were placed four farrowing pens with diagonally-fitted crates.

Each free-movement pen had a floor measurement of 2.70 m • 2.35 m. In each pen, the sow had a movement floor area of 4 m<sup>2</sup> bordered by three gates within the pen. In order to confine the sow more closely, it was possible to fold two of these gates together. The free-movement pen plan is illustrated in figure 1.

The farrowing pens with crates each had an outer measurement of 2.40 m • 1.95 m and the crate could be adjusted for width from 0.49 m to 0.72 m. Both types of pen had the same sort of flooring. All piglet creepers, or nests, were the same size and had underfloor heating. 66 sows and 755 of their piglets were involved in the statistical evaluation of the production data. Data concerning 28 sows were available for evaluation of animal behaviour and for labour requirements.

### Behaviour of sows around time of parturition

Sow behaviour was recorded for two days before farrowing and for two days after. Registration of behavioural parameters took place between 6 am and 10 pm by direct observations according to the time-portion method. The time interval between individu-

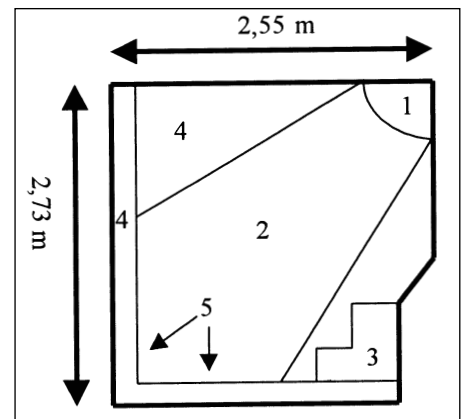


Fig. 1: Plan of free-movement pen (1 trough, 2 movement area for sow, 3 piglet creep, 4 piglet movement area, 5 piglet protection rails)

al observations was five minutes. The following behavioural parameters were taken account of during the observation: side, side/belly and belly laying position as well as sitting, standing and walking.

The greater freedom of movement possibility in the free-movement pen was taken advantage of by the sows and, in comparison with the animals in the farrowing crates, led to an increased period of time in active positions (standing, walking and sitting). With 4% of their time standing, the sows in the free-movement pens were significantly longer in this mode than those in the reference pens (table 1). The movement opportunity in the free-movement pens appeared to be taken advantage of especially by the younger sows as these were notably active for longer periods compared with animals of the same age in the crate pens. The housing system did

Frau Dr. Engel F. Hessel is scientific assistant at the Institut für Agrartechnik der Georg-August-Universität Göttingen, Gutenbergstr. 33, 37075 Göttingen and is presently on parental leave. Frau Urte Kolweyh was diploma student at this Institute. Prof. Dr. Ir. Herman Van den Weghe is director in the Chair of Procedural Technique at the Research and Study Centre for Veredelungswirtschaft der Georg-August-Universität, Göttingen, Driverstr. 22, 49377 Vechta; e-mail: hweghe@fosvwe.uni-vechta.de The project was financially supported by the Wilhelm-Schaumann-Stiftung.

### Keywords

Farrowing pen, animal behaviour, working time, productivity

Table 1: Least square means (LSM) and standard error (SE) of the observed activities, depending on the housing system (19795 individual observations)

Activities	Free-movement pen (n = 578 hour average values)		Crate (n = 562 hour average values)		t Test
	LSM	SE	LSM	SE	
Active (%)	18,76	0,83	15,11	0,82	**
Passive (%)	81,24	0,83	84,89	0,82	**
Standing (%)	13,92	0,74	9,69	0,82	**
Sitting (%)	4,84	0,44	5,42	0,43	n.s.
Laying on side (%)	52,06	1,43	43,63	1,41	***
Laying on belly (%)	1,64	0,24	0,66	0,23	**
Laying between side/belly (%)	27,54	1,26	40,60	1,29	***

n.s. = not significant; \*\* = P < 0,01; \*\*\* = P < 0,001

Parameter	Free-movement pen (n = 382)		Crate (n = 347)		t Test
	LSM	SE	LSM	SE	
Piglet weaning weight (g)	6599,94	86,74	6233,92	92,91	**
Piglet weight gain (g)	5091,92	86,74	4725,91	92,91	**

