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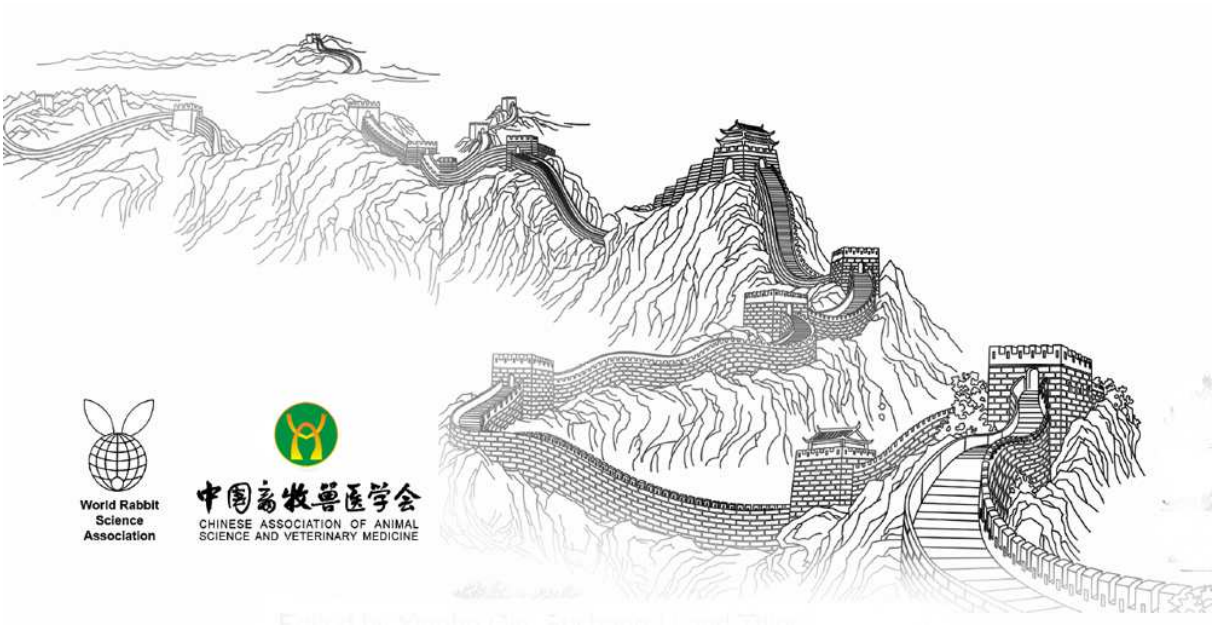

DIVERGENT SELECTION FOR TOTAL BODY FAT CONTENT OF RABBITS: 2. EFFECT ON PRODUCTIVE PERFORMANCE PRELIMINARY RESULTS

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ABSTRACT

The experiment was conducted at Kaposvár University with Pannon Ka rabbits. Divergent selection process was made during two generations for total body fat content. Fat index was calculated at 10 weeks of age by determining the ratio of the total body fat volume (ml) measured by computer tomography (CT) to the body weight (kg). The rabbits with the lowest fat index belonged to the Lean selected group of animals and those with the highest values belonged to the Fat selected group of animals. Weaned male rabbits of the first (Gen1, n = 60 Lean and 60 Fat) and second generation (Gen2, n = 60 Lean and 60 Fat) were housed in wire-mesh cages (3 rabbits/cage) and fed with commercial pellet *ad libitum* from weaning (5 wk) to slaughtering (11 wk). There was significant difference between Gen1 and Gen2 in the body weight at 5wk ($P<0.001$), at 11 wk ($P<0.01$), in feed intake ($P<0.01$) and feed conversion ratio ($P<0.001$) between 5-11wk, which may be caused by the higher temperature during the fattening of Gen2. The body weight, weight gain and feed intake of the Lean and Fat rabbits did not differ. In Gen1 the Lean group had better feed conversion ratio than that of the Fat rabbits (3.97 vs 4.20, respectively; $P<0.001$). Based on the data of the first two generations, there is not a clear difference between the productive performances of divergent selected rabbits for total body fat content.

Key words: Growing rabbit, CT, Divergent selection, Body fat content, Productive performance.

INTRODUCTION

Rabbit does cannot consume enough feed to meet their energy needs at the last few days of the pregnancy and near to the peak of the lactation, so their body fat deposits are mobilized and their condition deteriorate (Xiccato, 1996). Nulliparous does are bred at about 75-80% of their adult weight, so they also need energy for growth and their energy deficit could be remarkable. The amount of fat deposition has an important role in the condition of rabbit does. In addition, the lower fat content of rabbit meat could be beneficial for the customers. According to Pascual *et al.* (2013) the body condition of rabbit does may be important criteria for improving reproductive performance, longevity and health status. However, results about the connection between fat deposit in growing rabbits and their productive performance are limited.

Géraert *et al*. (1988) and Leclercq *et al.* (1989) found that fat and lean chickens had similar body weight. Baéza *et al.* (2015) stated that fat chickens were heavier than lean chickens, and they found that feed intake and average daily gain were greater in fat line chickens.

According to the study of Milisits *et al*. (1999), usage of TOBEC method and computer tomography (CT) are suitable for selecting rabbits for body fat content. Donkó *et al.* (2016) described a new CT measurement method. When rabbits were selected for thigh muscle volume by CT, the weight gain did not change, the feed intake decreased and the feed conversion ratio improved, while volume of fat depots also decreased (Szendrő *et al.*, 2012).

