EFFECTS OF DIFFERENT FAT SOURCES ON FATTY ACID COMPOSITION AND CLA CONTENT OF SOME TISSUES OF LAYING HENS

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Abstract

Effects of different fat sources on fatty acid composition and the CLA contents of some tissues of laying hens were investigated by gas chromatographic method. In this study, the control (group I), tallow (group II), the internal fat (group III) and the tail fat (group IV), obtained by diets of laying hens with abdominal fat, skin and breast meat + leg were investigated. A total of 160 units, 22-week-old laying hens Hy-line strain used. 40 chickens were used in each group. According to the plan the randomized study, for 10 replications each treatment group, and each iteration is used for the 4 chicken. 18-Hour light-dark day 6 hours' lighting program applied the trial lasted for 12 weeks, feed and water is provided. Total 30 different fatty acids were determined in fatty acid compositions of some tissues. These fatty acids were varied between C 8 - C 22. Different fat sources added that dietary has led to important differences in the of fatty acids composition in abdominal adipose tissue ($P<0.05$). Diets containing saturated fatty acids, rich oil resources abdominal adipose tissue increased the saturated fatty acid content, diets containing fat sources rich in unsaturated fatty acids increased the unsaturated fatty acid content of abdominal adipose tissue. Animal fat diets of laying hens., especially with addition of the tail fat, skin, leg and breast meat the amount of the total CLA except of amount for abdominal fat statistically significant increased. After 90 days analysing amount of CLA all of the tissues was found to be the highest.

Key words: fatty acid composition, CLA, hy-line

People in our country due to increased production of poultry meat is preferred white instead of red meat.Our country with 1.444.060 tonnes has a share of 1.4% of hen production (www.fao.org). As of 2010, 16,971,000 tons of U.S. chicken meat production in the world with 30.7% is performing, China 21.4% to 11,853,200 tons, 10,692,600 tons in Brazil has a share of 19.3%.the other major producing countries, Mexico, Russia, India and the European Union countries.

The nutrient composition of the fatty acid with the desired content aimed at, use can be adjusted in this direction in the ration. That means saturated fatty acids (SFA) can be reduced, in the other way unsaturated fatty acids (UFA) is increased. for this the researchers in them studies, tended to enrichment methods of ratio tissue polyunsaturated fatty acids PUFA (Kralik et al., 2008).

Obesity, hyperlipidemia, atherosclerotic changes, lifestyle-related diseases such as diabetes mellitus and hypertension are widely seen in industrialized countries (Nagao et al., 2003). Ration composition of fatty acids in oils, which contain important in terms of morbidity and mortality of these diseases (Vessby, 2003).

Depending on the supply finding in tissue linoleic acid and oleic acid is the most of them. Between conjugated linoleic acid isomers of CLA is available (Mulvihill, 2001). CLA is located in various regions of the organism. Is a product of adipose tissue (Kelly, 2001). On studies In animal, in the fats ruminant CLA 's to reduce the risk of cardio-vascular diseases, in the other hand plasma total cholesterol, triglyceride and LDL levels have been reported to decrease (Baumgard et al, 2001). CLA's anti-carcinogenic body(anti-cancer) the effect of anti-atherogenic effect (hypolipidemic), the effect of anti-diabetic, insulin resistance, anti-obesity effect, effect on the immune system and concluded that the effect of osteoporosis.

Studies of micro-organisms in the intestines of animals and humans bringing ruminate linoleic acid CLA synthesis showed a very limited extent (Aydin, 2005). As a result of long research

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strengthens the immune system of chickens, pursued increases the growth rate of pigs (Pariza et al. 2001). In the study was found add some of different animal-derived oils to rations increase the amount of CLA in the abdominal fat, tissue and skin. In this study, investigate the changes in the amount of fatty acids and CLA in abdominal fat tissue and skin of laying hens when different fat sources added to the ration composition. For this purpose, with the addition of tallow fat, internal fat and tail fat composition of fatty acid of the laying hens and determined whether or not the effect abdominal fat tissue and skin of CLA content.The present document is arranged so that it can be used as a model. It is also a template on which you can work directly by replacing the corresponding paragraphs.

MATERIAL AND METHOD

2.1. Animals and diets

At 22 weeks of age, 160 Hy-line white egg layers were housed in cages and were assigned (40 laying hens each group) to four experimental diets. The diets of groups were based on control (2.5% canola oil), diet 1 (2.5% canola oil + 2.5% tallow fat), diet 2 (2.5% canola oil + 2.5% internal fat) oil, diet 3 (2.5% canola oil + 2.5% tail fat), respectively. The experiment lasted 90 days. The ingredients and chemical composition of diets are listed in *Table 1*, and the fatty acid composition of the various oil or fat sources used in the experiment are given in *Table 2*.

