

REALISATION OF PIG CARCASSES IN CZECH REPUBLIC

David L., Pulkrábek J., Vališ L.

Institute of Animal Science, Prague, Czech Republic

Abstract

The sample of 954 slaughter pigs of common hybrid combinations ((Topigs x CL) x PN) from chosen agricultural enterprise were put into the field test. The fattening was realised in five separated fattening cycles (1 to 5). Barrows and gilts were equally represented in this sample. The pigs were slaughtered in selected slaughterhouses and graded regarding to the SEUROP-system with authorized devices. The average lean meat content reached the values from 56.5 +/- 0.216% (cycle 5) to 60.16 +/- 0.175% (cycle 2). From the whole sample (n = 954) the grading class „S“ was represented by 257 individuals (27%), the class „E“ by 581 carcasses (61%) and the class „U“ by 106 of them (11%), that means these three grading classes contained more than 99% of carcasses. From these reasons it's necessary to use the sub-classes (range of 1%). The average carcass weight reached values between 84.04 +/- 0.529 kg (cycle 5) and 99.89 +/- 0.605 kg (cycle 1). The influence of the carcass weight (x) on the lean meat content (y) was presented with the formula $y = -0.0262x + 60.648$. On the base of a model price mask were the farm prices observed, separately for every fattening cycle. It's advisable to use the sub-classes in range of one percent of lean meat.

Key words: pig; SEUROP system; lean meat content; carcass weight

Within the pig carcass grading according to the SEUROP-system are the most important valuables for the realisation the lean meat share and the carcass weight. These two values are according to biological principles in negative correlation, which should be respected and utilized in the slaughter pig production. This fact is influenced by growth allometry, that different parts of the animal's body are growing differently during the growing period. At first, the bones are growing intensively, then the muscles and in the last phase it is the fat. The pigs are able to grow a lot of fat, so the quantification of these differences is very remarkable.

The slaughter weight and the carcass weight is very various around the world, from very light (5-20kg) to very heavy pigs (around 180kg), which is dedicated for the special ham *prosciutto* in Italy or *cerrano* in Spain. Currently, in the Czech republic, we have the common fattening cycles upto 110-120kg in slaughter weight, which includes about 40 days before fattening cycle and 120 days of fattening. In one fattening cycle are animals of the same age, same hybrid combination and similar weight, and they are all fattened for the same time, and all together transported to the slaughter at the end of the cycle.

In the slaughter conditions are the grading methods aimed entirely on carcasses (Branscheid et al. 2011) and others. On the basis of the carcass characteristics from the grading process we can estimate the live weight of the pig as mentioned Vitek et al. (2010). Bigger differences in the carcass weight within the fattening cycle between each pig depend on the different growing ability of each individual, and this

affects the variability of the carcass weight in one fattening cycle. This fact is disadvantageous for the consequential processing of the carcasses in the slaughter industry. To reduce the share of nonstandard carcasses there are some steps how to give a price preference to carcasses in the preferred weight range. The preferred carcass weight is mostly inbetween 80-100 kg and the lower or higher weight carries price reduction from 2.5 till 15 % of the base price.

The price preferences are also mentioned by the lean meat content higher than 57.5% in the carcass. With the increasing lean meat content increases the price upto 104% of the base price. The class E5 with the lean meat share 56.1-57% have already lower price on 99% from the base price, and by the less valuable grading classes (O3 – P) is the base price lowered upto 50%. Some shopping managers has specified demands and wants the weight range between 93.1 and 102.9 kg within the lean meat content higher than 55%.

A sophisticated zootechnical work is demanded to reach the optimal weight range along with high lean meat content as the two most important characteristics for the best evaluation of the carcass by numerous samples of slaughter pigs. It's based primarily on equally balanced fattening cycles, good health of the animals and optimal nutrition. The key parameter is to estimate the best length of the fattening cycle, according to the carcass weight, eventually joined with measuring of the backfat thickness on the selected sample. The aim of the work is to evaluate the results from the „Grading protocole“, mainly the carcass weight and the lean meat content, and optimize the farming price.

Material and Methods

Into the sample were chosen 954 pigs from selected farm, all of the hybrid combination (Topigs x CL) x PN. The fattening was organised in fattening cycles. The whole sample was divided into five cycles (1 – 5). The share of gilts and barrows was equal in every cycle (1:1) The pigs were slaughtered in selected slaughterhouses.

By all the individuals was within the 45 minutes *post mortem* noticed the carcass weight, which is made by two halves with head and hide, without hair, eye- and ear-cutouts, without the brain, spinal cord, tongue, diaphragm, kidneys, internal fat, genitals, hooves, organs of the thoracic and abdominal cavities. The „cold“ carcass weight (24 hours *post mortem*) which refers to the carcass weight lowered of 2% is the important for the farming prices. In this study was used a hypothetical price mask with the preferred weight and lean meat content.

