

Summary

The role of „Functional Food“ in the nutrition of the Geneva adult population - an exploratory study.

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Objective: Assess qualitative and quantitative information concerning consumption of functional foods (FF) in an exploratory study in the Geneva general adult population. Specifically, characterize FF consumers, assess consumption frequency, and estimate the functional ingredient intakes.

Method: Develop a specific self-administered FF dietary assessment tool and implement a two-step assessment procedure, using food photographs for the second verification step, during eight months (639 participants (307 men, 332 women) from September 2003 through May 2004) in the cross-sectional Geneva surveillance program “Bus Santé” (participation rate 65%). Study participants were free living adults, ages 35-74 years, registered as legal residents of the canton of Geneva. They were recruited following a standardised procedure which provides a gender and age representative random sample of the Geneva adult population. FF intake data were analysed in conjunction with data derived from the existing validated health questionnaire, food frequency questionnaire, and physical activity questionnaire.

Results: Prior to the second verification step, 33% of the study population reported that they knew or had already consumed so-called FF (“aliments fonctionnels”). The net effect of the verification step (mostly first step self-reported non-consumers who were actually FF consumers) was to increase the population percentage of true FF consumers to 45%. FF consumption tended to be driven by health conscious lifestyles, such as being active or having low alcohol consumption, rather than by ill health status. Demographic and socio-economic factors and food purchase habits did not have a primary impact. Of FF consumers, up to 30% ate FF from one or more of five food groups on a daily basis. Daily intake levels of functional ingredients (micronutrients and non nutrients) deriving from functional foods alone were estimated. The contribution of FF to vitamin and mineral intake was shown to be important. For estimated maximum concentration levels in foods, intake of just a few functional ingredients exceeded tolerable upper intake levels only for a minority of single individuals.

Conclusions: Special assessment procedures are needed to definitely identify all consumers of FF. Overall, estimated functional ingredient intake levels were within tolerable upper limits, but they need to be evaluated further in the context of the whole diet. FF intake needs to be considered when evaluating nutrient intakes.

ERRATUM

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The role of “Functional Food” in the nutrition of the Geneva adult population – an exploratory study.

Fifth Swiss Nutrition Report. pp. 751-766

Due to an error in the compilation of the Functional Food (FF) database (market research 2003) with respect to the magnesium content of functional food beverages, the magnesium intake values shown in Table 5 (page 762) are not valid. In the corrected table below, we considered new for the percent coverage of the tolerable upper intake levels an 80% magnesium fortification of Functional Food (see footnote 2). The annex available on www.epidemiology.ch has also been rectified.

The statement on page 763, left column, was accordingly revised and now reads as follows (in German):

„Für den Bereich der Minimalgehalte wird die tolerierbare höchste Tageszufuhrmenge zu maximal 71% (Magnesium) ausgeschöpft. Bei Berücksichtigung der Maximalgehalte wurden von 95% der Bevölkerung die tolerierbaren höchsten Tageszufuhrmengen für keines der funktionellen Ingredienzien überschritten. Hingegen erreichte die Aufnahme von Folsäure und Magnesium für einzelne Individuen Werte deutlich über den tolerierbaren höchsten Tageszufuhrmengen.“

Geneva, May 17.2006

Table 5 Estimated daily intake of functional ingredients at population level (μg = microgram; mg= milligram; g= gram).
P50 (median), P95, maximum and proportional coverage of tolerable upper intake levels (UL, see Annex 2) (in % UL).
N = 285 individuals identified as FuFo consumers. n.a.= not available

