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Chemical analysis of linseed meal produced in Egypt

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With 1 table

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Linseed meal is produced in Egypt from several oil mills in different locations. Some of this meal is consumed locally and the another part is exported to the outside countries. Therefore, it is of importance to evaluate the variations in chemical composition between the different meals produced by the different oil mills covering all over the country.

Ghoneim (4) reported the chemical composition of the Egyptian linseed meal to be 8.15, 91.85, 31.33, 10.73, 35.22, 7.08 and 7.49 for the percentages of moisture, dry matter, crude protein, ether extract, nitrogen-free extract, crude fiber and ash respectively.

The percentages of the chemical composition of the same meal mentioned by the Ministry of Agriculture, Egypt (6); were 8.49, 91.51, 29.97, 7.57, 35.29, 8.02 and 10.66 for the previously mentioned components respectively.

Material and methods

Representative samples of linseed meal were collected from the productive nineteen oil mills covering allover Egypt. The summative chemical analysis was conducted for these linseed meal samples for the determination of moisture, crude protein, ether extract, crude fiber ash and nitrogen-free extract respectively according to A.O.A.C. (1).

The calculated caloric values were evaluated for the mentioned samples of linseed meal using the factors 4.15, 9.40 and 5.65 kcal for one gram of carbohydrates, fats and protein respectively (5).

Calcium was determined in the linseed meal using A.O.A.C. (1) method, while phosphorus was determined by an adaption of the methods of *Fiske* and *Subbarow* (3) and *Chapman* (2) after *Toth* et al. (8). The standard deviation of the means (Standard error "s \bar{x} ") was calculated according to *Snedecor* (7).

Results and discussion

Table (1) shows the results of the chemical analysis of the linseed meal collected from the productive nineteen oil mills of Egypt. The percentages of the different nutrients were as follows. Moisture ranged from 4.40 to 7.86 with an average of 6.55 ± 0.22 , dry matter ranged from 92.14 to 95.60 with an average of 93.45 ± 0.22 , ether extract ranged from 5.00 to 16.46 with an average of 11.19 ± 0.60 , crude protein ranged from 22.33 to 33.22 with an average of 26.97 ± 0.59 , crude fibre ranged from 8.71 to 14.74 with an average of 11.18 ± 0.43 , nitrogen-free extract ranged from 31.80 to 41.01 with an average of 31.60 ± 0.60 , ash ranged from 5.82 to 11.41 with an average of 8.00 ± 0.38 .

Tab. 1. Chemical analysis of linseed meal produced in Egypt.