On the left carcass half in the P₂ point, located between the 2nd and 3rd last rib, 7cm from the split line were measured:

- backfat thickness including hide (mm),
- muscle depth (mm).

These parameters were used for the estimation of the lean meat content in the carcass with use of the FOM device (cycles 1,2 and 3) and the UFOM device (cycles 4 and 5). The basic statistical parameters were done for all the measured characteristics and the sample was analysed in the SAS programme (vs. 9.3) using the GLM procedure.

Results and Discussion

The basic statistical parameters are shown in the Table 2. Beside the number of individuals in each cycle are there presented the average values for the lean meat content and for the carcass weight. These are two basic parameters that are used for the pig carcass realization in the Czech republic.

By the selected cycles, the average lean meat content reached from 56.50 +/- 0.216 (cycle 5) to 60.16 +/- 0.175 % (cycle 2). The average carcass weight was within the range from 84.04 +/- 0.529 (cycle 5) to 99.89 +/- 0.605 kg (cycle 1). These values confirm the good level of meatiness, when the whole sample (n= 951), which was classified, reached the average lean meat content 58.20 +/- 0.098 %. It corresponds with the bigger sample from the whole country (more than 2.2 millions carcasses) from the year 2014 (Ročenka MZe 2015), where this value reached 58.28% of the lean meat content and average weight of 89.70 kg. This lean meat content is also conformable with Branscheid, Judas and Hoereth (2011) and David et al. (2014). The lean meat content is however higher circa by two percentage points than in Kernerová et al. (2007), Víték et al.(2008), Sládek et al. (2010) and others, which also analyzed the

meatiness of pig carcasses until the year 2013. The reason is a new methodics for the construction of the estimation formulae, applied since 2014 (Comission Decision 2013/187/EU).

The results according to the carcass weight and according the grading classes are presented in tables 3 and 4. For detailed analysis was the sample divided into 10kg intervals . For each weight interval is presented the average lean meat content. The grading system SEUROPE includes in the Czech republic carcasses in-between 60 and 120 kg, and in this range laid 951 carcasses of the sample. The weight higher than 120 kg was registered in two carcasses, and lower than 60 in one case. In the price-preferred interspace 80 – 100 kg was 650 individuals i.e. 68%. These results are conformable with the values presented in the Ročenka MZe 2015, where were in this interval 67.54% of individuals. In the grading class S was 257 individuals (27%), in the class E then 581 carcasses (61%). The class U was represented by 106 carcasses (11%) and the class R only by 7 individuals (1%). The classes O and P weren't present.

The farming prices were observed by all the cycles. The stratification according to the carcass weight is shown in the table 5 and according to the lean meat content in the table 6. The price for 1kg of the carcass was expressed using the percentage of the basic price (100%). The table 5 presents the fact that in the preferred weight range 80 – 99.9 kg was by the cycles 1 – 3 the price always higher than 101%.

The influence of the grading class was observed (Table 6) and the price was also expressed as the percentage from the basic price (100%). By the class S was the increase of the price from 100.5% (cycles 4 and 5) up to 103.2% (cycle 3). By other grading classes was the price lower than 100% of the basic price. In the table 6 is shown the evaluation of each fattening cycle. The best evaluation reached the cycle 2, where the average price reached the value of 100.8% from the basic price. The cycle 3 reached the value 100.2%, followed by the cycle 1 (98.4%) and cycle 4 (98%). The lowest value reached the cycle 5 – only 96.7% from the basic price.

The basic presumptions were condemned that the grading system is influenced by the negative correlation between the carcass weight and the lean meat content (figure 1). Partial differences between the cycles could be explained by the individual growth ability, where individuals with higher body weight reach also higher value of the backfat thickness and so lower lean meat content in the carcass. Some hybridizing programmes are specialized on the production of pigs which have high lean meat content even along the higher carcass weight. From the results appears that it's recommendable to use the subclasses with range of 1% in the grading process in the Czech republic, so each grading class is divided into 5 subclasses.

