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The effect of diet on the composition and positional distribution of the fatty acids in the triglycerides obtained from the adipose tissues of rabbits

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1. Five groups of male rabbits (six to eight per group) were given *ad lib.*, for a period of 9 months, diets that contained high levels of maize oil, butter, butterfat, hydrogenated coconut oil or starch. At the end of this period the rabbits were killed and the fatty acid compositions of the triglycerides obtained from the subcutaneous and perinephric adipose tissues were determined.

2. Irrespective of whether there had been a net gain or a net loss of adipose tissue during the feeding period, the fatty acid compositions of the diets were reflected to some extent in the fatty acid compositions of the adipose tissue triglycerides. The concentration of linoleic acid was unexpectedly high in the adipose tissue triglycerides of the rabbits given the diet containing hydrogenated coconut oil.

3. Significant subcutaneous–perinephric differences in fatty acid composition were invariably negative for lauric, myristic, palmitic and palmitoleic acids and positive for stearic, oleic, linoleic and linolenic acids.

4. Within each group of rabbits, the liver triglycerides contained higher concentrations of lauric, myristic, palmitic and palmitoleic acids and lower concentrations of stearic and oleic acids than did the adipose tissue triglycerides.

5. There was no marked preferential esterification of individual fatty acids in the α,α'- or β-positions of the triglycerides in the adipose tissues of the experimental rabbits. Only in the rabbits given the high-maize oil diet was there any differential distribution of linoleic acid between the α,α'- and β-positions. In this group of rabbits linoleic acid occurred in higher concentrations in the α,α'-position in both types of adipose tissue triglycerides.

In a previous publication, Moore & Williams (1964*a*) described the effects of diets containing high levels of maize oil, butter, butterfat, hydrogenated coconut oil or starch on the concentrations of cholesterol in the plasma, liver, heart and kidneys and on the degree of aortic atherosis in rabbits. This study has now been extended by a detailed investigation of the effects of these different diets on the fatty acid compositions of the triglycerides isolated from the adipose tissues of the same experimental rabbits. The results of this investigation are now reported together with a comparison of the fatty acid compositions of the triglycerides of the liver and adipose tissues.

EXPERIMENTAL

Rabbits, diets and experimental procedure

Forty male New Zealand White rabbits, obtained at the age of 6 months from a local breeder, were divided into five groups of eight each. The rabbits were housed in individual cages and were given food and water *ad lib.* The basal diet consisted (parts

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by weight) of starch 16·3, sucrose 10, casein 25·0, wheat straw (ground to pass through a 2 mm sieve) 19·0, methyl cellulose 1·0, potassium acetate 2·5, magnesium oxide 0·5, sodium chloride 0·7, choline chloride 0·5, salt mixture 4·0 and vitamin mixture 0·5, making 80 parts in all. The compositions of the salt and vitamin mixture have been given by Moore & Williams (1964*a*). To 80 parts of this basal diet were added: for group 1, 20 parts maize oil; for group 2, 24 parts butter; for group 3, 20 parts butterfat; for group 4, 20 parts hydrogenated coconut oil; and for group 5, 1 part maize oil and 41·9 parts starch. The high-starch diet given to the rabbits in group 5 was devised so that the linoleic acid : gross energy ratio was the same as that of the diet containing 20% butterfat given to the rabbits of group 3 (Moore & Williams, 1964*a*). The fatty

Table 1. *Fatty acid compositions (g/100 g diet) of the experimental diets*

Acid	Group 1 (high-maize oil diet)	Group 2 (butter diet)	Group 3 (butterfat diet)	Group 4 (coconut oil diet)	Group 5 (high-starch diet)
Lauric	0·03	0·18	0·18	6·09	0·02
Myristic	0·09	1·50	1·71	3·95	0·07
Palmitic	2·00	5·51	5·61	2·77	0·18
Palmitoleic	0·06	0·33	0·34	0·07	0·01
Stearic	0·27	2·14	1·99	3·94	0·03
Oleic	4·64	5·12	4·94	0·34	0·22
Linoleic + linolenic	10·61	0·59	0·57	0·17	0·44

acid compositions of the experimental diets are given in Table 1. These diets were given to the rabbits for a period of 9 months. Certain of the animals died during the experiment and the numbers that survived in each group are given in Table 2. At the end of the 9-month period, the animals were killed and the livers and samples of subcutaneous and perinephric adipose tissues were taken for analysis. The samples of subcutaneous adipose tissues were taken from the interscapular region.