Compositions of the experimental diets

Table 1

Ingredients	Control (%)	Tallow fat (%)	Internal fat (%)	Tail fat (%)
Corn	60.55	60.55	60.55	60.55
Soybean meal (% 47 CP)	25.1	25.1	25.1	25.1
Barley	8.74	8.74	8.74	8.74
Canola Oil	2.5	2.5	2.5	2.5
Animal Fat	0	2.5	2.5	2.5
Dicalcium phosphate (DCP 20%)	2.28	0.07	0.07	0.07
Salt (NaCl)	0.39	0.1	0.1	0.1
Min + Vit premix	0.26	0.26	0.26	0.26
DL-Methionine	0.18	0.18	0.18	0.18

Fatty acid composition of diets (%)

Table 2

Fatty acids	Control (%) (n=5)	Added Tallow fat (%) (n=5)	Added Internal fat (%) (n=5)	Added Tail fat (%) (n=5)
C 8:0*	-	-	-	-
C 10:0	-	-	-	-
C 12:0	0.032±0.00a	0.092±0.00c	0.056±0.01b	0.110±0.01c
C 14:0	0.371±0.36c	5.368±0.17a	1.509±0.16b	1.521±0.24b
C 15:0	0.091±0.01c	0.818±0.02a	0.372±0.04b	0.352±0.01b
C 16:0	15.803±0.89c	33.84±0.72a	21.078±1.04b	15.746±0.34c
C 17:0	0.211±0.01b	0.791±0.03a	0.774±0.08a	0.807±0.02a
C 18:0	4.509±0.54d	13.89±0.41b	16.39±0.37a	7.82±0.25c
C 20:0	0.061±0.00c	0.070±0.00ab	0.075±0.01b	0.269±0.01a
C 21:0	0.054±0.01b	0.032±0.00c	0.034±0.01c	0.068±0.00a
C 22:0	0.551±0.03a	0.168±0.01c	0.258±0.04b	0.187±0.01c
∑ SFA	**21.683±0.90d**	**55.069±0.66a**	**40.546±0.96b**	**26.880±0.42c**
C 14:1ω5	0.014±0.00b	0.216±0.03b	0.158±0.03b	0.715±0.44a
C 15:1ω5	0.039±0.01c	0.202±0.01a	0.218±0.04a	0.116±0.01b
C 16:1ω7	0.288±0.04b	1.307±0.02a	1.186±0.14a	1.210±0.07a
C 17:1ω8	0.037±0.00c	0.094±0.01b	0.094±0.01b	0.111±0.01a
C 18:1 c9	36.355±0.75b	30.721±0.44c	41.718±0.82a	43.139±0.73a
C 18:1 c11	0.887±0.08c	1.274±0.12b	1.475±0.09a	1.555±0.04a
C 20:1ω9	0.355±0.04b	0.352±0.04b	0.414±0.25b	0.805±0.01a
C 22:1ω9	0.081±0.01a	0.089±0.01a	0.016±0.00b	0.014±0.00b
∑ MUFA	**38.056±0.62c**	**34.255±0.50d**	**45.279±0.84b**	**47.665±0.28a**
C 18:2ω6	36.765±0.55a	6.978±0.16d	10.597±0.49c	22.297±0.61b
C 18:3ω6	0.598±0.01a	0.430±0.04ab	0.631±0.23a	0.291±0.02b
C 18:3ω3	1.303±0.05b	0.322±0.02d	0.554±0.05c	2.079±0.10a
C 20:4ω6	0.046±0.01c	0.083±0.01c	0.377±0.04b	0.503±0.02a
C 20:5ω3	0.007±0.00d	0.026±0.00c	0.035±0.00b	0.045±0.00a
C 22:4ω6	0.548±0.04c	1.467±0.06a	1.231±0.15b	0.107±0.01d
C 22:5ω6	0.414±0.04b	1.092±0.27a	0.807±0.23a	0.178±0.01b
C 22:5ω3	0.260±0.02a	0.187±0.04b	0.196±0.02b	0.074±0.00c

C 22:6ω3	0.304±0.06a	0.168±0.03b	0.185±0.04b	0.062±0.01c
∑ PUFA	**40.245±0.53a**	**10.783±0.26d**	**14.667±0.28c**	**25.689±0.56b**
CLA c9 – t11**	0.000±0.00c	0.026±0.00b	0.040±0.01ab	0.047±0.00a
CLA t10 – c12**	0.000±0.00a	0.004±0.00a	0.014±0.02a	0.006±0.00a
∑ CLA**	**0.000±0.00c**	**0.030±0.01b**	**0.054±0.01a**	**0.053±0.01a**
∑ UFA	78.301±0.90a	45.038±0.66d	59.946±0.96c	73.354±0.42b
∑ PUFA / MUFA	1.058±0.02a	0.315±0.01c	0.324±0.00c	0.539±0.01b
∑ ω3	1.874±0.06b	0.703±0.09d	0.970±0.10c	2.260±0.10a
∑ ω6	38.371±0.54a	10.049±0.17d	13.643±0.27c	23.375±0.61b
∑ ω3/ω6	0.049±0.00c	0.070±0.01b	0.071±0.01b	0.097±0.01a

* a – d Mean values within the same row sharing a common superscripts are not significantly different at P < 0·01.
** a – d Mean values within the same row sharing a common superscripts are not significantly different at P < 0·001.

