

PROGRESSIVE TENDENCY OF LEAN-MEAT PERCENTAGE IN CARCASSES OF PIGS IN THE CZECH REPUBLIC*

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With respect to the fact that slaughter pigs have not been so far evaluated in the Czech Republic according to the muscles percentage in carcass, data of our previous investigations from the years 1990 to 1998 were processed. The muscles percentage amounted to $47.17 \pm 0.244\%$ at the beginning of the given period at the end it was $53.82 \pm 0.552\%$. This investigation included 13 025 of slaughter pigs. To determine the developmental trend the data from different years, when eliminating the effect of slaughter weight and effect of sex, were processed by the method of least squares. The changes in evaluated data are expressed by the curve given by the following equation:

$$y = -15.03 + 0.6152x + 0.000942x^2$$

The course of the curve close to the straight line means that breeders in the Czech Republic were concentrated in the given period on significant improvement of this indicator in production of slaughter pigs, that is uniformly during the whole period under study. It follows from the genetic substance of slaughter value of pigs that the basic measurement to improve the composition of slaughter bodies of pigs consist prevalingly in the sphere of breeding and hybridization. Further investigations were made in the set of 520 final hybrids where in the position of sires four populations of final hybrids specialized to high percentage of muscles in carcass were used. In four groups where muscles percentage ranged from 55.51 ± 0.297 to $59.22 \pm 0.294\%$ and slaughter weight ranged from 110.5 ± 1.198 to 114.2 ± 1.284 kg. These data are higher than those in the previous investigation and show the possibility of further improvement of muscle development score of pigs.

pig; muscles percentage; developmental tendency

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INTRODUCTION

In the Czech Republic problems of estimate of the muscles percentage in pigs started to be investigated in large scale at the end of the 1980s. This corresponded to long-year efforts to improve muscle development score of pigs (Šiler, 1975). At the same time, however, it meant a new qualitatively higher degree of investigation of slaughter value. The given problems for further development of pig rearing are emphasized by e.g. Pour (1999).

Evaluations of slaughter pigs according to the muscles percentage were based above all on studies of German authors. These were e.g. studies written by Sack (1982), Branscheid et al. (1987) and Oster et al. (1987). The Pulkrábek's et al. (1992) study can be considered as an initial study for application of the methods for estimate of muscles percentage in the Czech Republic. The mentioned authors accomplished necessary detail analyses of pig carcasses and appropriate regression equations for estimate of muscles percentage were determined. These equations were accepted in 1993 the Czech Institute for Standardization and confirmed their validity for the whole Czech Republic. EUROP-system has not been so far used in large scale but in some plants of meat industry carcasses are evaluated according to the above-mentioned indicator. Regression equations of the mentioned authors are applied in it. Pulkrábek et al. (1998a, b) refer on verification of the existing equation when estimate of muscles percentage was compared with the data found in detail analysis of carcasses of investigated animals. Results of the study indicate that the mentioned equations have not yet been sufficiently precise and therefore it is not necessary to undertake their innovation.

The aim of this study was to evaluate in our investigations the tendency of increase of the muscles percentage in slaughter pigs in recent approximately nine years and at the same time to verify eventual possibilities of significant increase of this indicator by using of special sire populations in production of final hybrids.

MATERIAL AND METHODS

The first part of the submitted study evaluated several independent sets which processed by the authors in the years 1990 to 1998. The muscles percentage in carcasses of pigs was determining by dissection or by using the regression equations which were determined on the basis of detail dissections.

The set A included purebred animals of initial pig breeds and set B to G consisted of final hybrids. The individual sets had the following numbers of animals: set A ($n = 209$), B ($n = 132$), C ($n = 1156$), D ($n = 9959$), E ($n = 731$), F ($n = 762$) and G ($n = 76$). The linear model was used to eliminate the effect of sex inside each set. As to the composition of set A pigs of dam

and sire breeds. All starting populations characterized the concept of original hybridization programme accomplished in the Czech Republic before 1990. Similar situation was also in sets B to G where animals of the mentioned populations were used fully or dominantly for production of final hybrids. As late as since 1995 was applied here to less degree the position of sires and animals newly imported special populations or lines.

With respect to the relationship between slaughter weight and muscles percentage the curve with appropriate equation was determined by the method of least squares in evaluated material and based on this auxiliary characteristics the value of muscles percentage was corrected in carcass in each of the studied sets to the data corresponding to 110 kg of slaughter weight. The curve expressing developmental tendency in muscles percentage in pig carcass for the studied period of last nine years was laced with the method of least squares by the data obtained like this.