Total study population N=285	Range of minimal concentrations in foods ¹						Range of maximal concentrations in foods ¹					
	P50	% UL	P95	% UL	Max	% UL	P50	% UL	P95	% UL	Max	% UL
Vitamin A (RE) ($\mu\text{g}/\text{day}$)	46.54	1.55	517.30	17.24	950.14	31.67	143.33	4.78	1276.14	42.54	2477.80	82.59
Vitamin E (mg/day)	0.47	0.16	2.20	0.73	6.02	2.01	2.23	0.74	15.59	5.20	30.85	10.28
Vitamin C (mg/day)	4.28	0.21	26.16	1.31	59.33	2.97	13.01	0.65	282.22	14.11	456.70	22.84
Vitamin B1 (mg/day)	0.04	0.01	0.33	0.07	0.68	0.14	0.18	0.04	1.36	0.27	2.58	0.52
Vitamin B2 (mg/day)	0.08	n.a.	1.07	n.a.	1.99	n.a.	0.21	n.a.	1.56	n.a.	2.93	n.a.
Vitamin B6 (mg/day)	0.06	0.24	0.47	1.88	0.98	3.92	0.39	1.56	2.58	10.32	5.93	23.72
Niacin (mg/day)	0.21	0.02	2.29	0.25	4.36	0.48	1.49	0.17	12.32	1.37	26.42	2.94
Pantothenic acid (mg/day)	0.22	n.a.	2.16	n.a.	5.01	n.a.	0.57	n.a.	4.27	n.a.	9.29	n.a.
Biotin ($\mu\text{g}/\text{Day}$)	8.19	n.a.	95.75	n.a.	220.19	n.a.	13.50	n.a.	114.68	n.a.	248.70	n.a.
Vitamin B12 ($\mu\text{g}/\text{day}$)	0.01	n.a.	0.26	n.a.	0.61	n.a.	0.18	n.a.	1.32	n.a.	3.49	n.a.
Folic acid ($\mu\text{g}/\text{day}$)	1.75	0.18	32.62	3.26	73.00	7.30	61.73	6.17	562.07	56.21	1473.2	147.32
Vitamin D ($\mu\text{g}/\text{day}$)	0.06	0.12	1.33	2.66	3.03	6.06	0.27	0.54	2.72	5.44	4.92	9.84
Calcium (mg/day)	36.61	1.46	373.84	14.95	863.64	34.55	105.38	4.22	706.80	28.27	1295.45	51.82
Magnesium (mg/day) ²	6.20	1.98	112.18	35.90	221.55	70.89	24.45	7.83	196.94	63.02	392.22	125.51
Iron (mg/day)	0	0.00	0.47	1.04	1.47	3.27	0	0.00	2.36	5.24	7.37	16.38
Zinc (mg/day)	0.21	0.84	1.89	7.56	3.27	13.08	0.94	3.76	9.54	38.16	17.89	71.56
PUFA (n3, n6 FS) (g/day)	0	n.a.	2.70	n.a.	3.98	n.a.	0.23	n.a.	6.40	n.a.	10.07	n.a.
Prebiotics (dietary fibre) (g/day)	0	n.a.	0.14	n.a.	0.43	n.a.	1.77	n.a.	13.06	n.a.	55.77	n.a.
Phytosterols (g/day)	0	0.00	0.70	23.33	1.03	34.33	0	0.00	0.80	26.67	1.18	39.33

¹ see Annex 1 range of functional ingredients concentrations in different food groups [min; max] per 100g.

² The tolerable upper intake level for magnesium is defined for added readily dissociable magnesium salts to food and for supplements only.

Ne rien écrire dans cette section

No dossier Date v2 j m a 200Sexe F/H Date de naissance j m a 19**Questionnaire Alimentaire supplémentaire**Ne rien écrire dans
cette colonne**1 Veuillez s.v.p. décrire votre ménage**

- 1 à 2 personnes oui non
- 3 personnes ou plus oui non
- Personnes adultes (>19 ans) exclusivement oui non
- Personnes adultes et enfants oui non

v1 v2 v3 v4 **2 Quel membre de votre ménage est chargé d'acheter les denrées alimentaires ?**

- Vous-même, uniquement oui non
- Votre mari/compagnon ou votre femme/compagne oui non
- Conjointement avec votre compagnon/compagne oui non

v5 v6 v7 **3 Dans quels magasins achetez-vous (ou votre famille) les denrées alimentaires que vous consommez ?** Veuillez s.v.p. répondre à cette question pour chacun des types de magasins répertoriés en précisant la fréquence de vos achats (jamais, rarement, souvent ou toujours) à Genève et en France.

