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PREPARATION AND CHARACTERIZATION OF PEANUT BUTTER

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Peanut butter was prepared from a composit sample of Pakistani peanuts. Peanuts were analysed for proximate composition. The quality of peanut butter samples was evaluated during storage for 90 days. Crude fat content decreased slightly during storage while free fatty acids and peroxide value of butter samples increased. Oil separation in different samples was also determined.

INTRODUCTION

Legally peanut butter is cohesive, comminuted food product prepared from clean, sound, shelled peanuts by grinding roasted, mature peanut kernels from which the seed coats have been removed, and salt added as seasoning agent. Peanut butter has been commercially prepared and marketted in Western countries since 1936. The preparation of peanut butter has been described by Woodroof *et al.* (1949) and the factors affecting the quality and stability of this product have been studied by many research workers. Lenth (1940) observed that a low percentage of glycerine in peanut butter reduced oil separation and stiffened the product. Mitchell (1950) suggested the addition of hydrogenated peanut oil (m.p. 138°F) and iodine value of 8 in the preparation of butter would reduce oil separation. Willich *et al.* (1952) stated that the oils in peanut butters were quite stable against autoxidative rancidity at the time of manufacture and remained satisfactorily (although somewhat reduced) stable during storage at 80°F, in the absence of light for 2 years.

Morris *et al.* (1953) reported that free fatty acids of peanut oil ranged from 0.1 per cent to 0.6 per cent. Slight decrease in free fatty acids was generally noted as a result of roasting, blanching and sorting and the average decrease was reported to be 0.1 per cent.

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Food and Drug Proposals (Fed. Reg. 1964) provided that peanut butter should contain not less than 90.00 per cent peanuts. The remaining 10 per cent represented optional ingredients. The total oil contents of the finished food may not exceed 55 per cent.

These studies were undertaken to investigate the quality characteristics of peanut butter as affected by method of preparation and storage.

MATERIALS AND METHODS

Peanuts were purchased from the local market, sorted to remove any foreign material and shelled manually. Shelled peanut kernels were blanched by giving a dip in boiling water. Blanched peanuts were dried in an air oven at 200°C for 90 minutes, and testa was removed by gentle rubbing of the dried kernels between hands.

After removal of testa, the clean and sound kernels were divided into three lots A, B and C, which were further sub-divided into 3 samples of 2.8 lbs. each. All the nine samples were treated differently before the preparation of butter. In case of lot A, whole peanut kernels were used. Sub-lot A-1 was processed into butter without any treatment, A-2 was dry roasted at 320°F for 40 minutes and A-3 was fried in fat. In case of lot B, peanuts were defatted in a hydraulic press under a pressure of 15,000 to 20,000 lbs. per sq. inch. Then B-1 was processed into butter without any treatment while sub-lots B-2, and E-3 were dry roasted and fat fried as in case of lot A. In case of lot C peanuts were again defatted by the method adopted in case of lot B. Sub-lot C-1 was processed into butter without any treatment, while C-2 and C-3 were dry roasted and fat fried exactly as in case of lot A and lot B. In this case, oil extracted during defatting was added back dropwise during the preparation of butter.

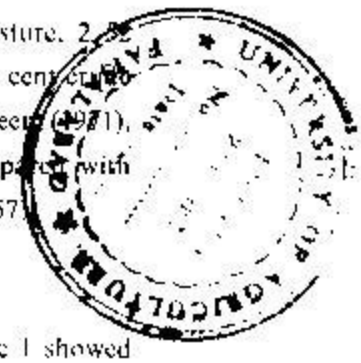
The treated peanut samples were coarsely ground and converted to paste in an attrition mill. During grinding, salt was added at the rate of 2 per cent and butter thus prepared was packed in 8 oz sterilized glass jars, capped, labelled and stored at ambient temperature. The produce was analysed after 0, 15, 30,

45, 60, 75 and 90 days of storage for crude fat and free fatty acids according to the methods described in A.O.A.C. (1975) and peroxide value according to the method described in A.O.C.S. (1975).

