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UTILIZATION OF KHARISH CHEESE IN PREPARATION OF BABY FOOD MIXTURES

Emam, O. A.* ; ,Ghada M. El- Bassyouni ** and Fatma M. Baghdady***

*** Home Economics Dept., Faculty of Specific Education, Benha University, Egypt.**

**** Home Economics Dept., Faculty of Specific Education, Benha University, Egypt.**

***** Benha University, Egypt.**

ABSTRACT

Ten weaning-food mixtures were prepared by using cereals (rice and corn);Legumes (lentil and faba beans); karish cheese; yellow carrot and apple peel powder. Results showed that chemical composition (g/100g.on dry weight basis)of protein ranged from 15.2 to 17.8%, carbohydrates (74.47 - 78.16%);ash(2.6-2.87%);crude fibers(1.85-2.٩٦%)lipids (1.7-1.9%) and total calories (386.2 - 391.1 k.cal.), respectively. The highest value of protein and ash content was found in prepared formula (2) containing kharish cheese (12%).

Minerals (mg/100g.on dry weight basis) illustrate that Ca ranged between 120 and 310 mg.; P(108-246mg.); Mg (68-136mg.)and Fe (5.17-6.16 mg), respectively. Formula (2) showed the highest value of Ca and P, while formula (4) containing apple peels (12%) was the highest value of iron.

Prepared weaning-foods and local mixtures are considered as a good source of essential amino acids (EAA). It contained 120 – 199 mg/ 100g. on dry weight basis . The highest value was found in prepared formula (2)and the lower value was found in local mixtures. All formulas could cover the daily requirments of EAA for babies.

Total bacterial counts and phychrophilic bacteria of all formulae were in the permible limit, also free from coliform group; fungi; yeasts and safe for babies. Sensory evaluation of all formulas was highly acceptable and could be used for the first vital stage of childhood age and also breast feeding as asupplementary foods.

INTRODUCTION

Malnutration is the most serious nutritional disease among children.It affects the overall-health begining from infanthood to childhood, (Farag, 1999). Malnutrition is the direct cause of death is referred to as protein energy malnutrition (WHO, 2004). Although it is rarely the direct cause of death, child was associated with 54%of child death (10.8 million children) in developing countries in 2001 year .

Human milk is considerably less than in infant formula. In the last six months of the first year, diets of breast-fed infants should be supplemented with additional sources of high quality protein such as yoghourt or cereal mixed with milk (Mahan and Escott .Stump, 2000). Weaning foods must bridge the gab between breast-feeding and family diet. Infant age 6-12months are the major group of weaning food consumers. In addition, such food must have an easy to sallow consistency and should be microbiologically safe when consume (Nout, 1993). In Egypt, milk production is not sufficient to supply the daily requirements of population. For this reason, many efforts had been carried out to prepare weaning-food mixtures.

Legumes fortified weaning-foods are considered as a good nutritional value source and have been shown to prevent protein energy malnutrition (Egounlety *et al.,* 2002). In addition, more than 50% of the world depends on cereals as a source of high energy. The mixtures which have been used were rice, corn, bean, lentil and supported by some nutritional additives i.e. karish cheese, carrot and apple peels.

The main objective of the present study is an attempt to prepare some weaning-food mixtures with the high nutritional quality, microbiologically safe, acceptable for baby consumption and cheap price from the view economical point. Also, comparative study between prepared formulas and local market mixtures (Riri and cerelac) was carried out.

MATERIALS AND METHODS

Materials

Faba beans *(Vicia faba, L.)* variety Giza; rice *(Oryza sttiva, L.)*; corn *(Zea mays, variety320*; Lentil *(Lens culinaris)* were obtained from Agricultural Reasearch Center, Giza, Egypt. Meanwhile, Karish cheese *(Cottage cheese)*; apple *(Malus domistica)* and yellow carrots *(Daucus carrot)* were obtained from local market, El Apoor city, Qalubia Governorate, Egypt.