2.2. Sample collection

For the determination of fatty acid composition, five hens from each dietary treatment were randomly selected and analyzed at the end of the 90 days of experimental feeding. Selected hens were separated abdominal fat, skin and tissue. At the beginning of each analysis, the samples were allowed to achieve at room temperature and homogenized.

2.3. Fatty acid analysis

Collected samples for fatty acid & CLA analysis Folch & arc.To use from (1957)'s management 24 thousand rev / min in adjustabled homogenizer in blend of chloroform: methanol (v:v, 2:1) have been homogenized. Homogenized samples have been hold in deep-freeze to become methyl.

Fatty acids & CLA analysis was pt performed by HP (Hewllett Packard) Agilent brand, HP 6890N model, FID (Flame Ionization Detector) automatic injectory detectory of gas chromatography. The best perform of distinction of conjugated fatty acids in analysis were used 100 meters HP 88 capillary column.

From the fat was made 0,5 ml it putted into conical centrifuge tube. 1 ml 2N solution of KOH methanolic was added above. Then by adding 7 ml n-Heptan, closing tube & was shaken completely. After the shake level it was centrifuged for 10 minute in 5000 revolution. There was two phase on tube. By taking a little of the top phase & filtered by anhydrous Na_2SO_4 transferred to vial & was injected to gas chromatography (ISO-5509, 1978).

For gas chromatographic analysis was performed by modifying the terms of Ledoux 7 arc. (2005)'s. Temperature of injector block of GC was sat to 250 °C & Temperature of detector block was sat to 280 °C. Heat was applied to column. The beginning temperature of column was sat to 60 °C, this temperature was waited for 1 minute, then it was raised 20°C for each minute & reached to 190 °C. It was kept in this temperature for 60 minute. Following this temperature it was raised 1°C for each minute & reached to 220°C then was waited for 10 minute in this temperature. Total analysis duration is 107.5 minute. The gas flow rates of gas chromatography; hydrogen: 45 ml/min, dry air: 400 ml/min & helium: 1 ml/min was used as transporter gas were sat. 1µl of samples of fatty acids that became methyl form for the analysis was injected to GC.

Fatty acids methyl esters standards were obtained from Nu-Check Prep. Inc. USA, Sigma-Aldrich & Accu company. Conjugated linoleic acid (catalog number 05632) standards was provided from Sigma-Aldrich (st Louis, MO, USA) company. Standards relative retention times was determined by analysing gas chromatography instrument. So obtained standards with the help of relative retention times were determined which of fatty acids corresponding to chromatography's peaks. The triplicate chromatography's peaks that was obtained percent (%) field's arithmetic averages & standard deviations were calculated are given in tables form.

2.4. Statistical analysis

The experiment was based on a completely randomised design. The data were analysed by means of one-way ANOVA ($P < 0.05$). When analysis of variance indicated a significant treatment the means were compared by Duncan's multiple range tests. The data were expressed as means ± standard error.

RESULTS AND DISCUSSIONS

The fatty acid compositions of abdominal fat, skin and tissue at d 90 shown in *Tables 3, Table 4 and Table 5*, respectively.

In terms of control the saturated fatty acids difference was observed with, untie oil, tallow and tail fat groups. This is because of difference between stearic acid and palmitic acid content groups and that is the find out in some experiment.

Fatty acids in oils obtained from chickens abdominal part; Sol oleic fatty acid group (47.03%), linoleic acid in the control group (27.44%), palmitic acid in the control group (18.48%), sol-fat group, stearic acid (8.59%), palmitoleic acid in the control group (2.03%) and the internal fat group linolenic acid (1.197%), respectively.

Abdominal fat compositions of fatty acids, saturated and unsaturated fatty acids unchanged, increased in all groups of monounsaturated fatty acids, polyunsaturated fatty acids decreased. ω-6 fatty acids as well as decreased ω-3 ratio remained

constant. The total amount of PUFA and tail fat control groups with the highest values and the lowest values were observed in the groups containing sol oil and internal fat. The control group in terms of total MUFA, is different than the other groups. Trial groups, total ω3, ω6, and ω3/ω6 differences in terms of the rate in which is important (P <0.01). The highest value in the control group in terms of the content of ω6 realized the Res oil group recorded the lowest ω6 value. the highest value observed in the control group in terms of rate of ω6/ω3 oil, this group, respectively, lard, internal oil, oil-containing groups followed and conquer.

Palmitic acid values has decreased in groups. In terms of the percentage of stearic acid sol was no statistical difference was found with oil, lard group. Accordingly, the maximum value of stearic acid sol-fat group and the lowest value was observed in the tail-fat group.

Detected in chickens in the control group with oleic acid, oleic acid values determined from other groups of birds, there are statistically significant differences (P <0.01). Linoleic acid content of the oil was added to the control group, a significant level of groups is low. There was no difference between the groups in terms of linolenic acid (P <0.01). However, the oils of the control group of chickens abdominal percentage arachidonic acid, higher fatty diet.

