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AN ECONOMIC COMPARISON OF TWO RABBIT GENOTYPES FOR PRODUCTIVE AND CARCASS TRAITS

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ABSTRACT

The aim of the study was to carry out an economic evaluation of crossbred rabbits originated from Pannon Large (PL) and Hungarian Giant (HG) bucks based on the most important cost factors of feed and the revenue from processed products. Pannon Ka (maternal line) does were inseminated with PL and HG sperm. The crossbred rabbits (n = 336) were weaned at 5 weeks of age, their body weight and feed intake were measured fortnightly. Rabbits were reared until the age of 12 weeks. The weight of whole carcass, head, heart and lung, liver, kidneys, fore part, loin fillet, mid part's bone, thigh meat, and thigh bone were quantified. The revenue from whole carcass and carcass parts were based on the Italian market price. Gross margin was calculated on the level of production chain (including farm and slaughterhouse). Feed intake (147 and 132 g/day), weight gain (42.3 and 39.5 g/day) and body weight at 12 weeks of age (3.17 and 2.94 kg) were lower by 10.2%, 6,6% and 7.43%, respectively in Group MxHG than in MxPL rabbits. A 0.9% difference was observed in dressing out percentage, in favour of MxPL (62.7% and 61.6%). Ratios of fore-, mid-, hind part and perirenal+scapular fat to reference carcass were 27.5%, 33.4%, 36.9% and 2.16% in MxPL rabbits, whereas 27.1%, 33.6% 37.3% and 1.94% in MxHG group. Total cost of production was 3.82 and 4.20, while total revenue from carcass parts were 7.68 and 8.49 €/rabbit for MxHG and MxPL, respectively. Results showed a 11% difference between gross margin values of MxHG and MxPL, meaning that 11% more rabbit product of MxHG should be sold in order to obtain the same revenue as of MxPL. It can be concluded that productive performance and dressing out percentage were significantly lower in HG rabbits than in PL group, also gross margin difference is considerable, and therefore Hungarian Giant rabbits could be used mainly in alternative, organic rabbit production systems in which their lower performances are compensated by a higher price of sold rabbits.
Keywords: rabbit genotypes, production, carcass traits, economic evaluation, gross margin

INTRODUCTION

Besides rabbit meat products from intensive rabbit breeding, there is a growing interest in less intensive breeds kept in alternative housing and feeding conditions. Due to this fact, most hybrid breeding enterprises trade not only with white terminal paternal line rabbits, but also with colored terminal males to produce growing rabbits reared in alternative conditions. Additionally, the reduction of feeding cost is of primary importance to rabbit producers, and the main possibilities include using efficient stock and good quality feed, as well as effective farm management and the limitation of losses (*Maertens*, 2009). On the other hand, slaughterhouses are interested in realizing ever higher profits from the products sold. However, reports on economic evaluation for

growth and carcass traits are rare (*Mikó et al.*, 2010; *Verspecht et al.*, 2011; *Szendrő et al.*, 2012; *Szendrő et al.*, 2013). The aim of the experiment was to economically compare an intensive and an alternative production system (two genotypes, two housing systems and two feeding methods). In this paper the productive and carcass traits of rabbits are compared from the economic point of view, based on the most important cost factors, including feed and the revenue from processed products.

MATERIAL AND METHODS

The experiment was carried out at Kaposvár University. Pannon Ka (maternal line) females were inseminated with the semen of Pannon Large or Hungarian Giant males (MxPL and MxHG, respectively). The crossbred rabbits (n = 336) were weaned at 5 weeks of age, half of them were kept in cages (3 rabbit/ cage), the other half were kept in pens (10 rabbits/ pen). The stocking density was 16 rabbit/ m^2 in each case. Two subcategories were formed (however this study does not consider these factors); rabbits received solely commercial pellet or commercial pellet supplemented with hay, *ad libitum*. Water was available *ad libitum* from nipple drinkers. The temperature in the room was 15-17^{o}C, and it was illuminated by natural light (through windows), however additional artificial lighting was used to achieve 16h of light.