Table 1a. Hypothetical price mask – the price depending on the lean meat content

Class	lean meat content %	price %
S1	>61.5	103.0
S2	60.5 - 61.4	104.0
S3	60.0 - 60.4	104.0
E1	59.5 - 59.9	104.0
E2	58.5 - 59.4	102.5
E3	57.6 - 58.4	101.0
E4	57.1 - 57.5	100.0
E5	56.1 - 57.0	99.0
E6	55.0 - 56.0	97.5
U1	54.0 - 54.9	96.0
U2	53.0 - 53.9	94.5
U3	52.0 - 52.9	93.0
U4	51.0 - 51.9	91.5
U5	50.0 - 50.9	90.0
R1	49.0 - 49.9	88.5
R2	48.0 - 48.9	87.0
R3	47.0 - 47.9	85.5
R4	46.0 - 46.9	84.0
R5	45.0 - 45.9	81.0
O1	44.0 - 44.9	78.0
O2	43.0 - 43.9	75.0
O3	42.0 - 42.9	50.0
O4	41.0 - 41.9	50.0
O5	40.0 - 40.9	50.0
P	<39.9	50.0
N	-	50.0
T	-	70.0

Table 1b. Hypothetical price mask – the price depending on the carcass weight

carcass weight kg	% price reducing
60,0 - 71,4	-15,0
71,5 - 76,4	-5,0
76,5 - 83,4	-2,5
83,5 - 101,4	0,0
101,5 - 106,4	-2,5
106,5 - 111,4	-5,0
111,5 - 120,0	-15,0

Table 2. Basic statistical parameters

Cycle	Individuals (n)	Carcass weight (kg)		Lean meat content (%)	
		x	s	x	s
1	190	99.89 ^a	8.336	58.49 ^a	2.789
2	201	95.01 ^b	8.515	60.16 ^b	2.482
3	200	95.33 ^b	7.247	58.71 ^a	2.614
4	183	86.71 ^c	7.733	57.00 ^c	2.858
5	180	84.04 ^d	7.097	56.50 ^c	2.902

The differences between the means marked with the same letter index are not statistically significant. (P- 0.05)

Table 3. The results according to the carcass weight

Carcass weight (kg)	Individuals (n)	Carcass weight (kg)		Lean meat content (%)	
		x	s	X	s
< 60	1	56.80	-	-	-
60 – 69.9	7	68.49	0.801	59.79 ^a	1.237
70 – 79.9	88	76.49	2.537	58.10 ^a	3.054
80 – 89.9	308	85.84	2.703	58.30 ^a	3.354
90 – 99.9	342	94.76	2.801	58.51 ^a	2.856
100 - 109.9	171	104.13	2.661	57.89 ^{a,b}	2.570
110 - 120	35	113.43	2.580	56.26 ^b	2.735
60 - 120	951	92.36	9.587	58.20	3.021
> 120	2	122.95	0.950		

The differences between the means marked with the same letter index are not statistically significant. (P- 0.05)

Table 4. The results according to the grading classes

Grading class	Individuals (n)	Lean meat content (%)		Carcass weight (kg)	
		x	s	x	s
S	257	61.70	1.146	90.35 ^a	8.551
E	581	57.79	1.425	93.21 ^{a,b}	9.739
U	106	52.92	1.395	92.28 ^{a,b}	9.875
R	7	47.70	0.554	96.37 ^b	15.146
O	-				
P	-				
S - P	951	58.20	3.021	92.36	9.587

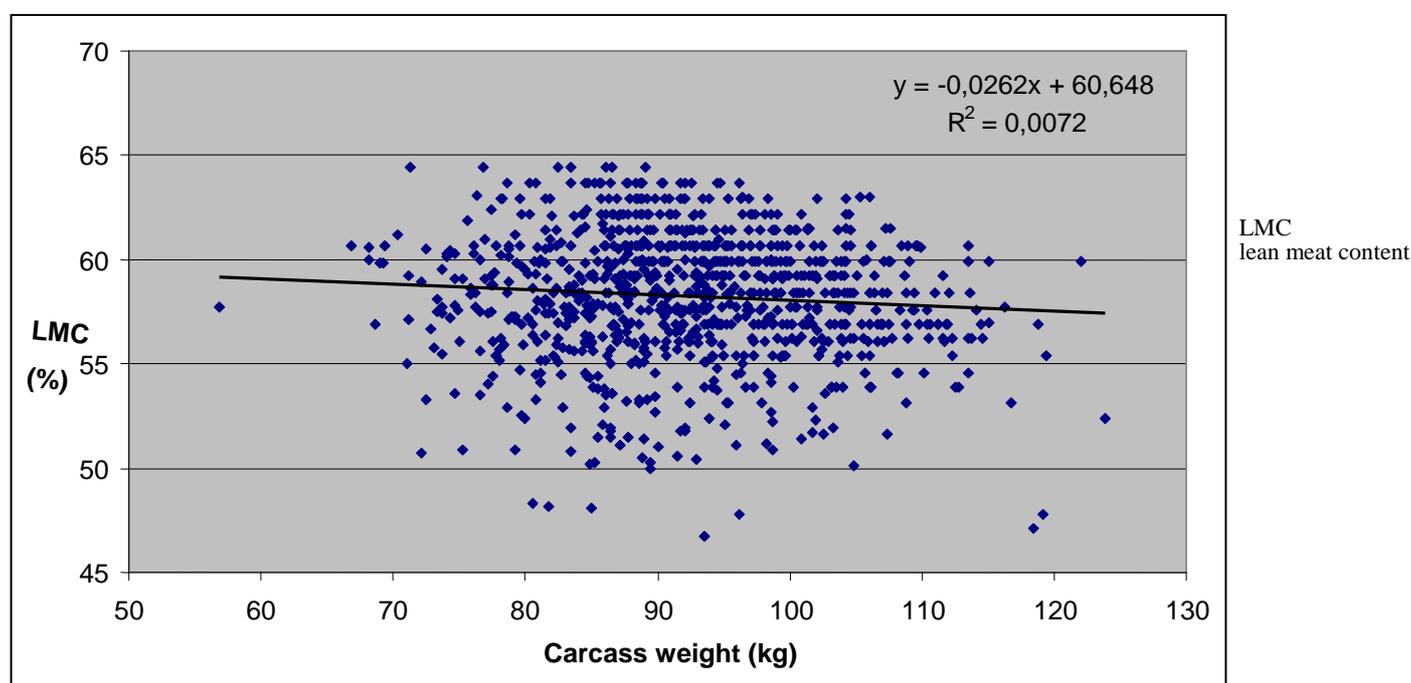
The differences between the means marked with the same letter index are not statistically significant. (P- 0.05)

