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WATER-SOLUBLE VITAMINS OF SPRAY-DRIED DEPROTEINATED SALTED AND SWEET WHEY

M. A. Khorshid, I. D. Rifaat*, A. A. Hofi
and M. H. Abd El-Salam

Whey played an important part in the recognition and early development of knowledge of the vitamins. As might be expected the so-called water soluble vitamins are found with large exceptions, in the whey. Therefore, the object of this paper was to determine thiamine-HCl, riboflavin, and nicotinic acid in spray-dried-deproteinated salted and sweet whey. The vitamins contents of the sweet whey were little higher than in salted whey. The salted whey contains an average 1.76, 0.86, and 30.44 mg/Kg whey of thiamine-HCl, nicotinic acid, and riboflavin respcectively. On the other hand the sweet whey contains an average 2.81, 1.72, and 31.00 mg/Kg whey of thiamine-HCl, nicotinic acid, and riboflavin respectively.

Whey played an important part in the recognition and early development of knowledge of the vitamins. As might be expected, the so-called water soluble vitamins, the B vitamins are found, with large exceptions, in the nonfat portion.

In this paper trials were made to determine the thiamine, riboflavin and nicotinic acid contents of sweet and salted dried whey.

Materials and Methods

Preparation of the samples for the determination of thiamine-HCl contents

One g of dried whey sample was stirred rapidly into a 100ml beaker with 50 ml distilled water, the mixture was adjusted to pH 4.5 with diluted HCl, and the extraction allowed to proceed at 70°C for 30 min. Exactly 5 g of purified Zeolite ion exchange resin suspended in distilled water were poured into a chromatographic; column tube ; 30 × 1.5 cm, with center glass disc fitted in the constricted outlet of the column tube. Resin was first washed with KCl-HCl solution, and then washed with 50 ml of hot distilled water. The extract solution was added to the column, and the rate of filtration was approximately 10 ml/min. As soon s all the extract solution was drawn, 50 ml of HCl at pH of 4.5 were added, followed by 20 ml of KCl-HCl solution, finally washed with 500 ml hot distilled water. Three ml of the dilute were used for the determination of thiamine-HCl spectrophotometrically as described by Prebluda, and McCollum (1939), Giri and Balakrishman (1955) and Melnick and Field (1959).

Preparation of the samples for the determination of nicotinic acid contents

Ten g of dried whey were put in a test tube, 30 × 3 cm: 5 ml of concentrated HCl were added, and the final volume made up to 15 ml with distilled water.

* Dairy and Food Tech. Lab., N.R.C. Dokki, Cairo, Egypt.

The tube was immersed in boiling water for 30 to 40 min. The sample was cooled and the volume restored to the original volume by the addition of distilled water. Ten ml of ethyl alcohol were added and the solution was transfered to 250 ml conical flask. Exactly 200 ml of charcoal were added, and the mixture was shaken and filtered. The filtrate was neutralized with 0.1N NaOH and the final volume made up to 50 ml with distilled water. Three ml aliquots of the final solution were used for the determination of nicotinic acid content according to Melnick and Field (1940).

Preparation of the samples for the determination of riboflavin contents:

One g of dried whey sample was stirred into 100 ml beaker with 50 ml hot distilled water for 30 to 40 min. The beaker contents were then filtered through Whatman No. 42, filter paper, and the filtrate was placed into 50 ml voumetric flask and made up to the volume with distilled water. With micropipette; 0.1 ml of the sample was used for the determination of riboflavin by using paper chromatographic technique as reported by Brown and Marsh (1952) and Giri and Balakrishman (1955).

Results and Discussion

TABLE 1.—THIAMINE HYDROCHLORIDE, NICOTINIC ACID AND RIBOFLAVIN CONTENT OF SPRAY-DRIED-DEPROTEINATED SALTED AND SWEET WHEY (MG/KG).

