

**ESTIMATION OF SOME INDUSTRIAL POLLUTANTS
IN MACRO - AND MICROENVIRONMENT OF CAMELS
(With Three Tables)**

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قياس بعض الملوثات الصناعية (الكبريت والفلورين) في الجمل وبيئتها

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لما كانت الجمل واحدا من أهم حيوانات العمل واللحوم لدى طائفة كبيرة من سكان محافظة أسيوط مع تضائل الدراسات على هذا النوع في مجالات مختلفة من بينها مدى تأثيرها بمخلفات مصانع السوبر فوسفات عليها بالإضافة إلى أن أول دراسة على الجمل أفادت بوجود ارتفاع بين وعالي في معدلات الفلورين في أمصال الحيوانات المختبرة سواء في مناطق التلوث أو في المنطقة المستخدمة كضابط للتجربة (سيد 1987)، مما يفصح عن احتمالات تزايد نسب هذه المخلفات في لحوم وأعضاء الحيوانات المذبوحة والتي تعيش نسبة عالية منها داخل المحافظة. الأمر الذي دفع بنا إلى عمل دراسة مستوفاه عن مدى تعرض هذه الجمل لمثل هذا النوع من التلوث داخل المحافظة ولاستبيان مدى صلاحية هذه اللحوم للاستهلاك الأدمي. وقد اختير في هذا البحث ثلاث مناطق للدراسة وهي منطقة منقباد (منطقة التلوث) ومنطقة منفلوط كضابط للتجربة ولثبوت خلوها من التأثيرات السامة للمخلفات الصناعية ومنطقة بني عدى والتي تعد أهم مناطق تجمع وتربية وذبح الجمل في المحافظة بأسرها. ومن ثم فقد تم أخذ عينات من العلائق الحيوانية المقدمة وكذلك مياه الشرب بواقع ستة عينات من التبن والدريس والرده ومياه الشرب في المناطق الثلاث. أما في الحيوانات فقد تم أخذ عينات من المصل والبول من منطقتي منفلوط ومنقباد، أما بني عدى فقد تم أخذ عينات من المصل والبول واللحوم والأعضاء الداخلية (الكبد، الكلى والرئتين) وذلك من ثلاثين جملا مذبوحا. وقد إثبتت النتائج ارتفاع معدلات الفلورين والكبريت في علائق ومياه الشرب ومصل وبول الجمل التي تم فحصها بمنطقة منقباد ارتفاع ملحوظ، أما منطقة بني عدى فقد أظهرت النتائج عن عدم وجود أي ارتفاع في نسب هذه المخلفات اللحم إلا ارتفاع طفيف في معدل الكبريت بمياه الشرب ومصل وبول الجمل المفحوصة بهذه المنطقة بالمقارنة بمنطقة منفلوط. وبفحص اللحوم والأعضاء الأخرى (الكبد، الكلى، والرئتين) فقد أوضحت النتائج عن ارتفاع أياً من الفلورين أو الكبريت فيها مقارنة بما تم تسجيله من قبل في لحوم جاموسي منطقة منقباد ومما سبق يتضح أن لحوم الجمل بمحافظة أسيوط والتي تذبح في مجازر بني عدى لا تمثل أي خطورة على صحة المستهلك من ناحية التلوث بالمخلفات الصناعية ومن ثم يمكن استخدامها بأمان.

SUMMARY

The present study evaluate the levels of some industrial pollutants (sulphur and fluorine) in both macro and microenvironment of camels in Assiut governorate.

The analytical results indicated a significant elevation of both sulphur and fluorine in feedstuffs, water, serum and urine in Manqabad. In Bani-

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Ady no significant change for both the two pollutants were observed, except a slight elevation of sulphur in water, serum and urine when compared with the control area.

No significant change in both sulphur and fluorine were observed in meat and organs of camels slaughtered in Bani-Ady abattoir, when compared with previous results recorded in buffaloe's meat and organs at the zone of pollution.

INTRODUCTION

Increasingly of industrial development in the last three decades have focused attention on the multiple sources of pollution.

In Assiut governorate, the manufacture of superphosphate fertilizer at Manqabad is a major industry. Sulphur and fluorine are the main pollutants emitted from this plant, which are potentially hazardous to both human and animals.

Previous toxicological studies at Assiut governorate for both the two pollutants (sulphur and fluorine), were carried out on sheep and goat (IBRAHIM, 1980), sheep (ABDEL-AAL, 1981), buffaloes (IBRAHIM, 1983) and goat (SADDEK, 1988). Also SAYED, in 1987 studied the clinical haematological and biological changes in camels which were intoxicated by sulphur and fluorine compounds emitted from Manqabad superphosphate plant.

