PROXIMATE AND MINERAL COMPOSITION OF SOME COMPOUNDED SOUP POWDERS

by

B. S. Bhatia, K. G. Nair and Girdhari Lal

Central Food Technological Research Institute, Mysore

ABSTRACT

Proximate and mineral composition of soup powders prepared in the laboratory and obtained from U.K. has been determined. The results show that (*i*) they are rich in proteins, carbohydrates (starch and sugars) and fairly rich in fat and minerals like calcium, phosphorus and iron; (*ii*) Sodium chloride forms the major component of ash and its concentration in the soup is directly proportional to the extent of dilution required for reconstitution; (*iii*) In general, the quantity of diluents like starch and cane sugar used in commercial soups is fairly high when compared with the laboratory samples.

Introduction

In earlier communications [1,2], preparation of some compounded soup powders has been described. The present paper deals with their proximate and mineral composition.

Materials and Methods

Soup powders from Chicken, Mutton, Tomato, Potato, Carrot, Green pea, Dried pea, Fried green pea, Fried field bean and Fried lima bean were prepared as described earlier [1,2]. Mushroom soup powder was prepared by mixing together 10 lb. of 50 mesh mushroom powder, 1·60 lb. each of skim milk powder, hydrogenated ground nut oil, common salt, 0·48 lb. of mixed spices and 0·16 lb. of monosodium glutamate. Commercial samples obtained from the U.K. Market and included in this study were soup powders from cauliflowers, asparagus, tomato, spring vegetables, thick pea, mixed vegetables, mushrooms, celery, chicken, chicken noodle, oxtail and pea with smoked ham.

Ash, ether extract, total protein, total titratable acidity, crude fibre, starch (by acid hydrolysis), sodium chloride, calcium and iron were estimated by A.O.A.C.[3] methods. Moisture was determined by drying the powder thinly spread in a flat aluminium dish at 70°C for 48 hours. The value thus obtained was comparable to that obtained by vacuum drying method employing 6 hours drying time at 70°C and 1mm. Hg. pressure in the oven. Protein soluble in 5 per cent. salt solution was estimated by Chamberlain's method[4], non-protein nitrogen by the method followed by Becker *et al* [5], reducing and total sugars by the Colorimetric method of Ting[6], and Phosphorous by the method of Fiske and Subba Row[7].

Results and Discussion

Data regarding proximate and mineral composition of laboratory and commercial samples are given in Table 1.

1. *Moisture*—It varies from 6·12 to 10·40 per cent. in laboratory samples and 4·70 to 10·51 per cent. commercial soup powders.

2. *Ash*—Ash content varied from 1·20 to 20·88 per cent. in laboratory soups and 6·96 to 19·40 per cent. in market samples. Added Sodium chloride forms the major component of ash and its concentration depends upon the degree of dilution required for reconstitution. Roughly speaking each dilution is equivalent to about 1 per cent. common salt *e.g.*, thick pea soup containing 5·92 per cent. common salt is required to be diluted six times only while spring vegetable soup containing 18·4 per cent. common salt needs 20 times dilution.

Soup powders are found to be fairly rich in minerals, like calcium, phosphorus and iron derived mainly from the individual bases of vegetable or animal origin.

3. *Ether extract*—Crude fat varies from 6·49 to 15·04 per cent. in the laboratory samples. In the case of mutton soup where fat content was 6·49 per cent., lean meat was used to facilitate drying and addition of further fat was not considered necessary. In the case of chicken soup, however, additional fat was added while compounding. Soups prepared from fried bases contained enough original fat to give a concentration of more than 10 per cent. fat in the compounded soups. In commercial samples, the crude fat varies from 0·65 to 13·90 per cent. It appears that in tomato and mushroom soups no extra fat has been added.

