

PROTEIN POLYMORPHISM OF SOME CAMEL BREEDS IN EGYPT

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ABSTRACT

Sixty one camels of approximately same age group belonging to Fallahy, Magrabi, Sudany and Mowaled breeds were used to measure variations in their plasma protein electrophoretic banding patterns by native gel electrophoresis. The electrophoretic patterns between and within the 4 camel breeds revealed the presence of 7 different fractions viz. immunoglobulin, post transferring, a-globulin, transferrin, b-globulin, albumin and post-albumin. Specific protein markers for males and females within each breed as well as between camel breeds were observed. Some pairs of breeds were also genetically characterised by specific protein marker viz, "Mowaled and Falahi", "Sudany and Falahi" and "Sudany and Maghraby" which reflected a relationship between intra-paired breeds. Homogeneity ratios were 10.0, 16.7, 31.6 and 20.8% for Maghraby, Sudany, Falahy and Mowaled, respectively. Genetic similarity estimates varied between 0.81 and 0.88, 0.78 and 0.92, and 0.66 and 0.78 for intra-breed males, intra-breed females and as camel breeds, respectively.

Key words: Camel breeds, gel electrophoresis, genetic similarity, protein polymorphism, variability

In Egypt, there is a high demand for meat and milk. Wardeh *et al* (1990) classified Fallahy, Mowaled and Sudany as meat breeds while Magrabi was classified as a dual purpose breed (meat and milk). Many attempts have been made to limit importation of meat and milk by using selection to improve animal genetically but the desirable progress is still not achieved. The different camel breeds are dispersed between Nile valley, Delta and the desert and the phenotypic differences may simply reflect genotype- environment interactions. In this case, biochemical genetic markers can be helpful to compare genetic variability between and within breeds. In India, Tandon *et al* (1997) studied the genetic variability between Bikaneri, Jaisalmeri and Kachchhi camel breeds and their crossbred based on protein polymorphism by using starch gel electrophoresis and SDS-PAGE.

The objective of the present study was to set use of protein banding patterns to measure the genetic similarity and variability between and within the main four camel breeds.

Materials and Methods

Sample collection

Blood samples collected in EDTA from 61 adult and non-pregnant female camels of Fallahy,

Magrabi, Sudany and Mowaled breeds from camel market in Barkash, camel slaughterhouses of Alkalag and Alkhanka, Desert Research stations at Mariout, Halaip and Shalatin were used to separate plasma. The plasma was obtained by centrifugation at 1500 rpm for 15 minutes at 4°C and stored at -80°C until analysed.

Electrophoresis and gel analysis

The plasma samples were mixed with sample run buffer and the electrophoresis was carried out according to Hames and Rickwood (1981). The gels were scanned using Bio-Rad Gel Doc 2000 and analysed with the quantity one software package supplied from the manufacturer (1995).

The equation of homogeneity was obtained as follows:

$$\% \text{ Homogeneity} = \frac{\text{Number of monomorphic bands}}{\text{Total number of bands}}$$

Statistical analysis

Data of protein polymorphism was analysed using SPSS statistical package program (2000).

Results and Discussion

Plasma protein electrophoretic patterns among and within the different camel breeds (Fig 1) revealed

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the presence of 7 different bands of immunoglobulin, post transferrin, a-globulin, transferrin, b-globulin, albumin and post-albumin, in a descending order from the most cathodal fraction to the most anodal one. These results were in agreement with those of Kataria *et al* (1992) who reported 7 different zones obtained in plasma protein electrophoresis in camels. However, Jatkar *et al* (1962), Biagia (1984) and Purohit *et al* (1981) recorded 4, 5 and 6 bands in camel sera, respectively. This variation in bands may be attributed to some factors like sex, age, and nutritional status of animal or climatic conditions. More recently, Chaudhary *et al* (2003) used serum of camels in Abu Dhabi, Emirates. They identified only 6 fractions from plasma protein electrophoresis by using agarose gel.

Intrabreed homogeneity

The electrophoretic banding patterns of Maghrabi male camels (Table 1) showed that a maximum number of observed bands was 20 in which 8 bands were monomorphic. From these monomorphic bands, 5 bands with relative mobility of 0.74, 0.56, 0.49, 0.36 and 0.14 RF were specific for Maghrabi males.