Among the reared animals species at Assiut governorate, camel is one of the most important animals used for both work and meat production. Considering the scanty of toxicological research on camels, the aim of this study is the investigation of the main industrial pollutants (sulphur and fluorine) in both macro-(feedstuffs, and drinking water) and microenvironmental "serum, urine, camel's meat and organs (liver, lung and kidney)" of camels slaughtered in Assiut abattoirs.

MATERIAL and METHODS

Three areas were chosen for this investigation, the first, of which was Manqabad which was considered more or less the most affected area by pollution, the second, Manfalout which was used as control and the third was Bani-Ady, the site of aggregation, breeding and slaughtering of camels in Assiut governorate.

Sampling:

Eighteen camel's feedstuff samples were collected from every examined area, constituting 6 dreas, 6 tbn, and 6 wheat bran samples.

Drinking water samples offered to camels (10 of each) were collected from the three mentioned areas. From each area of Manqabad and Manfalout, 10 serum and 10 urine samples were taken. In Bani-Ady abattoir, serum, urine, camel's meat and organs (liver lung and kidney) were collected from 30 slaughtered camels.

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Methodology:

Sulphur was determined in feedstuffs, water, serum, urine, meat and organs (liver, lung and kidney) by titration with 10% barium chloride after oxidation processes (SEINFELD, 1975). The amount of barium sulphate was determined gravimetrically as recommended by VOGEL, 1961).

Fluoride was estimated in examined samples by means of fluoride electrode 94-09 attached to single junction reference electrode model 90-01 fitted to expandable ion analyser EA 920, Orion research incorporated, Cambridge, U.S.A. according to the method of FRY and TAVES (1970).

RESULTS

Results obtained of sulphur and fluorine levels in feedstuffs, water, serum and urine of camels were recorded in tables (1) and (2) respectively. The results of sulphur and fluorine levels in camel's meat and organs (liver, lung, and kidney) were recorded in table (3).

DISCUSSION

The emission of sulphur and fluorine to the surrounding environment from superphosphate factories represent the main source of industrial pollution by these products. The previous study which carried out by SAYED (1987), recorded a highly significant concentration of fluorine in serum of camels rearing in areas surrounding the superphosphate factory at Manqabad and also in Manfalout which used as control in his study. Therefore, the present study was carried out to clarify the picture of pollution in macro and macroenvironment of camels, especially meat and organs which consumed by the people lived at Assiut governorate.

Bani-Ady was the site of choice for this study, which is considered the main area of camels aggregation and slaughtering at Assiut. The choice of the other two areas was due to that Manqabad showed a highly significant levels of both sulphur and fluorine in the environment and inversely Manfalout was used as a control (ABDEL-MEGUID, *et al.* 1981 and IBRAHIM, 1983).

The analytical findings in macroenvironment (feedstuffs, and water) and micro-environment (serum and urine) revealed a highly significant in sulphur in Manqabad area. In Bani-Ady a slight elevation was recorded in all examined samples, except in feedstuffs (table 1). Sulphur levels were recorded in water samples as 890.88, 540.16 and 378.66 p.p.m. for Manqabad, Bani-Ady and Manfalout respectively. This results are in agreement with that recorded previously by IBRAHIM (1983). In comparison the results of sulphur in water with that given by TWORT, *et al.* (1974) as 250 p.p.m. for the recommended maximum limits, it is obvious that water in both Manqabad and Bani-Ady heavily polluted with sulphur.

Urine analysis revealed a highly significant elevation of sulphure level in both Manqabad and Bani-Ady than the control area. Urinary sulphur was also the highest

of all the examined samples (water, serum, feedstuffs). In accord this concept supported by KULWICH, et al. (1957), that urine is the main route of sulphur excretion.

The analytical findings of fluorine revealed a highly significant elevation in feedstuffs, water, serum and urine of the investigated camels at Manqabad compared with the normal values of the control area. No significant change was recorded at Bani-Ady. However, camels urine revealed the highest concentration of fluorine in Manqabad reached about 10 folds that of the control, whereas the concentration of serum not exceeded 2 folds of the control. It can be concluded that urine analysis is more indicative in case of fluorine toxicity. In accordance, SHUPE, et al. (1963) has stated that fluorine in the urine is highly related to length of fluorine exposure time.

The results of fluorine level in camel's serum recorded in our study were about 1/4 that reported by SAYED (1987), as 3.03-3.00 ppm at the control area (Manfalour). The difference between the two records is explained by the data obtained by SUTTIE, et al. (1971), who revealed a close positive relationship between the concentration of plasma and fluorine intake. A level of 1.0 ppm in plasma represented a high level, observed only after extended periods of exposure. Animal receiving 1.5 mg/kg, plasma fluorine reached to 0.7-0.8 ppm followed by severe dental fluorosis (SUTTIE and FALTIN, 1973 and GRIFFITH, 1977).

