LEAN MEAT CONTENT AND DISTRIBUTION IN PIG CARCASSES

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Abstract

A total of 152 carcasses from final pig hybrids were analysed with the aim to determine the lean meat content and its distribution among different carcass parts. The lean meat contents were expressed as proportions from carcass weights. The average lean meat proportion of the whole set of carcasses was 55.61 %. The lean meat contents in leg, loin, shoulder, filet, and other parts were 18.31, 9.76, 8.18, 5.30, 1.22, and 12.84 %, respectively. Gilts had a significantly higher average lean meat content (56.10 %) compared to barrows (55.13 %), mainly as a result of gender differences in leg and loin conformation. Lean meat content and distribution were also analysed in different carcass weight intervals to determine the effect of carcass weight. Significantly different lean meat contents were found between carcasses weighing less than 95 kg and heavier. A similar tendency was confirmed in the lean meat distribution among the main meaty parts when the weight limit of 95 kg also proved to be significant.

Key Words: Pig; carcass; lean meat content; carcass cuts

The content of lean meat is a main carcass quality trait. Considering the fact that this trait directly influences the carcass price (farmer's price), it determines the market value of carcasses. Besides, the meat content in different carcass cuts is also perceived by a consumer (Tholen et al., 2003).

The meat processing industry requires pig carcasses with consistent lean meat contents, especially in commercial cuts. Such a requirement has been recognised by pig producers and appropriate measures in the area of pig breeding and hybridization have been taken. The conformation of the specific carcass cut which plays a decisive role for the estimation of lean meat content is essential for producers. Thus, the conformation of the loin is important in case of the apparatus classification, while it is the ham for the two-point method.

The SEUROP classification system distributes pigs into different groups according to the quality of their carcasses. However, it is more difficult to compare the quality of different carcass cuts and the extent to which they contribute to the overall carcass lean content. Different carcass cuts have different weights and thus represent different proportions of the carcass. For example, the fillet has a high lean content but its contribution to the overall lean percentage is small. Therefore, the effort is exerted to increase the lean meat content especially in the cuts significantly contributing to the total carcass weight, e.g. in the belly.

Due to the facts mentioned above, some authors, e.g. Senčić et al. (1998), attempted to compare and evaluate the participation of the cuts with different weight proportions of the carcass in the overall carcass lean meat content. The attention was also paid to the effect of sex, genotype of final hybrids, carcass weight, and lean meat content on this relationship.

The objective of this study was to analyse the mentioned relationship using the selected set of pigs.

Material and methods

A total of 152 carcasses of pig final hybrids were included in the analysis. The sample described the average pig population from common production conditions in terms of sex (1:1 ratio), used genotype in the sire position (CLW – sire line, CLW – sire line x Pn, and DxPn), and fat thickness in P2.

Twenty-four hours post mortem, the left sides were divided into standardised cuts which were subsequently dissected in detail according to the method of Walstra and Merkus (1996). Different tissues were separated and their weights recorded in ham, loin, shoulder, belly with bones, and fillet. The main emphasis was put on the muscle tissue. The remaining cuts were marked and calculated as "other cuts".

Based on the dissection results, the carcass (carcass side) lean meat content was determined as well as the participation of different cuts in this lean content despite their different weights and thus different proportions in the carcass weight.

The lean meat content development was first analysed for the whole sample of carcasses and then the effects of sex, genotype, carcass weight and overall lean content were studied.

Data were analysed using the procedures MEANS and GLM of the SAS programme (SAS Institute Inc., 2001).

Results and discussion

The results are summarised in Table 1. The average lean meat percentage and carcass weight were 55.61 ± 0.324 % and 90.01 ± 0.955 kg, respectively. Mainly ham, loin, shoulder, and belly with bones contributed to the total lean meat (18.31, 9.76, 8.18, and 5.30 %, respectively), followed by other "undissected" cuts and fillet (12.84 and 1.22 %, respectively).