Preparation of ingredients

Rice grains were cleaned from impurities, washed with tap water, cooked for 30 minutes, sun dried for 2 days, then dried in an electric oven at 50°c for 96 hours and ground into flour powder in an electric oven grinder and packed in polyethylene pags. Corn grains were cleaned, washed in tap water, then boiled for one hrs. Until swelling, sun dried for 2 days, then dried in an electrical oven at 50°C for 3 days, ground into flour powder in electrical grinder and packed in polyethylene bags.

Faba beans were cleaned, washed with tap water, soaked in water for 24 hours., then peeling, boiled for an hour until swelling, air dried at room temperature for 24 hours, then dried in an electrical oven at 50°c for 96 hours., ground into fine powder in an electrical grinder and packed in polyethylene bags. Lentil grains were cleaned from impurities and washed several times with tap water, boiled for 30 minutes until well cooked, air dried at room temperature for 24 hours, then dried in an electrical oven at 50°C for 96 hours, then ground into powder in an electrical grinder and packed in polyethylene bags.

Karish cheese was dried at 50°C for about 24 hr in an electric oven, then blended in electric miller till fine powder. Yellow carrot was cleaned, dehulled; washed, peeled; cut into small slices and blanched for 5 minutes, then dried in electrical oven at 50°C and ground into fine powder by electrical grinder. Apple is washed with tap water, and peeled. These peels were air dried under ventilation condition for three days under sun drying, ground to soft powder and packed in polyethylene bags.

Preparation of weaning-food formula

Ten formulas were prepared from the abovementioned sources. The composition of different prepared weaning-food formulas were blended together as shown in Table (1).The ingredients of each formula were blended in the electrical mixture for full homogenization, then backed into pyrex glass

jars which was closed tightly and sterilized by autoclave at 121°C for 15 minutes at 15 of pressure and kept in refrigerator at 4 ± 1°C for three months.
Methods

Table (1): The percentage of materials in prepared weaning food formulas.

Food Formula / No.	Corn	Rice	Bean	Lentil	Karish cheese	Carrot	Apple peels
1	30	25	25	20	-	-	-
2	25	25	20	18	12	-	-
3	25	25	20	18	-	12	-
4	25	25	20	18	-	-	12
5	25	25	20	18	6	6	-
6	25	25	20	18	-	6	6
7	25	25	20	18	6	-	6
8	25	25	20	18	4	4	4
9	25	25	20	18	6	3	3
10	25	25	20	18	3	6	3

Analytical methods

Gross chemical composition of prepared weaning-food mixtures and local baby foods including, protein, fat, ash, crude fibers and moisture contents was determined according to the methods of AOAC (2000). Total carbohydrates calculated by the difference and caloric value was calculated according to FAO/WHO (1985) by the following equation.

Energy value = 4 (protein + carbohydrate) + 9 (fat).

Minerals (Ca, P, Mg and Fe) were determined according to the method described by Anon (1982) by using Atomic Absorption Spectrophotometer (Perklin Elmer Model 2380). While, amino acids were determined according to the method of Winder and Eggum (1966) by using High Performance Amino Acid Analyzer Biochrn 20 Pharmacia Biotec. Also, chemical protein score was calculated according to FAO/WHO (1989).

Microbiological evaluation of all blends including total bacterial counts; psychrophilic bacteria; coliform bacteria; fungi and yeasts were determined according to the method of microbiological specification for foods, ICMSF (1978). Sensory evaluation of colour, taste, consistency, odour, appearance and overall acceptability was evaluated by 10 panelists of Lactate mothers according to the method described by Fahmy (1969) and was applied by Bahlol (1993). The intensity of acceptability was described according to the following code numbers 7-10 highly acceptable, 5-7 acceptable and >5 non acceptable. Statistical analysis of the obtained data was used according to the method described by SAS (1993).

RESULTS AND DISCUSSION

Chemical composition of raw materials

Chemical composition of food materials (g/100g on dry weight basis) is shown in table (2). Results indicated that, kharish cheese powder recorded the highest percentage of protein (31.6%) and also ash content (8.3%).