The second part of the study evaluated four groups of final hybrids after sires of special populations which were imported into the Czech Republic during the limited time period. As dams animals always produced on the basis of dam populations used in the Czech Republic were used. Identical combination of crossing was used in all studied groups. Therefore, it can be said that the influence of dams in this comparison could not be manifested in differences among means of different groups. The following numbers of animals were investigated in the given groups: group I (167), II (102), III (124) and IV (127). Like in the previous part, elimination of the influence of sex was considered here and data on the muscles percentage in carcass is always supplemented by appropriate value of slaughter weight. Investigation took place in 1998 what correspond to the end of the period evaluated in the first part of the study.

RESULTS AND DISCUSSION

Numerical data from the first part are given in Table I. The values of muscles percentage in different findings are supplemented by appropriate value, as an auxiliary data, characterizing the slaughter weight of animals.

The necessity of the present information on both indicators is emphasized with respect to their correlation e.g. in the study written by Pulkrábek et al. (1998a, b). As to the assessment of absolute values in the muscles percentage in pig carcass, they are presented for appropriate years by Demo and Poltársky (1994), and Matoušek et al. (1995). Mutual comparisons confirm the congruence with these studies.

Average slaughter weight which fluctuated from 105.6 ± 0.503 to 117.1 ± 0.507 kg were processed in Fig. 1. Based on this auxiliary characteristic, the

I. Investigation of muscles percentage in the pig carcass during the years 1990 to 1998

Set	Year	Method of determination	Slaughter weight in kg	Muscles percentage in %
			$\bar{x} \pm s_{\bar{x}}$	
A	1990	dissection	117.1 ± 0.507	47.17 ± 0.244
B	1992	dissection	106.6 ± 1.445	50.30 ± 0.430
C	1994	regression equation	110.0 ± 1.450	49.89 ± 0.529
D	1995	regression equation	114.6 ± 0.180	51.97 ± 0.044
E	1996	regression equation	112.4 ± 0.594	53.53 ± 0.154
F	1997	regression equation	105.6 ± 0.503	53.78 ± 0.177
G	1998	dissection	111.3 ± 1.480	53.82 ± 0.552

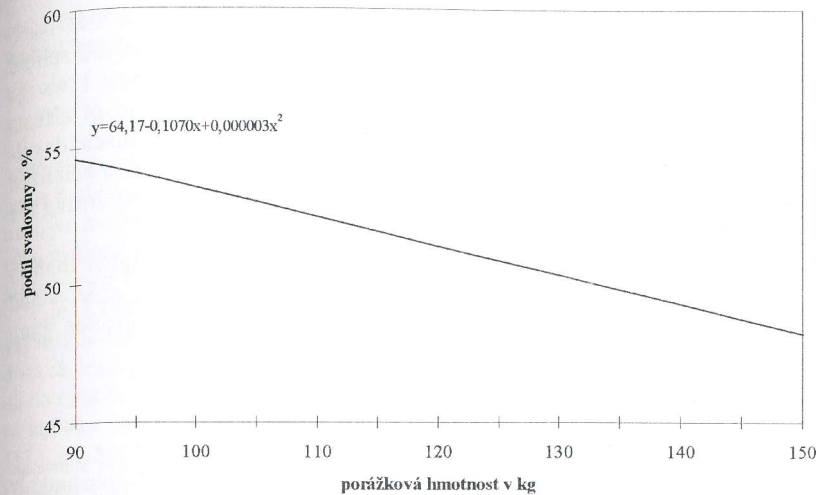
II. Muscles percentage in the carcass of final hybrids after sires of populations concentrated on the high level of this indicator

Group	Final hybrids after sires	Slaughter weight in kg	Muscles percentage in %
		$\bar{x} \pm s_{\bar{x}}$	
I	Large White – sire population	112.3 ± 1.209	55.51 ± 0.297
II	Pietrain	113.5 ± 1.452	58.88 ± 0.344
III	Large White – sire population x Pietrain	110.5 ± 1.198	59.22 ± 0.294
IV	imported special line L16	114.2 ± 1.284	57.83 ± 0.294

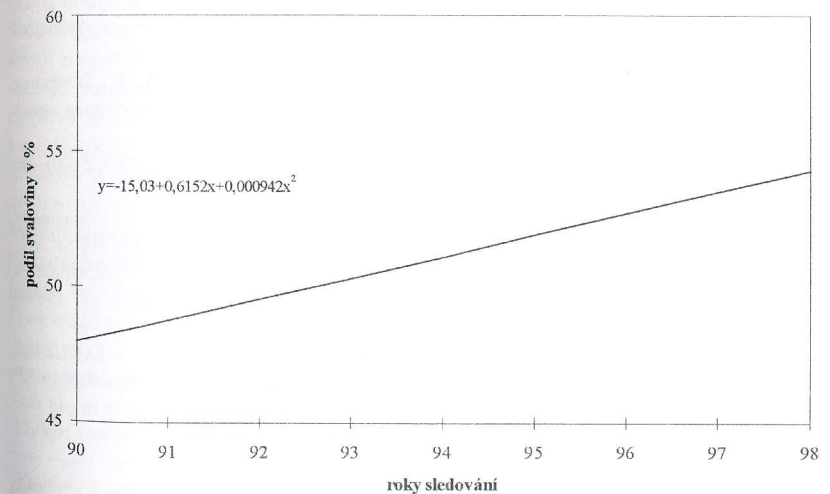
given data was corrected to the slaughter weight 110 kg for further investigation of the value of muscles.

