THE INFLUENCE OF THE STABLE MICROCLIMATE ON THE PIG PRODUCTION PERFORMANCE

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Abstract

The study deals with the effect of the pen locations with regard to their place in the section on selected pig production parameters in the weaning pigs. 8 pens, each with 25 weaners pigs of the DanBred genotype, were tested. The body weight (BW), daily gain (DG), average daily gain (ADG), and mortality of animals at the start of the test, in the 14th, 28th, 42nd day and at the end the test, were monitored during the season during the same temperature. From the obtained results one could say, that the pen locations in the section may affect the growth intensity and mortality in pigs. Transverse pen locations, influence more significantly ADG as well as overall mortality then longitudinal pen location in the weaners section.

Key Words: Pig, weaner, technology, pen loccation, growth, mortality, influence

The stable environment acts on animals, both directly and indirectly. Various quality of microclimate, especially the temperature and moisture parameters, significantly affect the pig performance, respectively their production efficiency (Pfizer, 2005). Odehnalová (2006) states that environmental influence on the production can be monitored not only quantitatively but also qualitatively in the final product. Also, thanks to new statistical methods, the genetic and environmental share from the total phenotypic performance of an animal can be estimated more accurately (Stupka et al., 2006). Quantifying the effects of the individual microclimate components on performance, behavior and health in pigs is relatively difficult. In this respect the works of Novak (2005), Renaudeau (2010) and Ngwabie (2011) can be cited. Those, the problems of interactions between different temperatures, relative humidity, air velocity and pig production solved. To evaluate the stable microclimate, a practice used mostly temperature without giving any moisture. However, this to evaluate the microclimate quality is not enough (Morrison et al., 2005; Classens, 2006). According to Midwest planning service (2002) and Oberreuter (2005) stable microclimate should be optimized mainly according to the temperature, which, if possible, should be corrected by relative humidity and air flow. Although all control systems, in theory, provide an identical microclimate to animals, especially, given the amount of temperature, from a technological point of view these variables are not homogeneous in the stable (Líkař, 2005). One of the reasons is the animal pens location in halls, thus the distance from point of air inlet and outlet, which affects their performance.

Material and Methods

The aim of the study was to determine the effect of the pen locations with regard to their place in the section on selected pig production parameters in the weaning pigs.

In the given section was 8 pens, each with 25 weaner pigs of the DanBred genotype (see Figure 1.2). Pens L (left side) and R (right side) were marked according to the location from the central corridor. Left side, where L1, respectively R1 is closest to the inlet and outlet air, pen L4, respectively R4 is located farthest from the inlet and outlet air. Diffuse ventilation system with air supply from the central corridor into two channels in the lower part with diffusion plate and air outlet in central ventilation duct was used. Selected performance parameters, ie body weight (BW), daily gain (DG), average daily gain (ADG), and mortality of animals at the start of the test, in the 14th, 28th, 42nd day and at the end the test, were monitored during the season during the same temperature.

Results were evaluated using statistical methods using SAS ® 6.4 procedures MEANS, UNIVARIATE, GLM, CORR and REG. For the categorical variables, frequency analysis was performed to identify any invalid values. For continuous variables, the analysis of extreme values and the model was constructed to evaluate the effect of individual factors such

$Y = \mu + P_i + S_j + C_k + K_i + e_{ijkl}$, where

Y - values of the parameters,
μ - average population,
P_i - effect of season,
S_j - effect of microclimate management (winter, spring / autumn, summer),
C_k - effect of pen (1-8),
K_i - effect of pen location (right, left side),
e_{ijkl} - random error.

Results and Discussion

Tables 1 and 2 documented the monitored the fattening capacity traits with regard to the pen location in the section according to the distance from the ventilation inlet holes both in the longitudinal and transverse directions.

