

## CHARACTERISTICS OF LIPIDS AND COMPONENT GLYCERIDES OF ARABIAN CAMEL *CAMELUS DROMEDARIUS* BY GAS CHROMATOGRAPHY

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Estimation of major fatty acids of triglycerides from the hump, stomach and rump of camel fat was carried out by subjecting the methyl esters to gas chromatography. There is a wide variation in the percentage composition of fatty acids in different parts of the same body. Iodine value, refractive index, saponification value and the ratios of oleic acid to stearic acid and total unsaturated fatty acids to total saturated fatty acids have been determined.

*Key words:* Characteristics, Lipids and *Camelus dromedarius*.

### INTRODUCTION

The fatty acid determination and estimation of various animal fats and lipid characteristics have already been reported by spectrophotometric and GLC methods [1-3]. By the introduction of gas chromatography, it has become very convenient to analyse oils and fats qualitatively and quantitatively for its fatty acid compositions ranging in chain length from 10 to 20 carbon atoms.

The contents of unsaturated fatty acids in animals from Moscow including rendered camel fat were reported by Lyaskauskaya and Piul's Kaya by spectrophotometric methods [1].

The fatty acid composition of Egyptian camel fat were investigated by hydrolysis with pancreatic lipase and thin layer and gas liquid chromatography [2].

Felinski *et al.* [3] studied camel fat from some ruminants from the zoological gardens in Poland.

In the present work the lipid characteristics and fatty acids composition of the Arabian camel from near Mecca have been investigated. Camel is a unique type of animal which survives in the scorching heat of deserts for days without food and water. The fat stored in the hump acts as food reserve during its forced journey. The stomach has such a good storing property that a 15 gallons drink is sufficient for trip of 5 days with a heavy load on its back.

The lipid characteristics of the fat from the hump, the stomach and rest of the body, especially from the rump have been analysed. The fatty acid composition, iodine value, refractive index and saponification value show that different parts have variations in characteristics. The

unsaturated fatty acids are in highest quantity in the hump as compared with the stomach and the body legs.

### EXPERIMENTAL

Fresh samples of camel tissues representing the fat being rendered were obtained from the animals of the Mecca region. Fat was extracted on the same day in the laboratory by mixing about 100 g fatty tissues with 50 cc of petroleum ether in an electric mixer. The petroleum ether having extracted the fat was dried by sodium sulphate and was removed from the fat in a rotary evaporator.

Methyl esters of the saponified fat was prepared using 14 % born trifluoride-methanol solution.

A Perkin Elmer Model 900 Gas Chromatograph with FID and nitrogen as carrier gas was used. Stainless steel 6 ft long and 1/8" O.D. column packed with 15 % DEGS on 80-100 mesh Chrom. W. was used. Column temperature was maintained at 160-170° and the carrier gas flow rate was 30 ml/min.

The triangular method of area estimation was adopted for determination of the percentages of fatty acids.

### RESULTS AND DISCUSSION

The fatty acid composition of animal fat is dependent upon the dietary habits of the animal and the environment in which it is raised. It has been reported [4] that the iodine value of the fat of those animals of the same species which are fed on soyabean is higher than those put on other diet (the iodine value of soyabean is approximately 128).

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Table 1. Composition of the fatty acids of triglycerides from hump

Sample No.	C <sub>12:0</sub>	C <sub>14:0</sub>	C <sub>15:0</sub>	C <sub>15:0</sub> ISO	C <sub>16:0</sub> ISO	C <sub>16:0</sub>	C <sub>16:1</sub>	C <sub>17:0</sub>	C <sub>17:1</sub>	C <sub>18:0</sub>	C <sub>18:1</sub>	C <sub>18:2</sub>	C <sub>20:0</sub>
1.	0.09	0.89	0.12	0.36	0.06	22.90	0.54	1.06	0.48	36.63	32.02	2.53	0.09
2.	0.05	1.78	0.28	0.40	0.14	25.25	0.65	1.17	0.65	35.76	31.56	2.13	0.19
3.	0.07	2.10	0.20	0.50	0.08	21.8	0.90	1.30	0.52	37.0	33.80	2.10	0.17
Mean value	0.08	1.59	0.20	0.42	0.09	23.32	0.70	1.18	0.55	36.46	32.44	2.52	0.15

Table 2. Composition of the fatty acids of triglycerides from stomach

Sample No.	C <sub>12:0</sub>	C <sub>14:0</sub>	C <sub>15:0</sub>	C <sub>15:0</sub> ISO	C <sub>16:0</sub> ISO	C <sub>16:0</sub>	C <sub>16:1</sub>	C <sub>17:0</sub>	C <sub>17:1</sub>	C <sub>18:0</sub>	C <sub>18:1</sub>	C <sub>18:2</sub>	C <sub>20:0</sub>
1.	0.19	5.87	0.87	1.16	0.09	36.21	0.58	1.45	0.68	28.67	20.52	2.51	1.11
2.	0.26	7.45	1.06	1.35	0.13	37.43	0.48	0.68	0.45	27.09	19.87	3.87	1.23
3.	0.19	5.47	0.84	1.75	0.14	33.94	—	1.17	—	29.69	22.63	3.27	0.87
Mean value	0.21	6.26	0.92	1.42	0.12	35.88	0.53	0.91	0.57	28.48	21.01	3.22	1.07

Table 3. Composition of fatty acids of triglycerides from rump

Sample No.	C <sub>12:0</sub>	C <sub>14:0</sub>	C <sub>15:0</sub>	C <sub>15:0</sub> ISO	C <sub>16:0</sub> ISO	C <sub>16:0</sub>	C <sub>16:1</sub>	C <sub>17:0</sub>	C <sub>17:1</sub>	C <sub>18:0</sub>	C <sub>18:1</sub>	C <sub>18:2</sub>	C <sub>20:0</sub>
1.	0.24	6.63	0.81	1.16	0.12	34.02	0.45	1.79	0.42	32.77	17.99	2.29	1.13
2.	0.21	6.19	0.69	1.51	0.07	32.83	0.43	1.65	0.42	32.49	20.60	2.48	1.38
3.	0.28	6.44	0.64	1.16	0.07	33.06	0.47	1.80	0.52	32.07	21.04	2.15	0.81
Mean value	0.24	6.43	0.71	1.28	0.08	33.30	0.45	1.75	0.45	32.44	19.88	2.31	1.11

Table 4. Constants obtained from different parts of camel fat.