The electrophoretic banding patterns of Maghrabi females (Table 2) showed 20 as maximum number of bands of which 7 were monomorphic bands. Four bands with relative mobility of 0.73, 0.61,

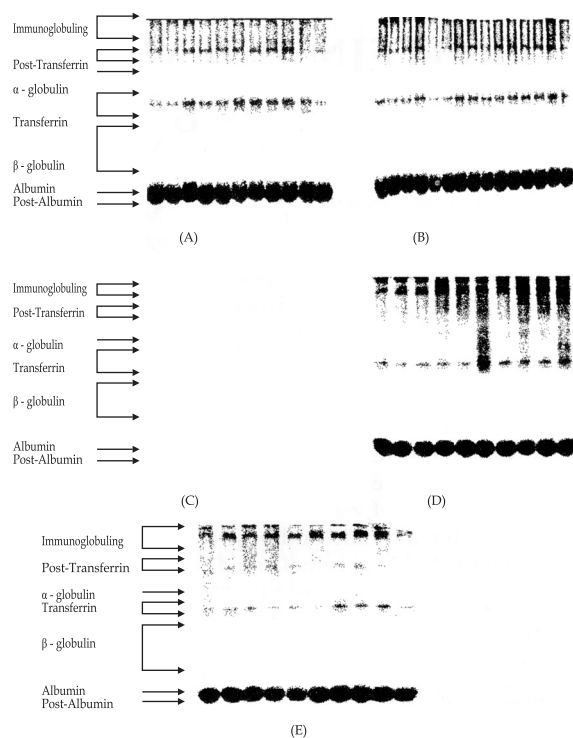


Fig 1. Plasma protein electrophoretic pattern of camel breeds

- A : Maghrabi males
- B : Maghrabi females
- C : Sudany breed (Lane 1-8 males, Lane 9-15 females)
- D : Fallahy breed (Lane 1-5 males and Lane 6-10 females)
- E : Mowaled breed (Lane 1-5 males and Lane 6-10 females)

Table 1. Protein banding patterns of Male Maghrabi camel breed.

Lane No.		RF	1	2	3	4	5	6	7	8	9	10	11
1	Immunoglobulin	0.13	1	1	0	1	0	0	1	0	0	1	0
2		0.14	1	1	1	1	1	1	1	1	1	1	1
3		0.17	0	0	1	1	1	0	1	0	1	0	1
4	Post-Transferrin	0.19	1	1	1	1	1	1	1	1	1	1	1
5		0.34	0	0	0	0	1	0	1	0	0	0	0
6		0.35	1	1	1	1	0	1	0	1	1	0	0
7		0.36	1	1	1	1	1	1	1	1	1	1	1
8	a-globulin	0.37	1	1	1	1	1	1	1	1	1	1	1
9		0.39	1	1	0	0	1	0	0	1	0	1	1
10		0.40	1	1	1	1	0	1	0	0	1	0	0
11		0.43	0	1	0	0	1	0	1	0	1	1	0
12	Transferrin	0.45	1	1	1	1	0	1	0	1	0	0	1
13		0.46	1	0	0	0	1	0	1	0	1	0	1
14	b-globulin	0.49	1	1	1	1	1	1	1	1	1	1	1
15		0.50	1	0	0	1	1	0	1	0	1	0	1
16		0.53	1	1	1	1	1	1	1	1	1	1	1
17		0.56	1	1	1	1	1	1	1	1	1	1	1
18		0.57	1	1	0	1	1	1	1	0	1	0	0
19	Albumin	0.73	1	1	0	0	1	0	1	0	1	0	0
20	Post- Albumin	0.74	1	1	1	1	1	1	1	1	1	1	1

RF = Relative Front

Table 2. Protein banding pattern of female Maghrabi camel breed.

Lane No.		RF	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Immunoglobulin	0.13	0	1	0	1	0	1	0	1	0	0	1	0	1	1	0
2		0.14	0	1	0	0	1	0	0	0	1	0	0	0	0	1	0
3		0.15	0	0	0	0	1	0	1	0	0	1	0	0	0	1	0
4		0.17	0	0	1	0	0	1	1	0	0	1	0	1	1	1	0
5	Post-Transferrin	0.19	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6		0.36	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1
7		0.37	0	0	1	0	1	0	0	1	1	0	1	1	1	0	0
8	a-globulin	0.39	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9		0.40	0	0	1	1	1	1	1	0	1	1	1	0	1	0	0
10	Transferrin	0.43	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
11		0.46	0	0	0	0	0	1	1	1	1	1	0	1	1	1	1
12		0.47	0	0	0	1	1	0	0	0	0	0	1	0	0	0	0
13	b-globulin	0.53	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
14		0.56	0	0	1	1	0	0	1	0	1	0	1	1	1	0	0
15		0.57	1	1	0	0	0	1	0	1	0	1	0	0	0	0	0
16		0.61	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
17		0.62	0	1	0	1	0	0	0	0	0	1	0	0	1	0	0
18	Albumin	0.73	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
19	Post-Albumin	0.74	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0
20		0.81	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