Lieu →	à Genève (Suisse)				en France				GE	FRANCE
	Jamais	Rarement	Souvent	Toujours	Jamais	Rarement	Souvent	Toujours		
Types de magasin ↓										
▪ Supermarchés (grands distributeurs tels que Migros, Coop, Champion, Leclerc, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	v8 <input type="checkbox"/>	v9 <input type="checkbox"/>
▪ Epicerie (petits magasins de quartier)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	v10 <input type="checkbox"/>	v11 <input type="checkbox"/>
▪ Magasins spécialisés (magasins de produits diététiques et de produits biologiques, droguerie, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	v12 <input type="checkbox"/>	v13 <input type="checkbox"/>
▪ Boutiques / Marché (boulangerie, boucherie, fromagerie, magasin de fruits et légumes; chez le producteur)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	v14 <input type="checkbox"/>	v15 <input type="checkbox"/>

4 **Parmi les facteurs mentionnés ci-dessous, lesquels influent sur votre choix du produit ou sur votre décision d'achat ?**

Ne rien écrire dans
cette colonne

- | | | | |
|--|------------------------------|------------------------------|------------------------------|
| • La publicité (télévision, radio, affiches, prospectus, articles de journaux, etc.) | oui <input type="checkbox"/> | non <input type="checkbox"/> | V16 <input type="checkbox"/> |
| • Le prix | oui <input type="checkbox"/> | non <input type="checkbox"/> | V17 <input type="checkbox"/> |
| • Le goût | oui <input type="checkbox"/> | non <input type="checkbox"/> | V18 <input type="checkbox"/> |
| • L'aspect ou la présentation (emballage) | oui <input type="checkbox"/> | non <input type="checkbox"/> | V19 <input type="checkbox"/> |
| • L'impact du produit sur la santé | oui <input type="checkbox"/> | non <input type="checkbox"/> | V20 <input type="checkbox"/> |
| • Les recommandations d'autres personnes (connaissances, amis, médecin, diététicien, etc.) | oui <input type="checkbox"/> | non <input type="checkbox"/> | V21 <input type="checkbox"/> |
| • L'envie spontanée | oui <input type="checkbox"/> | non <input type="checkbox"/> | V22 <input type="checkbox"/> |
| • La fabrication industrielle | oui <input type="checkbox"/> | non <input type="checkbox"/> | V23 <input type="checkbox"/> |

5 **De nombreuses indications figurent sur les étiquettes et les emballages des denrées alimentaires. Parmi celles qui sont mentionnées ci-dessous, lesquelles attirent votre attention ?**

- | | | | |
|---|------------------------------|------------------------------|------------------------------|
| • Le fabricant | oui <input type="checkbox"/> | non <input type="checkbox"/> | V24 <input type="checkbox"/> |
| • Le nom du produit | oui <input type="checkbox"/> | non <input type="checkbox"/> | V25 <input type="checkbox"/> |
| • La liste des ingrédients | oui <input type="checkbox"/> | non <input type="checkbox"/> | V26 <input type="checkbox"/> |
| • La composition nutritionnelle | oui <input type="checkbox"/> | non <input type="checkbox"/> | V27 <input type="checkbox"/> |
| • Les mentions publicitaires faisant référence à un effet sur la santé et les recommandations relatives au mode de vie, au régime alimentaire et aux quantités consommées | oui <input type="checkbox"/> | non <input type="checkbox"/> | V28 <input type="checkbox"/> |

6 **Connaissez-vous une ou plusieurs denrées alimentaires qui correspondent à ces définitions terminologiques ? Il peut s'agir de denrées alimentaires que vous avez remarquées, que vous avez goûtées, ou que vous achetez et consommez régulièrement**

- | | | | |
|---|------------------------------|------------------------------|------------------------------|
| • Aliments qui contribuent à prévenir certaines maladies | oui <input type="checkbox"/> | non <input type="checkbox"/> | V29 <input type="checkbox"/> |
| • Aliments qui contribuent de manière active au capital santé | oui <input type="checkbox"/> | non <input type="checkbox"/> | V30 <input type="checkbox"/> |
| • Aliments enrichis, avec un effet bénéfique sur la santé | oui <input type="checkbox"/> | non <input type="checkbox"/> | V31 <input type="checkbox"/> |
| • Aliments fonctionnels | oui <input type="checkbox"/> | non <input type="checkbox"/> | V32 <input type="checkbox"/> |

