COEFFICIENTS FOR THE ESTIMATION OF PIG LIVE WEIGHT

Vítek M., Vališ L., David L., Pulkrábek J.

Institute of Animal Science, Prague Uhrineves, Czech Republic

Abstract

To determine the coefficients for the calculation of pig live weights on the basis of their carcass weights, a representative group of totally 319 pigs was analysed. The coefficients were determined for both cold and hot carcass weights. The equation for calculating live weight (y) based on the cold carcass weight was as follows: y = 1.30*x. The equation for calculating live weight (y) based on the hot carcass weight was as follows: y = 1.27*x. The coefficients for different weight categories and genders were also determined. For practical use it is recommended to employ the cold carcass weight and the coefficient 1.30, as the cold carcass weight is compulsorily given in classification reports according to the Regulation MZe 324/2005.

Key Words: pig, carcass weight, estimate, calculation coefficient.

Calculation coefficients used to estimate the live weight of pigs at the end of the fattening period have great practical importance to pig producers. They are applied to evaluate different pig production traits like feed intake, daily gain etc.

Pig market situation is monitored and reported through the Market information system administered by the State Agricultural and Intervention Fund (SZIF). The reported Prices of agricultural producers (CZV) are related to pig cold carcass weight but also to live weight. In addition, corrected calculation coefficients can be utilized by professional associations.

With regards to the developments of pig carcass classification methods, the coefficients used earlier were related to the former definition of pig carcass, i.e. including flare fat and diaphragm (Pulkrábek et al., 2004). As referred to in the Regulation MZe No 112/2001, the coefficients 1.23 and 1.25 were used to calculate the live weight from hot and cold carcass weights, respectively.

The new definition of reference carcass presentation, i.e. without flare fat and diaphragm, resulted in a need to determine new coefficients. The crucial factor for calculation is the cold carcass weight shown in the classification record as referred to in the Regulation MZe No 324/2005. The earlier proposed coefficients based on the EU carcass definition were 1.26 and 1.28 for hot and cold carcass weights (Pulkrábek and Pavlík, 2004).

The application of weight coefficients is directly related to the information available in the pig carcass classification record. Besides the lean meat content, cold carcass weight is the second indicator necessary for price fixing. Carcass classification results provide important information for breeders, producers, processors, professional organizations and state administration.

The pig production flow designed on an all in - all out system with the animal concentration of 5 00 to 800 pigs per house assumes that all animals are moved in a single day and they are moved out as quickly as possible at the end of the fattening period. This means that it is not possible to measure their live weight before slaughter. However, it can be predicted on the basis of the cold carcass weight provided in classification records.

Dressing percentage calculated as the proportion of carcass weight from slaughter live weight is an important slaughter characteristic (Kováč, 1998; Kernerová and Matoušek, 2005). In the 1970s, the dressing percentage was administratively set at 81.3 % in the Czech Republic. Since the carcass presentation without flare fat and diaphragm has been applied, it is estimated that the average dressing percentage is 79.4 %. As slaughter weight decreases, a certain reduction of dressing percentage can be expected.

Material and Methods

To estimate the live weight of pigs at the end of fattening, a total of 319 animals (169 gilts and 150 barrows) were included in the analysis. The animals were selected from the most frequently used combinations of final hybrids produced in an all in – all out system.

The animals were weighed with an accuracy of two decimal places and marked with ear tags before the transportation to the slaughterhouse. Carcass weights and carcass classes were obtained from classification records. These values (live weight, hot and cold carcass weight) were used to determine calculation coefficients and dressing percentage. The live weights had to be recorded at the end of fattening in the stable as it was impossible to weigh the animals before slaughter in the slaughterhouse. The data were analysed using the procedures MEANS, GLM and REG of SAS, version 9.1.

Results and Discussion

The data were categorised according to sex and carcass weight. The results of gilts and barrows are given in Table 1. The average live weights recorded before the transportation to the slaughterhouse were 107.1 and 109.8 kg in gilts and barrows, respectively. The difference between sex groups was 2.7 kg and was statistically insignificant. The average live weight of all animals was 108.4 kg. Compared to our results, the average live weight at slaughter of 277 hybrids (ČBUxČL) x (DxBL) was 105.5 kg (Sládek et al. (2010).

The average carcass weights measured 45 min after slaughter were 84.1 and 86.6 kg in gilts and barrows, respectively. The difference was statistically significant. In agreement with other studies (Čítek et al., 2004; Kernerová et al., 2006), the lean meat content in gilts was by 2.34 percent points higher compared to barrows.

Based on measured traits the coefficients estimating the live weight of animals at the end of fattening were derived. The coefficients for both hot and cold carcass weights are presented in Table 2. The use of the cold carcass weight coefficient is preferred as cold carcass weight is available in classification records. The identical coefficient for cold carcass weight 1.30 is recommended to be used for both gilts and barrows. Dressing percentage was higher in barrows with the difference of 0.32 percent points. This is associated with the higher deposition of fat in castrates (Malmfors and Lundström, 1983).

