EFFECT OF DIETARY OAT SUPPLEMENTATION IN RABBIT FEED FOR DEVELOPMENT OF LOW FAT FUNCTIONAL MEAT

Muhammad I. Khan[1*], Muhammad R. Tariq[2] and Aysha Sameen[1]

[1]*National Institute of Food Science and Technology, University of Agriculture, Faisalabad-Pakistan*
[2]*Department of Food Science & Technology, University College of Agriculture & Environmental Sciences, The Islamia University of Bahawalpur, Pakistan*
[*]Corresponding author email: drkhan@uaf.edu.pk

Abstract – The study was performed to examine the nutritive response of oat from 2 – 4 %. Bearing in mind that this range of oat will reduce the fat percentage and improve fatty acid concentration of the rabbit meat. Rabbits were distributed in respective groups and raised for time span of sixty days. Rabbits on the control feed were T0 while those reared on 4% oat were T1 and on 2% oat in the feed were T2. As the time period of sixty days ended, they were slaughtered. Physico-chemical and fatty acid analysis of rabbit meat were carried out following the respective methods. Supplementation of oat in rabbit feed expressively changed the pH, fat, protein, textural attributes and fatty acid concentration of the rabbit meat. It was concluded from the results that the supplementation of 2 % oat seed in the feed of rabbits not only significantly enhanced concentration of polyunsaturated fatty acids in meat of rabbit but also reduced level of fat percentage in rabbit meat.

Key Words: Fatty acid profile, Meat quality, Rabbit feed

I INTRODUCTION

Functional foods are becoming famous due to uncertainty and negative image of drugs and supplements. Everywhere the population requires eating healthy foods without change in their traditional dietary style [1]. Consumption of healthy diet has attained more attention in the recent years due to disliking for fat, sugar and salt because people have health concerns [2]. Healthier diets consisting no fat or low fat and reduced-calories are in higher demand by the customer. The functional foods provide an alternative to the customers containing better food and should be taken as a part of regular diet [3]. Functional foods have three basic to be regarded as functional. First it would be a food (not powder, tablets or capsules) obtained from ingredients occurring naturally, secondly it must be utilized as a constituent of the routine food and thirdly after ingestion, it must carry out definite progressions like preventing and treating specific diseases, enhancing biological defense mechanisms, controlling mental and physical conditions, and delaying the process of ageing [4]. Meat is the whole or part of carcass of any animal tissues [5]. It plays important role in human nutrition because meat and products of meat are excellent sources for proteins, fats, minerals, vitamins and essential amino acids [6]. Rabbit meat offers excellent nutritive and dietetic properties. Rabbit meat is almost a lean meat that consists of high valuable proteins which is characterized through high amounts of proteins. In contrast to red meat rabbit meat is of low caloric value because of its low fat content [7].

II MATERIAL AND METHODS

New Zealand White strains rabbits (30±5 days) were acquired from National Institute of Health Islamabad, Pakistan. All of them were equally distributed in three sets. First of all the cages where rabbits placed were fumigated. The temperature of the room was kept 25 ^{o}C. The tentative feed was designed in such a way that it must fulfil rabbit's nutritional requirements. Additions of whole oat seeds were distributed in two different proportions in the diet (2% and 4%). The Rabbits were reared for the period of 8 weeks at ad libitum. The rabbits were slaughtered as eight weeks ended at the farm. Samples of the meat and blood was collected in respective ways and stored in a refrigerator at −4 °C (Sanyo, Japan) to carry out further processes. pH meter was used to measure the pH of rabbit meat samples according to the respective method [8]. 10 g sample was mixed with 50 ml distilled water and the value of pH was recorded by using digital pH-meter. Electronic water activity (Hygropalm) meter was used to determine the water activity of meat samples (Model Aw-Win, Rotronic, with Karl-Fast probe) by the method described by Cosenza *et al*. [9]. The analysis of fat and protein were carried out by kjeldhal method [10]. Texture Analyzer was used to determine the textural characteristics of rabbit meat by utilizing (model TA_XT Plus, Stable Microsystems, Surrey, UK) and procedure was adopted as suggested by Carlos [11]. Rabbit meat samples were prepared to check the fatty acids concentration. Each sample was run through Gas Chromatography (Agilent Technologies 6890 N) by Flame Ionization Detector. The carrier gas was Nitrogen with a flow rate of 1.3 ml/ min. The protocol of fatty acid determination was used as described by AOCS [12]. The results were analyzed statistically by using Over the Year

Design with factorial analysis of variance (ANOVA) by using software (Statistic 8.1). Duncan Multiple Range test was done to check comparison of means [13].