A further six male New Zealand White rabbits (group 6) were obtained at the age of 6 months from the same local breeder. It was ascertained that, up to this age, these rabbits had been given the same commercial diet as had the animals of the previous consignment. On arrival at the laboratory, these six animals were killed and samples of subcutaneous and perinephric adipose tissues were taken for analysis. The mean weight (kg, ± SEM) of the rabbits in group 6 was 3·52 ± 0·18.

Extraction of lipids and methods of analysis

The lipids were extracted from the livers and adipose tissues by the method of Folch, Lees & Stanley (1957). To separate the triglycerides from the remaining lipid fractions, portions of the purified lipid extracts were then chromatographed on columns of silicic acid as described by Moore & Doran (1962). The fatty acid compositions of the triglycerides were then determined by the procedure given in detail by Moore & Williams (1964*b*). The fatty acid compositions of the adipose tissue triglycerides were determined on the samples obtained from each of the animals in groups 1–6, whereas the fatty acid compositions of the liver triglycerides were de-

termined on pooled samples obtained from each group (1–5) of rabbits. The positional distributions of the various fatty acids in the triglycerides extracted from each type of adipose tissue were determined on pooled samples of triglycerides obtained from each group (1–5) of rabbits. The technique of determining the distribution of the various fatty acids between the α,α'- and β-positions of the triglycerides was that of Coleman (1961).

Statistical analysis

Differences between dietary treatments. Within each fatty acid and type of adipose tissue, the range of concentration percentages was fairly small and an analysis of variance was carried out on the observed values to examine dietary differences. The tests of significance were based on the multiple-range test (Duncan, 1955).

Differences between tissues. For individual fatty acids, analyses of variance between the concentrations in the triglycerides of the subcutaneous and perinephric adipose tissues provided tests of group and of overall average differences.

Table 2. *Numbers of rabbits in each group and weights* (kg) of the rabbits at the beginning and end of the experiment*

Group no.	No. of rabbits/group	Wt at beginning of expt	Wt at end of expt
1 (high-maize oil diet)	8	3·65 ± 0·23	4·09 ± 0·19
2 (butter diet)	7	3·12 ± 0·27	3·68 ± 0·24
3 (butterfat diet)	6	3·65 ± 0·20	3·97 ± 0·23
4 (coconut oil diet)	6	3·87 ± 0·05	3·15 ± 0·11
5 (high-starch diet)	6	3·59 ± 0·14	3·93 ± 0·15

* Mean values with their standard errors.

RESULTS

With the exception of the rabbits given the diet containing hydrogenated coconut oil (group 4), all of the animals gained weight during the experiment (Table 2). The rabbits in group 4 lost weight progressively and this loss in weight was reflected by the smaller amounts of adipose tissue that were found in the animals in this group at the end of the experiment.

The fatty acid compositions of the triglycerides obtained from the subcutaneous and perinephric adipose tissues of the rabbits on the various dietary treatments are given in Tables 3 and 4. Lauric acid was found only in low concentrations in the adipose tissue triglycerides of all the experimental rabbits including those in group 4 that were given the diet containing hydrogenated coconut oil. However, the concentration of lauric acid in both the subcutaneous and perinephric triglycerides of the rabbits in group 4 was significantly higher than that in the corresponding triglycerides of the rabbits in the other groups (Tables 3 and 4). Higher levels of myristic acid were present in the diets containing butter, butterfat or hydrogenated coconut oil (Table 1) and the concentrations of myristic acid in the adipose tissue triglycerides of the rabbits in groups 2, 3 and 4 tended to be higher than those observed for the rabbits in groups 1 and 5, but, even in the rabbits of group 4, myristic acid did not constitute more than