The price of a slaughter rabbit (1.66 €/kg) was based on French data (*Coutelet*, 2011). Weaned rabbit's price (2.0 €/kg) was considered 20% above that of slaughter rabbits. The price of feed (0.216 €/kg) was also obtained from *Coutelet* (2011). Total cost of production was based on feeding cost, which may represent 70% of total production costs (*Maertens*, 2009). Other costs (including slaughtering) were not considered in this study as these are mostly constant, regardless of genotypes. Hence, total expenses include the price of the weaned rabbit and the total cost of rearing until slaughter. The following carcass weights were measured: head, heart and lung, liver, kidneys, perirenal and scapular fat, fore part, loin fillet, mid part's bone, thigh meat and bone, and the whole carcass. Revenue from the whole carcass and different carcass parts were Italian market-specific; data were gained from the owner of a Hungarian rabbit slaughterhouse: whole carcass (4.3 €/kg), loin fillet (12.0 €/kg), thigh meat (11.0 €/kg), liver (2.8 €/kg), kidney (2.5 €/kg), fore part (2.6 €/kg), head, bone, heart, and lung (0.45 €/kg). Gross margin was calculated based on the whole production line costs as the difference between the revenue from rabbit products and production cost (excluding the cost of slaughtering).

Statistical Analysis

Productive and carcass traits were evaluated by means of one factor ANOVA, mortality was analyzed by Chi^2-test, with using the SPSS 10.0 software package.

RESULTS

Productive traits of the two genotypes are summarized in *Table 1*. The weight was higher in MxPL ($P<0.001$) in each age category. The difference increased from 7.5% to 11% between 5 and 9 weeks of age, and decreased to 8% by the age of 12 weeks. Concerning weight gain, significant differences were found only between 5-7

and 7-9 weeks, in favor of MxPL rabbits. Despite this, the total weight gain between 5 and 12 weeks of age was 7% higher for MxPL group than for MxHG rabbits. MxPL rabbits consumed more pellet in each age category than that of MxHG; not significant difference was found only between the age of 11 and 12 weeks. Average difference was 11.4% between the groups, which was the highest between 7-9 weeks of age (25.3%). There was no significant difference in the feed conversion ratio. However, the mortality in MxHG was twofold compared to the MxPL group; significant difference was found only between 5-7 weeks of age.

Table 1

Productive performances of crossbred rabbits originated from Pannon Ka (M) does and Pannon Large (PL) or Hungarian Giant (HG) bucks

Age (wk)	Genotype		P
	MxHG	MxPL	
Weight, g			
5	948	1019	<0.001
7	1654	1781	<0.001
9	2090	2319	<0.001
11	2658	2907	<0.001
12	**2935**	**3170**	**<0.001**
Weight gain, g/day			
5-7	47.1	50.8	<0.001
7-9	31.8	39.0	<0.001
9-11	39.6	41.5	0.088
11-12	39.0	37.6	0.344
5-12	**39.5**	**42.3**	**<0.001**
Feed intake, g/day			
5-7	109	119	<0.001
7-9	110	133	<0.001
9-11	143	161	<0.001
11-12	166	176	0.158
5-12	**132**	**147**	**0.002**
Feed conversion ratio			
5-7	2.23	2.25	0.699
7-9	3.58	3.29	0.230
9-11	3.68	3.93	0.119
11-13	4.07	4.76	0.082
5-12	**3.39**	**3.56**	**0.411**
Mortality, %			
5-7	2.98	0.00	0.024
7-9	1.84	2.98	0.502
9-11	3.75	1.23	0.145
11-13	1.30	0.62	0.537
5-12	**9.52**	**4.76**	**0.091**

Carcass traits are shown in *Table 2*. Due to the higher slaughter weight, the weight of almost all carcass parts was significantly higher in MxPL rabbits. Concerning carcass traits (ratio of warm-, chilled- and the reference carcass refer to slaughter weight) were 1.1-1.5% higher in MxPL rabbits than in the MxHG group. Ratios of fore-, mid-, hind part and perirenal+scapular fat to reference carcass were 27.5%, 33.4%, 36.9% and 2.16% in MxPL rabbits, whereas 27.1%, 33.6% 37.3% and 1.94% in MxHG group.