	Taiamine HCl		Nicotinic acid		Riboflavin	
	Salted whey	Sweet whey	Salted whey	Sweet whey	Salted whey	Sweet whey
1	2.20	3.25	0.96	1.23	35.5	26.5
2	2.15	3.00	0.83	2.20	42.5	35.5
3	3.00	2.20	0.76	1.66	33.5	33.5
4	1.10	2.60	0.93	1.60	44.5	28.5
5	1.30	3.00	0.93	1.93	18.0	—
6	1.35	—	1.00	—	31.0	—
7	1.10	—	0.83	—	22.0	—
8	1.85	—	0.66	—	16.5	—
Mean	1.76	2.81	0.86	1.72	30.44	31.00

The thiamine contents of spray-dried-deproteinated-salted whey ranged from 1.10 to 3.00 mg/Kg with a mean value of 1.76 mg/Kg; table 1. On the other hand the thiamine contents of sweet whey were higher than that in salted whey. The values ranged from 2.20 to 3.00 mg/Kg, and thus gave a higher mean value of 2.81 mg/Kg. Hartman and Dryden (1965), recorded more wider range for thiamine contents of dried whey, being 1.7 to 4.9 mg/Kg than the present study. They also found that the mean value of thiamine content of dried whey, being 3.7 mg/Kg was higher than the reported (2.81 mg/Kg). The riboflavin contents of salted whey ranged form 16.5 mg/Kg to 44.5 mg/Kg with a mean value of 30.44 mg/Kg; table 1. On the other hand the riboflavin content of sweet whey ranged from 26.2 mg/Kg to 35.5 mg/Kg which was less than that of dried-salted whey but with a similar mean value of 31.0 mg/Kg. Comparing the data obtained in the literature for the riboflavin contents of spray-dried whey with the present study, it was observed that the literature gave smaller range, being 20.0 to 29.7 mg/Kg by Hartman and Dryden (1965), than the author findings being 16.5 to 44.5 mg/Kg. The nicotinic acid contents of salted whey ranged from 0.66 to 1.00 mg/Kg with a mean value of 0.86 mg/Kg; table 1. Regarding the value for the sweet whey, the nicotinic acid content yiedled a higher range, being 1.23 to 1.93 mg/Kg and higher mean value, being 1.23 mg/Kg than salted whey.

Higher values for nicotinic acid, however, were found by Hartman and Dryden (1965), namely 8.0 to 11.2 mg/Kg for dried whey with a mean value of 9.6 mg/Kg.

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الفيتامينات الذائبة فى المـاء الموجودة فى الشرش المخفف الخالى من البروتينات الملح والغير مملح

الدكتور محمد عبد الجليل ـ الدكتور ابراهيم الدسوقي رفعت
الدكتور عبد الحميد الحوفى ـ الدكتور محمد الحسينى عبد السلام

الملخص

يلعب الشرش دورا هاما بالنسبة لمعلوماتنا عن الفيتامينات فمن المتوقع أن الفيتامينات الذائبة فى المـاء توجد بنسب عالية فى الشرش ولهذا السبب كان الغرض من هذا البحث هو تقدير بعض هذه الفيتامينات الذائبة فى المـاء وهى الثيامين والريبوفلافين وحامض النيكوتينك الموجودة فى الشرش المجفف الخالى من البروتينات الملح والغير مملح ـ هذا وقد وجد عموما أن الشرش الملح يحتوى على نسب اقل من الفيتامينات . فوجـد أن الشرش الملح يحتوى على ١ر٧٦ مليجرام/كجم ثيامين كلوريد ، ٨٦ر مليجرام/ كجم حامض النيكوتينك ، ٣٠ر٤٤ مليجرام/كم ريبوفلافين .

أما الشرش الغير مملح فيحتوى على ٢ر٨١ ، ١ر٧٢ ، ٣١ر٠٠ مليجرام/ كجم من هذه الفتيامينات على التوالى .

* معمل الصناعات الغذائية والالبان ـ المركز القومى للبحوث ـ الدقى ـ القاهرة .