

## FORAMEN OVALE PATENS AS A NEGATIVE MARKER FOR FATTENING PIGS OF VARIOUS GENOTYPES

BAJAN L, DURAN A, BULECA J, ŠVICKY E, PILIPČINEC E, and BUGARSKY A

*University of Veterinary Medicine, Košice, Slovak Republic*

(Received 2.September 2001)

*During two years, the occurrence of heart damage - foramen ovale patens, and the main characteristics of fattening capacity and carcass values (average daily weight increase, carcass length of trunk, area of musculus longissimus dorsi, thigh meat (%) and thickness of backfat) were investigated in Large White, Landrasse, Pietrain, Duroc, Yorkshire and Slovak Meat pig breeds. The occurrence of foramen ovale patens was different in the individual breeds observed, the highest values being found in the Large White breed (15%) and the lowest in the Yorkshire breed (2,7%). In Pietrain and Duroc pigs the existence of this type of heart damage was not detected. Concerning fattening capacity markers and carcass values, the highest daily weight increase was found in the Yorkshire breed and the lowest in the Pietrain breed. Maximal length of trunk was observed in the Landrace breed. The greatest area of musculus longissimus dorsi, as well as weight of thigh meat (%) was noticed in the Pietrain breed. Maximal values of thickness of backfat were found in Large White pigs and minimal in Pietrain and Duroc breeds. Complex analysis of the results indicated, that the presence of foramen ovale patens had a negative influence on the main parameters of fattening capacity and carcass values of pigs.*

*Keywords: heart defect, foramen ovale patens, carcass quality, pigs*

### INTRODUCTION

An increase in the human population causes a search not only for new natural sources, but also for maximal production, shortening the duration of production and a substantial increase in the parameters of quality. That is also applicable to pork meat (Konracki and Zebrovski, 1991, Jacyno and Pietruska, 1997, Candek *et al.*, 1998, Brown *et al.*, 1998). Therefore, many studies presented recently have been aimed, at certain quantitative and qualitative parameters and interactions. They have made an attempt to solve the whole problem from the view point of breeding-production in as complex a way as possible (Demo *et al.*, 1997, Kralik *et al.*, 1997, Pour, 1998).

The quality of food of animal origin and therefore of pork meat is influenced by many external and internal factors, starting with production environment,

breed, nutrition and treatment of health disorders. The heart defect *foramen ovale patens* belongs to the last category. Already in 1927 Steger disclosed its incidence in animals, including pigs. However, this has remained largely unnoticed. Even if some works, describing the incidence of this heart defect in various species of animals including wild animals, have appeared, there were few references to pigs. Only Jelaneck (1962) reported *foramen ovale patens* in pigs in one sanitary slaughter house. Later Popesko and Meszaroš (1968) reported this defect in pigs and possible losses due to its occurrence. More extensive and complex material about *foramen ovale patens*, including various interactions was presented by Gabriš *et al.* (1975), Bajan and Gabriš. (1974) and Bajan and Duran 1997). On the basis of these findings it follows that the heart defect - *foramen ovale patens* is a defect that negatively influences both health state and efficiency of pig production, and therefore it is necessary to elucidate its etiology and to exclude it from the breeding-production process.

#### MATERIAL AND METHODS

Observations were carried out at the accredited station of fattening control and meat value. At the examination of hearts and visual inspection the incidence number and size of the *foramen ovale patens* were observed according to the uniform method (Bajan and Duran, 1997). In addition to the detection of this heart defect, the following production parameters were observed:

- the mean daily gain in kg
- the slaughter length of the trunk in cm
- the area of *m. longissimus dorsi* in cm<sup>2</sup>
- the weight of meat from the buttock in %
- the thickness of bacon in cm.

The observations were carried out according to the uniform methods of the State breeding institute in Bratislava in the following breeds of pigs: Large White (LW) - 455 heads, Landrace (LD) - 103, Pietrain (PN) - 124, Duroc (DU) - 32, Slovak meat (SM) - 61, Yorkshire (YC) - 74.

#### RESULTS

Evaluation of the incidence of *foramen ovale patens* in each breed is given in Table 1.