Chickens after 90 days, the abdominal fat are C 18:0, stearic acid (6.437-8.585%) and C 16:0, palmitic acid (16.823-18.476 %) major SFA: C 18:1 c9, oleic acid (39.987-47.030%) Major MUFA and C 18:2 ω6, linoleic acid (21.526-27.436%) major PUFA, respectively (*Table 3*). Similarly, Kralik et al. (2008), (Crespo et al., 2001). Javadi et al., (2007) major abdominal fats SFA palmitic acid and stearic acid, oleic acid and linoleic acid in major MUFA PUFA were identified as major. Chickens after 90 days, a total abdominal fat are SFA, control, Res oil, tallow and oil 26.971% groups, respectively, 27,605%, 27.217%, and determined to be 24.523% (*Table 3*).

In our study, a total abdominal fat SFA value, Sehu et al. (2012), Javadi et al. (2007) in their studies with the values obtained were similar to the total SFA. Palmitic acid and stearic acid were high percentages. Following this myristic acid, the fatty acids with the highest percentage of saturated fatty acid is determined as the third. Similar results Kawahara et al.. (2009), Rymer et al. (2010) and Wongsuthavas et al. (2011), in their study of abdominal fat are obtained from chickens have been observed.

Oils of chickens after 90 days, the total MUFA abdominal control, sol-fat, tallow fatty groups and tail, respectively, 43,873%, 48,968%, 48.055% and 49.175% as determined (*Table 3*). Oleic acid has been identified as the major fatty acid. Pamitoleic acid chickens with the highest percentage of abdominal fat are identified as the second MUFA. At the end of 90 days of total MUFA oils chickens abdominal control, sol-fat, internal fat, and tail-fat groups, respectively, 29.121%, 23.427%, 24.728%, and 26.299%, respectively. The high PUFA control group of abdominal fats chickens was obtained (*Table 3*).

Total PUFA oils of chickens after 90 days, abdominal count. Du et al. (2002), Crespo et al. (2001) have obtained similar results in their studies. Abdominal total ω3 oils, respectively, 1.122%, 1.103%, 1.211% and 1.145% as determined (*Table 3*).The highest value in terms of total ω3 obtained from chickens fed internal fat abdominal fats were added. Samples from chickens after 90 days, abdominal fatty acid composition of oils, a high percentage of the one found two CLA isomer-C 18:2 c9 t11 isomer (*Table 3*).The highest total CLA chickens among the groups of abdominal fat are fatty groups sol (0.419%), then the tail-fat group (0.226%) was determined. abdominal oils total CLA respectively is 0.028%, 0.419%, 0.183% and 0.226%, respectively. Similar results Du et al. (2002) also observed.

Table 3

Fatty acid compositions of abdominal fat at 90. days (%)

Fatty acids	Control	Tallow	Internal fat	Tail fat
	(n=5)	(n=5)	(n=5)	(n=5)
C 8:0*	0.001±0.00a	0.000±0.00a	0.000±0.00a	0.001±0.00a
C 10:0	0.005±0.00a	0.011±0.01a	0.014±0.01a	0.010±0.00a
C 12:0	0.022±0.00b	0.026±0.01ab	0.033±0.01ab	0.039±0.00a
C 14:0	0.505±0.06b	0.761±0.10a	0.826±0.11a	0.823±0.06a
C 15:0	0.062±0.02ab	0.033±0.04b	0.098±0.03a	0.035±0.02b
C 16:0	18.476±1.62a	17.845±0.68a	17.965±0.62a	16.823±0.94a
C 17:0	0.185±0.09b	0.316±0.07a	0.235±0.04ab	0.328±0.06a
C 18:0	7.652±0.37ab	8.585±0.95a	8.001±0.72ab	6.437±0.60b
C 20:0	0.023±0.01a	0.014±0.01a	0.023±0.02a	0.020±0.01a
C 21:0	0.009±0.01a	0.005±0.00a	0.008±0.01a	0.002±0.00a