Based on the obtained values of monitored variables can be stated that the transverse pen location in this section causes some differences in weaners´ performance. In the case of diffuse ventilation, it can be stated that the more couple pens is located closer to the air inlet, the animals in pens grow better. Although the differences are not significant, the difference between a pen L1+R1 vs. L4+R4 was about 10g (ADG), respectively 3.2%. The possibility of partial affecting performance of modern pig genotypes by different distances from the source of the air inlet stated Oberreuter (2005). Further he states that this type of ventilation during colder periods does not guarantee a sufficient air exchange of more distant pens from the air inlet, because this ventilation is dimensioned for the summer season. In summer, pens overheating, so cannot be used the "wind chill effect" of air flow. As Table 1 shows, in pens (4L, 4R) a tendency of reduced growth and increased mortality of the animals was found. The amount of mortality between the first (1L+1R), the best group (4 heads) and distant (4L+4R), the worst group (16heads) was 12 animals. The findings confirm the claim Novak (2005), who indicates that the modern pig genotypes, as DanBred, react to any deficiencies of stable environment intensively.

Table 2 documents the fattening capacity characteristics with regard to the location of the pens in the section in the longitudinal direction. This is a pen layouts in the section on the right (R), respectively left (L), from central corridor.

As is obvious, from the results in the case of the longitudinal pen layouts, practically no performance changes was not recorded in summary, with the exception of DG in the interval 29-42 days ($P \leq 0.05$). Also, in the case of total death, these were identical for both groups, thus after about 15 animals. It can be stated that the longitudinal pen layouts in sections, due to the same microclimate quality as indicate Renaudeau, 2010 and Ngwabie, 2011, does not affect the pig performance, which has also demonstrated Líkař (2009).