The effects of carcass weight on the predicted values of live weight at slaughter are summarised in Table 3 and 4.

Six sub-groups of animals were set up according to their cold carcass weight. An additional sub-group of carcasses ranging from 80 to 100 kg, which are usually preferred in the price grid, was evaluated separately.

The sub-group of heaviest carcasses (110 – 120 kg) was represented only by 5 animals and therefore the coefficients determined for this sub-group have only an informative value. These carcasses also had a higher lean meat content compared to the other sub-groups of heavy carcasses.

The animals that fell into the preferred carcass weight interval (80 – 100 kg) had the average live weight measured at the end of fattening 113.6 kg, cold carcass weight 88.0 kg and lean meat content 56.36 %.

The coefficients and dressing percentages calculated for different carcass weight categories are shown in Table 4. Increased carcass weight is associated with decreased coefficients except for the heaviest carcass weight category which is, however, represented by only few carcasses. The coefficient determined for the lightest cold carcasses (60 – 69.9 kg) was 1.32 while it was 1.28 for both the intervals 90 – 99.9 and 100 – 109.9 kg. The differences between weight categories were statistically insignificant. The coefficient for the preferred interval of cold carcasses 80 – 100 kg was 1.29. Dressing percentage increased with growing carcass weight with the highest value (79.78 %) found for the weight interval 90 – 99.9 kg. The reduced dressing percentage observed in heaviest animals might have been due to an increased weight of flare fat.

Table 1. Basic characteristics of the whole data set and sex groups

Category	n	Live weight - measured (kg)		Hot carcass weight (kg)		Cold carcass weight (kg)		Lean meat content (%)	
		$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s
Gilts	169	107.1[a]	13.13	84.1[a]	10.34	82.4[a]	10.13	57.78[a]	3.520
Barrows	150	109.8[a]	13.16	86.6[b]	10.85	84.9[b]	10.63	55.44[b]	3.702
Total	**319**	**108.4**	**13.20**	**85.3**	**10.64**	**83.6**	**10.43**	**56.68**	**3.786**

Means in the same column with the same superscripts are not significantly different (P≤ 0.05).

Table 2. Coefficients for the calculation of live weight for the whole dataset, gilts and barrows

Category	Coefficient for hot carcass weight	Coefficient for cold carcass weight	Dressing percentage (%)
Gilts	1.28[a]	1.30[a]	78.53[a]
Barrows	1.27[a]	1.30[a]	78.85[a]
Total	**1.27**	**1.30**	**78.68**

Means in the same column with the same superscripts are not significantly different (P≤ 0.05)

Table 3. Effect of carcass weight on the basic characteristic observed

Weight category (kg)	n	Live weight - measured (kg)		Hot carcass weight (kg)		Cold carcass weight (kg)		Lean meat content (%)	
		$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s
60 - 69,9	29	87.0^{a}	5.39	67.0^{a}	2.75	65.7^{a}	2.69	58.68^{a}	2.074
70 - 79,9	86	98.3^{b}	4.83	76.8^{b}	2.81	75.2^{b}	2.75	57.14^{ab}	3.241
80 - 89,9	127	110.4^{c}	5.69	86.8^{c}	3.02	85.0^{c}	2.95	56.62^{ab}	3.711
90 - 99,9	59	120.7^{d}	4.55	96.2^{d}	2.70	94.3^{d}	2.64	55.79^{bc}	4.121
100 - 109,9	13	133.7^{e}	5.99	106.7^{e}	3.13	104.5^{e}	3.07	53.72^{c}	6.114
110 - 120	5	145.8^{f}	3.13	114.4^{f}	1.30	112.1^{f}	1.27	56.76^{ab}	4.53
80 – 100	**186**	**113.6**	**7.19**	**89.8**	**5.27**	**88.0**	**5.16**	**56.36**	**3.854**