10% of the fatty acids in the adipose tissue triglycerides. In both the subcutaneous and perinephric adipose tissues, palmitic acid accounted for about 25% of the triglyceride fatty acids in groups 2, 3, 4 and 5, but the concentration of palmitic acid in the adipose tissue triglycerides of the rabbits in group 1 was significantly lower than that found for all the other groups of rabbits. Palmitoleic acid occurred in significantly higher concentrations in the adipose tissue triglycerides of the rabbits in group 5 given the high-starch diet. The concentration of stearic acid in the subcutaneous trigly-

Table 3. *Fatty acid compositions (weight percentages of the total) of the triglycerides extracted from the subcutaneous adipose tissues of rabbits on the various dietary treatments*

(Mean values and standard errors of single observations are given)

Acid	Group 1 (high-maize oil diet)	Group 2 (butter diet)	Group 3 (butter-fat diet)	Group 4 (coconut oil diet)	Group 5 (high-starch diet)	SE (28 df)	Significance of differences*
Lauric	0·1	0·2	0·2	1·2	0·1	0·25	1 5 3 2 4
Myristic	0·8	5·5	4·7	5·7	2·6	0·77	1 5 3 2 4
Palmitic	12·8	24·2	25·2	23·9	25·0	2·52	1 4 2 5 3
Palmitoleic	2·1	4·0	4·6	2·6	8·0	1·26	1 4 2 3 5
Stearic	3·8	7·3	7·4	8·8	6·1	1·06	1 5 2 3 4
Oleic	32·4	43·4	41·5	30·3	41·2	2·80	4 1 5 3 2
Linoleic	45·4	7·8	11·4	22·4	14·3	3·02	2 3 5 4 1
Linolenic	0·6	0·9	1·2	1·8	0·6	0·39	1 5 2 3 4

The number of rabbits in each group is given in Table 2.

* The mean values differ significantly ($P < 0.01$) except when the group numbers share a common underlining.

Table 4. *Fatty acid compositions (weight percentages of the total) of the triglycerides extracted from the perinephric adipose tissues of rabbits on the various dietary treatments*

(Mean values and standard errors of single observations are given)

Acid	Group 1 (high-maize oil diet)	Group 2 (butter diet)	Group 3 (butter-fat diet)	Group 4 (coconut oil diet)	Group 5 (high-starch diet)	SE (28 df)	Significance of differences*
Lauric	0·2	0·3	0·3	2·2	0·2	0·89	1 5 2 3 4
Myristic	1·1	6·0	4·8	9·0	2·7	1·92	1 5 3 2 4
Palmitic	18·2	27·9	25·9	25·1	27·1	3·29	1 4 3 5 2
Palmitoleic	3·2	3·8	4·4	3·2	9·2	1·31	1 4 2 3 5
Stearic	2·8	7·5	7·2	8·3	4·4	1·27	1 5 3 2 4
Oleic	28·9	43·6	42·9	29·5	37·4	3·30	1 4 5 3 2
Linoleic	45·4	7·1	10·5	20·1	15·3	3·51	2 3 5 4 1
Linolenic	0·5	0·8	0·9	1·1	0·5	0·17	1 5 2 3 4

The number of rabbits in each group is given in Table 2.