Table 5. The price for 1kg of carcass presented in percentage from the basic price stratified according to the carcass weight

Cycle	1	2	3	4	5
Carcass weight (kg)					
< 60	-	-	-	-	50 (n=1)
60 – 69.9	-	-	-	89.0 (n=2)	88.0 (n=5)
70 – 79.9	-	97.2 (n=5)	99.4 (n=4)	96.4 (n=36)	95.9 (n=43)
80 – 89.9	103.0 (n=27)	102.3 (n=56)	102.0 (n=42)	99.0 (n=84)	97.7 (n=99)
90 – 99.9	101.8 (n=64)	102.5 (n=92)	101.3 (n=104)	98.9 (n=51)	97.7 (n=31)
100 – 109.9	98.0 (n=80)	99.0 (n=35)	97.6 (n=45)	93.1 (n=10)	95.0 (n=1)
110 - 120	83.3 (n=17)	88.4 (n=13)	87.1 (n=5)	-	-
> 120	70.0 (n=2)	-	-	-	-

Table 6. The price for 1kg of carcass presented in percentage from the basic price stratified according to the grading class

Cycle	1	2	3	4	5
Grading class					
S	102.9 (n=50)	102.5 (n=100)	103.2 (n=61)	100.5 (n=24)	100.5 (n=22)
E	98.6 (n=122)	99.3 (n=98)	99.7 (n=123)	99.3 (n=128)	98.2 (n=110)
U	88.8 (n=14)	89.7 (n=3)	93.5 (n=15)	91.6 (n=28)	92.7 (n=46)
R	70.5 (n=2)	-	85.5 (n=1)	85.2 (n=3)	84.5 (n=1)
N	-	-	-	-	50.0 (n=1)
T	70.0 (n=2)	-	-	-	-
Entire	98.4 (n=190)	100.8 (n=201)	100.2 (n=200)	98.0 (n=183)	96.7 (n=180)

Figure 1. The relation between the lean meat content and the carcass weight

References

- BRANSCHIED, W., JUDAS, M., HÖRETH, R.: Zur Klassifizierung von Schweinehälften: Neue Schaezformeln von neue Geräte. Fleischwirtschaft, 2011,91,5,104-108.
- Comission Decision (2013/187/EU)
- KERNEROVÁ, N., MATOUŠEK, V., VEJČÍK, A., VÁCLAVOVSKÝ, J., EIDELPESOVÁ, L.: Field tests of three final hybrids of pigs. Research in Pig Breeding, 1, 2007 (1).
- 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 systém. Research in Pig Breeding, 4, 2010 (2) 17 – 21.
- VÍTEK, M., PULKRABEK, J., VALIŠ, L., DAVID, L., WOLF, J.: Improvement of accuracy in the estimation of lean meat content in pig carcasses. Czech Journal of Animal Science, 2008, 53, 204-211.
- VÍTEK, M., PULKRABEK, J., VALIŠ, L., DAVID, L.: Odhad hmotnosti jatečných prasat při ukončení výkrmu. Certifikovaná metodika, VÚŽV v.v.i., Praha Uhřetěves

Corresponding Address

In g. Libor David, Ph.D.
Institute of Animal Science
Přátelství 815, 10400 Praha Uhřetěves
Czech Republic
E-mail:david.libor@vuzv.cz

The study was supported by the project MZERO0714.