No.	Oil Mills	Moisture %	Dry matter %	Ether extract %	Protein %	Fiber %	Nitrogen free %	Ash %	Calorific value kcal/100 g	Calcium %	Phosphorus %
1.	Cairo Company for Oils and Soap, Cairo	7.41	92.59	10.43	30.33	9.92	33.65	8.26	450.22	0.72	0.48
2.	Tanta Company for Oils and Soap, Tanta	4.52	95.48	5.00	33.22	10.08	39.03	8.15	438.50	0.37	0.99
3.	Tanta Company for Flax and Oils, Tanta	5.98	94.02	7.96	28.79	10.33	35.53	11.41	427.81	0.82	0.73
4.	The Giar Company for Oils, Alexandria	6.41	93.59	10.47	26.48	11.12	34.34	11.18	436.69	0.45	0.51
5.	Regab Company for Oils, Alexandria	7.77	92.23	10.86	29.22	9.82	33.76	8.57	448.03	0.40	1.09
6.	El-Miladi Company for Oils, Alexandria	6.50	93.50	12.80	26.24	9.60	36.71	8.15	460.76	0.32	1.14
7.	Abd-Elhalim										
	Company for Oils, El-Mahala El-Kobra	6.61	93.39	12.65	27.23	9.34	38.35	5.82	470.67	0.28	0.83
8.	Abd Elfatrah										
	Company for Oils, El-Mahala El-Kobra	7.08	92.92	14.68	27.04	9.60	35.27	6.33	476.98	0.31	0.89
9.	Hussain Salama										
	Company for Oils, El-Mahala El-Kobra	6.31	93.69	14.02	25.22	10.67	35.21	8.57	464.68	0.34	0.91
10.	Shehata Sons Company for Oils, Tanta	6.98	93.02	10.71	28.40	11.18	35.56	7.17	455.11	0.34	0.94
11.	Moh. Fargal										
	Company for Oils, El-Mahala El-Kobra	7.53	92.47	11.98	27.28	8.71	37.83	6.67	459.89	0.31	1.00
12.	El-Sayed Fargal										
	Company for Oils, El-Mahala El-Kobra	7.86	92.14	9.80	27.74	11.83	33.85	8.92	438.42	0.39	0.79
13.	Abas Yousf										
	Company for Oils, El-Mahala El-Kobra	6.49	93.51	9.81	28.35	13.06	35.67	6.62	454.62	0.34	0.96
14.	Saad Kamar										
	Company for Oils, El-Mahala El-Kobra	7.34	92.66	16.46	23.68	14.61	31.80	6.11	481.12	0.27	0.96
15.	Ahmed Fargal										
	Company for Oils, El-Mahala El-Kobra	5.86	94.14	14.18	22.23	14.74	32.11	10.78	453.88	0.45	0.73
16.	El-Sahawy										
	Company for Oils, El-Mahala El-Kobra	6.83	93.17	11.49	23.83	13.72	37.17	6.96	453.84	0.36	0.87
17.	Mohamed Zayed										
	Company for Oils, El-Mahala El-Kobra	4.40	95.60	8.82	26.78	13.59	39.58	6.83	454.87	0.30	0.94
18.	Sayed Abu Enin										
	Company for Oils, El-Mahala El-Kobra	5.96	94.04	9.56	24.11	10.76	41.01	8.60	440.93	0.35	0.90
19.	Sliman Fargal										
	Company for Oils, El-Mahala El-Kobra	6.67	93.33	10.91	26.21	9.80	39.53	6.88	455.36	0.25	1.20
Average		6.55	93.45	11.19	26.97	11.18	36.10	8.00	453.81	0.39	0.89
sx		± 0.22	± 0.22	± 0.60	± 0.59	± 0.43	± 0.60	± 0.38	± 3.16	± 0.03	± 0.04

The calculated calorific value per 100 g meal ranged from 427.81 to 481.12 kcal with an average of 453.81 ± 3.16 .

Calcium content ranged from 0.25 to 0.82% with an average of 0.39 ± 0.03 . Phosphorus percentage ranged between 0.48 and 1.20 with an average of 0.89 ± 0.04 .

Generally the mentioned results are in agreement with that previously reported by *Ghoneim* (4) and the Ministry of Agriculture, Egypt (6).

Summary

Representative samples of linseed meal were collected from the productive nineteen oil mills of Egypt. The averages of nutrients in the mentioned samples were 6.55 ± 0.22 , 93.45 ± 0.22 , 11.19 ± 0.60 , 26.97 ± 0.59 , 11.18 ± 0.43 , 36.10 ± 0.60 , 8.00 ± 0.38 , 0.39 ± 0.03 and 0.89 ± 0.04 for moisture, dry matter, ether extract, crude protein, crude fiber, nitrogen-free extract, ash, calcium and phosphorus respectively. The average of the calculated calorific value was 435.81 ± 3.16 kcal per 100 gram of the meal.

Zusammenfassung

Repräsentative Stichproben von Leinsamen-Mehl der 19 produktiven Mühlen in Ägypten wurden gesammelt. Der prozentuale Anteilswert der Nährstoffe dieser Stichproben betrug: $6,55 \pm 0,22$ Feuchtigkeit, $93,45 \pm 0,22$ Trockensubstanz, $11,19 \pm 0,60$ Ätherextrakt, $26,97 \pm 0,59$ Eiweiß, $11,18 \pm 0,43$ Rohfaser, $36,10 \pm 0,60$ freier N, $8,00 \pm 0,38$ Asche, $0,39 \pm 0,03$ Kalzium, $0,89 \pm 0,04$ Phosphor. Der durchschnittliche Brennwert des Mehls betrug $435,81 \pm 3,16$ kcal pro 100 g.

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