* The mean values differ significantly ($P < 0.01$) except when the group numbers share a common underlining.

cerides of the rabbits in group 1 was significantly lower than that observed in the other groups of rabbits. Similar differences in the concentration of stearic acid occurred in the perinephric triglycerides, but the value obtained for the rabbits in group 1 did not differ significantly from that obtained for the rabbits in group 5. Oleic acid was the major fatty acid present in the triglycerides of both the subcutaneous and perinephric adipose tissues of the rabbits in groups 2, 3 and 5, but the triglycerides in the corresponding tissues of the rabbits in groups 1 and 4 contained significantly lower concentrations of oleic acid. The higher concentration of linoleic acid in the adipose tissue triglycerides of the rabbits in group 1 was undoubtedly a reflection of the high level of linoleic acid in the diet given to this group of rabbits. However, a most unexpected finding was the relatively high concentration of linoleic acid in the diet of the adipose tissue triglycerides of the rabbits in group 4 that were given the diet containing the lowest concentration (0·17 %) of linoleic acid.

Table 5. *Differences between fatty acid compositions (weight percentages of the total) of the triglycerides extracted from the subcutaneous and from the perinephric adipose tissues of rabbits on the various dietary treatments*

(Mean differences (subcutaneous–perinephric) and standard errors of single differences are given)

Acid	Group 1 (high-maize oil diet) (8)	Group 2 (butter diet) (7)	Group 3 (butterfat diet) (6)	Group 4 (coconut oil diet) (6)	Group 5 (high-starch diet) (6)	Groups 1–5 (all diets) (33)	SE (28 df)
Lauric	−0·1	−0·1	−0·1	−1·0**	−0·1	−0·3	0·81
Myristic	−0·3	−0·5	−0·1	−3·3***	−0·1	−0·8**	1·49
Palmitic	−5·4**	−3·7*	−0·7	−1·2	−2·1	−2·8**	4·43
Palmitoleic	−1·1***	0·2	0·2	−0·6	−1·2**	−0·5***	0·82
Stearic	1·0*	−0·2	0·2	0·5	1·7**	0·6**	1·30
Oleic	3·5*	−0·2	−1·4	0·8	3·8*	1·4*	3·86
Linoleic	0·0	0·7	0·9	2·3*	−1·0	0·5	2·57
Linolenic	0·1	0·1	0·3	0·7***	0·1	0·2**	0·45

Figures in parentheses are the numbers of rabbits.
* $0{\cdot}05 > P > 0{\cdot}01$; ** $0{\cdot}01 > P > 0{\cdot}001$; *** $0{\cdot}001 > P$.

The results in Table 5 show that significant subcutaneous–perinephric differences were invariably negative for lauric, myristic, palmitic and palmitoleic acids and positive for stearic, oleic, linoleic and linolenic acids. The non-significant differences generally showed supporting negative or positive trends within each group of fatty acids.

The fatty acid compositions of the pooled samples of liver triglycerides obtained from the five groups of rabbits are given in Table 6. The effects of diet on the fatty acid composition of the liver triglycerides followed a pattern similar to that observed for the adipose tissue triglycerides. However, within each group, there were marked differences between the fatty acid compositions of the liver and adipose tissue triglycerides. In general, the liver triglycerides contained higher concentrations of lauric, myristic, palmitic and palmitoleic acids and lower concentrations of stearic and oleic acids than did the adipose tissue triglycerides. The high levels of lauric and myristic

acids in the diets given to the rabbits in groups 2, 3 and 4 were reflected to a greater extent in the fatty acid compositions of the liver triglycerides. This was particularly noticeable in the rabbits in group 4 where the concentrations of lauric and myristic acids in the liver triglycerides were respectively 6 and 4 times greater than the corresponding concentrations of these fatty acids in the adipose tissue triglycerides. It should be noted that in the rabbits of group 4 the concentration of linoleic acid in the adipose tissue triglycerides was considerably greater than that in the liver triglycerides.