Meanwhile, carrots showed the highest percentage of crude fibers (6.9%), followed by apple peel (4.0%). Rice was the highest percentage of

carbohydrates (88.5%), followed by corn (81.8%), also, the highest value of calories was found in corn (411.5 k.cal.), followed by rice (401.7 k.cal). These results are in agreement with those found by Emam (2002); Abou Sebaa, Sherin (2004) and Allam (2007). It could be concluded that, cereals are rich in carbohydrates and the main source of energy, while kharish cheese is considered as a good source of animal protein and ash content. In addition, carrots and apples are the major source of crude fibers.

Table (2): Gross chemical composition of raw materials (%) (on dry weight basis).

Constituents % / Ingredients	Moisture content	Crude protein	Total lipids	Ash content	Crude fibers	Carbohydrates	Total energy
Corn	8.10	10.5	4.70	1.60	1.40	81.8	411.5
Rice	6.50	8.10	1.70	0.90	0.80	88.5	401.5
Bean	8.40	24.5	1.20	4.90	1.90	67.5	378.8
Lentil	7.50	26.2	0.50	4.10	1.00	68.2	382.1
Karish cheese powder	4.50	31.6	4.50	8.30	0.00	55.6	389.3
Carrot powder	6.10	7.50	2.10	7.10	6.90	76.4	354.5
Apple peels powder	5.50	5.10	1.80	4.50	4.00	84.6	375

Mineral contents of raw food materials (mg/100g on dry weight basis) were illustrated in Table (3). Results indicateكs that calcium ranged between 120 and 470 mg; phosphorous (120-352 mg); magnesium (94-230mg) and iron (2.76-23.9mg). The highest value of Ca was found in karish cheese (470mg) and the lower value was found in bean (120 mg). Also, the highest value of P was found in karish cheese (352mg). In addition, the highest value of microelements of iron (23.9mg) was found in apple peel powder. Such results were in agreement with those obtained by Emam,(2002). It could be concluded that, karish cheese is considered as a good source of Ca and P. Meanwhile, apple peels as the main source of iron.

Table (3): Mineral composition of raw food materials (mg/100g on dry weight basis).

Minerals / Foods	Ca	P	Mg	Fe
Rice	390	149	230	4.08
Corn	360	120	128	3.60
Lentil	260	182	94	5.70
Bean	120	253	319	5.52
Karish cheese powder	470	352	144	2.76
Carrot powder	240	330	168	22.6
Apple peel powder	390	290	95.0	23.9

Chemical composition of prepared formulas

Chemical composition of all formulas (g/100g on dry weight basis) is shown in table (4). Total protein ranged from (15.2 to 17.8%); total lipids (1.7-1.9%); ash content (2.6-2.87%; crude fibers (1.85-2.05%); carbohydrates (74.47 – 78.16%) and total calories (386,2 -391.1 k.cal.). These results are in

agreement with those obtained by Freig, Shadia (2002). Results indicated that, the prepared formula (2) recorded the highest percentage of protein (17.8%) and ash content (2.87%) as compared with the other formulae. This may be due to the addition of karish cheese.

Table (4): Gross chemical composition of both prepared weaning food mixtures and local baby foods (%on dry weight basis).

Constituents % / Formula no.	Moisture content	Crude protein	Total lipids	Ash content	Crude fibers	Carbohydrates	Total Calories
1	3.80	15.5	1.80	2.60	2.01	78.09	390.6
2	3.96	17.8	1.90	2.87	2.96	74.47	386.2
3	3.91	15.2	1.82	2.80	2.02	78.16	389.8
4	4.15	15.3	1.83	2.81	2.05	78.01	390.3
5	4.01	17.1	1.79	2.82	1.91	76.38	390.0
6	4.06	15.5	1.77	2.66	2.01	78.06	390.2
7	3.98	17.2	1.70	2.61	1.85	76.64	390.7
8	3.95	16.3	1.88	2.80	1.92	77.1	390.5
9	4.15	17.5	1.75	2.85	1.87	76.03	389.9
10	4.09	16.9	1.83	2.70	2.00	76.57	390.4
*11	4.02	15.9	1.90	2.65	1.95	77.6	391.1
**12	4.10	15.5	1.81	2.80	2.00	77.89	389.9
	NS	S	NS	S	S	NS	NS