The developmental tendency itself in the muscles percentage in pig carcass in the period 1990 to 1998 follows from Fig. 2. The curve characterized in the graph by the given equation indicate uniformly increasing share of this body component during the whole studied period.

It is documented by the determined curve whose course is much close to straight line. The muscles percentage increased for the evaluated period by 6.33%. Though the evaluation of slaughter pigs according to EUROP-system in large extent in this period in the Czech Republic was not applied, yet the mere information on the prospective introduction of the muscles percentage in the classification of slaughter animals led the breeders to systematic increase of muscle development score of pigs. It should be emphasized that costs of this improvement have not been yet returned back to the producers of slaughter animals.



1. Diagram of relationship between muscles percentage in pig carcass and their slaughter weight
x-axis – slaughter weight in kg; y-axis – muscles percentage in %



2. Diagram of developmental tendency of increase of muscles percentage in the pig carcass in the Czech Republic for the period 1990 to 1998

x-axis – years of investigations; y-axis – muscles percentage in %

It follows from genetic principle of slaughter value of pigs that basic measurement to improve quality of slaughter pigs will consist in the sphere of breeding and hybridization.

For this reason in the second part of the study quantification of effects following from, materialization of some procedures increasing muscle development score, was undertaken. It was the case of the utilization of specialized sire populations which were imported into the Czech Republic just during the period under study (Table II).

In all four investigated groups the muscles percentage was higher than in previously given cases. It is confirmed by great effect of genetic aspects and at the same time it indicates other possibilities to increase the muscles share in the pig carcass.

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Vývojový trend u podílu svaloviny v jatečném těle prasat v České republice.

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Vzhledem k tomu, že v České republice se jatečná prasata zatím plošně nehodnotí podle podílu svaloviny v jatečném těle, bylo cílem předložené práce zjistit vývojový trend ve zvyšování hodnot tohoto ukazatele. Zároveň jsme ověřili možnost podstatného zlepšení skladby jatečných těl prasat použitím speciálních otcovských populací při produkci finálních hybridů.

V první části práce jsme hodnotili několik samostatných souborů, jež jsme zpracovávali v letech 1990 až 1998. Podíl svaloviny v jatečných tělech prasat byl zjišťován disekcí, popř. použitím regresních rovnic, které jsme stanovili na podkladě zmíněných disekcí jatečných těl prasat. Sledovali jsme 13 025 zvířat. Hodnocený ukazatel dosáhl na začátku sledovaného období hodnoty $47,17 \pm 0,244 \%$ při porážkové hmotnosti $117,1 \pm 0,507$ kg a na konci sledovaného období $53,82 \pm 0,552 \%$ a $111,3 \pm 1,480$ kg. Při eliminaci vlivu pohlaví a porážkové hmotnosti jsme hodnotami podílu svaloviny zjištěnými v jednotlivých letech proložili metodou nejmenších čtverců křivku znázorňující vývojový trend v uvedeném období. Tato křivka je charakterizována rovnicí:

$$y = -15,03 + 0,6152x + 0,000942x^2$$

Průběh křivky dokládá, že chovatelé v České republice se v uvedeném období orientovali na podstatné zlepšení tohoto z hlediska dnešních požadavků stěžejního ukazatele. Z genetické podstaty jatečné hodnoty prasat vyplývá, že základní opatření na zlepšení skladby jatečných těl prasat spočívá ve sféře šlechtění a hybridizace. Pro kvantifikaci jednoho z dílčích opatření z této oblasti jsme uskutečnili sledování 520 finálních hybridů, kde v pozici otců byla využita zvířata čtyř populací specializovaných na vysoký podíl svaloviny v jatečném těle. V těchto čtyřech skupinách finálních hybridů kolísala podíl svaloviny v rozmezí od $55,51 \pm 0,297$ do $59,22 \pm 0,294 \%$ při rozmezí porážkové hmotnosti od $110,5 \pm 1,198$ do $114,2 \pm 1,284$ kg. Zjištěné hodnoty podílu svaloviny jsou zde podstatně vyšší, než tomu bylo v předešlém sledování. Poukazuje to na možnost dalšího zlepšování zmasilosti prasat.

prase; podíl svaloviny; vývojový trend

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