RF = Relative Front

Table 3. Homogeneity ratio in the four camel breeds.

Breed	Gender	Total No. of bands	No. of Monomorphic bands	No. of Polymorphic bands	Homogeneity %
Maghrabi	Males	20	8	12	40
	Females	20	7	13	35
Overall means		20	2	18	10
Sudany	Males	18	7	11	38.89
	Females	18	5	13	27.78
Overall means		18	6.5	12	16.7
Fallahy	Males	19	8	11	42.11
	Females	19	11	8	57.78
Overall means		19	9.5	9.5	50.00
Mowaled	Males	24	10	14	41.17
	Females	24	8	16	33.33
Overall means		24	9	15	37.25

0.43 and 0.39 RF were specific for Maghrabi females. The band with relative mobility of 0.53 RF was clearly specific protein marker for Maghrabi breed. The homogeneity ratios for Maghrabi males, females and as a unique breed were found to be 40, 35 and 10% (Table 3).

The results of electrophoretic banding patterns of male and female Sudany camels (Table 4) revealed 1 total number of 18 pronounced bands in which 7 bands with relative mobilities of 0.71, 0.69, 0.48, 0.46,

0.37, 0.34 and 0.19 RF were monomorphic in males. From these monomorphic bands, the band with relative mobility of 0.34 RF was specific for Sudany males. Five bands with relative mobilities of 0.71, 0.55, 0.48, 0.40 and 0.37 RF were monomorphic in females. However, the band with relative mobility of 0.40 RF was specific for Sudany females. The 3 bands with relative mobility of 0.71 RF were specific protein markers for Sudany breed. The homogeneity ratio for Sudany males, females and Sudany as a unique breed

Table 4. Protein banding patterns of male and female Sudany camel breed.

Lane No.		RF	Male								Females						
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Immunoglobulin	0.13	1	1	0	1	0	0	0	0	0	1	1	0	1	0	0
2		0.14	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0
3		0.15	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0
4		0.17	1	0	1	0	0	0	0	0	1	0	1	0	0	1	1
5	Post-Transferrin	0.19	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0
6		0.34	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0
7		0.35	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0
8	a-globulin	0.37	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9		0.39	0	1	0	0	0	0	1	0	0	1	1	0	0	0	0
10	Transferrin	0.40	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
11		0.46	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0
12		0.48	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
13	b-globulin	0.50	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
14		0.53	0	1	0	1	1	1	1	1	1	0	0	0	0	1	1
15		0.55	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
16		0.68	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
17		0.69	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0
18	Albumin	0.71	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

RF = Relative Front

Table 5. Protein banding patterns of male and female Fallahy camel breed.

Lane No.		RF	Male				Females						
			1	2	3	4	5	6	7	8	9	10	
1	Immunoglobulin	0.13	1	1	1	1	1	1	1	1	1	1	1
2	Post-Transferrin	0.31	1	1	1	1	1	1	1	1	1	1	1
3	a-globulin	0.45	1	1	1	1	1	1	1	1	0	0	0
4		0.46	0	0	0	0	0	0	1	1	1	1	1
5	Transferrin	0.47	1	0	1	0	0	0	0	0	1	1	1
6		0.48	1	1	1	1	1	1	1	1	1	1	1
7		0.49	1	0	1	0	0	0	0	1	0	1	1
8	b-globulin	0.50	1	1	1	1	1	1	1	1	1	1	1
9		0.55	0	0	0	0	0	0	1	1	1	1	1
10		0.56	1	0	0	1	1	0	0	0	1	1	1
11		0.57	0	1	1	0	0	0	0	0	0	0	0
12		0.65	1	0	0	0	0	0	1	1	1	1	1
13		0.66	1	1	1	1	1	1	0	0	0	0	0
14		0.68	0	0	0	0	0	0	1	1	1	1	1
15		0.71	0	0	0	0	0	0	1	1	1	1	1
16	Albumin	0.73	1	0	1	0	1	1	1	1	1	0	0
17		0.74	0	1	0	1	0	0	0	1	0	1	0
18	Post-Albumin	0.84	1	1	1	1	1	1	1	1	1	1	1
19		0.95	1	1	1	1	1	1	1	1	1	1	1

RF. Relative Front

were found to be 38.9, 27.8 and 16.7%, respectively (Table 3).