C 22:0	0.031±0.02a	0.009±0.01a	0.014±0.02a	0.005±0.01a
∑ SFA	**26.971±2.31a**	**27.605±1.29a**	**27.217±1.17a**	**24.523±1.34a**
C 14:1ω5	0.021±0.01a	0.021±0.03a	0.043±0.02a	0.024±0.01a
C 15:1ω5	0.008±0.01a	0.009±0.02a	0.027±0.01a	0.006±0.01a
C 16:1ω7	2.025±0.56a	1.816±0.34b	1.940±0.45ab	1.555±0.33b
C 17:1ω8	0.192±0.15a	0.082±0.07a	0.091±0.04a	0.210±0.03a
C 18:1 c9	39.987±1.94b	47.030±0.60a	45.925±0.76a	46.958±2.20a
C 18:1 c11	1.232±0.09a	0.00±0.00b	0.00±0.00b	0.297±0.66b
C 20:1ω9	0.406±0.15a	0.007±0.05a	0.022±0.03a	0.123±0.16ab
C 22:1ω9	0.002±0.00a	0.003±0.00a	0.007±0.01a	0.002±0.00a
∑ MUFA	**43.873±2.03b**	**48.968±1.40a**	**48.055±1.01a**	**49.175±1.49a**
C 18:2ω6	27.436±1.67a	21.526±1.32b	23.072±1.50b	24.459±1.66ab
C 18:3ω6	0.125±0.10a	0.117±0.03a	0.119±0.07a	0.127±0.09a
C 18:3ω3	1.021±0.13a	1.086±0.11a	1.197±0.15a	1.135±0.13a
C 20:4ω6	0.356±0.33a	0.104±0.06ab	0.121±0.12ab	0.037±0.02b
C 20:5ω3	0.007±0.00a	0.004±0.00a	0.003±0.00a	0.003±0.00a
C 22:4ω6	0.030±0.02b	0.129±0.17ab	0.007±0.01b	0.299±0.27a
C 22:5ω6	0.024±0.03a	0.029±0.02a	0.015±0.01b	0.006±0.01b
C 22:5ω3	0.008±0.01a	0.010±0.02a	0.005±0.01a	0.003±0.00a
C 22:6ω3	0.086±0.08a	0.003±0.00b	0.006±0.00b	0.004±0.00b
∑ PUFA	**29.121±1.56a**	**23.427±1.42c**	**24.728±1.38bc**	**26.299±1.76b**
CLA c9 – t11**	0.020±0.01b	0.408±0.07a	0.171±0.19ab	0.220±0.22ab
CLA t10 – c12**	0.008±0.01a	0.011±0.01a	0.012±0.02a	0.006±0.01a
∑ CLA**	**0.028±0.01b**	**0.419±0.07a**	**0.183±0.21ab**	**0.226±0.23ab**
∑ UFA	72.994±2.33a	72.395±1.29a	72.783±1.18a	75.474±1.33a
∑ PUFA / MUFA	0.664±0.05a	0.478±0.04c	0.515±0.04b	0.535±0.05b
∑ ω3	1.122±0.15a	1.103±0.12a	1.211±0.15a	1.145±0.12a
∑ ω6	27.971±1.51a	21.905±1.44c	23.334±1.44bc	24.928±1.77b
∑ ω3/ω6	0.040±0.01a	0.050±0.01a	0.052±0.01a	0.046±0.01a

* a – d Mean values within the same row sharing a common superscripts are not significantly different at P < 0·01.

** a – d Mean values within the same row sharing a common superscripts are not significantly different at P < 0·001.

MUFA fatty acids compared to controls, increased. Accordingly, the largest increase was observed in sol-fat group. MUFA's reason for the elevation of C18: 1 oleic acid due to the increase. This is despite an increase in PUFA fatty acids decreased (P <0.01). Due to C18: 2 linoleic acid decreases PUFA 's decreased. Therefore, there was no correlation between MUFA and PUFA fatty acids. Saturated fatty acids were not statistically any change. Skin of chickens after 90 days, the total monounsaturated fatty acid increased. Oleic acid, linoleic acid, palmitic acid, stearic acid, palmitoleic acid, linolenic acid and myristic acid primary fatty acids found in their skin. There was no significant difference between the groups in terms of the content of palmitic acid. Stearic acid, with the highest percentage of saturated fatty acid used, respectively.

C 18:0 fatty acid composition of the skin of chickens after 90 days, stearic acid (6.109-7.269%) and C 16:0, palmitic acid (17.502-18.998%) major SFA: C 18:1 c9, oleic acid (37.082-42.889 %) and C 18:2 ω6 major MUFA, linoleic acid (25.309-31.309%) major PUFA, respectively (*Table 4*).

SFA skin of chickens after 90 days, the total fatty acid composition, control, sol-fat, tallow fatty groups, respectively, and dry 26.022%, 26.972%, 26.726% and 24.842% as determined (*Table 4*).

High percentages of saturated fatty acids palmitic acid and stearic acid, is respective. Total fatty acid composition of the skin of chickens MUFA, control, sol-fat, tallow fat and dry the groups, respectively, 40.747%, 45.140%, 44.503% and 44.543% as determined (*Table 4*).Oleic acid from the skin of chickens have been identified as major MUFA. This is followed by fatty acid pamitoleic acid with the highest percentage of all the skin from chickens fed MUFA diets, respectively.major PUFA linoleic acid in the skin was determined as the highest (1.237%). Chicken fat, chicken skin to the rations of different fat sources of DHA and EPA fatty acids also affected.

At the end of 90'th days in the control group total CLA fatty acid composition in the skin of chickens, respectively, 0.016%, 0.244% sol-fat

group, the group internal fat and tail fat 0.070% 0.258% as a group, have been identified.

