REARING HEAVIER PIGS FOR THE PURPOSES OF "PREKMURSKA ŠUNKA" (PREKMURJE HAM) PRODUCTION

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Background

Smoked, dry-cured ham "Prekmurska šunka" is a traditional product of north-eastern Slovenian region Prekmurje, with a protected designation of origin (Jerič, 2000). The raw material comes from pigs that are born and reared in Prekmurje region and must have adequate quality. Recently, a demand for heavier hams, as traditionally practiced, was expressed for the "Prekmurska šunka" production. However, due to current trends in human nutrition, pigs should not be too fat and should provide good meat quality. The aim of the present study was to determine, if the genetic potential of pigs reared in Prekmurje region allows prolonged fattening (130 kg), while achieving good lean content and meat quality. Furthermore, which of the usual crossbreeds would be the most appropriate source of raw material and what is the economics of fattening heavier pigs.

Material and methods

Material. Forty-eight pigs (24 females, 24 castrates) of three different crossbreeds were included in the experiment; 15 pigs (8 females, 7 castrates) were the offspring of landrace male (LN11) and large white (LW) female, 16 pigs (8 females, 8 castrates) were the offspring of crossing meat-type landrace male (LN55) to LN11×LW female and 17 pigs (8 females, 9 castrates) were the offspring of pietrain (PI)×LN55 male and LN11×LW female. Pigs started the experiment at 27.5 kg and were sent to slaughter at 128.0 kg. They were group-housed and allotted to 6 pens; castrates were housed separately from females. Pigs were fed three different diets, up to app. they were fed *ad libitum* until 100 kg, but thereafter they had limited access to food. Pigs were slaughtered in two series, within 14 days. Crossbreeds and sexes were equally distributed between the two slaughter series. Pigs were fasted for 12 hours prior to slaughter, transported early in the morning to a commercial abattoir and slaughtered according to their standard procedure.

Measurements. Following slaughter, carcass weight and lean content (%) were recorded by the authorized service. A day after slaughter carcasses were transported to the local butchery Kodila, where measurements of carcass and meat quality traits were performed. Subcutaneous fat thickness was measured on the carcass split line at last rib and at the thinnest part over *m. gluteus medius*, also at trimmed ham (average of two measurements). Ultimate pH (pH_{24}) was measured directly in the *longissimus dorsi* muscle (LD) between 6th and 7th lumbar vertebrae using Mettler Toledo pH meter equipped with InLab 427 electrode. Weights of loin (jointing between 4th and 5th thoracic vertebrae and 6th and 7th lumbar vertebrae), ham (before, after trimming), shoulder, neck and belly were recorded. Belly leanness was evaluated on 1 to 7 note scale (1-only fat to 7-only meat). Meat color was assessed (1-6 as proposed by Nakai, 1975), L value measured (Minolta Chromameter CR300) and water holding capacity evaluated as imbibing time (time necessary for 1 cm^2 of filter paper Schleicher-Schell 589[1] to become wet) on LD muscle between 6th and 7th lumbar vertebrae. Loin eye area was measured between 6th and 7th lumbar vertebrae. Economics of fattening pigs to higher weight was analyzed with usually practiced methodology (Katalog..., 1998). To avoid the effect of fattening time and fixed costs the calculation was made per standing place. Calculation was based on the results of the present study (overall means for feed consumption, fattening time and carcass lean) and average prices for food, pigs, piglets in Pomurje region (for year 2000). Due to experimental procedure (mixed genotypes, group-housing) the separate analysis for each crossbreed was not possible.

Statistical analysis. Data were analyzed by GLM procedure of SAS (1990). For growth data, crossbreed, sex, crossbreed×sex interaction and group were included as effects, whereas for carcass and meat quality traits, model included crossbreed, sex, crossbreed×sex interaction, slaughter series as effects and carcass weight as a covariable. Least square means (lsmeans) for genotypes were compared at the 5% probability level.

