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EVALUATION OF THE RABIT CARCASS AND MEAT QUALITY

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ABSTRACT

The aim of the work was to analyze the carcass structure and the quality of the meat and fat oxidation of French Lop and Californian rabbit breeds. Carcass yield of the Californian rabbit breed was 50 % and the French Lop rabbit was 49.9 %. In the thing muscle of the French Lop rabbit, the protein content was 23.85 g.100 g^{-1} and in the *musculus longissimus dorsi* (MLD) − 23.31 g.100 g^{-1}. The Californian rabbit breed had a protein content of 23.30 g.100 g^{-1} in the thigh muscle and 23.67 g.100 g^{-1} in the MLD. The intramuscular fat content of the French Lop rabbit thigh muscle was 0.92 g.100 g^{-1} and the back muscle was 0.99 g.100 g^{-1}. The thigh muscle of the Californian rabbit had an intramuscular fat content of 1.10 g.100 g^{-1} and a back muscle of 1.07 g.100 g^{-1}. The higher content of oleic acid was found in both breeds: in the MLD of French Lop rabbit breed had 38.32 g.100 g^{-1} FAME (fatty acid methyl ester) and in the MLD of Californian rabbit − 39.76 g.100 g^{-1} FAME. In the thigh muscle, the oleic acid content in a French Lop rabbit was of 30.76 g.100 g^{-1} FAME and in a Californian rabbit breed − 39.02 g.100 g^{-1} FAME. The docosahexaeonic acid content in the thigh muscle of the French Lop rabbit was the same as that of the Californian rabbit (0.03 g.100 g^{-1} FAME). Malondialdehyde content, an indicator of fat oxidation, determined after 5 days of maturation in the MLD of both breeds was the same (0.17 mg.kg^{-1}). The content of MDA in the thigh muscle of the French Lop rabbit was 0.17 mg.kg^{-1} and in the Californian rabbit – 0.16 mg.kg^{-1}. To achieve optimal carcass maturity, it is appropriate to fatten the French Lop rabbits to an older age.

Key words: carcass structure; amino acid; fatty acid; malondialdehyde; rabbit

INTRODUCTION

Rabbit meat consumption in the world is the highest in Malta − 7.5 kg per capita, followed by Italy − 5.5 kg and France − 3.0 kg (Para Pa *et al.*, 2015).

The Californian rabbit is very well muscled in front part. The back is muscled, the legs are short and good muscled. Rabbits slaughter weigh is 4.5 to 5 kg (Doušek, 1994). The Californian rabbit is the second most widespread rabbit breed in the world. The basic color is white. Due to its good fertility and excellent maternal properties, it is suitable for hybridization (Zadina *et al.*, 2004). The breed has a gentle skeleton and very good musculature of the hips, back and thighs, this should be reflected in a high carcass yield, which should reach up to 65 %, excellent meat performance. The slaughter weight can reach up to 3.5 − 5 kg (Verhoef − Verhallen, 2013).

The French Lop rabbit is currently bred in a variety of colors, monochromatic or magpie with a mantle, reaching a slaughter weight of 4 kg at the age of 5 months and 5.5 kg at the age of 8 months (Zadina *et al.*, 2004). Rabbit meat is easily digestible and dietary meat. In addition is low in fat and cholesterol contents, it has a low purine and sodium content. It also has an optimal content of zinc, copper, phosphorus, calcium and cobalt (Zadina *et al.*, 2004). The back muscle (*musculus longissimus dorsi*) has a protein content of 22.4 g.100 g^{-1} and

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the thigh muscle 21.7 g.100 g^{-1}, the fat content in the back muscle is 1.8 g.100 g^{-1} and the thigh muscle 3.4 % g.100 g^{-1} (Dalle Zotte, 2015).

Rabbit meat is richer in lysine (2.12 g.100 g^{-1}), but also leucine (1.73 g.100 g^{-1}), valine (1.19 g.100 g^{-1} compared to other meats), isoleucine (1.15 g.100 g^{-1}), threonine (2.01 g.100 g^{-1}) and phenylalanine (1.04 g.100 g^{-1}) (Hernández and Dalle Zotte, 2010). Rabbit meat has a relatively high contents of polyunsaturated fatty acid, around 60 % of all fatty acids. Due to this fact, rabbit meat faster oxidized during processing and storage time (Dalle Zotte, 2002).