Table 1. Occurrence of foramen ovale patens in the observed breeds of pig

Breed	Total No	Number of examined	Number of positive cases	%	Number of positive cases		
		M	F			M	F
Large White	455	218	237	68	15.0	30	38
Landrace	103	48	55	14	13.4	6	8
Pietrain	124	60	64	-	-	-	-
Duroc	32	17	15	-	-	-	-
Slovak Meat	61	31	30	2	3.3	-	2
Yorkshire	74	39	35	2	2.7	1	1

Table 2: Average values of carcass parameters in pigs of different genotypes

Parameter	1 LV n=455		2 LD n=103		3 PN n=124		4 DU n=32		5 SM n=61		6 YC n=74	
	X	$\pm s$	X	$\pm s$	X	$\pm s$	X	$\pm s$	X	$\pm s$	X	$\pm s$
Daily weight increment	0.864	0.10	0.870	0.09	0.842	0.08	0.845	0.11	0.901	0.12	0.907	0.12
Area of MLD	48.53	6.02	54.16	7.88	59.66	8.68	55.70	9.88	53.43	10.21	56.31	10.43
% of thigh meat	19.83	2.04	19.78	2.76	24.26	3.01	21.02	2.79	22.20	2.69	22.39	3.32
Carcass length of trunk	79.94	8.26	80.44	10.32	75.94	11.28	77.25	12.77	77.14	13.01	78.89	14.05
Thickness of backfat	1.98	0.28	1.92	0.29	1.587	0.32	1.58	0.30	1.93	0.34	1.75	0.32

The final evaluation showed that the incidence of this cardiac defect varied quantitatively. The highest incidence was in the group of Large White pigs where 68 of the total number of hearts examined were positive, which represents 15 %. A relatively large number of *foramen ovale patens* occurred in the group of Landrace pigs where 14 of 103 hearts were positive (13.4 %). In the groups of Pietrain and Duroc pigs no case of *foramen ovale patens* was found. In the Slovak meat pigs this heart defect was found in two cases, representing a 3.3 % incidence. For the last of the breeds observed - Yorkshire, 2 of 74 hearts examined were positive.

Biometrical evaluation of the production parameters in the different breeds is presented in Table 2.

The highest mean daily gain occurred in Yorkshire pigs (0.907 kg) and the lowest in Pietrain (0.842 kg). This difference is statistically significant ( $P < 0.01$ ). The maximal value for the slaughter length of the trunk was found in Landrace pigs (80.44 cm) and the minimal one in Pietrain pigs (75.95 cm) ( $P < 0.01$ ). A high variability of values was for the area of the  $m_2$  *longissimus dorsi*. The scale of variance according to breeds was 48.53 cm<sup>2</sup> (Large White) and 59.66 cm<sup>2</sup> (Pietrain).

The quantitative data about the percentage of meat from the buttock, which ranged from 19.83 % (Large White) to 24.26 % (Pietrain), were also significantly different ( $P < 0.01$ ). The greatest thickness of bacon was measured in Large White pigs (1.98 cm) and the least, with the same values, in Pietrain and Duroc (1.58 cm) ( $P < 0.01$ ).

## DISCUSSION

Our results showed that individual parameters of the slaughter value and quality of meat in the six breeds observed were different, especially regarding the area of *m. longissimus dorsi*, amount of meat in the buttock and thickness of bacon. Similar findings were presented by Kralik et al. (1997) and others. The best results were recorded in Pietrain and Yorkshire pigs. However, when our values obtained from Pietrain pigs are compared with the data presented by Demo et al. (1994) obtained from hybrids with 50 % portion of genes, we can state that our results are more favorable. Because there are no similar foreign or domestic studies concerning this problem, our results can be confronted only with our previous work.

After comparison of our results with those of Gabriš et al. (1975) we may state that while they found 6.61 % incidence of this heart defect in Large White pigs and in the 5.06 % Landrace breed we found a substantially higher incidences of *foramen ovale patens* in these breeds - 15 % and 13.4 %, respectively. These data are much nearer to those reported by Bajan and Duran (1997) where in Large White and Landrace pigs the incidence was 19.2 % and 14.04 %, respectively.

As far as the Slovak meat and Yorkshire pigs are concerned we may state that there was a minimal incidence of this heart defect in comparison with Large White and Landrace.

Similarly Gabriš et al. (1975), we did not find a case of *foramen ovale patens* incidence in Pietrain and Duroc pigs, even if our number of examinations in the group of Pietrain were 9-times and in the Duroc almost 3-times higher. However,

these numbers are still not considered to be sufficient to enable us to make a conclusion about the absence of *foramen ovale patens* in these breeds of pigs.

It will be necessary to observe much greater numbers of animals from both the mentioned breeds in order to make a conclusion for the breeding-production sphere. We recommend observation of the presence of the *foramen ovale patens* also in other species and hybrids as a marker for production health of pigs.