Table 6. *Fatty acid compositions (weight percentages of the total) of the liver triglycerides of rabbits on the various dietary treatments*

(Values are for pooled samples obtained from each group)

Acid	Group 1 (high-maize oil diet)	Group 2 (butter diet)	Group 3 (butterfat diet)	Group 4 (coconut oil diet)	Group 5 (high-starch diet)
Lauric	0·8	0·6	0·8	7·2	0·4
Myristic	4·5	8·7	11·8	23·4	6·2
Palmitic	26·8	37·5	38·8	31·8	40·8
Palmitoleic	2·4	5·2	5·7	3·8	9·5
Stearic	2·4	3·1	3·8	4·6	3·2
Oleic	19·4	32·6	29·4	20·6	25·6
Linoleic + linolenic	41·1	9·6	6·9	5·6	10·8
Arachidonic	0·6	0·5	0·5	0·4	1·2

The compositions of the fatty acids in the α,α'- and β-position of the pooled samples of subcutaneous or perinephric triglycerides obtained from the five groups of rabbits are given in Tables 7 and 8. These results show that in the adipose tissue triglycerides of the rabbit there is no marked preferential esterification of individual fatty acids in either the β- or the α,α'-positions in the triglyceride molecules. In all groups and in both types of adipose tissue triglycerides there was a tendency for myristic acid to be esterified preferentially in the β-position. Higher concentrations of palmitic acid were observed in the β-positions of the subcutaneous and perinephric triglycerides only in the rabbits of group 1, but higher concentrations of palmitoleic acid were found in the β-positions of the subcutaneous and perinephric triglycerides in the rabbits of both groups 1 and 5. Only in the rabbits given the diet containing 20 % maize oil was there any differential distribution of linoleic acid between the α,α'- and β-positions. In this group of rabbits, linoleic acid occurred in higher concentrations in the α,α'-position in both types of adipose tissue triglycerides.

The fatty acid compositions of the subcutaneous and perinephric triglycerides obtained from the sixth group of rabbits that were given a commercial diet and were killed at 6 months of age are given in Table 9. It should be noted that the concentrations of linoleic acid in the triglycerides of both types of adipose tissues were similar to the concentrations of linoleic acid in the adipose tissue triglycerides of the rabbits given the diet containing hydrogenated coconut oil (group 4, Tables 3 and 4).

Table 7. *Compositions (weight percentages of the total) of the total fatty acids and of the fatty acids in the α,α′- and β-positions of the triglycerides obtained fromthe subcutaneous adipose tissues of rabbits on the various dietary treatments*

(Values are for pooled samples obtained from each group)

	Group 1 (high-maize oil diet)			Group 2 (butter diet)			Group 3 (butterfat diet)			Group 4 (coconut oil diet)			Group 5 (high-starch diet)		
Acid	Total	α,α′-Position	β-Position	Total	α,α′-Position	β-Position	Total	α,α′-Position	β-Position	Total	α,α′-Position	β-Position	Total	α,α′-Position	β-Position
Lauric	—	—	—	—	—	—	—	—	—	1·9	2·2	1·2	—	—	—
Myristic	1·2	0·2	3·2	5·9	4·8	9·6	6·2	4·4	9·8	7·9	7·4	8·9	3·7	2·9	5·3
Palmitic	15·9	14·7	18·4	29·5	30·2	28·1	29·9	30·7	28·3	26·8	28·2	24·0	31·2	32·6	28·4
Palmitoleic	2·2	1·6	3·5	3·6	3·5	3·8	3·4	3·4	3·4	2·3	2·0	2·9	8·1	6·2	11·8
Stearic	3·4	3·3	3·6	7·1	8·5	4·2	6·3	7·6	4·5	7·2	7·3	7·0	5·9	5·9	5·9
Oleic	35·3	36·5	32·9	40·6	39·8	42·1	40·8	41·5	39·4	32·0	30·7	33·5	38·5	39·2	37·1
Linoleic+linolenic	40·9	43·2	36·3	8·2	7·9	8·8	9·8	9·2	10·9	22·0	22·6	21·2	10·6	10·8	10·1

Table 8. *Compositions (weight percentages of the total) of the total fatty acids and of the fatty acids in the α,α′- and β-positions of the triglycerides obtained from the perinephric adipose tissues of rabbits on the various dietary treatments*

(Values are for pooled samples obtained from each group)