Table 4

Fatty acid compositions of skin at 90. days (%)

Fatty acids	Control (n=5)	Tallow (n=5)	Internal fat (n=5)	Tail fat (n=5)
C 8:0*	0.002±0.00a	0.000±0.00a	0.000±0.00a	0.000±0.00a
C 10:0	0.012±0.01a	0.015±0.01a	0.021±0.01a	0.010±0.00a
C 12:0	0.018±0.01b	0.030±0.01a	0.034±0.01a	0.034±0.01a
C 14:0	0.527±0.06b	0.704±0.08a	0.725±0.04a	0.767±0.07a
C 15:0	0.046±0.01b	0.046±0.04b	0.083±0.02a	0.054±0.02b
C 16:0	18.395±1.28a	18.998±0.46a	18.318±0.53a	17.502±1.42a
C 17:0	0.197±0.03b	0.314±0.03a	0.239±0.03b	0.323±0.06a
C 18:0	6.739±0.67ab	6.826±0.85ab	7.269±0.40a	6.109±0.58b
C 20:0	0.012±0.01a	0.008±0.01a	0.011±0.01a	0.014±0.02a
C 21:0	0.031±0.04a	0.013±0.01a	0.017±0.01a	0.014±0.02a
C 22:0	0.043±0.03a	0.018±0.01a	0.009±0.01a	0.015±0.02a
∑ SFA	**26.022±1.30a**	**26.972±0.99a**	**26.726±0.63a**	**24.842±1.65a**
C 14:1ω5	0.019±0.01b	0.024±0.03b	0.049±0.07a	0.017±0.01b
C 15:1ω5	0.011±0.01a	0.005±0.00a	0.007±0.00a	0.006±0.00a
C 16:1ω7	2.132±0.48a	2.095±0.60a	2.353±0.66a	1.716±0.43b
C 17:1ω8	0.253±0.18a	0.109±0.09ab	0.062±0.02b	0.253±0.09a
C 18:1 c9	37.082±0.47b	42.889±2.90a	42.010±0.57a	42.385±0.04a
C 18:1 c11	1.054±0.25a	0.000±0.00b	0.000±0.00b	0.154±0.34b
C 20:1ω9	0.193±0.15a	0.010±0.00b	0.015±0.02b	0.005±0.00b
C 22:1ω9	0.003±0.00a	0.008±0.00a	0.007±0.00a	0.007±0.00a
∑ MUFA	**40.747±0.36b**	**45.140±1.56a**	**44.503±0.75a**	**44.543±1.22a**
C 18:2ω6	31.309±1.15a	25.309±0.58b	26.523±1.17b	27.453±2.04b
C 18:3ω6	0.187±0.16a	0.205±0.06a	0.183±0.13a	0.187±0.09a
C 18:3ω3	1.147±0.15b	1.140±0.09b	1.221±0.14a	1.237±0.15a
C 20:4ω6	0.468±0.16ab	0.707±0.47a	0.680±0.36a	0.364±0.38b
C 20:5ω3	0.005±0.01a	0.007±0.01a	0.006±0.01a	0.009±0.01a
C 22:4ω6	0.046±0.03b	0.189±0.42ab	0.007±0.00b	0.639±0.81a
C 22:5ω6	0.011±0.01a	0.033±0.03a	0.027±0.03a	0.027±0.03a
C 22:5ω3	0.009±0.01a	0.022±0.04a	0.006±0.00a	0.008±0.01a
C 22:6ω3	0.033±0.03ab	0.012±0.01b	0.049±0.06a	0.013±0.01b
∑ PUFA	**33.231±1.19a**	**27.868±0.96b**	**28.772±1.11b**	**30.195±1.64b**
CLA c9 – t11**	0.012±0.01b	0.225±0.17a	0.058±0.07ab	0.247±0.08a
CLA t10 – c12**	0.004±0.00a	0.019±0.01a	0.012±0.01a	0.011±0.01a
∑ CLA**	**0.016±0.01b**	**0.244±0.17a**	**0.070±0.07ab**	**0.258±0.08a**
∑ UFA	73.978±1.30a	73.008±0.97a	73.275±0.63a	74.738±2.13a
∑ PUFA / MUFA	0.816±0.05a	0.617±0.04b	0.647±0.03b	0.678±0.04b
∑ ω3	1.194±0.14a	1.181±0.08a	1.282±0.13a	1.267±0.17a
∑ ω6	32.021±1.15a	26.443±0.90b	27.420±1.05b	28.670±1.79b
∑ ω3/ω6	0.037±0.01b	0.045±0.00a	0.047±0.01a	0.044±0.01a

* a – d Mean values within the same row sharing a common superscripts are not significantly different at P < 0·01.

** a – d Mean values within the same row sharing a common superscripts are not significantly different at P < 0·001.

Rump and Breast meat, due to lower cholesterol and triglyceride, portions of the most widely consumed by humans. Therefore, in terms of consumption of these parts would be useful to know the fat and fatty acid ratios. This fatty acid analysis is difficult to do because they are lean meat parts. So it is preferred to the consumption.

