BEHAVIOUR OF GROWING PIGS AS AN EXPRESSION OF THEIR PHYSIOLOGICAL RESPONSE TO DIFFERENT WELFARE LEVELS

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THE AIM OF RESEARCHES

The behaviour is the direct pig response on environmental conditions. Animals housed indoor without the possibility of choice demonstrate some specific behaviours which are the characteristic response on a given factor or behaviours which are reoriented for the better adaptation (Meunier-Salaun and Dantzer, 1990).

Single and clear estimation of the welfare level of animals kept in different housing systems and environmental conditions causes many difficulties in practice (Broom, 1996). The problem lies not only in the lack of criterious but first of all in the impossibility of appointing the unequivocal method (Pedersen, 1996). Pig behaviour could be the field where practicians would recognize the welfare level but its usefulness in this regard is often being questioned. Observations of growing pigs concerning their behaviour, physiology and biophysics were realized in order to confirm direct relevances to changes in functioning of pig organism caused by different welfare levels and their expression in animals behaviour.

MATERIAL AND METHODS

Researches were realized on 240 growing pigs of the synthetic line 990, not subjected to stress, kept from 14th to 30th week of life. Animals were kept in four groups in separated rooms of the same technical parameters in the following housing systems: self cleaning floor (Arey, 1993), deep litter, litter and litter free. The pen ratio was 1.0 m/pig and there were 10 pigs in each group. Animals were fed ad libitum with dry feed concentrate of energy content 12,56 MJ.

As a factor of physiological pig reaction to environmental conditions a concentration in blood of hormones was chosen, such as thyroxin, corticotrophin, cortisol, as well as test momentary concentration of adrenaline. These concentrations were measured by radio-immunological method on the 90th day of housing.

Mean daily pulse rates and skin temperatures, measured telemetrically, were selected from among biophysical parameters. The microclimate of rooms was monitored standardly: temperature and humidity measured constantly, and the air movement periodically. These parameters were confronted with pig behaviour by means of daily, constant video recordings.

RESULTS

The obtained results concerning the thermal comfort, the housing system quality, social relations and welfare level are illustrated in tables 1 – 4. The results indicate that higher concentrations of cortisol and ACTH are correlated with the changes in course of 24–hour pig behaviour rhythms clearly showing the differences in welfare levels. The clear phase of night rest

and 2 – 3 peaks of day activity, related to feeding, were recorded only in housing systems of good and high welfare levels.

Different thyroxin levels manifest themselves especially in motor activity, and ways of lying down and body positions during rest showing the energiogenic influence of this hormone. In the worse thermical comfort (lower floor thermal resistance, higher cooling) pigs preferred lying in group and in abdomen position. This is confirmed by the differences in pig skin temperatures. A marked higher aggressiveness is reflected in higher adrenaline level. Disturbances in agonistic behaviour increase mean pulse rate of pigs and the 24-hour rhythms of mean pulse rate equally well indicate the welfare standard.

The construction of a pen and a kind of housing system have an influence on number of injuries of pigs. The differences in cleanness and mortality of pigs are well marked. In friendly conditions animals can create functional zones and respect them. Poor environment lack of straw or other suitable material causes appearing of high quantity of stereotypes and caudophagies.

CONCLUSIONS

The results of researches allow to formulate the conclusion that animals behaviour can be successfully used to estimate their welfare. However, it is advisable to base scientific purposes on integrated physiological, behavioural and biophysical methods. These methods allow to indicate the influence of separate factors and eliminate their faults. Pigs too often use the same behavioural mechanisms to cope with different factors and stressors.

LITERATURE

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Table 1.

Results of thermal comfort evaluation

Specification	Thermal comfort			
	High		Good	Low
	Housing systems			
	Self cleaning /10% slope/	Deep litter	Litter	Litter free
Plasma T_4 levels [ng/ml	29,0 A,B	29,9 C,D	35,5 A,C,e	45,5 B,D,e
Skin temperature [°C]	37,5 f,g	36,8 h,i	35,9 f,h,j	34,8 g,i,j
Rest and lying [% of pigs]				
- in group	16,8 K,L	17,6 M,N	69,2 K,M,O	87,4 L,N,O
- separately	83,2 P,Q	82,4 R,S	30,8 P,R,T	12,6 Q,S,T
Body position [% of pigs]				
- sternal	34,1 U,W	21,3 X,Y	62,6 U,X,Z	71,7 W,Y,Z
- lateral	65,9 A,B	78,7 C,D,	37,4 A,C,E	18,3 B,D,E

aa - differences significant at P≥0.05
AA - differences significant at P≥0.01

Table 2.

Results of usefulness of housing system evaluation

Specification	Conditions			
	Very Good		Good	Poor
	Housing systems			
	Self cleaning /10% slope/	Deep litter	Litter	Litter free
Injuries [%]	3 a,B	3 c,D	5 a,c,E	10 B,D,E
Mortality [%]	1 f,g	1 h,i	2 f,h,j	3 g,i,j
Cleanness [pt]	4,7	4,5	3,5	2,0
Stereotypies [n/day]	3,1 k	3,8 l	4,7 m	10,2 k,l,m
Caudophagies	-	-	-	+
Functional areas in pen	+	+	-	- -

aa - differences significant at P≥0.05
AA - differences significant at P≥0.01

Table 3.

Results of environment quality – pigs' welfare

Specification	Welfare			
	Very Good		Good	Poor
	Housing systems			
	Self cleaning /10% slope/	Deep litter	Litter	Litter free
Plasma cortisol levels [nmol/m]l	37,4 a, B,C	40,1 a,D,E	59,2 B,D,F	63,3 C,E,F
Plasma ACTH levels [pg/ml]	32,1 G,H	38,8 I,J	44,8 G,I,K	62,1 H,J,K
Avg. pulse rate [n/min.]	90,9 l	84,2 m,n	93,1 m,o	99,3 l,n,o
Behaviour [% of day]				
-Movement	20,5	26,3	17,4	13,6
-Lying and rest	79,5	73,7	82,6	86,4
-Eating	7,5	8,7	6,7	5,9
-24-hours activity rhythms	++	++	+	+/-

aa - differences significant at P≥0.05
AA - differences significant at P≥0.01

Table 4.

Results of social relation evaluation

Specification	Social enwironement			
	Very Good		Good	Poor
	Housing systems			
	Self cleaning /10% slope/	Deep litter	Litter	Litter free
Test Plasma Adrenaline levels [pg/ml]	2,6 a	2,8 b	2,9 c	3,6 a,b,c
Agression [n/day]	6,2 D	7,1 E	7,6 F	13,7 D,E,F
Max. pulse rate [n/min.]	132,7 g	136,4 h	138,1 i	163,3 g,h,i

aa - differences significant at P≥0.05
AA - differences significant at P≥0.01