The levels of sulphur recorded in camel's meat and organs (liver, lung and kidney) are within the same range obtained by IBRAHIM (1983) in buffaloes. The only exception was that buffaloe's lung at Manqabad area showed a high level of sulphur due to the direct inhalation through air.

The analytical findings of fluorine in camel's meat were 0.054, 0.085, 0.056 and 0.180 ppm for muscle, liver, lung and kidney respectively. According to the absence of available data recording the normal or abnormal levels of fluorine in camel's meat. The discussion of our records with that obtained by IBRAHIM (1983) in buffaloe's meat may be valuable. Our results revealed a lower levels of fluorine in comparison with both polluted area (Manqabad) and the control area (Manfalout) obtained by IBRAHIM (1983).

The correlation between our evidence of fluorine levels in feedstuffs, water, serum and urine of Bani-Ady with that obtained in camel's meat, support our results. As reported by CHANG, et al. (1934) and SUTTIE, et al. (1958) that the quantity of fluorine in animal tissues (bone, teeth, organs such as liver muscle, kidney, heart, thyroid, and hair) followed the same excess of fluorine addition in the normal ration.

It may be concluded from the previous evidence that camel's meat and organs (liver, lung and kidney) slaughtered in Bani-Ady abattoir do not constitute a hazard to the consumer in Assiut governorate.

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Table (1)
Sulphur levels in macro and micro environments of camels at Assiut

	Feed stuffs (mg/gram)			Water (ppm)	Serum mg%	Urine (ppm)	
	Dreese	Wheat bran	Tibn				
Mangabab	Mean ±	187.34+	163.92+	104.13+	890.88+	827.12+	1366.80+
	S.E.	68.81*	33.44*	20.83**	144.19**	152.77**	247.88**
	Min. Max.	72.56- 235.2	147.20- 230.8	70.6- 118.76	688.40- 1095.80	352.70- 940.60	962.0- 1654.00
Bani-Ady	Mean ±	41.78+	41.49+	83.62+	540.166+	406.66+	522.80+
	S.E.	13.88	8.52	31.96	90.01*	100.74*	126.89*
	Min. Max.	32.44- 69.40	29.12- 52.20	45.32- 115.20	430.00- 650.00	360.00- 579.00	114.00- 742.00
Control	Mean ±	64.69+	70.05+	35.54+	378.66+	199.70+	297.24+
	S.E.	35.59	40.94	10.04	15.28	33.40	61.70
	Min. Max.	32.48- 114.30	35.06- 127.50	21.98- 45.20	365.00- 401.00	85.90- 204.60	155.70- 352.60

* Significant at $P/0.05$

** Significant at $P/0.01$

S.E.: Standard error.

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Table (2)
Fluoride levels in macro and micro environments of Camels at Assiut province

	Feed stuffs (ppm)			Water (ppm)	Serum (ppm)	Urine (ppm)	
	Dreese	Wheat bran	Tibn				
Mangabad	Mean±S.E.	25.799± 6.56**	7.85± 1.30**	24.15 ± 6.49**	5.23±0.71**	1.75±0.51*	40.40±15.58**
	Min-Max	14.00 - 33.33	5.40-10.30	15.00 - 32.00	4.66-6.66	1.15-2.90	21.00-65.00
Bani-Ady	Mean±S.E.	5.55 ± 1.10	5.04± 0.22	2.604± 0.709	2.02±0.66	1.09±0.31	2.89± 1.82
	Min-Max.	3.90 - 6.90	4.80- 5.40	1.80 - 3.60	1.30-2.80	1.30-2.50	0.96- 7.20
Control	Maan±S.E.	7.14 ± 1.19	2.24± 0.488	2.65 ± 0.81	1.58±0.15	0.70±0.29	3.95± 0.24
	Min-Max.	6.30 - 9.00	1.95- 3.30	1.26 - 3.60	1.40-1.80	0.36-1.55	1.75- 4.92

* Significant at $P/_{0.05}$
 ** Significant at $P/_{0.01}$
 S.E. Standard error.

Table (3)
Sulphur and fluorine levels of Camel's meat and organs
investigated at Bari-Ady abattoir

Elements	Muscle	Liver	Lung	Kidney	
Sulphur (gram%)	Mean±S.E.	0.608±0.169	0.996±0.504	0.355±0.190	0.820±0.332
	Min.- Max.	0.426-0.906	0.371-1.649	0.137-0.673	0.412-1.360
Fluorine (ppm)	Mean±S.E.	0.054±0.018	0.085±0.038	0.056±0.040	0.180±0.070
	Min. - Max.	0.020-0.070	0.055-0.190	0.003-0.090	0.110-0.282