At the end of 90 days from the leg and breast meat of chickens increased total MUFA. The maximum increase is in tail fat group. This group is followed by the order to untie oil and tallow. MUFA in the biggest reason for the increase is due to an increase in oleic acid C 18:1. Palmitoleic acid remained the same between the groups. While the control group, 89% oleic acid, about 95% of sol-fat group. Saturated fatty acids decreased the tail-fat group, and other groups remained the same. PUFA fatty acids decreased in the control group. Feeds fatty acids and breast meat but the best part was reflecting. Thus, diets and breast meat fatty acid composition of different oils mixed but can be changed.

With the highest percentage saturated fatty acid palmitic acid (60-65%).The remaining 30-35% is part of stearic acid. except that 1-2% one of saturated fatty acids and oils of some form. Rump and Breast meat fatty acid profile shows that common property. Saturated fatty acids, is lower than monounsaturated fatty acids. Similarly, saturated fatty acids, PUFA and MUFA similar

correlations between the occurrence. Resolve fat and breast meat according in the group of polyunsaturated fatty acid value but is lower than saturated fatty acids. Similarly, the observed correlation between MUFA and PUFA. PUFA / MUFA ratio decreased compared to the control group. This shows that PUFA's are more than MUFA's. PUFA's have a high level of linoleic acid is because a high percentage. Total amount of ω-3 fatty untie group than the control group increased by reduced the internal oil group. This value is the tail-fat group remained the same. Total value of ω-6 in the control group decreased. Therefore, the rate of the control group decreased ω-6/ω-3.

Table 5

Fatty acid compositions of tissue at 90. days (%)

Fatty acids	Control (n=5)	Tallow (n=5)	Internal fat (n=5)	Tail fat (n=5)
C 8:0*	0.000±0.00a	0.000±0.00a	0.000±0.00a	0.001±0.00a
C 10:0	0.019±0.03a	0.026±0.05a	0.023±0.01a	0.007±0.01a
C 12:0	0.020±0.02a	0.016±0.01a	0.014±0.02a	0.032±0.02a
C 14:0	0.361±0.15b	0.510±0.24ab	0.518±0.12ab	0.660±0.19a
C 15:0	0.035±0.03b	0.056±0.05a	0.051±0.03ab	0.044±0.02b
C 16:0	20.357±0.92a	19.950±2.15a	19.232±0.81a	18.286±0.75a
C 17:0	0.186±0.03b	0.236±0.06a	0.207±0.05ab	0.241±0.15a
C 18:0	11.277±2.58a	11.711±4.18a	11.662±1.95a	8.696±2.16b
C 20:0	0.078±0.12a	0.019±0.02b	0.023±0.00b	0.020±0.02b
C 21:0	0.014±0.00b	0.071±0.07a	0.024±0.03b	0.004±0.00b
C 22:0	0.329±0.11a	0.087±0.17b	0.022±0.04b	0.113±0.09b
∑ SFA	**32.676±2.31a**	**32.682±6.02a**	**31.776±2.50a**	**28.104±1.57b**
C 14:1ω5	0.024±0.03b	0.080±0.15a	0.020±0.02b	0.012±0.01b
C 15:1ω5	0.006±0.01a	0.011±0.02a	0.007±0.00a	0.006±0.00a
C 16:1ω7	1.312±0.65a	1.465±1.07a	1.363±0.35a	1.592±0.81a
C 17:1ω8	0.129±0.08ab	0.092±0.07ab	0.051±0.02b	0.147±0.09a
C 18:1 c9	25.581±5.10b	34.069±6.32a	32.349±6.28a	36.712±4.97a
C 18:1 c11	1.424±0.46a	0.000±0.00b	0.000±0.00b	0.000±0.00b
C 20:1ω9	0.176±0.10a	0.030±0.04b	0.027±0.02b	0.070±0.12ab
C 22:1ω9	0.014±0.01a	0.010±0.01a	0.014±0.01a	0.009±0.01a
∑ MUFA	**28.666±5.44b**	**35.757±7.23ab**	**33.831±3.78ab**	**38.548±5.70a**
C 18:2ω6	23.307±4.07a	21.837±2.78a	22.525±1.77a	23.824±1.45a
C 18:3ω6	0.103±0.09ab	0.092±0.05b	0.121±0.04a	0.129±0.05a
C 18:3ω3	0.508±0.39b	0.699±0.36ab	0.704±0.26ab	0.906±0.31a
C 20:4ω6	11.033±6.30a	5.751±5.99b	8.570±2.51ab	5.942±4.34b
C 20:5ω3	0.022±0.01a	0.019±0.01a	0.008±0.01a	0.015±0.01a
C 22:4ω6	0.977±0.37a	0.447±0.52b	0.757±0.93ab	0.566±0.37b
C 22:5ω6	0.551±0.31a	0.261±0.26ab	0.089±0.07b	0.280±0.31ab
C 22:5ω3	0.383±0.21a	0.439±0.37a	0.139±0.08b	0.217±0.19ab
C 22:6ω3	1.630±0.78a	1.859±1.33a	1.439±0.93a	1.253±0.97a
∑ PUFA	**38.539±3.53a**	**31.540±5.04b**	**34.389±2.18b**	**33.348±4.32b**
CLA c9 - t11**	0.011±0.01b	0.109±0.09ab	0.026±0.02b	0.199±0.14a
CLA t10 – 12**	0.014±0.01a	0.027±0.02a	0.011±0.01a	0.017±0.01a
∑ CLA**	**0.025±0.01b**	**0.136±0.08ab**	**0.037±0.01b**	**0.216±0.13a**
∑ UFA	67.205±2.19b	67.297±6.00b	68.220±2.50b	71.896±1.57a
∑ PUFA / MUFA	1.344±0.44a	0.882±0.34b	1.016±0.18ab	0.865±0.26b
∑ ω3	2.543±0.63ab	3.016±1.36a	2.290±0.86b	2.391±0.86ab
∑ ω6	35.971±2.84a	28.388±4.27b	32.062±2.12ab	30.741±3.36ab
∑ ω3/ω6	0.071±0.01b	0.106±0.05a	0.071±0.03b	0.078±0.02b