Formula 1-10 see Table (1)
*** local market sample** **** Local market sample**
***** On dry weight basis** **S: Significant difference**
NS: Non significance

Moreover, consuming 100g from any formula could cover the daily requirements for baby (6-12 months) from protein and about half or more from total energy according to FAO/WHO, (1998),which reported that baby needs from 13-14g protein and 650-850k.cal. during the first year. Statistical analysis showed that, there were asignificant differences at $p \leq 0.05$ of protein, ash and carbohydrates. In contrast, there were no significant differences of lipids, ash, carbohydrates and total calories among formulas.

Minerals of prepared weaning-foods and local baby mixtures (mg/100g on dry weight basis) were recorded in Table (5). Results revealed that, calcium ranged between 120 and 310mg; phosphorous (108-246mg), Magnesium (68-136mg) and Iron (5.17-6.16mg). Moreover, consuming 100g from any formula could cover about half or more of the daily requirements of iron according to FAO/WHO (1989), while Mg covers all the daily requirements; Ca (20-51.7%) and P (21.6-49.2%) from the daily requirements of babies. It is worthy to mentioned that, some prepared mixtures showed the higher percentage of Ca, P, Mg and Fe than those found in commercial baby foods, especially, formula (2)and(4). This may be due to the addition of apple peels which rich in ash content as illustrated in table (4). Moreover, all prepared weaning-food formulae are considered as a good source of studied minerals for the first vital stage of childhood age as a supplementary foods.

Table (5): Minerals of prepared weaning food mixtures and local baby foods (mg/100g on dry weight basis).

Minerals / Formula no.	Ca	P	Mg	Fe
1	190	133	123	5.92
(RDA %)	31.7	26.6	205	59.2
2	310	246	136	5.75
(RDA %)	51.7	49.2	226.7	57.5
3	200	133	112	5.22
(RDA %)	33.3	26.6	186.7	52.2
4	140	108	114	6.16
(RDA %)	23.3	21.6	190	61.6
5	200	153	123	5.67
(RDA %)	33.3	30.6	205	56.7
6	250	175	68	5.34
(RDA %)	41.7	35.0	113.3	53.4
7	180	133	73.0	5.17
(RDA %)	30.0	26.6	121.7	51.7
8	120	120	98	5.58
(RDA %)	20.0	24.0	163.3	55.8
9	170	153	69.0	5.49
(RDA %)	28.3	30.6	115	54.9
10	170	186	121	5.39
(RDA %)	28.3	37.2	201.7	53.9
*11	260	174	96.0	5.47
(RDA %)	43.3	34.8	160	54.7
**12	200	120	115	5.85
(RDA %)	33.3	24.0	191.7	58.5
***RDA	600	500	60	10

Formulas 1-10 see Table (1)
*** Local market sample** **** Local market sample**
RDA % The percentages of RDA covered by element
***** RDA: Requirement of daily allowance per mg for babies (6-12) months according to FAO/WHO, (1989)**

Amino acids composition of prepared formulas:

Table (6) shows amino acids content (A.A) of prepared weaning foods and local market baby food mixtures (mg/100g on dry weight basis). Results revealed that seventeen amino acids were identified by using Amino Acid Analyzer. The predominant compounds of essential amino acids (EAA) were leucine (33.75-59.8 mg) and lysine (12.7-24.7 mg). While, glutamic acid was (13.6-18.0mg) and asparatic acid was (11.2-18.2) of non essential amino acids (NEAA). The total EAA ranged (107 - 199.5mg). However total NEAA (64.4-96.2mg). Results show that EAA of blends increased with increasing the amount of kharish cheese which is the main source of EAA, total EAA in formula (2) was the best formula, followed by formulas 7, 8, 6 and 5, respectively. It is worthy to mention that, all prepared formulas recorded the higher value of EAA as comparing with these of two local baby food mixture Moreover, consuming 100g of any formula could cover the daily requirements allowance from EAA for babies except methionine and cystein as recommendation by FAO/WHO (1989).