Physical constants	Hump	Stomach	Rump
Iodine value	42	28	26
Saponification Value	246	243	226
Refractive index at 40°C	1.4581	1.4583	1.4574

The Arabian camel fat therefore may have different percentage of fatty acid composition as compared to the same species of other regions. Tables 1-3 show the analysis of fat from the hump, stomach and rump respectively. Fig. 1 represents the chromatogram for fatty acids of triglycerides from the hump of the Arabian camel and the major fatty acids detected are stearic, oleic, palmitic, linoleic and myristic.

Table 2 show the fatty acids of triglycerides from stomach. The major fatty acids are palmitic, stearic, oleic, myristic and linoleic. Table 3 gives fatty acids percentages from triglycerides of the body specially from the rump. They are palmitic, stearic, oleic, myristic and linoleic.

The fatty acids detected in small quantities in all the parts in varying percentages are C<sub>12:0</sub> C<sub>15:0</sub> (ISO) C<sub>16:0</sub> (ISO)

Table 5.

Parts of the body	Total unsaturated	Oleic stearic	Iodine value
	Total saturated		
Hump	0.570	0.888	42
Stomach	0.337	0.738	28
Rump	0.299	0.613	26

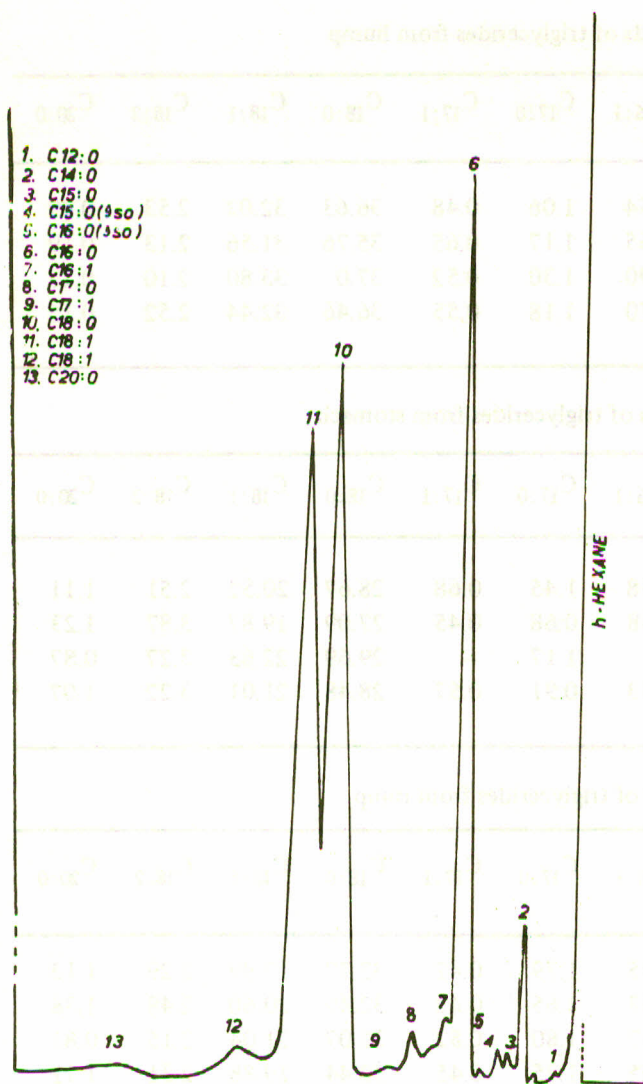


Fig. 1. Percentage composition of fatty acids from triglycerides of hump.

C<sub>16:1</sub>, C<sub>20:0</sub>. Pure fatty acids, methyl esters and mixtures of these were employed to establish satisfactory operating condition and to obtain reference data.

Table 4 gives the constants obtained from different parts of camel fat. The iodine value for a particular fat corresponds to the total unsaturated fatty acids. Hump fat has the highest unsaturated fatty acids as compared to the other parts.

In order to compare the iodine values with unsaturation in different parts, the ratio of oleic/stearic and total unsaturated/saturated for all the fatty acids detected in the particular chromatogram has been calculated. Table 5 shows that the hump has the highest percentage of unsaturated fatty acids, next in unsaturation is the stomach and least was the body near legs. Iodine values also show similar results.

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Part	C <sub>16:1</sub>	C <sub>20:0</sub>
Hump	0.888	0.970
Stomach	0.738	0.937
Body	0.617	0.989

The iodine value of the hump fat was found to be 110.5, which is higher than that of the stomach (100.5) and the body (95.5). This indicates that the hump fat has the highest percentage of unsaturated fatty acids. The iodine value of the hump fat is also higher than that of the stomach and the body. This is in agreement with the results of the chromatogram, which shows that the hump fat has the highest percentage of unsaturated fatty acids.