* a – d Mean values within the same row sharing a common superscripts are not significantly different at P < 0·01.
** a – d Mean values within the same row sharing a common superscripts are not significantly different at P < 0·001.

Leg and breast meat of chickens after 90 days, composition C 18:0 fatty acid, stearic acid (8.696-11.711%) and C 16:0, palmitic acid (18.286-20.357%) major SFA: C 18:1 c9, oleic acid (25.581-36.712%) and C 18:2 ω6 major MUFA, linoleic acid (21.837-23.824%) was found to be the major PUFA (*Table 4*).

Similarly Gülsen et al. (2010), in leg and breast meat, major SFA palmitic acid and stearic acid, oleic acid major MUFA and linoleic acid in major PUFA were identified.

Again the same results in the similar studies, has been observed conducted that (Kralik et al.

2012). Kawahara et al. (2009), Broiler chickens, major SFA is palmitic and stearic acid, oleic acid and linoleic acid major is the MUFA were identified as major PUFA.

Total SFA, control, tallow, internal oil and tail fat groups, respectively, 32.676%, 32.682%, 31.776% and 28.104% was determined (*Table 5*).this results in the literature may be found to be the same (Kralik et al. 2012). No significant difference was detected in total SFA and stearic acid. Similarly, Kralik et al. (2012) in their study on the total SFA, myristic and palmitic acid, able to specify the difference. Total MUFA, respectively, 28.666%, 35.757%, 33.831% and 38.548% determined to be (*Table 5*).In our study, the value of the total MUFA are similar to, Kawahara et al. (2009) total MUFA value in their study's. Oleic acid has been identified as the major fatty acid. Following these fatty acids respectively, MUFA secondary pamitoleik acid. Similar results was in Kralik et al. (2012) study's.

Total PUFA control, untie oil, internal fat and tail fat groups, respectively, 38.539%, 31.540%, 34.389% and 33.348%, has been found.

The major PUFA's linoleic acid, have been identified as the high tail fat groups (23.824%).After 90 days, in tissue samples, total ω3 respectively, 2.543%, 3.016%, 2.290% and 2.391% was determined (*Table 5*). Hy-line laying hens race in terms of total ω3 fat observed in the group of the high res.Du et al. (2002) found similar results as our.

CLA isomer one found in the tissues of the high percentage of C 18:2 c9-t11 isomer (*Table 5*).Similar results also observed in Kawahara et al. (2009), Aletor et al. (2003) studys. The total CLA from the high tail fat group, (0.216%), also followed by thigh and breast chickens meat sol fat group (0.136%) have been identified. Total CLA control, Res oil, internal fat and tail fat groups, respectively, 0.025%, 0.136%, 0.037% and 0.216%, has been founded. Du et al. (2002) was added to a different source of fat, so thigh and breast meat of laying hens have obtained similar results. Results of the investigation at abdominal fat, skin, leg and breast meat showed total of 30 fatty acid identified. These fatty acids has varied as C 8 and C 22.

At the end of 90 days, untie fat group in the tissues of chickens the total SFA, PUFA and ω-3 in the tissues was higher than the percentage of abdominal fat and skin, while the highest percentage of abdominal fat was observed in terms of total MUFA. With adding supplemented internal fat to the diets of laying hen at the end of 90 days were total percentage of SFA, PUFA, ω-3 in the tissues was higher than percentage of abdominal and skins, the highest percentage of MUFA and CLA was determined in the abdominal fat.

With adding tail fat to the laying hen rations after 90 days the total SFA, ω-3 and PUFA percentage were detected in the tissues, in terms of total MUFA the highest percentage was observed in abdominal fat.in terms of the highest percentage, total CLA has been found in the skin (*Table 3,4,5*).

CONCLUSIONS

Adding the animal fat, especially tail fat to the laying hens's feeds is reason of the CLA isomers that have an important place in terms of health increase, it's advised to laying hens growers to add tail fat to their feeds.

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