In rabbit meat there are 57 – 59 g.100 g^{-1} FAME of unsaturated fatty acids (Skřivan *et al.*, 2008). About 32.5 g.100 g^{-1} FAME are polyunsaturated fatty acids and monounsaturated 28.5 g.100 g^{-1} FAME. A higher polyunsaturated acid content (34.6 g.100 g^{-1} FAME) is found in the thigh muscle (Hernández and Gondret, 2006). Also, Dalle Zotte (2015) reported 31.9 g.100 g^{-1} FAME of PUFA and 28.3 g.100 g^{-1} FAME of MUFA in the thigh muscle.

There is a high content of palmitic acid, linoleic acid and oleic acid in rabbit fat. The fat of other animal species has a higher oleic and stearic acid content than that of rabbits (Skřivan *et al.*, 2008).

Rabbit meat has a low cholesterol content of about 45 – 90 mg.100 $g^{-1}$of muscle (Skřivan *et al.*, 2008). The average cholesterol content in rabbit meat is 59 mg.100 g^{-1} (Combes, 2004). The most important factor of fat oxidation is the degree of fatty acid saturation. Technological processing of meat, such as grinding, cooking, cutting, can increase the oxidation of polyunsaturated fatty acids to by-products as pentanal, hexanal, 4-hydroxynoneal and malondialdehyde (MDA) (Gray *et al.*, 1996). After long-term storage of frozen meat Corino *et al.* (2007) found malondialdehyde content in the thigh muscle of rabbits at the level of 60 µmol MDA.kg^{-1}.

The aim of the study was to analyze the carcass structure and the quality of the meat and fat oxidation of French Lop and Californian rabbit breeds.

MATERIAL AND METHODS

The experimental groups were represented by the French Lop rabbit (n = 8) and Californian rabbits (n = 8) fattened up to 6 months of age. All rabbits included in the study were fed equally, with the same composition feed and voluminous feed (hay) – *ad libitum*.

At the age of six months and at the end of the fattening period, the rabbits were weighed, slaughtered and deboned. The carcasses were matured for 5 days at 4 °C, and samples were taken from MLD (*musculus longissimus dorsi*) and thigh (middle part of thigh). Basic carcass parameters, basic chemical composition, amino acid content, fatty acids and malondialdehyde (MDA) content were analysed. Samples were taken from the *musculus longissimus dorsi* (MLD) and thigh muscle. Samples were taken from each part of the muscle for each rabbit. Contents of fatty acids and amino acids were analysed in the thigh muscle and *musculus longissimus dorsi*. Malondialdehyde content as an indicator of fat oxidation was analysed after five days of maturation in MLD and thigh muscle.

Analysis of basic meat composition by FTIR method

The samples from MLD and thigh muscle (30 g) were analysed for proximate composition, specifically moisture, protein, intramuscular fat amino acids and fatty acids using spectrometer Nicolet 6700 in g.100 g^{-1}. Fatty acid contents were analysed as fatty acid methyl ester (FAME) in g.100 g^{-1} FAME (Vavrišínová *et al.*, 2019).

Determination of the oxidative stability

The content of malondialdehyde (MDA) was determined by spectrophotometric method. The rate of secondary lipid oxidation is determined as the thiobarbitur number in mg malondialdehyde (MDA) per kg of meat. Sample preparation was performed according to Cubon *et al.* (2019). The obtained data were calculated and the MDA concentration was expressed in mg.kg^{-1} of meat.

Statistical analysis

The data were statistical analysed by the SAS 9.3 software using the application Enterprise Guide 4.2.