Table 2

Carcass traits of crossbred rabbits originated from Pannon Ka (M) does and Pannon Large (PL) or Hungarian Giant (HG) bucks

Characteristics	Genotype		P
	MxHG	MxPL	
Body weight (at slaughter), g	2881	3109	<0.001
Warm carcass, g	1777	1951	<0.001
Chilled carcass, g	1736	1906	<0.001
Reference carcass, g	1463	1618	<0.001
Dressing out percentage, % (relative to body weight)			
Warm carcass	61.6	62.7	<0.001
Chilled carcass	60.2	61.3	<0.001
Reference carcass	50.7	52.0	<0.001
Edible offal			
Heart+lung, g	22.6	23.5	0.012
Liver, g	76.1	87.8	<0.001
Kidneys, g	18.4	18.1	0.318
Fat			
Perirenal fat, g	21.9	27.0	<0.001
Scapular fat, g	7.45	10.55	<0.001
Carcass parts			
Head, g	153	156	0.037
Fore part, g	396	444	<0.001
Mid part, g	492	542	<0.001
Rear part, g	545	596	<0.001
Hind legs			
Right leg, g	257	281	<0.001
Left leg, g	261	286	<0.001
Meat			
Right leg fillet, g	182	201	<0.001
Left leg fillet, g	184	204	<0.001
Loin fillet (*Longissimus dorsi*), g	173	190	<0.001
Ratios relative to reference carcass, %			
Fore part	27.1	27.5	0.010
Mid part	33.6	33.4	0.178
Rear part	37.3	36.9	0.001
Fat depot	1.94	2.16	0.018

In terms of prices, weaned rabbits of MxPL were more expensive by 7.5% compared to MxHG (*Table 3*). Due to the higher feed intake of MxPL - and therefore their costs - the price difference of values between MxHG and MxPL increased to 8% by the age of 12 weeks. In general, feed costs represent 70% of the total costs (*Maertens*, 2009). Total cost of production and total expenses (including the price of rabbit at 5 wk) of MxHG appeared to be lower, but their weight was also lower at the end of the experiment.

Table 3

Total expenses and prices depending on the genotypes (€/rabbit)

Genotype	MxHG	MxPL
Price of rabbit at 5 wk (expense)	1.90	2.04
Cost of feed (5-12 wk)	1.35	1.52
Other costs	0.58	0.65
Total cost of production	1.93	2.17
Total expenses	3.83	4.20

Total cost of production = cost of feed (70%) + other costs (30 %); Total expenses = price of rabbit at 5 wk + cost of production.

When total revenue from the whole carcass was calculated, the income from MxPL group was 8.20 €/kg, while for MxHG rabbits was lower by 10% (*Table 4*). On the other hand, selling different portions of the carcass leads to a higher total income, ranging between 7.68 and 8.49 €/kg for MxHG and MxPL, respectively. Loin fillet and thigh meat are the most valuable carcass parts with 12 and 11 €/kg. Since the proportion of the thigh meat is about 21% of the whole carcass, the revenue from this product is of the highest interest for the slaughterhouse. The income from thigh meat was the highest (4.46 €/kg) for MxPL group.

Table 4

Total revenue from whole carcass and carcass parts depending on genotypes (€/kg)

Genotype	MxHG	MxPL
Revenue from whole carcass	**7.46**	**8.20**
Revenue from different carcass parts		
Thigh meat	4.03	4.46
Loin fillet	2.08	2.28
Fore part	1.03	1.15
Liver	0.21	0.25
Kidney	0.05	0.05
Heart + lung	0.01	0.01
Head	0.07	0.07
Mid part's bone	0.14	0.16
Thigh bone	0.07	0.07
Total revenue from carcass parts	**7.68**	**8.49**

When total expenses of and revenue from rabbit products were calculated, the highest difference (gross margin) per rabbit was found for MxPL rabbits (*Table 5*). Results showed a 11% difference between values of MxHG and MxPL groups, meaning that 11% more rabbit product of MxHG should be sold in order to obtain the same revenue as of MxPL.

Table 5

Profitability of production lines as affected by genotype

Genotype	MxHG	MxPL
Rabbit slaughter weight (kg)	2.88	3.11
Revenue from rabbit products (€/r)	7.68	8.49
Total expenses (€/r)	3.83	4.21
Gross margin (€/r)	**3.85**	**4.28**

€/r = €/rabbit

Since the evaluation was carried out on crossbred rabbits, meaning that the differences between the groups show half the difference between the PL and HG breeds, therefore there could be even higher differences between the two genotypes.

CONCLUSIONS

Based on the results it can be concluded that the MxHG is not competitive as a terminalsirebreed in intensive farming. Therefore, Hungarian Giant rabbits may play a role mainly in alternative, organic rabbit production systems in which their lower performace and more expesive rearing are offset by a higher selling price.

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