Address for correspondence:

Dr Ludovát Bajan

University of Veterinary Medicine,

Komenskaho 73, 041 81 Košice,

Slovak Republic

#### REFERENCES

1. Bajan L, Duran A, 1997. Vplyv foramen ovale patens na užtkove vlastnosti ošipanych u plemena biela ušlchtla a landras, *Infovet*, 4, 41NEKLE
2. Bajan L, Gabriš J., 1974. The frequency of genes for foramen ovale patens Station of Fatten and Slaughter Value, *Spišské Vlachy Vet.čas*, 125-6.
3. Brown SN, Wariss PD, Nute GR, Edwards JE, Knowles TG, 1998. Meat quality in pigs subjected to minimal preslaughter stress, *Meat Sci*, 49, 257-65
4. Candek M, Zlender B, Lefaucheur L, Bonneau M, 1997. Effects of age and/or weight at slaughter on longissimus dorsi muscle: biochemical traits and sensory quality in pigs, *Meat Sci*, 48, 287-300.
5. Demo P, Poltarsky J, Reňák A, 1994. Use of the Pietrain breed for production of terminal slaughter hybrid (in Slovak), *Živ. vyr.*, 39, 865-79
6. Demo P, Poltarsky J, 1997. Objective evaluation of meatiness from lean meat content (in Slovak), *Živ. Vyr.*:42, 33-9.
7. Gabriš J, Popesko P, Stanok J, Bajan L, 1975. Vyskum geneticky podmienenych chorob a vad hospodarskych zvieratm, Zav Sprava VU P-11-329-051-219, Košice, Vysoka škola veterinárska
8. Jacyno E, Pietruszka A, 1997. Relationship between the fattening performance and carcass quality of pigs (in Polish), *Zeszyty Naukowe*, 34, 47-51
9. Jelonek K, 1962. Vyhodnotenie patologickych nalezov pri prehliadke masa ošipanych na sanitarnom bitunku vo Veľkucj Bieličiach, Atestačna praca
10. Kondracki S, Zebrowski Z, 1991. Level of intramuscular fat in the muscle longissimus dorsi in fatteners of Pulawy and Polish Landrace breeds slaughtered at 90 to 140 kg body weight (in Polish), *Roczniki Naukowe Zootechniki*, 18, 141-9.
11. Kralík G, Kusec G, Petricevic A, Zivkovic J, 1997. Meat yield evaluation in pig carcasses (in Slovak), *Živ Vyr*, 42, 473 - 9.
12. Popesko P, Meszaroš Š, 1968: Foramen ovale patens u ošipanych a straty, ktore vznikaju v súvislosti s jeho vyskytom, *Veterinarstvi*, 18, 472.
13. Pour M, 1998, The current problems of producing pig meat in the Czech Republic (in Polish), *Prace i Materiały Zootechniczne*, 8, 27-31.

#### FORAMEN OVALE PATENTS KAO NEGATIVNI MARKER U TOVU KLANIČNIH SVINJA

BAJAN L, DURAN A, BULECA J, ŠVICKY E, PILIPČINEC E, i BUGARSKY A.

#### SADRŽAJ

U toku perioda od dve godine proučavana je pojava srčane mane - *foramen ovale patens* kao i osnovne tovnje karakteristike i klanični parametri (prosečan dnevni prirast, klanična dužina trupa, površina *m. longissimus dorsi*, težina mesa sa buta u % i debljina slanine) kod tovljenika rasa Landras, plemenita bela, Pjetren,

Durok, Jorkšir i Slovačke mesnate svinje. Zastupljenost ove mane bila je različita kod pojedinih rasa a najveća učestalost je registrovana kod bele plemenite svinje (15%) dok je kod Jorkšira ta vrednost bila najniža (2.7%). Kod Pjetrena i Duroka ova mana nije registrovana. Pri ispitivanju tovnih sposobnosti najveći dnevni prirast je registrovan kod Jorkšir rase a najmanji kod Pjetrena. Maksimalna dužina trupa je zabeležena kod Landrasa a najveća površina *m. longissimus dorsi* i težina buta (%) kod Pjetrena. Najveće vrednosti za debljinu slanine su izmerene kod bele plemenite svinje a najmanje kod Pjetrena i Duroka. Prisustvo mane *foramen ovale patens* imalo je negativan uticaj na toвне i klanične parametere ispitivanih rasa svinja.