

## INDOOR VS. OUTDOOR-REARING OF PIGS, PERFORMANCE, CARCASS AND MEAT QUALITY

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## INTRODUCTION

In the last few years there is a growing concern, mainly in developed countries, about the ethics in animal production. Welfare of pigs and pollution problems associated with confinement are major issues in the media. Some people also believe that pigs raised free produce better quality meat. The pig industry in the state of Santa Catarina is the largest in Brazil and almost 100% are raised and finished in indoor conditions. The objective of this work was to compare pigs that were kept until slaughter outdoor with a group that remained following the usual way: in total confinement.

## MATERIALS AND METHODS

Twenty-four hybrid pigs, 12 castrated males and 12 gilts were used. Half was kept outdoor with 300 m<sup>2</sup>/head. The other group was put in pens, 1.74 m<sup>2</sup>/head. The experiment started when they were weaned (28 days). Until weaning time the sows with the piglets were kept outdoor.

Both groups received the same ration "ad libitum" and they were slaughtered at the same time with live weight of about 97 kg. They were transported during the night to a Packing Plant, 260 km away from the experimental farm. The experiment was conducted during April/August (fall/ winter) and lasted 120 days.

The Hennessy Grading Probe was used in the killing line at the 10th rib. After the evaluation in the Plant, a sample of the *Longissimus* was removed from each carcass and taken to the Meat Laboratory at the University and frozen for further analyses.

The initial pH (pHi) was measured at 45 minutes after bleeding and ultimate (pHu) when the chops were thawed. The chops were roasted to an internal temperature of 75° C for sensorial determinations. The chemical analyses were performed in the raw muscle.

## RESULTS AND DISCUSSION

It was not found difference ( $P > .05$ ) in the growth of pigs in the two groups. This result is in contrast with the work of Jones *et al.* (1993), Enfalt *et al.* (1997) and Sather *et al.* (1997) who found better performance for pigs raised in confinement. The thicker layer of fat in outdoor pigs also does not agree with the results of Jones *et al.* (1993), Enfalt *et al.* (1995/1997) and Sather *et al.* (1997) who reported that outdoor pigs presented leaner carcasses. The differences in the climate maybe could help to explain the conflicting results. Carcass length and fat thickness were similar to the results found by Müller *et al.* (1988) for pigs raised in confinement. Table 1 presents the performance and some characteristics of the carcasses. Evaluation done by the use of the HGP can be visualized in table 2.

TABLE 1. PERFORMANCE AND PHYSICAL MEASUREMENTS OF THE CARCASSES OF PIGS RAISED IN TWO SYSTEMS

Variable	Indoor		Outdoor		Level of Significance
	Mean	SE	Mean	SE	
Initial weight (kg)	6.86	0.32	6.70	0.31	NS
Final weight (kg)	96.19	2.56	99.13	1.20	NS
Average daily gain (kg)	0.75	0.02	0.78	0.01	NS
Dressing (%)	77.35	0.81	76.63	0.69	NS
Carcass length (cm)	95.39	0.97	95.01	0.98	NS
Longissimus area (cm <sup>2</sup> )	35.62	0.88	36.00	0.98	NS
Backfat thickness <sup>a</sup> (cm)	3.56	0.09	3.91	0.10	*

<sup>a</sup> Average of 3 measurements

TABLE 2. HENNESSY GRADING PROBE EVALUATION IN PIGS RAISED IN TWO SYSTEMS (Done at the 10th rib)

Variable	Indoor		Outdoor		Level of Significance
	Mean	SE	Mean	SE	
Backfat thickness (cm)	2.40	1.11	2.55	1.28	NS
Longissimus depth (cm)	47.26	1.08	48.77	1.25	NS
Lean (%)	50.33	0.55	49.82	0.64	NS
Mean/fat	0.50	0.02	0.53	0.02	NS

TABLE 3. ORGANOLEPTIC EVALUATION OF PIGS RAISED IN TWO SYSTEMS

Variable	Indoor		Outdoor		Level of Significance
	Mean	SE	Mean	SE	
Panel tenderness <sup>a</sup>	6.23	0.32	6.16	0.36	NS
Panel juiciness <sup>a</sup>	5.85	0.25	6.30	0.28	NS
Panel flavor <sup>a</sup>	6.10	0.27	5.84	0.30	NS
Shear force (kg)	3.86	0.29	4.00	0.33	NS
Thawing loss (%)	5.28	0.71	5.63	0.69	NS
Cooking loss (%)	27.66	1.33	28.08	1.49	NS

<sup>a</sup> 1=Ext. tough, dry, undesirable; 5=Average; 9=V. tender, juicy, v. desirable.



Although it was not found any significant difference among the variables, there was a tendency of outdoor pigs to present more fat and lower percentage of lean. Table 3 shows the organoleptic evaluation.

Both groups presented similar meat quality, above average values. *Essen-Gustavsson et al.* (1998) and *Van der Wall* (1993) reported that the physical exercise did not affect sensory characteristics of pigs. Work conducted by *Enfalt et al.* (1997) found better meat quality in pigs raised in confinement. Some meat parameters are presented in table 4.

TABLE 4. MEAT QUALITY PARAMETERS OF PIGS RAISED IN TWO SYSTEMS

Variable	Indoor		Outdoor		Level of Significance
	Mean	SE	Mean	SE	
Color of lean <sup>a</sup>	3.54	0.20	4.80	0.23	*
Marbling <sup>b</sup>	12.25	0.73	11.38	0.82	NS
Texture of lean <sup>c</sup>	3.99	0.14	3.67	0.16	NS
pHi	5.76	0.08	5.75	0.09	NS
pHu	5.58	0.03	5.60	0.03	NS

<sup>a</sup> 1=V. pale pink; 3=Light pink; 5=Red pink; <sup>b</sup> 1=Traces; 12=Average; 18=Abundant; <sup>c</sup> 1=Very coarse; 5=Very fine

The outdoor pigs displayed a more reddish color possibly as a result of the exercise. Although the initial pH was quite low, no PSE carcass was detected. No significant difference in pH was also reported by *Warris et al.* (1983) whilst *Enfalt et al.* (1995) found that the outdoor pigs produced meat with lower pH. Table 5 reports mineral and cholesterol content.

TABLE 5. MINERAL AND CHOLESTEROL CONTENT OF PIGS RAISED IN TWO SYSTEMS

Variable	Indoor		Outdoor		Level of Significance
	Mean	SE	Mean	SE	
Calcium (mg/100g)	12.27	1.25	9.58	1.37	NS
Phosphorus (mg/100g)	353.91	17.60	322.35	11.61	NS
Iron (mg/100g)	0.76	0.10	0.57	0.11	NS
Zinc (mg/100g)	1.43	0.04	1.51	0.05	NS
Cholesterol (mg/100g)	45.47	2.74	45.61	2.95	NS

<sup>a</sup> Calculated in a wet basis

## CONCLUSION

It can be concluded that the differences between systems were small and not economically important.

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