RESULTS AND DISCUSSION

The rabbits of the French Lop breed had a weight before slaughter of 4288 g and the Californian rabbits

Table 1. Slaughter parameters of the French Lop and Californian rabbit

Parameters	French Lop				Californian rabbit				T – test
	Mean	SD	SE	CV %	Mean	SD	SE	CV %	
Live weight (g)	4288.000	219.802	109.901	5.12	3427.000	233.103	116.505	6.800	++
Carcass weight (g)	2117.000	196.204	0.09	9.26	1711.000	150.507	75.28	8.79	++
Liver (g)	97.50	8.18	4.09	8.39	62.50	9.39	4.69	15.003	++
Lungs (g)	69.00	100.04	50.02	144.909	17.75	2.62	1.31	14.801	-
Kidney (g)	24.00	1.41	0.70	5.89	18.25	2.36	1.18	12.904	++
Heart (g)	12.75	2.21	1.10	17.39	9.00	0.81	0.40	9.07	+
Carcass yield (%)	49.29	1.21	0.71	2.45	50.00	1.35	0.75	2.70	-

had a significantly (P ≤ 0.01) lower weight of 3427 g (Table 1). Similar to our results, the weight of rabbits of the Californian rabbit breed of 3.4 kg at 6 months of age was also reported by Zadina *et al*. (2004). With the French Lop rabbits they reported a higher weight compared to our results (4.5 kg). The weight of the carcass was 2117 g, while for the French Lop and for the Californian rabbit (1711 g) it was significantly lower.

Carcass yield was significantly lower (49.29 %; P ≤ 0.05) for the French Lop breed than for the Californian rabbit (50.00 %). Carcass yield than in was reported by Verhoef-Verhallen (2013; 65 %). Tůmová *et al*. (2018) reported a higher slaughter yield (58 %) for large breeds at 90 days of age, while for medium breeds a slaughter yield at 90 days of age was 58-59 %.

The weight of the liver was significantly higher (97.50 g; P ≤ 0.01) in the French Lop breed than in the the Californian rabbit breed (62.50 g). Mota-Rojaz *et al.* (2006) reported lower liver weight for large breeds, such as Chinchilla (83.58 g) and medium-sized breed, such as the Californian rabbit (86.9 g). Similarly, Bianospino *et al.* (2006) reported 68.3 g of liver weight in rabbits and Petkova *et al.* (2011) recorded approximately the same average weight of liver (83.72 g).

The average thigh weight was higher in the French Lop rabbit (730.15 g) than the Californian rabbit

Table 2. Carcass structure of the French Lop and Californian rabbit

Parameters	French Lop				Californian rabbit				T – test
	Mean	SD	SE	CV %	Mean	SD	SE	CV %	
Back + Chest (g)	1179.82	142.48	47.47	12.07	910.22	165.28	55.12	18.16	+
Skin (g)	541.25	30.92	15.46	5.71	493.75	61.28	30.64	12.41	-
Head (g)	371.25	30.92	15.46	8.32	275.00	38.07	19.03	13.74	++
Shoulder (g)	207.77	3.77	1.21	1.79	187.22	17.88	5.86	9.55	-
Thigh (g)	730.15	37.85	15.61	5.18	613.77	15.63	5.21	2.54	++
Meat (g)	1878.46	132.51	40.17	7.05	1481.45	167.55	54.20	11.31	++
Meat (%)	88.73	0.99	0.31	1.11	86.58	0.23	0.07	0.27	+
Bones (g)	239.09	39.83	13.11	0.17	229.79	22.93	7.42	0.99	-
Bones (%)	11.27	0.47	0.16	4.17	13.42	0.24	0.08	1.79	++

Table 3. Basic chemical composition of the MLD (g.100 g^{-1}) from the French Lop and Californian rabbit

Parameters	French Lop				Californian rabbit				T – test
	Mean	SD	SE	CV %	Mean	SD	SE	CV %	
Humidity	74.78	0.90	0.45	1.29	74.15	0.62	0.31	0.88	-
Proteins	23.31	0.76	0.38	3.04	23.67	0.46	0.23	1.79	-
Intramuscular fat	0.92	0.25	0.12	27.61	1.10	0.23	0.11	21.59	-
Minerals	0.99	0.05	0.01	5.50	1.07	0.06	0.02	5.67	-

(613.77 g; Table 2). Neirurer and Fik (2018) reported the average weight of the thighs in the Nitra rabbit breed as 542.8 g. The weight of the foreleg was higher in the carcass of French Lop (207.77 g) than in the Californian rabbit (187.22 g).

The net muscle weight without bone was higher in the carcass of French Lop (1878.46 g) than in the Californian rabbit breed (1481.45 g). The percentage of meat from the carcass was 88.73 % in the French Lop and 86.58 % in the Californian rabbit. Zadina *et al.* (2004) reported that the carcass of a headless rabbit contains from 70 to 85 % of pure muscle. The proportion of bone in the carcass of the French Lop was 11.27 % and in the Californian rabbit – 13.42 %.