Table (6): Amino acids composition of prepared weaning-food mixtures and local baby food mixtures (mg/100g on dry weight basis).

Formula / Amino acids	1	2	3	4	5	6	7	8	* 9	** 10	*** RDA
Essential amino acids (EAA)											
Valine	13.0	15.6	12.5	9.75	10.4	14.3	14.3	15.6	10.4	10.4	5.5
Methionine	0.0	0.0	0.0	0.75	0.0	0.0	0.0	2.00	1.80	1.80	4.2
Cystine	2.0	4.5	2.0	2.0	4.80	2.0	3.6	0.0	0.0	0.0	
Isoleucine	15.0	18.2	14.0	12.0	16.0	16.5	15.4	18.0	12.8	12.0	4.6
Leucine	35.0	59.8	44.0	33.75	44.8	49.5	49.5	54.0	36.8	37.6	9.3
Tyrosine	15.0	14.3	2.0	1.50	9.60	4.40	13.2	1.20	6.40	3.2	7.2
Phenylalanine	18.0	22.1	14.0	12.0	12.8	18.7	18.7	19.2	14.4	12.8	
Histidine	19.0	22.1	15.0	12.75	13.6	19.8	22	20.4	15.2	16.0	2.6
Lysine	20.0	24.7	16.0	12.75	14.4	20.9	20.9	20.4	15.2	15.2	4.3
Threonine	13.0	18.2	11.0	9.75	11.2	14.3	12.1	14.4	8.0	11.2	
Total EAA	150.0	199.٥	130.5	107.0	137.6	160.4	196.7	165.2	121.0	120.2	44.3
Non essential amino acids (NEAA)											
Aspartic	17.0	18.2	14.2	12.0	13.6	17.6	15.4	16.8	11.2	11.2	
Serine	13.0	13.0	11.0	9.75	10.4	14.3	9.90	14.4	6.4	10.4	
Glutamic	18.0	16.9	15.0	17.8	13.6	17.6	16.5	18.0	13.6	13.6	
Proline	4.0	2.60	4.0	5.25	5.60	5.5	3.3	6.0	4.4	6.4	
Glycine	10.0	11.7	8.0	6.0	7.20	9.90	9.9	9.6	7.2	7.2	
Alanine	9.0	9.10	8.0	6.75	7.20	9.90	9.9	9.6	7.2	7.2	
Arginine	17	24.7	16.0	17.7	16.0	19.8	20.9	19.2	14.4	14.4	
Total NEAA	89	96.2	76.0	75.3	73.6	94.6	85.8	93.6	64.4	70.4	
Total AA	238	295.7	206.7	182.3	211.2	255	255.5	258.8	185.4	190.6	

Formula 1-10 see Table(1)

*** Local market sample** **** Local market sample**

***** RDA: Requirement of daily allowance per mg for babies (6-12 mounths) according to FAO/ WHO, (1989).**

Table (7): Chemical protein score of prepared weaning-food mixtures and local baby foods (mg/100g on dry weight basis).

Formula / A.A.	1	2	3	4	5	6	7	8	* 9	** 10	Whole egg protein
Essential amino acids (EAA)											
Valine	197.0	236.4	189.4	147.7	157.6	216.7	216.7	236.4	157.6	157.6	6.6
Methionine	47.6	78.9	35.1	48.7	84.2	35.1	63.2	35.1	31.6	31.6	5.7
Cysteine											
Isoleucine	326.1	337.0	259.3	222.2	280.7	305.5	285.2	333.3	237.0	222.0	5.4
Leucine	639.5	695.3	511.6	392.4	520.9	575.6	575.6	627.9	428.0	437.2	8.6
Tyrosine	354.8	475.3	172.0	145.2	240.9	248.4	343	219.4	223.7	172.0	9.3
Phenylalanine											
Histidine	826.1	960.1	576.9	554.3	591.3	860.9	956.5	887.0	660.9	295.7	2.5
Lysine	295.7	352.9	228.6	182.1	205.7	298.6	298.6	291.4	217.1	217.1	7.0
Threonine	276.6	387.2	234.0	207.4	238.3	304.3	257.4	408.5	170.2	238.3	4.7