Figure 1. Section - side plan

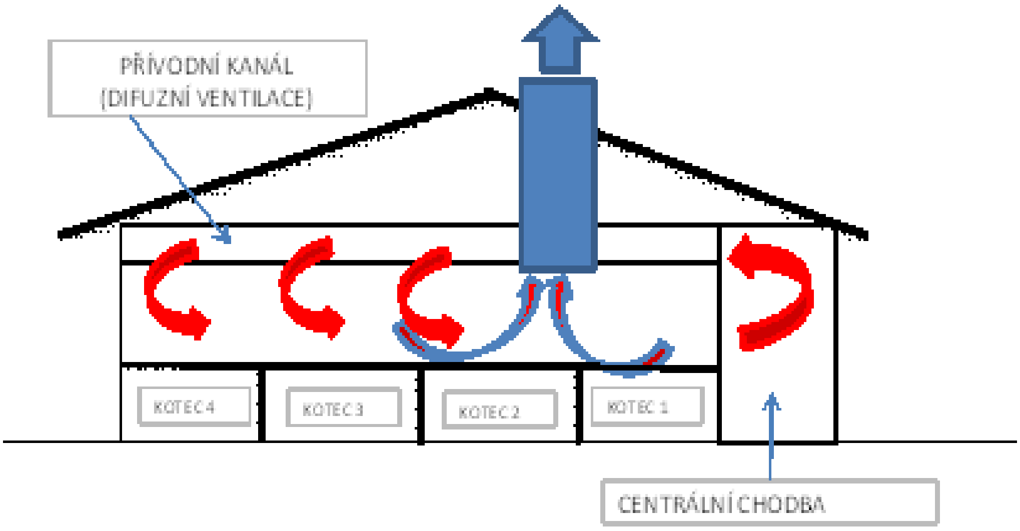

Figure 2. Section - floor plan

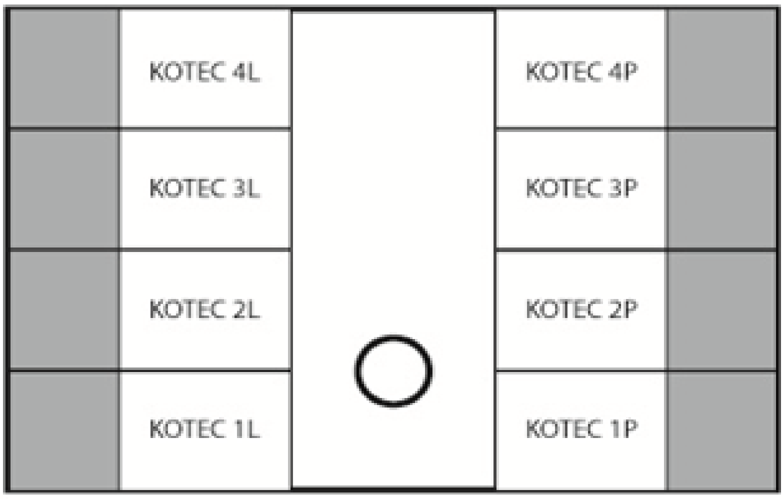

Table 1. Selected indicators of the fattening performance with regard to the transverse direction of pens location in pigs sescion

Parameter monitored	pen 1 (1L,1R)			pen 2 (2L,2R)			pen 3 (3L,3R)			pen 4 (4L,4R)			Significance
	Mean	SD	Σ	Mean	SD	Σ	Mean	SD	Σ	Mean	SD	Σ	
Initial BW	7.22	0.40		7.36	0.56		7.30	0.43		7.19	0.45		NS
BW at 14.day	11.11	1.82		11.31	1.42		11.21	1.77		11.02	1.78		NS
BW at 28.day	15.64	3.13		15.89	2.69		15.67	2.65		15.44	2.85		NS
BW at 42.day	24.34	2.09		24.21	1.37		24.10	1.10		23.86	0.84		NS
Final BW	29.85	2.39		29.81	1.29		29.80	0.87		29.63	1.04		NS
DG from 1st to 14th day	509	691		493	622		308	90		299	102		NS
DG from 15 th to 28 th day	360	63		366	61		361	46		356	50		NS
DG from 29 th to 42 th day	490	36		467	45		466	50		469	35		NS
DG at 42 th day (final)	535	118		550	151		559	134		583	202		NS
ADG (g/day)	439	48		436	42		426	33		425	34		NS
Mortality from 1th to14th day			0			0			2			6	-
Mortality from 15th to28 th day			1			0			2			3	-
Mortality from 29th to 42 th day			1			0			1			2	-
Mortality at 42 th day (final)			2			1			4			5	-
Total mortality			4			1			9			16	-

NS – no significant

Table 2. Selected indicators of the fattening performance with regard to the transverse direction of pens location in pigs sescion

Parameter monitored	Part of the pig sections						Significance
	Left pens (L)			Right pens (R)			
	Mean	Std Dev	Sum	Mean	Std Dev	Sum	
Initial BW	7.26	0.44		7.27	0.47		NS
BW at 14.day	11.18	1.49		11.14	1.84		NS
BW at 28.day	15.78	2.51		15.53	3.01		NS
BW at 42.day	24.47	1.08		23.79	1.60		NS
Final BW	30.12	0.94		29.43	1.81		NS
DG from 1st to 14th day	316	75		489	649		NS
DG from 15 th to 28 th day	370	39		351	64		NS
DG from 29 th to 42 th day	485	34		461	46		*
DG at 42 th day (final)	553	141		561	163		NS
ADG (g/day)	433	30		431	47		NS
Mortality from 1th to14th day			4			4	-
Mortality from 15th to28 th day			4			2	-
Mortality from 29th to 42 th day			0			4	-
Mortality at 42 th day (final)			7			5	-
Total mortality			15			15	-

NS – no significant, * significant at P≤0.05

Conclussion

From the experimental results it can be stated that the pen locations by central corridor, ie the distance from the air inlet and outlet in a the diffuse ventilation in section of young pigs may affect their production potential, ie the growth intensity and mortality. In the case of transverse pen locations in section, the difference between the closest and most distant pens was 3.2% for ADG, for overall mortality was four times greater. It has been shown that longitudinal pen location does not affect the performance in weaners.

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