4. *Proteins*—Protein content is about 7-8 per cent. in vegetable soups from tomato, potato and carrot; 16·20 per cent. in bean and pea soups and 45-47 per cent. in chicken and mutton soups. The proteins of these laboratory samples are mainly derived from the dried bases, though some contribution is also made by the added skim milk powder. Inspite of incorporation of hydrolysed proteins, soyaflour, meat extract and skim milk powder (declared on the labels) which contribute towards the protein in content, comparatively lower values of commercial samples seem to be due to reduced base content and increased use of diluents like starch, sugar etc.

5. *Acidity*—In laboratory and commercial samples of tomato soup, the acidity is 4·10 and 3·08 per cent. respectively. Comparatively higher acidity (1·93 %) in commercial mixed vegetable soup may be mainly due to the presence of tomatoes declared on the label.

6. *Sugars*—In laboratory samples non-reducing sugars are comparatively more in the case of tomato and carrot soups, which are mainly derived from the vegetable bases. In commercial samples like asparagus, tomato, mixed vegetables, mushroom, celery, chicken and chicken noodle soups, the presence of non-reducing sugars is mainly due to the addition of cane sugar as declared on their labels.

7. *Starch*—The highest starch content amongst the laboratory soups is in the case of potato soup and is entirely contributed by the potato base. In other laboratory samples, besides 10 per cent. of added starch, the ramaining

quantity is derived from the respective bases. In commercial samples, the starch content varies from 17·60 to 49·96 per cent. and as indicated by the declarations on the labels, they have included starch bearing materials like rice flour, wheat flour, soya flour and corn starch in their soups.

In general, it may be concluded that in commercial samples the quantities of diluents used like starch and sugar are fairly high. Considering the highly competitive nature of this industry catering to the needs of comparatively low income groups, such a practice may be unavoidable.

Acknowledgement

Grateful acknowledgement is made to Dr. V. Subrahmanayan, Director of the Institute, for the keen interest in this investigation.

References

1. Bhatia, B. S., Nair, K. G., and Lal, Girdhari, *Def. Sci. J.*, **11,** 18, 1961.
2. Bhatia, B. S., Nair, K. G., Prabhakar, J. V., and Lal, Girdhari, *Def. Sci. J.*, **11,** 23, 1961.
3. The A.O.A.C. Official Methods of Analysis, Eighth Ed., Published by the Association of Official Agricultural Chemists, Washington, 4, D. C., 1955.
4. Chamberlain, quoted by Winton, A. L. and Winton, K. B., The Analysis of foods, (1947). p. *436*. John Willey and Sons, Inc., New York.
5. Becker, H. C., Milner, R. T., and Nagel, R. H., *Cereal Chem.*, **17**, 447, 1940.
6. Ting, S. V., *J. Agri. Food Chem.*, **4**, 263, 1956.
7. Fiske, C. H., and Subbarow, Y., *J. Biol., Chem.*, **66**, 375, 1925.