The aim of this experiment was to examine the effect of divergent selection for total body fat content on productive performance of growing rabbits.

MATERIALS AND METHODS

Animals And Experimental Design

The experiment was conducted at Kaposvár University with Pannon Ka (maternal line) rabbits. Divergent selection process was based on the fat index, which was calculated at 10 weeks of age by determining the ratio of the total body fat volume (ml) measured by computer tomography (CT) to the body weight (kg). The method of CT measurement is described by Donkó *et al*. (2016). The rabbits with the lowest fat index formed the Lean selected group of animals and those with the highest values formed the Fat selected animals.

The number of CT scanned rabbits and selected for future breeding animals (based on CT results) are shown in *Table 1*.

Table 1: Divergent selection process

		Female		Male	
		CT scanned	**Selected**	**CT scanned**	**Selected**
GEN1	Lean	209	*72*	142	*35*
	Fat		*72*		*34*
GEN2	Lean	96	*67*	80	*40*
	Fat	105	*64*	80	*40*
GEN3	Lean	180	*61*	149	*47*
	Fat	187	*61*	142	*47*

From the third litter of Gen1 and Gen2 60 Lean and 60 Fat male weaned rabbits were randomly chosen. After weaning at 35 days of age, animals were housed in wire-mesh cages until 11 wk of age (3rabbits/cage; 16 rabbits/m^2). The average temperature was 15-16 °C during rearing of Gen1 rabbits and 25-28 °C during rearing of Gen2 rabbits. They were fed a commercial pellet *ad libitum* (between 5-9 wk: DE: 9.6 MJ/ kg, CP: 16.2 %, CF: 18.5 %, EE: 2.7 %, with medication; between 9-11 wk: DE: 10.0 MJ/ kg, CP: 16.0 %, CF: 17.0 %, EE: 3.5 %, without medication). Drinking water was available *ad libitum* from nipple drinkers.

From 5 to 11 weeks of age the individual body weight of rabbits and the feed intake per cages were measured weekly. The individual daily weight gain and the feed conversion ratio per cage were calculated. The mortality was daily registered.

Statistical Analysis

Data of productive performance were evaluated by One-way ANOVA. Mortality of the groups was compared by Likelihood ratio test. Statistical analyses were performed by SPSS 10.0 software package.

RESULTS AND DISCUSSION

The productive performance of the growing rabbits is shown in *Table 2*.
The body weight, weight gain and feed intake of Lean and Fat groups did not differ, however Gen1 rabbits were heavier than Gen2 rabbits at 5 and at 11 wk of age ($P<0.001$ and $P<0.01$), and significant differences were found in feed intake and feed conversion ratio. The reason for these could be that rabbits of the Gen2 were reared in summer. Pascual *et al.* (2015) observed that rabbits with low intramuscular fat (IMF)

content were heavier than that of with high IMF. The feed conversion ratio (FCR) was nearly 6% better in the Lean group than in the Fat group in Gen1 ($P<0.05$), however in Gen2 the 4% difference was not significant. Szendrő *et al.* (2012) observed significant difference in feed intake, feed conversion ratio and fat deposit of divergently selected rabbits for thigh muscle volume, because the energy requirement (nutritional need) for fat deposition is high.

Table 2. Effect of divergent selection on productive performance of growing rabbits

Age, weeks	Generation				SE	P
	1		2			
	Divergent selection					
	Lean	Fat	Lean	Fat		
n	57	53	52	59	-	-
			Body weight, g			
5	816^{b}	812^{b}	742^{a}	719^{a}	4.75	*<0.001*
11	2306^{b}	2273^{b}	2227^{ab}	2167^{a}	14.7	*0.004*
			Weight gain, g/day			
5-11	36.0	35.2	35.5	34.5	0.30	0.343
			Feed intake, g/day			
5-11	141^{b}	146^{b}	112^{a}	114^{a}	2.01	*<0.001*
			Feed conversion ratio			
5-11	3.97^{b}	4.20^{c}	3.16^{a}	3.29^{a}	0.06	*<0.001*
			Mortality, %			
5-11	5.0^{ab}	11.7^{b}	13.3^{b}	1.7^{a}	-	*0.037*

Means with different subscripts on the same row differ significantly at $P<0.05$ level.

CONCLUSIONS

Based on the results of the first two generations, there is not a clear difference between the productive performances of divergent selected rabbits for total body fat content.

ACKNOWLEDGEMENTS

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AIM

In the experiment the effect of divergent selection for total body fat content az 10 weeks osf age on productive performance of growing rabbits was investigated.

MATERIAL AND METHODS

Divergent selection process was based on the fat index. The rabbits with the lowest fat index formed the ***Lean*** selected group of animals and those with the highest values formed the ***Fat*** selected animals.

- From the third litter of **Gen1** and **Gen2** ***60 Lean*** and ***60 Fat*** male weaned rabbits were randomly chosen.
- From 5 to 11 weeks of age the individual *body weight* of rabbits and the feed intake per cages were measured weekly.
- The daily weight gain and the feed conversion ratio were calculated.

RESULTS

Table 1: Effect of divergent selection on productive performance of growing rabbits

Age, weeks	Generation				SE	P
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