*** Local market sample** **** Local market sample**

Table (7) illustrates chemical protein score of prepared and local baby food mixtures. Chemical score was estimated by the ratio of essential amino acids in prepared formula to those provisional reference protein (whole egg) according to the recommendations of FAO/WHO (1989). Results

indicated that histidine recorded the highest chemical protein score in all formulae, especially formula (2). Moreover, all formulas covered the daily requirement allowance from essential amino acids, except cysteine and methionine amino acids. Cystine and methionine recorded the lowest score in all samples ranging from 31.6% to 78.9%. Thus, they are considered as the limiting amino acids. These results were in agreement with those obtained by Emam (2002). Generally, prepared formula (2) showed the best results of chemical protein score of all essential amino acids in comparison with either the other prepared blends or commercial baby foods.

Table (8): Microbiological examination prepared weaning-food mixtures and local baby food mixtures (cell/g) during storage.

formulas	Evaluation	Total Bacterial counts	Total psychrophilic	Fungi and yeasts	Coliform bacteria
1	Zero time	3.1×10^1	2.2×10^1	ND	ND
	One month	3.5×10^1	2.4×10^1	ND	ND
	Three months	4.8×10^1	3.1×10^1	ND	ND
2	Zero time	4.2×10^1	3.0×10^1	ND	ND
	One month	4.5×10^1	3.2×10^1	ND	ND
	Three months	5.2×10^1	4.0×10^1	ND	ND
3	Zero time	4.0×10^1	3.2×10^1	ND	ND
	One month	4.7×10^1	3.5×10^1	ND	ND
	Three months	6.0×10^1	4.1×10^1	ND	ND
4	Zero time	5.1×10^1	3.1×10^1	ND	ND
	One month	5.5×10^1	3.5×10^1	ND	ND
	Three months	6.1×10^1	4.0×10^1	ND	ND
5	Zero time	5.2×10^1	4.2×10^1	ND	ND
	One month	5.4×10^1	4.5×10^1	ND	ND
	Three months	6.0×10^1	5.0×10^1	ND	ND
6	Zero time	4.7×10^1	4.3×10^1	ND	ND
	One month	4.9×10^1	4.4×10^1	ND	ND
	Three months	5.8×10^1	5.0×10^1	ND	ND
7	Zero time	4.3×10^1	3.2×10^1	ND	ND
	One month	5.0×10^1	3.5×10^1	ND	ND
	Three months	6.2×10^1	4.2×10^1	ND	ND
8	Zero time	5.3×10^1	4.2×10^1	ND	ND
	One month	5.4×10^1	5.0×10^1	ND	ND
	Three months	6.1×10^1	5.4×10^1	ND	ND
9	Zero time	5.6×10^1	4.1×10^1	ND	ND
	One month	5.8×10^1	4.0×10^1	ND	ND
	Three months	6.8×10^1	5.0×10^1	ND	ND
10	Zero time	4.8×10^1	3.8×10^1	ND	ND
	One month	5.1×10^1	4.5×10^1	ND	ND
	Three months	6.0×10^1	5.0×10^1	ND	ND
*11	Zero time	5.9×10^1	4.2×10^1	ND	ND
	One month	6.2×10^1	4.9×10^1	ND	ND
	Three months	7.0×10^1	5.9×10^1	ND	ND
**12	Zero time	6.1×10^1	4.4×10^1	ND	ND
	One month	6.5×10^1	4.8×10^1	ND	ND
	Three months	6.9×10^1	5.1×10^1	ND	ND

Formula 1-10 see Table (1)
*** Local market mixtures** **** Local market mixtures**
ND: Not detected