Table 1. Carcass lean meat content as affected by different factors

Effect	Group	Carcass lean (%) $\bar{x} \pm s_{\bar{x}}$	Lean content in different cuts $\bar{x} \pm s_{\bar{x}}$					
			ham	loin	shoulder	Belly with bones	fillet	other cuts
Total		55,61 ± 0,324	18,31 ± 0,128	9,76 ± 0,070	8,18 ± 0,068	5,30 ± 0,041	1,22 ± 0,012	12,84 ± 0,075
Sex	Gilts	56,10 ± 0,456^{a}	18,47 ± 0,192^{a}	9,91 ± 0,095^{a}	8,18 ± 0,099^{a}	5,36 ± 0,052^{a}	1,23 ± 0,017^{a}	12,95 ± 0,105^{a}
	Barrows	55,13 ± 0,455^{b}	18,16 ± 0,169^{b}	9,61 ± 0,101^{b}	8,18 ± 0,094^{a}	5,24 ± 0,063^{a}	1,21 ± 0,018^{a}	12,72 ± 0,105^{b}
Genotype of sire	CLW-sire line	55,27 ± 0,504^{a}	18,20 ± 0,193^{a}	9,75 ± 0,109^{a}	8,04 ± 0,113^{a}	5,35 ± 0,066^{a}	1,17 ± 0,017^{a}	12,76 ± 0,116^{a}
	CLW-sire line x Pn	53,70 ± 0,906^{b}	17,57 ± 0,401^{b}	9,82 ± 0,167^{a}	7,52 ± 0,113^{b}	5,25 ± 0,132^{a}	1,16 ± 0,039^{a}	12,39 ± 0,209^{b}
	DxPn	56,17 ± 0,449^{c}	18,52 ±0,177^{a}	9,76 ± 0,103^{a}	8,39 ± 0,091^{c}	5,29 ± 0,057^{a}	1,25 ± 0,017^{b}	12,96 ± 0,104^{c}
Carcass weight (kg)	< 85	57,09 ± 0,505^{a}	19,06 ± 0,180^{a}	9,87 ± 0,121^{a}	8,36 ± 0,109^{a}	5,39 ± 0,076^{a}	1,24 ± 0,020^{a}	13,17 ± 0,116^{a}
	85 – 94,9	56,41 ± 0,553^{a}	18,40 ± 0,202^{b}	10,01 ± 0,148^{a}	8,40 ± 0,148^{a}	5,33 ± 0,066^{ab}	1,25 ± 0,027^{a}	13,02 ± 0,128^{b}
	95 – 104,9	53,36 ± 0,598^{b}	17,41 ± 0,267^{c}	9,41 ± 0,120^{b}	7,85 ± 0,091^{b}	5,20 ± 0,085^{ab}	1,17 ± 0,021^{b}	12,31 ± 0,138^{c}
	> 105	53,61 ± 0,867^{b}	17,57 ± 0,381^{c}	9,56 ± 0,126^{b}	7,79 ± 0,177^{b}	5,15 ± 0,113^{b}	1,18 ± 0,021^{b}	12,37 ± 0,200^{c}
Class	S	61,16 ± 0,217^{a}	20,26 ± 0,187^{a}	10,81 ± 0,155^{a}	8,83 ±0,152^{a}	5,80 ± 0,076^{a}	1,34 ± 0,034^{a}	14,11 ± 0,050^{a}
	E	57,43 ± 0,176^{b}	19,05 ± 0,090^{b}	9,89 ± 0,086^{b}	8,55 ± 0,091^{a}	5,43 ± 0,051^{b}	1,25 ± 0,016^{b}	13,25 ± 0,041^{b}
	U	52,74 ± 0,194^{c}	17,21 ± 0,102^{c}	9,38 ± 0,080^{c}	7,75 ± 0,071^{b}	5,08 ± 0,058^{c}	1,15 ± 0,016^{c}	12,17 ± 0,045^{c}
	R	48,92 ± 0,198^{d}	15,90 ± 0,201^{d}	8,80 ± 0,116^{d}	7,14 ± 0,113^{c}	4,71 ± 0,100^{d}	1,08 ± 0,022^{d}	11,29 ± 0,046^{d}

$^{a, b, c, d}$ $P \leq 0.05$

The gilts had significantly higher lean meat content by 0.97 percent point (p.p.) compared to the barrows. The lean percentages in gilts and barrows were 56.10 ± 0.456 and 55.13 ± 0.455 %, respectively. Thus, the tendency towards a higher lean meat content in the carcasses of gilts was confirmed, which is in agreement with e.g. Daumas et al. (1998) and Kernerová et al. (2007). When looking at the participation of different cuts in the total lean meat content, it is apparent that significant differences between gilts and barrows were only found in ham (18.47 % and 18.16 %, respectively) and loin (9.91 and 9.61 %, respectively). The remaining important cuts contributed practically the same proportion to the total lean meat content.

The analysis of the sire genotype effect on the lean meat content revealed the following results: The average lean percentages in final hybrids sired by (DxPn), CLW – sire line, and (CLW – sire line x Pn) were 56.17, 55.23, and 53.70 %, respectively, with the differences being significant. A similar tendency was found in the participation of ham and shoulder in the total lean meat content. In contrast, no differences between genotypes were observed ion loin and belly with bones. It was therefore demonstrated that the highest lean meat content in the carcasses of (DxPn) was due to superior conformation of mainly ham and shoulder. It is in agreement with the study by Gispert et al. (2007) in which the pigs sired by hybrid Pn boars had the highest lean meat content and the highest proportion of ham.

The lean meat content was further analysed within the four carcass weight intervals. Generally, it was confirmed that the lean meat content was reduced with increasing carcass weight (Matoušek et al., 2001; Pulkrábek, 2003). Significant differences were observed between the intervals up to 94.9 kg and above 95 kg (56.41 ± 0.533 % and 53.36 ± 0.598 %, respectively). In addition, the contribution of main cuts also significantly decreased in heavier carcasses. If index 1 is assigned to the value of ham contribution in the weight interval up to 85 kg, then the indexes for loin, shoulder, and belly with bones will be 0.52, 0.44, and 0.28,respectively. For the heaviest carcasses (above 105 kg), these indexes will be similar (1, 0.54, 0.44, and 0.29, respectively). It is suggested that with increasing carcass weight, the contribution of different cuts to the total lean meat content is reduced at the same rate.

A similar tendency was found in the contribution of different cuts in the lean meat content in the carcasses classified in the classes S, E, U, and R. The lean meat content of the R class was by 12.24 p.p. lower compared to the S class with the highest contribution of ham (4.36 p.p.) followed by loin (2.01 p.p.), shoulder (1.69 p.p.), and belly with bones (1.09 p.p.).

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Supported by the Ministry of Agriculture of the Czech Republic (Project MZE 0002701403)