The electrophoretic banding patterns of Fallahy camel breed are shown in Table 5. A total number of observed bands were 19 in which 8 bands with relative mobility of 0.95, 0.84, 0.66, 0.50, 0.48, 0.45, 0.31 and 0.13 RF were monomorphic in males. The band with relative mobility of 0.66 RF was specific for Fallahy males. Eleven bands with relative mobilities of 0.95, 0.84, 0.71, 0.68, 0.65, 0.55, 0.50, 0.48, 0.46, 0.31 and 0.13 RF were monomorphic in Fallahy females. The band with relative mobility of 0.68, RF was specific for Fallahy females. The 4 bands with relative mobilities of 0.84, 0.50, 0.31 and 0.13 RF were specific protein marker for Fallahy breed. The homogeneity ratio for males, females and the Fallahy in general were found to be 42.1, 57.9 and 31.6%, respectively (Table 3).

The electrophoretic banding patterns of Mowaled camel breed were shown in Table 6. A total number of 24 bands were observed. The band with

relative mobility 0.63 RF was monomorphic which could be considered as a specific protein marker for Mowaled breed. Ten bands with relative mobilities of 0.95, 0.94, 0.81, 0.69, 0.65, 0.63, 0.48, 0.46 and 0.45 RF were monomorphic in males while 7 bands with relative mobilities of 0.95, 0.81, 0.69, 0.64, 0.63, 0.62 and 0.45 RF were monomorphic in females. The band with relative mobility of 0.94 RF was a specific protein marker for Mowaled males, however, 2 bands only with relative mobility 0.64 and 0.62 RF were specific for females. The homogeneity ratio for males, females and the Mowaled breed were found to be 41.7, 29.2 and 20.8%, respectively (Table 3).

Interbreed homogeneity

Results of the electrophoretic banding patterns of plasma protein of the 4 camel breeds revealed that the band with relative mobility of 0.95 RF which was monomorphic in both Fallahy and Mowaled breeds could be considered as a specific protein marker for these 2 breeds. This result reflected the

Table 6. Protein banding patterns of male and female Mowaled camel breed.

Lane No.	RF	Male					Females					
		1	2	3	4	5	6	7	8	9	10	
1	Immunoglobulin	0.02	0	0	1	0	1	0	0	0	0	0
2		0.04	1	0	0	0	1	0	1	1	0	1
3	Post-Transferrin	0.19	0	0	1	1	0	1	0	1	0	0
4		0.26	0	0	0	0	1	1	0	0	1	0
5		0.28	0	1	1	0	0	0	1	1	0	0
6		0.31	1	0	0	1	1	0	0	0	0	0
7		0.40	0	0	0	0	0	1	1	1	1	0
8	a-globulin	0.43	1	1	0	0	0	1	0	1	0	0
9	Transferrin	0.45	1	1	1	1	1	1	1	1	1	1
10		0.46	1	1	1	1	1	0	0	0	0	0
11		0.48	1	1	1	1	1	0	0	0	0	0
12	b-globulin	0.53	0	0	0	1	1	1	0	1	0	0
13		0.55	1	1	1	1	1	0	0	0	0	0
14		0.61	0	0	0	0	0	0	0	1	0	0
15		0.62	0	0	0	0	0	1	1	1	1	1
16		0.63	1	1	1	1	1	1	1	1	1	1
17		0.64	0	0	0	0	0	1	1	1	1	1
18		0.65	1	1	1	1	1	0	0	0	0	0
19		0.69	1	1	1	1	1	1	1	1	1	1
20	Albumin	0.71	0	1	0	1	0	1	1	0	0	1
21	Post- Albumin	0.81	1	1	1	1	1	1	1	1	1	1
22		0.84	1	1	0	0	0	1	1	1	0	0
23		0.94	1	1	1	1	1	0	0	0	0	0
24		0.95	1	1	1	1	1	1	1	1	1	1

RF. Relative Front

fact that Mowaled breed is the descendent of the Fallahy breed. It was also observed that the band with relative mobility of 0.48 RF was monomorphic in both Sudany and Fallahy breed which revealed such relationship between these two breeds and it could be considered as a specific protein marker for Sudany and Fallahy breeds. Sudany and Maghrabi breed had also 1 band with relative mobility of 0.37 RF which was monomorphic in the 2 breeds revealing a relationship between these two breeds and it could be considered as a specific protein marker for Sudany and Maghrabi breeds.