The moisture content of the MLD from the French Lop breed was 74.78 g.100 g^{-1} and the Californian rabbit breed – 74.15 g.100 g^{-1} (Table 3). No statistically significant differences were found in basic chemical indicators between these breeds. In the MLD of French Lop breed the protein content was 23.61 g.100 g^{-1} and in the Californian rabbit breed it was 23.67 g.100 g^{-1}. Similarly, Dalle Zotte (2015) reported MLD moisture content in the rabbits – 74.6 g.100 g^{-1}, protein content – 22.4 g.100 g^{-1} and fat content – around 1.8 g.100 g^{-1}.

The intramuscular fat content of MLD was higher in the Californian rabbit breed 1.10 g.100 g^{-1} compare with the French Lop breed (0.92 g.100 g^{-1}). Difference in the intramuscular fat content likely to be affected by the breed and the size of the body frame. Martino *et al.* (2016) reported, similarly with our results, a water content of 75.3 g.100 g^{-1}, a protein content of 22.9 g.100 g^{-1} but a lower intramuscular fat content of 0.70 g.100 g^{-1}. The mineral content of MLD in the of French Lop breed was 0.99 g.100 g^{-1} and in the Californian rabbit breed – 1.07 g.100 g^{-1}. Malík (2002) and Combes (2004) reported higher mineral content in the rabbit MLD (1.2 g.100 g^{-1}).

The moisture content of the thigh muscle (Table 4) was higher in the French Lop (74.23 g.100 g^{-1}) than in the Californian rabbit (73.91 g.100 g^{-1}) breed. The protein content of the thigh muscles of the French Lop rabbits was 23.85 g.100 g^{-1} and in the Californian rabbit it was 23.3 g.100 g^{-1}. The intramuscular fat content was statistically significantly ($P \leq 0.01$) higher in the thigh muscle of the Californian rabbit, 1.64 g.100 g^{-1} than in the French Lop rabbit (0.75 g.100 g^{-1}). Dalle Zotte (2015), similarly to our results, reported the moisture content of the thigh of 73.8 g.100 g^{-1}, but found a lower

Table 4. Basic chemical composition of the thigh muscle (g.100 g^{-1}) of the French Lop and Californian rabbit

Parameters	FB				Kal				T – test
	Mean	SD	SE	CV %	Mean	SD	SE	CV %	
Humidity	74.29	1.63	0.81	2.37	73.91	4.32	0.53	18.63	-
Proteins	23.85	1.69	0.84	6.80	23.30	0.13	0.06	0.55	-
Intramuscular fat	0.75	0.15	0.07	21.08	1.64	0.26	0.13	16.19	++
Minerals	1.10	0.04	0.01	3.61	1.15	0.05	0.02	4.34	-

Table 5. Amino acid content of the thigh muscle (g.100 g^{-1}) of the French Lop and Californian rabbit

Parameters	French Lop				Californian rabbit				T – testt
	Mean	SD	SE	CV %	Mean	SD	SE	CV %	
Proteins	23.85	1.69	0.84	6.80	23.30	0.13	0.06	0.55	-
Lysine	1.32	0.33	0.16	25.53	1.43	0.09	0.04	6.67	-
Leucin	1.23	0.29	0.14	24.18	1.33	0.08	0.04	6.67	-
Methionine	0.49	0.10	0.05	21.67	0.57	0.04	0.02	7.44	-
Threonine	0.69	0.14	0.07	20.55	0.73	0.05	0.02	6.86	-
Valine	0.73	0.14	0.07	20.13	0.76	0.03	0.01	4.28	-
Isoleucine	0.60	0.15	0.07	26.30	0.65	0.04	0.02	7.36	-
Histidine	0.63	0.20	0.10	31.99	0.75	0.07	0.03	10.55	-
Phenylalanine	0.64	0.15	0.07	24.50	0.69	0.04	0.02	6.08	-
Cysteine	0.21	0.03	0.01	15.58	0.24	0.02	0.01	8.94	-
Arginine	0.99	0.24	0.12	24.99	1.07	0.07	0.03	6.76	-

protein content (21.7 g.100 g^{-1}) and a higher fat content (3.00 g.100 g^{-1}). This author also stated that the fat content of rabbit meat may be in the range 0.6 − 14.4 %. Tumová (2013) also reported a fat content of 0.6 to 14.5 % in the rabbit meat.