III RESULTS AND DISCUSSION

Supplementation of oat in the feed of rabbits has highly significant effect on pH values of both loin meat and hind leg meat. The results of physic-chemical analysis are presented in Table 1. T0 displayed minimum value (5.64) while T2 showed maximum value (5.74) in case of loin meat whereas the values for hind leg meat were 5.65 and 5.56 respectively. The present investigation showed that supplementation of oat in the feed of rabbits enhanced the ultimate pH of loin and hind leg muscles. The results are in accordance with work of Gilbert *et al.* [14] who used different inclusion levels of various cereals in the feed of rabbits that enhanced pH of the rabbit meat. The results of water activity showed non-significant effect in both meat samples (loin and leg meat). Oat enrichment in the feed wielded significant effect on protein percentage of loin and leg meat of rabbit. T0 presented minimum values of protein percentage i.e 21.06 while T1 displayed maximum percentage of protein i.e 22.91 in loin meat and in case of hind leg meat the values of protein percentage of T0 and T1 were 20.88 and 22.45 respectively. The protein results are analogous to the outcomes of Pla *et al* [15] who reported that rabbit loin meat displayed higher percentage of protein with respect to hind leg meat of rabbit meat. Supplementation of oat in the feed exerted significant effect on fat and textural values of both loin and hind leg meat samples. T1 showed minimum value of fat percentage 1.63 in case of loin meat whereas T0 displayed maximum values for fat percentage i.e 1.97. The values of fat percentage of hind leg meat were 3.73 and 3.43 respectively. Minimum textural value i.e 2.40 was recorded I T0 and T1 showed maximum i.e 2.87 in case of loin meat of rabbit while the values are 2.12 and 2.63 for hind leg meat respectively. Results for the textural attrbutes are agreed with the work of Hernández *et al* (2007) who found similar results when fed rabbits with dietary n-3 and n-6 fatty acids and determined lower textural values of rabbit meat.

Table 1 Physico-chemical analysis of loin and hind leg of rabbit meat

		T0	T1	T2
Loin meat	pH	5.64 ± 0.03^{B}	5.70 ± 0.02^{A}	5.74 ± 0.03^{A}
	Aw	0.842 ± 0.003^{A}	0.835 ± 0.003^{A}	0.845 ± 0.002^{A}
	Protein	21.06 ± 0.05^{C}	22.91 ± 0.02^{A}	22.05 ± 0.03^{B}
	Fat	1.97 ± 0.03^{A}	1.63 ± 0.03^{C}	1.84 ± 0.02^{B}
	Texture	2.40 ± 0.01^{C}	2.87 ± 0.02^{A}	2.68 ± 0.01^{B}
Hind leg meat	pH	5.56 ± 0.02^{B}	5.63 ± 0.03^{A}	5.65 ± 0.02^{A}
	Aw	0.872 ± 0.02^{A}	0.865 ± 0.02^{A}	0.875 ± 0.01^{A}
	Protein	20.88 ± 0.01^{C}	22.45 ± 0.01^{A}	21.07 ± 0.03^{B}
	Fat	3.73 ± 0.04^{A}	3.43 ± 0.02^{C}	3.58 ± 0.03^{B}
	Texture	2.12 ± 0.02^{C}	2.63 ± 0.01^{A}	2.40 ± 0.02^{B}

The degree of unsaturation and chain length of fatty acids are considered one of the important quality attributes of fats and oils. The data regarding the fatty acid profile of rabbit loin meat is presented in the Table 2. Addition of oat in the feed of rabbits put a remarkably significant effect on the fatty acid composition of the rabbit meat. The results depicted in Table 2 showed that oat supplementation raised the level of polyunsaturated fatty acids (PUFA) of Loin and leg meat. Oat seeds reduced the concentration of total saturated fatty acids (SFA) as described in Table 2. T0 depicted higher concentration i.e 35.95 in loin and 33.98 in hind leg while T2 showed minimum values i.e 34.01 and 32.44 in loin and hind leg meat respectively. Oat enrichment also enhanced the of monounsaturated fatty acids (MUFA). T1 showed higher percentage i.e 27.58 in case of hind leg while 24.96 in loin. It was also detected that growing levels of omega polyunsaturated fatty acids were varied from control group. The values were 2.98 % in loin meat while 5.10 % in leg meat of control group, rabbits fed on 4 % oat (T1) (4.19 % in Loin and 6.76 % in hind leg meat), 2 % oat (T2) (4.04 % in loin and 5.95 % in hind leg meat).

Table 2 Fatty acid profile of rabbit meat

Fatty acid composition (%)	Fatty acid profile of loin meat			Fatty acid profile of leg meat			p-value
	T0	T1	T2	T0	T1	T2	
C14,0	1.84	1.64	1.21	0.94	0.93	1.25	*
C16,0	26.79	26.28	25.83	26.21	26.03	25.91	*
C18,0	7.32	6.24	6.97	6.83	5.68	5.28	Ns
SFA	35.95	34.16	34.01	33.98	32.64	32.44	**
C14,1	0.07	0.02	0.02	0.13	0.08	0.07	Ns
C16,1	0.61	1.01	0.95	1.77	2.33	2.27	**
C18,1	23.03	23.93	23.75	24.57	25.17	25.13	*
MUFA	23.71	24.96	24.72	26.47	27.58	27.47	**
C18,2	18.82	18.2	18.04	20.02	19.45	19.65	*
C18,3	2.98	4.19	4.04	5.1	6.76	5.95	**
C20,3	0.30	1.81	1.75	0.33	1.66	1.8	**
C22,5	0.04	0.09	0.03	0.04	0.01	0.04	*
C22,6	0.09	0.61	0.04	0.25	0.06	0.08	Ns
PUFA	22.23	24.9	23.9	25.74	27.94	27.52	*
UFA	45.94	49.86	48.62	52.21	55.52	54.99	*
SFA/UFA	0.78	0.69	0.70	0.65	0.59	0.59	Ns
PUFA/SFA	0.62	0.73	0.70	0.76	0.86	0.85	*

*significant ** highly significant Ns Non-significant

IV. CONCLUSION

It is concluded that supplementation of 2 % oat seed in the feed of rabbits not only significantly enhanced concentration of polyunsaturated fatty acids in meat of rabbit but also reduced level of fat percentage in rabbit meat.

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