The results of the immunoglobulin fraction indicated that there were 4, 4, 1 and 1 bands belonging to Maghrabi, Sudany, Fallahy and Mowaled, respectively. These bands occurred between the band of relative mobility 0.02 RF and that of relative mobility 0.17 RF. The percentages of homogeneity of this fraction were 0.25, 0, 100 and 0% for the 4 breeds, respectively.

The results of post-transferrin fraction demonstrated 5, 3, 1 and 5 bands belonged to Maghrabi, Sudany, Fallahy and Mowaled, respectively. These bands were located between relative mobilities of 0.19 RF and 0.40 RF. The percentages of heterogeneity of this fraction were 80, 100, 0 and 100%, respectively.

The a-globulin fraction ranged between band of relative mobility 0.37 RF and 0.46 RF in the 4 breeds. There were 5, 3, 2 and 1 bands in this fraction for Maghrabi, Sudany, Fallahy and Mowaled, respectively. One monomorphic band was only found in Maghrabi females and another one was observed in both sexes of the Sudany breed.

The transferrin fraction expanded from the band of relative mobility of 0.45 RF to that of relative mobility of 0.50 RF. There were 3 bands in this fraction for each camel breed. Only one monomorphic band was found in female Maghrabi breed.

The a-globulin fraction was between the band of relative mobility 0.49 RF and that of relative mobility 0.71 RF. There were 5, 3, 8 and 8 bands in which 2, 0, 1 and 2 monomorphic bands were observed in Maghrabi, Sudany, Fallahy and Mowaled, respectively.

The albumin fraction revealed very few bands in the 4 breeds, being 2, 1, 2 and 1 bands in which one monomorphic band of relative mobility 0.73 RF in Maghrabi females, while the other bands in this fraction were polymorphic in both sexes of the other breeds. These results were in agreement with those of

Khanna and Tandon (1985), revealing polymorphism in these 2 fractions in the Indian camels. However, Ouragh and Bengoumi (1996) studied blood protein polymorphism in the one-humped camel (*Camelus dromedarius*) in Morocco and indicated the existence of monomorphic bands in albumin and postalbumin fractions.

The post-albumin fraction exhibited 2, 1, 1 and 4 bands in Maghrabi, Sudany, Fallahy and Mowaled, respectively. These bands were monomorphic in the first 3 breeds, while the percentage of homogeneity was 50% in this fraction for Mowaled breed. Similar results were obtained by Penedo and Juneja (1989) who studied the polymorphic plasma post-albumin of 60 samples from llamas and Alpacas revealed 4 monomorphic bands.

Intra and Interbreed Similarity

The results of proximate matrix of similarity between male camel breeds is shown in Table 7. The highest estimates of similarity (band sharing) were found between males of the same breed, however, the lowest similarity estimates were observed between males of the different breeds, particularly between males of Maghrabi breed and those of Mowaled breeds (0.190) which points to the fact that Mowaled breed is a descendent of Sudany and Fallahy breed.

Results of proximate matrix of similarity between females of the 4 breeds are shown in Table 8. Highest similarity estimates were observed between intra-breed females, however, the lowest similarity estimates were found between interbreed females.

Table 9 showed the similarity estimates between camel breeds. The highest estimates of similarity were

Table 7. Similarity estimates between males of camel breeds.

Case	Matrix File Input			
	Maghrabi	Sudany	Fallahy	Mowaled
Maghrabi	1.0			
Sudany	0.286	1.0		
Fallahy	0.208	0.152	1.0	
Mowaled	0.084	0.292	0.286	1.0

Table 8. Similarity estimates between females of camel breeds.

Case	Matrix File Input			
	Maghrabi	Sudany	Fallahy	Mowaled
Maghrabi	1.0			
Sudany	0.147	1.0		
Fallahy	0.190	0.327	1.0	
Mowaled	0.218	0.110	0.123	1.0

Table 9. Similarity Proximity Matrix between camel breeds.