The amino acid content of histidine in the thigh muscle of the Californian rabbit was 0.75 g.100^{-1} and in the French Lop rabbit it was 0.60 g.100^{-1} (Table 5). Among amino acids, the highest content was found in lysine: in the Californian rabbit − 1.43 g.100^{-1} and in the French Lop rabbit − 1.32 g.100^{-1}. The content of cysteine in the thigh muscle of the French Lop rabbit was 0.21 g.100^{-1} and in the thigh muscle of the Californian rabbit − 0.24 g.100^{-1}. In MLD (Table 6), the amino acid content of phenylalanine was 0.65 g.100^{-1} in the Californian rabbit and 0.60 g.100^{-1} in the French Lop rabbit. The lysine content in the MLD of Californian rabbit was 1.34 g.100^{-1} and in the MLD of French Lop rabbit − 1.23 g.100^{-1}.

Hernández and Dalle Zotte (2010) reported higher contents of lysine (2.1 g.100 g^{-1}), lucein (1.7 g.100 g^{-1}), valine 1.1 g.100 g^{-1}and phenylalanine (1.04 g.100 g^{-1}) in rabbit MLD compared to our results. Wognin *et al.* (2018) found lower contents of phenylalanine (0.77 g.100 g^{-1}) and threonine (0.89 g.100 g^{-1}) compared to our results.

Table 7 presents the fatty acid content of the thigh muscle. Oleic acid was the fatty acid with

Table 6. Amino acid content of the MLD (g.100 g^{-1}) of the French Lop and Californian rabbit

Parameters	French Lop				Californian rabbit				T – testt
	Mean	SD	SE	CV %	Mean	SD	SE	CV %	
Proteins	23.31	0.76	0.38	3.04	23.67	0.46	0.23	1.79	-
Lysine	1.23	0.17	0.08	13.84	1.34	0.21	0.10	15.97	-
Leucin	1.15	0.15	0.07	13.33	1.25	0.19	0.09	15.42	-
Methionine	0.49	0.05	0.02	10.21	0.53	0.06	0.03	12.82	-
Threonine	0.66	0.07	0.03	11.87	0.71	0.09	0.04	18.89	-
Valine	0.70	0.05	0.02	8.33	0.71	0.06	0.03	9.31	-
Isoleucine	0.54	0.08	0.04	15.14	0.60	0.10	0.05	17.44	-
Histidine	0.62	0.07	0.03	11.84	0.65	0.10	0.05	16.40	-
Phenylalanine	0.60	0.07	0.03	12.59	0.65	0.09	0.04	14.39	-
Cysteine	0.23	0.02	0.01	11.47	0.25	0.02	0.01	9.41	-
Arginine	0.91	0.13	0.06	14.18	1.01	0.16	0.08	16.02	-

Table 7. Content of intramuscular fat (g.100^{-1}) and fatty acids (g.100 g^{-1} FAME) and MDA (mg.kg^{-1}) in the thigh muscle of the French Lop and Californian rabbit