Results with discussion

Growth performance (Table 1). No difference in age or weight of pigs at the start was found, confirming good experimental planning. During the first fattening stage (voluntary feed intake) LW×LN11 pigs exhibited faster growth than the other two crossbreeds, the difference being significant for LN55 crossed pigs, whereas the tendency to significance (P=0.08) was observed for PI×LN55 crossed pigs. No difference in growth rate between crossbreeds was noticed in subsequent fattening periods. Thus it seems, that differences in growth rate during the first period were mainly responsible for observed weight differences at second and third weighing, as well as overall fattening daily gain. Our results are similar as those reported by Malovrh and Kovač (2000) for pigs of the same crossbreeds and origin. Due to restricted feeding, the daily gain in the last period of fattening was strongly reduced in all crossbreeds.

Carcass and meat quality. Carcass weight and lean meat percentage were similar for all crossbreeds, however some carcass traits were affected by crossbreed (Table 1). In the present study, good lean meat percentage (54.8%) was obtained for the average carcass weight (102.4 kg). In a recent experiment (Čandek-Potokar et al., in press) which was conducted in one of Slovenian big farms, LW×LN11 crosses had 54% of lean for much lighter (89 kg) carcasses. The result obtained in the present study confirms that the experiment was well conducted and that one of the purposes of the study, i.e. achieving good leanness at higher end weight was accomplished. One would expect that pigs crossed with meat-type genotypes (PI×LN55, LN55) would present leaner carcasses. However the thinnest subcutaneous fat was observed in LW×LN11 pigs; it was significantly thinner than in LN55 crossed pigs at two anatomical locations (at *m. gluteus medius* and on trimmed ham) and only on trimmed ham when compared to PI×LN55 crossed pigs. On the other hand, LW×LN11 pigs gave lighter hams than PI×LN55 and LN55 crossed pigs which can be considered as a disadvantage. Pigs with 25% PI blood had the largest loin eye area and weight of loin (meat+bones). The difference was significant when compared to LN55 crossed pigs, but not in comparison to LW×LN11 pigs. The highest ratio of meat and bone to total loin weight was observed in LW×LN11 crossbreed and was significantly different from the one found for LN55 crossed pigs, whereas PI×LN55 crossed pigs were intermediate. Belly leanness was noted significantly lower in LN55 crossed pigs compared to other two crossbreeds. Results in the present study corroborate recent study on pigs of the same origin which demonstrated better meat percentage in female line LW×LN11 as compared to PI×LN55 or LN55 crosses (Malovrh and Kovač, 2000). No important difference in meat quality traits was observed between the crossbreeds under study.

Economics (Table 2). Prolonged fattening lowered the profit considerably (56.3 EUR per standing place in a year). As a result of lower carcass lean content, the income per pig was lower (77.2 EUR per pig), while due to prolonged fattening variable costs increased (20.9 EUR per standing place in a year). The extent of loss in gross margin would be variable according to cost of pigs, piglets and food, the lowest being in case of high piglet prices. However, if prolonged fattening should be practiced, earnings similar to usual fattening technology can only be achieved with higher selling prices for pigs.

Literature

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Table 1: Growth, carcass and meat quality traits (lsmean ± stderr) of three studied crossbreeds