Microbiological examination of prepared formulas

Total bacterial counts; psychrophilic bacteria; fungi and yeasts (cell/g) of prepared weaning-food mixtures during storage at 4±1 c^o are recorded in Table (8). Total bacterial counts of all formulas mixtures ranged between 3.1 and 6.1×10^1, while psychrophilic bacteria ($2.2\text{-}4.4 \times 10^1$). These results are in agreement with those found by Emam (2002) and Abou-Sebaa, (2004). Microbiological evaluation showed that all formulae were in the permissible limit according to the recommendations of Egyptian Standared EOS (1992 and 1998). Also, results showed that total bacterial counts less than 1000 cell/g in all formula slightly increased of both tothal bacterial counts and psychrophilic bacteria, but were in the permissible limit.

Coliform bacteria, fungi and yeasts were not detected in all samples and had a negative presumptive test for the presence of coliform bacteria; fungi and yeasts. These results may be partially due to the effect of heat treatments during the preparing of mixtures and mainly is due to heat sterilization of final food mixtures.

Sensory evaluation of prepared formulas

Sensory evaluation of prepared weaning food and local baby food mixtures during storage period at 4±1 C^o for three months are shown in Table (9). Sensory evaluation of colour, taste, odour, appearance, consistency and overall acceptability could be highly acceptable scores for the panelists either at zero time or during subsequent storage. This is due to the effect of heating treatments which digestability of starchy foods and organoleptically acceptable (Anon, 1998) and (Mugula and Lyime 1999). It is worthy to mention that, all formulae are considered as highly acceptable scores from the organoleptic evaluation point of view, especially formula (4) was the best one, followed by formula (3). This may be due to the addition of apple peel and carrot which improved organoleptic properties. Moreover, all prepared formulae recorded the higher score of sensory properties than local market sample. Statistical analysis of the data revealed that there are significant difference among some formulae at $p\leq0.05$.

Finally, it could be concluded that kharish cheese could be used in preparation of weaning food mixtures as source of protein, essential amino acids and calcium . The produced formula was organoleptically highly acceptable and good source of different nutrients.

Table (9): Organoleptic evaluation of prepared weaning food formulas and local market baby foods .

Formula \ Evaluation		Color	Taste	Odor	Consistency	Apperarence	Overall acceptability
1	Zero time	8.40	8.00	8.50	8.26	8.73	8.93
	1 month	8.6	8.23	8.76	8.61	8.84	8.92
	3 months	8.30	8.46	9.30	8.92	8.61	8.61
2	Zero time	8.90	8.50	8.26	8.73	8.46	8.53
	1 month	8.9	8.61	8.76	8.61	8.76	9.15
	3 months	8.15	8.53	9.0	8.92	8.76	8.76
3	Zero time	8.96	9.13	8.66	8.46	8.26	9.13
	1 month	8.76	8.15	8.30	8.15	8.38	8.76
	3 months	8.61	8.26	8.30	8.0	8.15	8.15
4	Zero time	8.99	9.23	9.16	9.13	9.23	9.16
	1 month	8.66	8.23	8.88	8.07	8.53	8.76
	3 months	8.54	7.30	8.92	7.76	8.46	8.46
5	Zero time	8.93	8.53	9.13	8.86	8.93	8.06
	1 month	8.53	8.69	8.76	8.23	8.23	7.92
	3 months	7.84	7.07	7.76	7.38	7.46	7.46
6	Zero time	8.80	8.60	8.66	8.60	8.60	8.53
	1 month	8.61	8.53	8.30	7.46	8.38	8.61
	3 months	8.38	7.69	8.38	8.0	8.0	8.0
7	Zero time	8.93	8.86	9.06	8.86	8.86	9.00
	1 month	8.46	7.92	8.23	8.15	8.38	8.46
	3 months	8.46	7.53	8.30	8.0	7.92	7.92
8	Zero time	8.53	7.93	8.60	8.33	7.93	8.00
	1 month	8.23	8.53	8.61	8.15	8.53	8.91
	3 months	7.69	7.53	7.69	7.76	7.61	8.61
9	Zero time	8.66	8.06	8.26	8.33	8.06	8.20
	1 month	8.53	8.23	8.69	8.15	8.61	8.61
	3 months	8.53	7.76	8.53	8.23	8.0	8.0
10	Zero time	8.66	7.66	8.73	8.86	8.40	8.80
	1 month	8.84	8.53	9.07	8.61	9.23	8.61
	3 months	7.38	7.92	8.38	7.30	7.76	7.76
*11	Zero time	8.06	7.86	7.93	7.00	7.73	7.86
	1 month	7.92	7.38	7.80	7.0	7.5	7.35
	3 months	7.61	7.07	7.61	6.46	7.07	7.07
**12	Zero time	8.93	9.00	9.06	9.00	9.13	9.12
	1 month	9.23	8.76	9.0	8.84	9.0	9.10
	3 months	8.30	8.12	8.30	8.30	8.84	8.84
L.S.D. 0.05 %		0.275	0.329	0.305	0.295	0.441	NS