Parameters	French Lop				Californian rabbit				T – test
	Mean	SD	SE	CV %	Mean	SD	SE	CV %	
Intramuscular fat	0.75	0.15	0.07	21.08	1.64	0.26	0.13	16.19	++
Arachidonic acid	1.85	0.34	0.17	18.58	1.46	0.30	0.15	20.66	-
Conjugated Linoleic acid	0.14	0.01	0.01	4.74	0.12	0.01	0.01	6.47	++
Docosahexaenoic acid	0.03	0.01	0.01	7.75	0.03	0.01	0.01	10.74	-
Docosapentaenoic acid	0.13	0.01	0.01	4.77	0.14	0.01	0.01	6.14	-
Eicosanoic acid	0.58	0.20	0.10	35.20	0.52	0.08	0.04	15.20	-
Eicosapentaenoic acid	0.10	0.01	0.00	18.24	0.10	0.01	0.01	20.75	-
Heptadecanoic acid	0.29	0.06	0.03	21.63	0.31	0.06	0.03	20.75	-
Lauric acid	0.11	0.01	0.01	13.10	0.12	0.01	0.01	4.71	-
Linolenic acid	0.14	0.05	0.02	36.17	0.12	0.02	0.01	17.19	++
Linoleic acid	5.10	1.49	0.74	29.20	5.63	1.09	0.54	19.45	-
Myristic acid	1.42	0.04	0.02	3.31	1.32	0.04	0.02	3.41	+
Oleic acid	30.76	9.86	4.93	32.07	39.02	2.16	1.08	5.54	-
Palmitoleic acid	24.68	0.23	0.13	1.09	24.30	0.36	0.18	1.49	-
Stearic acid	10.49	0.45	0.22	4.37	10.75	0.21	0.10	1.97	-
Vaccenic acid	4.97	0.15	0.075	3.03	4.73	0.09	0.04	2.06	+
Essential fatty acids	9.04	0.58	0.29	6.48	7.36	0.78	0.39	10.71	+
Omega 3 fatty acids	0.42	0.06	0.031	14.93	0.46	0.04	0.02	8.89	-
Omega 6 fatty acids	9.28	2.09	1.047	22.58	9.74	0.54	0.27	5.62	-
MUFA fatty acids	48.88	2.15	1.07	4.40	50.04	1.51	0.75	3.03	-
PUFA fatty acids	12.10	0.69	0.34	5.70	11.51	1.78	0.13	2.37	-
SAFA fatty acids	33.85	1.32	0.66	3.91	35.81	1.78	0.89	4.99	-
MDA	0.17	0.03	0.01	21.05	0.16	0.01	0.01	11.75	-

the highest contents: in the French Lop rabbit – 30.76 g.100 g^{-1} FAME and in the Californian rabbit – 39.02 g.100 g^{-1} FAME were determined. The content of palmitic acid in the thigh muscle was 24.68 g.100 g^{-1} FAME in French Lop rabbit and 24.30 g.100 g^{-1} FAME in the Californian rabbit.

Likewise, Hernandez *et al.* (2008) found the highest content of oleic and palmitic acid in the thigh muscle of rabbits. Banskalieva *et al.* (2000) reported lower oleic acid content (25.4 g.100 g^{-1} FAME) and higher palmitic acid content (27.3.100 g^{-1} FAME) compared to our results. However, the docosahexaenoic acid content was the lowest in both breeds (0.03 g.100 g^{-1} FAME).

A similar content of palmitic acid (26.94 g.100 g^{-1} FAME) and docosahexaenoic acid (0.16 g.100 g^{-1} FAME) in the thigh muscle was also reported by Rasinska *et al*. (2018). However, compared to our results, they found a lower content of oleic acid in the thigh muscle (26.56 g.100 g^{-1} FAME). Ramírez (2005) reported lower oleic acid content in the thigh muscle (23.16 g.100 g^{-1} FAME) compared to our results, but approximately the same content of palmitic acid (25.08 g.100 g^{-1} FAME).

We found a statistically significant ($P \leq 0.01$) difference in linoleic acid content in the thigh muscle of the French Lop rabbit (0.14 g.100 g^{-1}) FAME compared to the Californian rabbit (0.12 g.100 g^{-1} FAME). There was also statistically significant ($P \leq 0.05$) difference in the myristic acid content of 1.42 g.100 g^{-1} FAME for the French Lop rabbit and 1.32 g.100 g^{-1} FAME for the Californian rabbit, and in the vaccenic acid contents for the French Lop rabbit (4.97 g.100 g^{-1}) FAME and Californian rabbit (4.73 g.100 g^{-1}) FAME. Significant ($P \leq 0.01$) differences were observed in the conjugated linoleic acid content in the thigh muscle of French Lop rabbit (0.14 g.100 g^{-1} FAME) and in the Californian rabbit (0.12 g.100 g^{-1} FAME). Differences in the MUFA content

Table 8. Content of intramuscular fat (g.100^{-1}) and fatty acids (g.100 g^{-1} FAME) and MDA (mg.kg^{-1}) in the MLD of the French Lop and Californian rabbit