	Group 1 (high-maize oil diet)			Group 2 (butter diet)			Group 3 (butterfat diet)			Group 4 (coconut oil diet)			Group 5 (high-starch diet)		
Acid	Total	α,α′-Position	β-Position	Total	α,α′-Position	β-Position	Total	α,α′-Position	β-Position	Total	α,α′-Position	β-Position	Total	α,α′-Position	β-Position
Lauric	—	—	—	—	—	—	—	—	—	2·0	2·3	1·4	—	—	—
Myristic	1·1	0·4	2·5	4·6	2·8	8·2	6·0	4·8	8·4	12·9	12·5	13·7	2·7	2·1	3·9
Palmitic	18·1	13·6	27·0	28·9	28·5	29·2	26·9	26·5	27·7	26·2	27·0	24·6	33·9	34·6	32·5
Palmitoleic	2·7	1·0	6·1	3·9	4·0	3·7	4·2	4·2	4·2	2·8	2·4	3·6	8·0	6·3	11·4
Stearic	3·7	2·3	6·5	7·2	8·4	4·8	6·3	6·8	5·2	7·6	7·7	7·4	4·6	4·4	5·0
Oleic	32·3	33·2	30·5	40·2	40·4	39·7	40·4	41·1	39·0	28·3	28·8	27·2	37·1	38·0	35·3
Linoleic+linolenic	41·5	48·5	27·5	9·8	10·2	9·0	12·1	12·3	11·7	19·2	19·2	19·2	11·5	12·0	10·0

Table 9. *Fatty acid compositions (weight percentages of the total) of the triglycerides extracted from the subcutaneous and perinephric adipose tissues of six rabbits given a commercial diet (group 6)*

(Mean values are given with their standard errors)

Acid	Subcutaneous	Perinephric
Lauric	0·2 ± 0·03	0·2 ± 0·04
Myristic	1·9 ± 0·2	1·5 ± 0·4
Palmitic	29·0 ± 1·6	29·6 ± 1·1
Palmitoleic	4·6 ± 0·2	4·9 ± 0·3
Stearic	5·2 ± 0·6	5·4 ± 0·4
Oleic	31·0 ± 1·4	29·1 ± 0·8
Linoleic	24·7 ± 1·4	25·3 ± 0·2
Linolenic	1·8 ± 0·2	1·9 ± 0·3

DISCUSSION

According to the work of Schoenheimer & Rittenberg (1936) depot fat exists in a state of dynamic equilibrium with other body fat and even when there is no net gain or net loss of depot fat, the synthesis and degradation of adipose tissue triglycerides occur continuously. Whether there is a net gain or net loss of depot fat will depend on the relative rates of the synthesis and degradation of adipose tissue triglycerides. It must be remembered that the rabbits in group 4 (given the diet containing hydrogenated coconut oil) lost weight continuously during the feeding experiment and at the end of the experiment the rabbits in this group contained noticeably less adipose tissue than did the rabbits in group 6. It seems reasonable to assume, therefore, that in the rabbits of group 4, the rate of degradation of adipose tissue triglycerides was always in excess of the rate of synthesis. On the other hand, the rabbits in groups 1, 2, 3 and 5 gained weight during the feeding period and at the end of this period contained appreciably more adipose tissue than did the rabbits in group 6. It is also reasonable to assume that in the rabbits in groups 1, 2, 3 and 5 the rate of degradation of the adipose tissue triglycerides was always less than the rate of synthesis. Thus, the influence of different dietary fatty acids on the fatty acid composition of the adipose tissue triglycerides was observed to some extent in all of the rabbits that had been given the high-fat diets (groups 1–4) irrespective of whether there had been a net gain or a net loss of adipose tissue during the feeding experiment. For instance, higher concentrations of myristic acid were found in the adipose tissue triglycerides of the rabbits given the diets containing butter, butterfat or hydrogenated coconut oil and higher concentrations of linoleic acid were found in the adipose tissue triglycerides of the rabbits given the diet containing 20% maize oil. Nevertheless, if a state of dynamic equilibrium exists between depot fat and other body fats it is difficult to explain why the adipose tissue triglycerides of the rabbits in group 4 contained such relatively high concentrations of linoleic acid. This group of rabbits had been given for 9 months a diet low in this essential fatty acid yet the linoleic acid in the adipose tissue triglycerides (Tables 3 and 4) was about four times the concentration of this acid in the liver triglycerides (Table 6). Moreover, linoleic acid was found to constitute only 9 and 13% respectively of the fatty acids in the liver cholesteryl esters and phospholipids