Case	Matrix File Input			
	Maghrabi	Sudany	Fallahy	Mowaled
Maghrabi	1.0			
Sudany	0.217	1.0		
Fallahy	0.140	0.240	1.0	
Mowaled	0.149	0.211	0.205	1.0

observed between males of the same breed, being the highest between those of the Fallahy breed which may be interpreted by the stability of this breed in the Delta of the Nile for long time on one hand and the desire of its holders to systematically practice selection to keep its genotypes which express the heaviest and the most muscular animals among the existing camel breeds in Egypt from the other hand. The lowest estimates were found between interbreeds, however, Mowaled breed seemed to have proportionally higher estimates with Fallahy and Sudany which ensured the preceding results of protein banding patterns that these 3 breeds have certainly a specific protein marker. The dendrogram (Fig 2) between the 4 camel breeds illustrated the previous explanation of relationship between the 4 breeds.

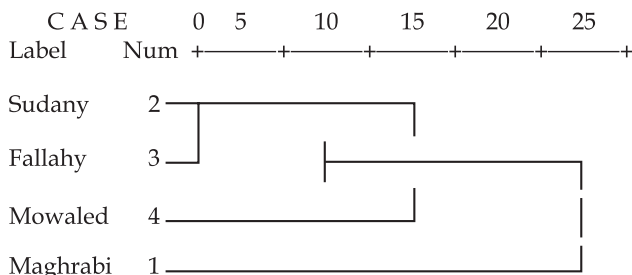


Fig 2. Dendrogram between four camel breeds.

Conclusion

Plasma protein polymorphism of 4 camel breeds revealed the presence of 7 different fractions which led to determination of specific protein markers within and between breeds. Homogeneity ratios were high for intra-breed males and females and lower for

the pure breeds which reflected some heterogeneity between males and females within each camel breed that may be due to the stability of camel females for breeding in Egypt. Similarity estimates were high for each breed, being lower for intra-breed animals. The highest estimate of similarity was found between Fallahy and Mowaled, which may ensure the relationship between these 2 breeds.

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News

PLAGUE FROM EATING RAW CAMEL LIVER

This investigation confirms that human plague with pharyngeal and gastrointestinal symptoms can result from eating infected raw camel liver. Only 1 published report has proposed this method of infection. In 1976, in a small, remote Libyan village, 13 plague cases occurred after a sick camel was slaughtered and its meat eaten. However, as a source of infection eating camel meat could not be distinguished from droplet transmission, percutaneous exposure during camel killing or handling fresh meat, or flea bites. Moreover, plague infection was not found in the camel, and the human pharyngeal plague might have resulted from crushing fleas between the teeth while grooming .

(Source: **Abdulaziz A. Bin Saeed,*†‡ Nasser A. Al-Hamdan,† and Robert E. Fontaine†§**
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CAMEL WRESTLING

Camel wrestling is a sport in which two male dromedary camels wrestle in response to a female camel in heat being led before them. It is most common in the Aegean region of Turkey, but is also found in the Marmara and Mediterranean regions of that country. There are an estimated 1200 camel wrestlers (or Tulu) in Turkey, bred specially for the competitions. A camel can win a wrestling match in three ways: By making the other camel retreat, scream, or fall. The owner of a camel may also throw a rope into the field to declare a forfeit if he is concerned for the safety of his animal. Camels wrestle with other in their same weight class. Camels have different tricks, and contest organisers match camels with different skills. Some camels wrestle from the right and some from the left; some trip the other with foot tricks ("çengelci"), and some trap their opponent's head under their chest and then try to sit ("bagci"); some push their rivals to make them retreat ("tekçi").

A camel wrestling event involves considerable pomp and ceremony. The camels get decked out, and participate in a march through town followed by musicians on the day before the event. The actual wrestling can be somewhat underwhelming to someone not familiar with the intricacies, although onlookers must often flee from an oncoming camel that is retreating in defeat from his opponent. In the heat of the tournament, camels spew foamy saliva in their excitement. Additionally, camels are retromingent animals, and so spectators would be advised to beware not only of flying saliva but of flying urine as well.

Popularity of the sport is declining, as the relative costs of caring for such an animal rises, as well as due to concern for animal welfare.

(Source:Wikipedia, the free encyclopedia)