Parameters	French Lop				Californian rabbit				T – test
	Mean	SD	SE	CV %	Mean	SD	SE	CV %	
Intramuscular fat	0.92	0.25	0.12	27.61	1.10	0.23	0.11	21.59	-
Arachidonic acid	1.96	0.65	0.32	33.08	2.01	0.39	0.19	19.74	-
Conjugated Linoleic acid	0.13	0.02	0.01	14.96	0.14	0.01	0.01	9.43	-
Docosahexaenoic acid	0.03	0.01	0.01	15.78	0.03	0.01	0.01	5.83	-
Docosapentaenoic acid	0.13	0.01	0.01	4.05	0.13	0.01	0.01	8.00	-
Eicosanoic acid	0.55	0.06	0.03	12.50	0.60	0.08	0.04	13.66	-
Eicosapentaenoic acid	0.11	0.01	0.01	8.56	0.11	0.02	0.01	21.71	-
Heptadecanoic acid	0.34	0.04	0.02	13.37	0.33	0.03	0.01	11.52	-
Lauric acid	0.11	0.01	0.01	2.64	0.11	0.01	0.01	4.03	-
Linolenic acid	0.13	0.01	0.01	11.81	0.15	0.01	0.01	5.26	-
Linoleic acid	5.97	0.66	0.33	11.15	5.91	0.86	0.43	14.60	-
Myristic acid	1.34	0.04	0.02	3.10	1.35	0.05	0.02	3.97	-
Oleic acid	38.32	2.78	1.39	7.27	39.76	1.56	0.78	3.93	-
Palmitoleic acid	24.32	0.31	0.15	1.30	24.35	0.20	0.10	0.84	-
Stearic acid	10.70	0.36	0.18	3.38	10.88	0.21	0.10	1.93	-
Vaccenic acid	4.82	0.12	0.06	2.61	4.77	0.15	0.07	3.25	-
Essential fatty acids	8.37	0.97	0.48	11.63	9.39	1.96	0.98	23.45	-
Omega 3 fatty acids	0.46	0.09	0.04	19.55	0.50	0.07	0.03	15.49	-
Omega 6 fatty acids	10.25	0.79	0.39	7.78	10.16	0.12	0.06	1.20	-
MUFA fatty acids	48.90	1.53	0.76	3.13	49.85	1.26	0.63	2.53	-
PUFA fatty acids	11.55	0.41	0.20	3.62	12.33	0.62	0.31	5.04	-
SAFA fatty acids	35.87	1.73	0.86	4.83	35.29	1.12	0.56	3.18	-
MDA	0.17	0.03	0.01	18.68	0.17	0.01	0.005	9.49	-

(48.88 g.100 g^{-1} FAME for French Lop rabbit; 50.04 g.100 g^{-1} FAME for California rabbit), contents of PUFA (12.10 g.100 g^{-1} FAME for French Lop rabbit; 11.51 g.100 g^{-1} FAME for Californian rabbit) and SAFA contents (33.85 g.100 g^{-1} FAME for French Lop rabbit; 35.81 g.100 g^{-1} FAME for Californian rabbit) were not statistically significant.

We also did not find differences in MDA content in the thigh muscle after 5 days of maturation, the MDA content of the French Lop rabbit was 0.17 mg.kg^{-1} and the Californian rabbit 0.16 mg.kg^{-1}.

Chrastinová *et al.* reported levels similar to our results: SAFA – 35.01 g.100 g^{-1} FAME, MUFA – 49.76 g.100 g^{-1} FAME and PUFA – 11.68 g.100 g^{-1} FAME. Otherwise, Xao (2016) reported the following values measured in the thigh muscle of rabbits: at the age of 35 days – content of MUFA – 14.64 g.100 g^{-1} FAME, PUFA – 52.22 g.100 g^{-1} FAME and SAFA – 33.14 g.100 g^{-1} FAME; at the age of 90 days – contents of MUFA – 18.37 g.100 g^{-1} FAME, PUFA – 37.50 g.100 g^{-1} FAME and SAFA – 44.13 g.100 g^{-1} FAME. Omega-6 fatty acids content was 9.74 g.100 g^{-1} FAME in the thigh muscle of French Rabbit, and 9.28 g.100 g^{-1} FAME in the French Lop, and Omega-3 fatty acids content was 0.42 g.100 g^{-1} FAME in the thigh muscle of the French Lop and in Californian Rabbit 0.46 g.100 g^{-1} FAME).