TABLE I

Proximate and Mineral Composition of Soup powders

	Laboratory Samples											
	Chicken	Mutton	Tomato	Potato	Carrot	Mushroom	Green peas	Dried peas	Fried green	Fried Field beans	Fried Lima beans	Fried Broad beans
Moisture per cent	7·95	10·40	8·50	7·65	8·02	7·13	9·13	8·23	6·25	6·12	7·32	7·23
Ash per cent	12·20	17·30	15·70	16·98	20·88	14·29	14·70	14·94	17·43	16·44	16·65	17·40
Ether extract %	14·40	6·49	10·80	10·14	11·29	13·90	14·07	14·40	15·04	13·03	9·85	14·73
Total Protein (N × 6·25)%	47·17	45·78	7·83	7·34	7·92	17·40	16·38	20·46	16·17	20·12	17·56	17·29
Salt soluble Protein%	12·40	10·40	5·05	4·87	4·84	11·50	7·05	8·18	5·59	4·62	4·57	5·28
Non-Protein Nitrogen %	0·96	0·59	0·70	0·36	0·41	0·87	0·59	..	0·61	0·50	0·42	0·51
Total Titratable acidity % (as anhydrous citric acid)	0·70	0·57	0·10	0·51	0·83	0·64	0·41	0·84	0·44	0·30	0·34	0·33
Crude Fibre %	0·91	0·78	2·10	1·40	5·35	1·72	3·72	2·17	2·46	2·16	2·44	2·48
Reducing Sugars (as invert)%	4·74	7·39	2·02	5·94	15·30	5·90	4·99	3·17	6·40	5·23	6·65	6·27
Total Sugars (as invert sugar)%	5·91	8·54	29·14	6·73	22·84	6·95	7·26	3·75	7·53	6·83	8·60	7·49
Starch %	10·70	9·77	16·70	39·31	12·93	8·80	26·53	23·60	28·62	32·94	31·23	21·43
Sodium Chloride %	9·05	14·63	11·58	14·97	17·67	9·10	12·40	12·01	15·66	15·27	14·91	14·87
Other Carbohydrates (by difference) ..	0·06	0·37	5·10	9·93	9·94	28·17	7·80	11·61	6·06	2·06	6·01	11·62
Calcium mg. per cent	432	350	192	181	301	291	240	274	314	276	279	340
Phosphorus mg. per cent	625	564	284	238	299	323	347	443	424	477	307	421
Ferric Iron mg. per cent	13·14	21·49	23·63	13·58	14·49	41·86	21·81	22·5	25·92	31·09	28·75	17·95

TABLE I—*Proximate and Mineral Composition of Soup powders*—contd.

	Market Samples											
	Cauli-flower	Aspa-ragus	Tomato	Spring Vege-tables	Thick pea	Mixed Vege-tables	Mush-room	Celery	Chi-cken	Chi-cken noodle	Oxtail	Pea with smoked ham
Moisture per cent	4·97	5·13	10·51	8·69	6·94	6·22	7·27	5·29	6·30	4·70	9·18	9·30
Ash per cent	14·65	15·50	15·03	19·40	6·96	14·54	14·72	14·70	13·09	14·22	18·03	14·70
Ether extract %	9·80	13·90	0·65	13·37	8·46	12·60	1·88	8·53	5·09	5·43	10·80	10·57
Total Protein (N×6·25)%	13·29	1·87	10·00	6·18	15·21	10·87	20·84	16·05	20·29	11·58	15·58	17·80
Salt soluble Protein %	8·36	7·75	7·03	4·68	4·51	9·02	15·73	12·37	9·57	3·99	9·06	7·38
Non-Protein Nitrogen %	..	..	..	..	..	..	..	..	..	..	..	..
Total Tiratable acidity % (asanhydrous citric acid)	0·65	0·80	3·08	0·72	1·21	1·93	1·03	0·62	0·44	0·30	1·43	0·64
Crude Fibre %	1·09	1·02	1·49	2·90	1·77	1·88	1·66	1·41	0·77	0·50	0·75	1·01
Reducing Sugars (as invert) %	4·23	5·38	19·80	3·91	7·58	5·20	11·45	11·37	8·64	2·10	4·12	1·18
Total Sugars (as invert sugar) %	9·50	11·23	38·10	8·94	19·04	26·00	22·70	18·76	21·39	6·70	9·04	1·18
Starch %	36·40	34·50	17·60	23·89	36·39	25·03	23·06	25·09	28·80	49·96	31·36	31·59
Sodium Chloride %	13·20	13·02	14·20	18·40	5·92	13·07	11·40	12·58	11·35	12·20	15·90	12·64
Other Carbohydrates (by difference) ..	9·65	6·05	3·54	15·91	5·49	0·93	5·94	9·55	3·83	6·61	3·83	13·21
Calcium mg. per cent	124	106	93	129	120	178	396	525	277	71	78	72
Phosphorus mg. per cent	164	144	201	196	312	315	599	430	403	102	407	345
Ferric Iron mg. per cent	15·60	8·91	9·55	10·58	12·69	16·52	21·61	12·11	10·75	7·46	12·93	11·05