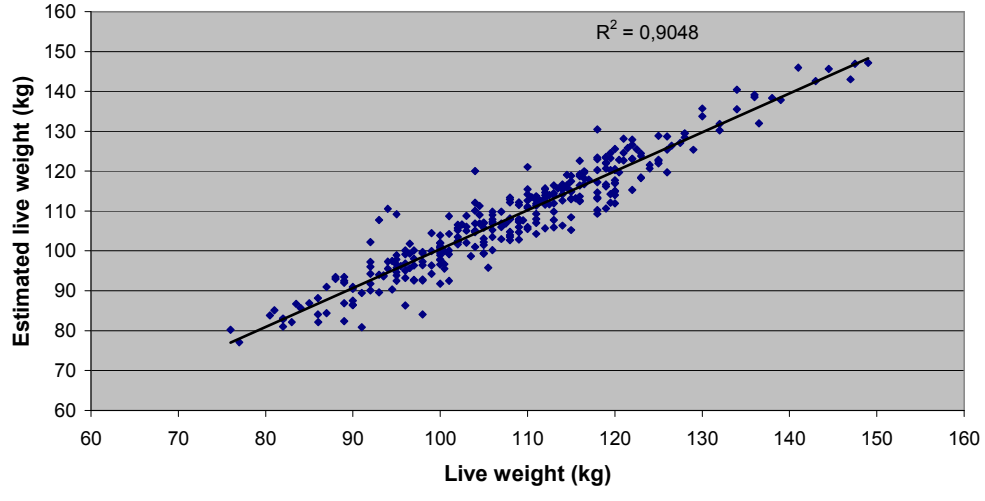
Means in the same column with the same superscripts are not significantly different (P≤ 0.05).

Table 4. Calculation coefficients and dressing percentage for different carcass weight categories

Carcass weight (kg)	Coefficient for hot carcass weight	Coefficient for cold carcass weight	Dressing percentage (%)
60 - 69,9	1.30^{a}	1.32^{a}	77.28^{a}
70 - 79,9	1.28^{a}	1.31^{a}	78.21^{a}
80 - 89,9	1.27^{a}	1.30^{a}	78.72^{a}
90 - 99,9	1.25^{a}	1.28^{a}	79.78^{a}
100 - 109,9	1.25^{a}	1.28^{a}	79.77^{a}
110 - 120	1.27^{a}	1.30^{a}	78.40^{a}
80 – 100	**1.27**	**1.29**	**79.09**

Means in the same column with the same superscripts are not significantly different (P≤ 0.05).

Figure 1: Relationship between the measured live weight and the live weight estimated using the calculation coefficient 1,30



Conclusion

The relationship between the live weight measured at the end of fattening and the live weight predicted on the basis of cold carcass weight using the coefficient 1.30 is demonstrated in Figure 1. It is evident that the differences between measured and predicted values are small which is confirmed by the correlation coefficient r = 0.95 and the coefficient of determination R = 0.905.

Based on the results mentioned above it is recommended to estimate the live weight of pigs using the known cold carcass weight according to the following equation:

$$y = 1.30*x$$

where: y = live weight of pig recorded in the stable (kg)
x = cold carcass weight (kg)

Similarly, it is recommended to estimate the live weight of pigs using the known hot carcass weight according to the following equation:

$$y = 1.27*x$$

where: y = live weight of pig recorded in the stable (kg)
x = hot carcass weight (kg).

References

ČÍTEK, J., ŠPRYSL, M., STUPKA, R.: Vliv pohlaví, genotypu a mrtvé hmotnosti na vybrané ukazatele jatečné hodnoty. In: Požadavky na chov prasat po vstupu do EU. Kostelec nad Orlicí, CHOVSERVIS, a.s., 2004, s. 34 – 36.

KERNEROVÁ, N., MATOUŠEK, V.: Tvarové a užitkové vlastnosti prasat. In: Chov prasat. Profi Press, Praha, 2005, s. 23-34.

KERNEROVÁ, N., VÁCLAVOVSKÝ , J., MATOUŠEK, V.: Analýza jatečné hodnoty vepříků a prasniček vybrané hybridní kombinace. In. Sborník příspěvků z mezinárodní konference „Biotechnology 2006“, České Budějovice, 2006, s. 238 - 240.

KOVÁČ, Ľ.: Chov ošípaných, Devos – Pinus, Bratislava, 1998, s. 181.

MALMFORS, B., LUNDSTRÖM, K.: Consumer reactions to boar meat – a review. Livest. Prod. Sci., 10: 1983, s. 187-196.

PULKRÁBEK, J., PAVLÍK, J.: Skrátené analýzy jatočných tiel. Slovenský chov, 2004, roč. 9, č. 2, s.24-25.

PULKRÁBEK J., WOLF J., VALIŠ L., VÍTEK M., HÖRETH R.: Vergleich verschiedener Methoden zur Bestimmung des Muskelfleischanteils im Schlachtkörper des Schweins. Züchtungskunde, 2004, 76,(1), s. 6 - 17.

SAS Institute Inc (2002 - 2003): Release 9.1. (TS1M3) of the SAS® System for Microsoft® Windows®. SAS Institute Inc, Cary, NC, USA.

SLÁDEK L., MIKULE V., ČECHOVÁ M., HADAŠ Z., CHLÁDEK G.: An influence of slaughter weight on commercial designation of carcass hybrid pigs (CLW x CL) x (D x BL) according to SEUROP system. Research in Pig Breeding, 4, 2010 (2): 17-21.

The study was supported by the project MZE 0002701404.