Opposite to our results, Rasinska *et al.* (2018) reported 21.98 g.100 g^{-1} FAME of omega-6 fatty acids and 2.47 g.100 g^{-1} FAME of omega-3 fatty acids in the rabbit thigh muscle.

In the MLD (Table 8) we found the highest content of oleic acid, in the French Lop rabbit it was 38.32 g.100 g^{-1} FAME and in the Californian rabbit 39.76 g.100 g^{-1} FAME. The difference in the content of palmitic acid between the rabbit breeds was not statistically significant, in the French Lop rabbit it was 24.32 g.100 g^{-1} FAME and in the Californian rabbit –

24.35 g.100 g^{-1} FAME. The lowest value was found in the content of docosahexaenoic acid: in the thigh muscle of the French Lop rabbit − 0.03 g.100 g^{-1} FAME and the Californian rabbit it was 0.03 g.100 g^{-1} FAME.

Rasinska *et al.* (2018) reported lower level of oleic acid (27.00 g.100 g^{-1} FAME) as well as palmitic acid (25.63 g.100 g^{-1} FAME) and higher level of docosahexaenoic acid (0.10 g.100 g^{-1} FAME) in thigh muscle compared to our results. The MUFA content in the MLD of the French Lop was 48.9 g.100 g^{-1} FAME, while in the Californian rabbit it was higher (49.85 g.100 g^{-1} FAME). The SAFA content in the MLD of the French Lop was 35.87 g.100 g^{-1} FAME and in the Californian rabbit it was 35.29 g.100 g^{-1} FAME. All the differences in the fatty acid content are likely to be affected by the breed and the size of the body frame.

The PUFA content in the MLD of the French Lop rabbit was 11.55 g.100 g^{-1} FAME and in the Californian rabbit it was 12.33 g.100 g^{-1} FAME. Xue (2016) reported lower MUFA content (16.30 g.100 g^{-1} FAME) but higher PUFA (50.54 g.100 g^{-1} FAME) and SAFA (33.16 g.100 g^{-1}) levels in MLD of rabbits at 35 days of age. However, at 90 days the MUFA content was 20.41 g.100 g^{-1} FAME, PUFA − 32 g.100 g^{-1} FAME, while the SAFA content was higher (46 g.100 g^{-1} FAME).

Rasinska *et al*. (2017) reported the fatty acid content in winter season: SAFA − 41.26 g.100 g^{-1} FAME, MUFA − 28.40 g.100 g^{-1} FAME and PUFA − 16.28 g.100 g^{-1} FAME. The n-6 fatty acid content was 12.42 g.100 g^{-1} FAME and the n-3 fatty acids content was higher (3.78 g.100 g^{-1} FAME). Rasinska *et al.* (2018) reported higher n-6 fatty acid level (25.99 g.100 g^{-1} FAME) and n-3 fatty acid level (3.23 g.100 g^{-1} FAME) in MLD compared to our results.

The MDA content in MLD was the same for both breeds (0.17 mg.kg^{-1}). In the thigh muscle of the French Lop, the MDA content was 0.17 mg. kg^{-1} and in the Californian rabbit it was 0.16 mg. kg^{-1}. Nakyinsige *et al.* (2015) reported MDA content after killing − 0.014 mg.kg^{-1}, at the first day 0.0263 mg.kg^{-1}, and at 7th day − 0.152 mg.kg^{-1}. Nakyinsige *at al.* (2014) also reported MDA content at the slaughter day − 0.014 mg.kg^{-1} and at the 7th day of maturing − 0.15 mg.kg^{-1}.

CONCLUSION

The rabbits of the French Lop breed and Californian rabbit breed were fatted to 6 months of age. The slaughter yield of the Californian rabbit and the French Lop was approximately the same. To achieve optimal carcass maturity, it is appropriate to fatten the French Lop rabbits to an older age. The protein content of the thigh muscle and MLD from the French Lop and the Californian rabbit breeds was approximately identical. The intramuscular fat content of the thigh muscle and the MLD of the French Lop breed was lower than that of the Californian rabbit breed. The MUFA and SAFA contents in the thigh muscle were higher in Californian rabbit breed. The MUFA and PUFA contents in the MLD were higher in the Californian Rabbit breed. The MDA content in the MLD was the same for both breeds.

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