		LW × LAN11	(PI×LAN55) × (LW× LAN11)	LAN55 × (LW× LAN11)
Number of pigs		15	17	16
Age, days	at start	73.1 ± 0.7	74.3 ± 0.7	73.5 ± 0.6
	at 1st weighing (at app. 60 kg)	120.1 ± 0.7	121.3 ± 0.7	120.4 ± 0.6
	at 2nd weighing (at app. 100 kg)	171.1 ± 0.7	172.3 ± 0.7	171.5 ± 0.6
	at 3nd weighing (at app. 130 kg)	220.1 ± 0.7	221.3 ± 0.7	220.5 ± 0.6
Weight, kg	at start	27.7 ± 0.7	26.9 ± 0.6	27.8 ± 0.6
	at 1st weighing (at app. 60 kg)	66.0 ± 1.4	62.3 ± 1.2	62.5 ± 1.2
	at 2nd weighing (at app. 100 kg)	108.2^{a} ± 1.1	104.8^{b} ± 1.0	104.6^{b} ± 1.0
	at 3nd weighing (at app. 130 kg)	131.4^{a} ± 1.4	128.0^{ab} ± 1.3	125.0^{b} ± 1.3
Daily gain, g/day	from the start to 1st weighing	813^{a} ± 24	753^{ab} ± 22	737^{b} ± 21
	from 1st to 2nd weighing	828 ± 23	833 ± 21	826 ± 20
	from 2nd to 3rd weighing	474 ± 28	474 ± 25	418 ± 25
	from the start to 3rd weighing	705^{a} ± 10	688^{a} ± 9	662^{b} ± 9
Carcass traits	Carcass weight, kg	103.3 ± 1.2	102.4 ± 1.1	101.8 ± 1.1
	Lean meat, %	55.5 ± 1.0	55.1 ± 1.0	53.7 ± 1.0
Fat thickness, mm	last rib	20.5 ± 1.3	22.1 ± 1.3	23.7 ± 1.3
	at *m. gluteus medius*	16.4^{a} ± 1.1	18.1^{ab} ± 1.0	19.5^{b} ± 1.0
	on trimmed ham	18.8^{a} ± 0.8	21.0^{b} ± 0.8	21.6^{b} ± 0.8
	Loin eye area, cm^2	53.6^{ab} ± 1.6	56.1^{a} ± 1.5	51.4^{b} ± 1.5
	Loin (meat + bone), kg	6.9^{ab} ± 0.1	7.1^{a} ± 0.1	6.8^{b} ± 0.1
	Loin (meat + bone) , %	82.0^{a} ± 0.7	81.1^{ab} ± 0.7	79.4^{b} ± 0.6
	Ham weight, kg	14.1^{a} ± 0.1	14.4^{b} ± 0.1	14.6^{b} ±0.1
	Trimmed ham weight, kg	6.0^{b} ± 0.1	6.3^{a} ± 0.1	6.2^{ab} ± 0.1
	Belly, kg	11.5 ± 0.3	11.5 ± 0.3	12.0 ± 0.3
	Belly leanness note (1-7)	4.0^{a} ± 0.2	3.9^{a} ± 0.2	3.0^{b} ± 0.2
	Shoulder, kg	7.6 ± 0.1	7.6 ± 0.1	7.6 ± 0.1
Meat quality (m. longissimus dorsi)	ultimate pH	5.43 ± 0.04	5.45 ± 0.04	5.53 ± 0.04
	imbibing time, sek	48 ± 13	27 ± 12	44 ± 12
	color note (-6)	2.7 ± 0.3	2.9 ± 0.3	3.1 ± 0.3
	Minolta L	55.5 ± 1.5	54.9 ± 1.5	53.6 ± 1.4

^{a,b,c} Means for the genotype bearing different superscripts differ at the $P<0.05$ level

Table 2: Gross margin calculation per standing place of usual (105 kg) and prolonged (128 kg) fattening of pigs

	Usual	Prolonged
Source data		
- Fattening period	27-105 kg	27-128 kg
- Outputs per year	3.1	2.1
- Feed conversion, kg/kg	2.63	3.64
- Carcass lean, %	56.3^{a}	54.8
Income per standing place	**382.4 EUR**	**305.2 EUR**
Variable costs		
- feed	110 EUR	132.8 EUR
- piglets	121.4 EUR	81.3 EUR
- other material costs	42.9 EUR	39.4 EUR
Total	274.3 EUR	253.5 EUR
Gross margin		
Per standing place	108.0 EUR	51.70 EUR
Price for kg liveweight[b]	**1.2 EUR**	**1.4 EUR**

[a]Expected carcass lean %; carcass lean would decrease for app. 1.5% with 20 kg increase in carcass weight (Malovrh and Kovač, 2000)
[b]Price calculated on the basis of equal gross margin (108 EUR)