of the rabbits in group 4. Continual degradation and re-synthesis of triglycerides in the adipose tissues coupled with a low intake of dietary linoleic acid and low concentrations of this essential fatty acid in the various lipid fractions of other tissues might have been expected to give rise to a progressive decrease in the concentration of linoleic acid in the adipose tissue triglycerides of the rabbits in group 4 during the feeding experiments. If it is assumed that the fatty acid composition of the adipose tissue triglycerides of the rabbits in group 4 at the beginning of the feeding period was similar to that of the adipose tissue triglycerides of the rabbits in group 6, then it is evident that the concentration of linoleic acid in the adipose tissue triglycerides of the rabbits in group 4 did not change appreciably during the feeding period. Since there is some evidence from experiments with mice that the fatty acids that occupy the β-position of adipose tissue triglycerides are metabolized more slowly than those that occupy the α,α'-position (Tove, 1961), it seemed possible that the linoleic acid that remained in relatively high concentrations in the adipose tissue triglycerides of the rabbits in group 4 might be esterified predominantly in the β-position. However, this was subsequently shown not to be so (Tables 7 and 8). It is clear that further studies are needed on the mechanisms that control the specificities of the uptake and release of different fatty acids by adipose tissues.

The results in Tables 7 and 8 are in broad agreement with the report of Coleman (1961) that there was little or no specificity in the distribution of the different fatty acids between the α,α'- and β-positions of the triglycerides in the adipose tissues of the rabbit. These results for the adipose tissues of the rabbit are thus in contrast to those that have been obtained for the adipose tissue triglycerides of other animals. For instance, in the adipose tissue triglycerides of the pig there is a marked preferential esterification of palmitic acid in the β-position, whereas the C_{18} saturated and unsaturated fatty acids occur predominantly in the α-position (Coleman, 1961; Garton & Duncan, 1965). In the adipose tissue triglycerides of ruminants, palmitic and stearic acids are preferentially esterified in the α,α'-position, whereas the C_{18} unsaturated fatty acids are preferentially esterified in the β-position (Garton & Duncan, 1965). According to the work of Perkins (1964), the positional distribution of the different fatty acids in the adipose tissue triglycerides of the rat is similar to that found in the adipose tissue triglycerides of ruminants. However, Tove (1961) has shown that the positional distribution of the various fatty acids in the adipose tissue triglycerides of the mouse depends to some extent on the fatty acid composition of the diet. Tove (1961) found that when mice were given normal diets, linoleic acid was predominantly esterified in the β-position of the adipose tissue triglycerides, but when the mice were given diets containing high levels of linoleic acid then the linoleic acid was predominantly esterified in the α,α'-positions of the adipose tissue triglycerides. In this respect, it is of interest that in the rabbits of group 1 given the diet containing the highest levels of linoleic acid, the concentration of the fatty acid in the α,α'-position was greater than that in the β-position of both types of adipose tissue triglycerides.

In the pig, the subcutaneous triglycerides contain higher concentrations of oleic acid and lower concentrations of palmitic acid than do the perinephric triglycerides (Hilditch & Pedelty, 1940). This difference in fatty acid composition is thought to be

due to the different temperatures at the site of fat deposition (Henriques & Hansen 1901). Although it might be expected that the temperature differential between the exterior and interior regions of the body of the rabbit would be less than that between the exterior and interior regions of the body of the pig, it is of interest to note that the results in Table 5 support those obtained with pigs by Hilditch & Pedelty (1940).

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