RESULTS AND DISCUSSION

Composition

Peanuts used in these studies contained 4.97 per cent moisture, 2.[illegible] per cent ash, 49.26 per cent fat, 30.46 per cent protein and 2.44 per cent crude fibre. These values compared favourably with those reported by Saleem (1971), while ash and crude fibre contents were slightly lower when compared with composition of peanuts reported by Freeman (1954) and Willich (1957).



Fat

Data on the fat contents of peanut butters as given in Table 1 showed that except in the case of butter samples prepared from defatted peanuts, the fat contents of butter ranged from 48.80 per cent to 50.50 per cent. The defatted samples contained 8 to 9 per cent fat. The fat contents of all butter samples decreased very slightly during storage, and this decrease was of the order of 0.05 per cent to 0.1 per cent in case of defatted samples while the decrease in other samples was 0.20 per cent to 0.40 per cent. Fat content of all butter samples was within the limit of 55 per cent as required for peanut butter under the Federal Food Drug and Cosmetic Act of U.S.A.

Free Fatty Acids

It has been observed from the data given in Table 2 that the initial free fatty acids ranged from 0.21 to 0.28 per cent (except in case of defatted samples where the range was 0.06 to 0.08 per cent. Free fatty acids in all samples increased during storage. Fat fried samples contained slightly more free fatty acids than the dry roasted ones. The free fatty acids of butter ranged from 0.28 to 0.40 per cent after 90 days of storage. Morris *et al.* (1953) reported a range of 0.1 to 0.6 per cent of free fatty acids in 20 batches of peanut butter.

Table 1. *Effect of storage and processing on the average* fat content (per cent) of peanut butter samples.*

Storage period	Samples								
(days)	A-1	A-2	A-3	B-1	B-2	B-3	C-1	C-2	C-3
0	49.50	49.80	50.50	8.00	9.00	49.60	48.80	49.20	50.30
15	49.45	49.80	50.40	8.00	9.00	49.55	48.80	49.20	50.20
30	49.40	49.75	50.30	8.00	8.95	49.50	48.75	49.15	50.15
45	49.40	49.70	50.30	7.95	8.95	49.40	48.75	49.10	50.10
60	49.35	49.60	50.25	7.95	8.90	49.30	48.70	49.00	50.05
75	49.30	49.50	50.20	7.90	8.85	49.25	48.65	48.95	50.00
90	49.30	49.40	50.10	7.90	8.85	49.20	48.60	48.90	49.95

* Data represents average of three determination in each case.

Table 2. *Effect of processing and storage on average* free acid contents (per cent) of peanut butter samples.*

Storage period (days)	Samples								
	A-1	A-2	A-3	B-1	B-2	B-3	C-1	C-2	C-3
0	0.23	0.25	0.28	0.08	0.06	0.26	0.21	0.23	0.24
15	0.25	0.26	0.29	0.10	0.07	0.27	0.22	0.24	0.28
30	0.26	0.28	0.31	0.11	0.10	0.28	0.23	0.25	0.30
45	0.28	0.30	0.33	0.12	0.11	0.29	0.24	0.27	0.31
60	0.30	0.32	0.36	0.14	0.12	0.31	0.26	0.28	0.32
75	0.31	0.34	0.38	0.15	0.14	0.32	0.27	0.30	0.33
90	0.32	0.36	0.40	0.16	0.15	0.33	0.28	0.31	0.35

* Data represents average of three determinations in each case.

Peroxide value

This value ranged from 0 to 0.3 in freshly prepared samples. Peroxide value increased significantly during storage and this increase was more pronounced in case of roasted samples as compared to those prepared from raw kernels. The oxidation of fat during storage might have occurred due to the atmospheric oxygen present in the head-space or that incorporated with butter during processing.

Willich (1952) observed a reduction in the stability of butter samples presumably due to the presence of atmospheric oxygen in the head-space of jars and that incorporated with the butter during processing.

Oil separation

Measurement of oil separation taken after 120 days of storage showed that oil layer in case of A-1 (Control as such), C-1 (Control defatted and reconstituted) and B-2 (Dry roasted defatted) was relatively less as compared to the rest of the samples.

Addition of hydrogenated peanut oil (m.p. 148°F and iodine value of 8) was suggested by Mitchell (1950) or addition of low percentage of glycerine by Lenth (1940) to reduce oil separation.

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