Formula 1-10 see Table (1)
*** Local market sample** **** Local market sample**
NS: Non significat

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استخدام الجبن القريش فى إعداد خلطات غذائية للأطفال

عمر أحمد إمام* , غادة محمود البسيوني و فاطمة محمد بغدادي*****

*** قسم الإقتصاد المنزلي- كلية التربية النوعية - جامعة بنها - مصر**

**** قسم الإقتصاد المنزلي- كلية التربية النوعية جامعة بنها - مصر**

***** جامعة بنها - مصر**

تم تحضير ١٠ خلطات للاطفال باستخدام كل من الحبوب (الارز, الذره) والبقوليات (العدس, الفول البلدى)، والتدعيم بالجبن القريش, الجزر الاصفر وقشور التفاح، وتم دراسة التركيب الكيميائى, العناصر المعدنية, الاحماض الامينية والتقييم الميكروبيولوجى والحسى للخلطات المحضرة والخلطات التجارية وقد دلت النتائج على ما يلى:

- تراوحت نسبة البروتين (جرام/١٠٠جرام كوزن جاف) ما بين ١٥.٢-١٧.٨%والكربوهيدرات (٧٣,٥-٧٦.٣%) والرماد (٢.٦-٢.٨٧%) والالياف الخام (١.٨٥-٢.٠٥%) والليبيدات (١.٧-١.٩%) والطاقة الكلية (٣٨١-٣٨٣.٤كيلو كالورى) وقد لوحظ أن أعلى نسبة بروتين كانت فى الخلطة المحضرة رقم (٢) التى تحتوى على ١٢%جبن قريش.
- بالنسبة للعناصر المعدنية فقد تراوحت نسبة الكالسيوم ما بين (١٢٠-٣١٠) مللجرام/١٠٠جرام وزن جاف، الفوسفور (١٠٨-٢٤٦مللجرام), الماغنسيوم (٦٨-١٣٦مللجرام) والحديد (٥.١٧-٦.١٦) مللجرام وقد سجلت الخلطة رقم (٢) اعلى نسبة في الكالسيوم والفوسفور بينما الخلطة رقم (٤) كانت أعلى نسبة في الحديد حيث تحتوى هذه الخلطة على ١٢% قشور تفاح .
- لوحظ ان جميع الخلطات تعتبر مصدر رئيسى للاحماض الأمينية الأساسية وأن الأحماض الأمينية الأساسية تغطى الاحتياجات اليومية للأطفال وأن الخلطة رقم (٢) سجلت أعلى نسبة فى الاحماض الأمينية الأساسية وكانت أعلى من الخلطات التجارية الموجوده في السوق المصري .
- أظهرت نتائج التقييم الميكروبيولوجى بأن جميع الخلطات مطابقة للمواصفات الصحية وخالية من بكتريا القولون والخمائر والفطريات وآمنة لتغذية الأطفال.
- دلت نتائج التقييم الحسى لجميع الخلطات بانها مقبولة حسيا من حيث اللون والطعم والقوام والرائحة واللزوجة والمظهر العام.