\*\* = P < 0,01

Parameter	Free-movement pen (n = 58)		Crate (n = 53)		t Test
	LSM	SE	LSM	SE	
Weight of dead piglets (g)	6136,08	69,84	5913,56	71,75	**
Weight gain of piglets (g)	4607,05	69,84	4384,53	71,75	**
Day of death (d)	3,11	0,58	2,40	0,61	n.s.

n.s. = not significant; \*\* = P < 0,01

Working time per operation [s]	Free-movement pen		Crate		t Test
	LSM	SE	LSM	SE	
Feeding of sow (n = 173)	36,38	0,81	21,13	0,85	***
Cleaning pen (n = 38)	15,42	0,50	42,08	1,06	***
Gathering piglet (n = 45)	14,76	0,95	7,69	1,17	***

\*\*\* = P < 0,001

not significantly influence the sitting period of the sows. However, the age of the sows had a significant influence of the sitting behaviour with older sows spending more time sitting compared with younger ones.

The sows spent the longest period of the day in lying (81.24% and 84.89%) whereby the sows in the crates lay in total longer than those in the free-movement pens. The sows in the reference pens lay longest in the indeterminate position between belly and side lying with 13% of the observation period, but lay on their sides for 9% less time than the free-movement sows. Both groups spend very short periods in the belly lying position with 0.66% and 1.64% of the observation time.

### Production data

After each sow's first meal post partum, piglets were individually weighed, sexed and any special findings recorded. After farrowing, born alive and born dead pig numbers were routinely recorded. Piglets were again weighed at weaning. For piglets that died during the suckling period weight, sex, day of age and time of day were recorded. Recording took place during the period July 1997 to June 1998.

With regard to total piglet mortality, the two systems did not differ. But when comparing the reason for mortality, significantly more piglets were killed by overlaying in the

Table 2: Least square means (LSM) and standard error (SE) of weaning weight and weight gain, depending on housing system

Table 3: Least square means (LSM) and standard error (SE) of weight of dead piglets, their weight gain to death and day of death, according to housing system

Table 4: Least square means (LSM) and standard error (SE) of working time for feeding one sow, cleaning one farrowing crate/pen and gathering of one piglet, depending on the housing system

ring time per piglet for treatment took notably longer in the free-movement pen with twice as long required compared with the crate pen. This difference can be traced to the design of the crate pen. In the free-movement pen, piglets could flee into the sow's movement area and the gatherer had to follow and this led to extra time requirement (table 4).

### Literature

- [1] Aumaitre, A. and J. Le Dividich: Improvement of piglet survival rate in relation to farrowing systems and conditions. *Annales de Rech. Vet.* 15, (1984), pp. 173 – 179
- [2] Kunz, H. J.: Abgangsursachen bei Ferkeln und Sauen. *Schriftenreihe des Institutes für Tierzucht und Tierverhalten der Christian-Albrechts-Universität zu Kiel*, Heft 32, 1986

free-movement pens while more piglet deaths occurred through general weakness in the crate pens. Piglets that died in the free-movement pens weighed a good 200 g more than the animals that died in the crate pens (table 2). Dead piglets born in the crate pens died on average 2.4 days after birth. Mortality cases in the free-movement pens averaged 3.1 days of age at death. Given in table 3 are the weaning weights and liveweight gains achieved during the suckling period, corrected for the birthweights. With 366 g, the daily weight gain of the piglets in the free-movement pens was significantly higher than those in the crate pens.

### Working time requirement

The working periods required for hand feeding of sows, cleaning the pens and gathering the piglets were recorded by stopwatch. The resultant times were adjusted to an unit so that the result gave times for one piglet, one sow or one pen.

Between the two pen types, significant differences in working time requirements were determined. Feeding a sow in the free-movement pen took 15 seconds longer than in the crate pen. Cleaning time in the free-movement pen was 27 seconds less than the crate pen, which probably can be traced to the amount of self-cleaning in the free-movement pen with more dung forced through the slats by the more active animals. Gather-