7 **Buvez-vous ou mangez-vous des aliments enrichis avec des nutriments ou d'autres ingrédients spécifiques (par ex. vitamines, sels minéraux, fibres alimentaires, ferments probiotiques), qui conviennent particulièrement bien à l'alimentation des femmes, des personnes âgées, des sportifs, des personnes avec un taux de cholestérol élevé, etc. ?**

oui

non ⇒ Question 9

V33



Question 8

ID Technicien Date v2 j m a 2 0 0 No dossier **Feuille de Verification du Questionnaire Alimentaire supplémentaire**Ne rien écrire dans
cette colonne**1 Cher technicien, merci de vérifier si le participant a répondu à chaque question !**

- Si oui ⇒ point 2
- Si vous avez rempli le questionnaire avec le participant, cochez ici
⇒ inutile de continuer à remplir la feuille de vérification.
- **Si non, demandez au participant pour chaque question concernée:**

***"Vous n'avez pas coché une réponse pour la question suivante <<.....>>.
Merci de compléter la réponse ouverte maintenant."***

S.v.p., aidez le participant à compléter le questionnaire.

Si le participant mentionne un motif pour n'avoir pas répondu à une des questions, notez-le:

N° question:

Motif/commentaire:

N° question:

Motif/commentaire:

N° question:

Motif/commentaire:

2 "Les questions 7 et 8 concernent la consommation des aliments enrichis. En répondant à ces questions, avez-vous pensé à des aliments tels que ceux qui sont représentés sur ces photos ?"

⇒ Montrez les photos au participant; Les produits ont été choisis à titre d'exemple

oui ⇒ Vérification terminée – "Merci"non 

continuez (7) et (8)

"Merci de répondre encore une fois aux questions 7 et 8, à l'aide de ces photos pour les différents groupes d'aliments" ⇒ Passez la feuille au participantV49

⇒ SUITE À LA PAGE 2 AU VERSO

- (7) **Buvez-vous ou mangez-vous des aliments enrichis avec des nutriments ou d'autres ingrédients spécifiques (par ex. vitamines, sels minéraux, fibres alimentaires, ferments probiotiques), qui conviennent particulièrement bien à l'alimentation des femmes, des personnes âgées, des sportifs, des personnes avec un taux de cholestérol élevé, etc. ?**

oui ₁

non ₀ ⇒ Vérification terminée – "Merci"

V50



Question 8

- (8) **Au cours des quatre dernières semaines, à quelle fréquence avez-vous consommé des aliments enrichis appartenant aux groupes alimentaires suivants :**

ALIMENTS ENRICHIS	FREQUENCE						
	Jamais ces 4 dernières semaines	1 x par mois	2 à 3 x par mois	1 à 2 x par semaine	3 à 4 x par semaine	1 x par jour	2 x ou plus par jour
▪ Produits céréaliers	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>	7 <input type="checkbox"/>
▪ Lait et produits laitiers	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>	7 <input type="checkbox"/>
▪ Matières grasses à tartiner et matières grasses à cuire	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>	7 <input type="checkbox"/>
▪ Boissons	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>	7 <input type="checkbox"/>
▪ Plats pré-cuisinés (également par ex. soupes, compote de fruits, etc.)	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>	7 <input type="checkbox"/>

V51

V52

V53

V54

V55

"Merci"

Ne rien écrire dans cette colonne

Annex 1 Key functional ingredients and the range of concentrations (min-max) in functional foods (by food group) [at time of market research, Feb.-Apr. 03]

Functional ingredient	Food (group)	Concentration per 100g [min-max]
"Vitamin mix" Anti-oxidants A-E-C, B-vitamins		
Vitamin A (Retinol equivalent)	Cereal products	128 µg – 980 µg
	Milk & dairy products	48 µg – 200 µg
	Fat spreads/cooking fats	450 µg – 800 µg
	Beverages	120 µg – 270 µg
	Convenience type foods	68 µg – 160 µg
Vitamin E (Tocopherol equivalent)	Cereal products	1.5 mg – 13 mg
	Milk & dairy products	0.85 mg – 1.7 mg
	Fat spreads/cooking	7 mg – 34 mg
	Beverages	0.27 mg – 3.3 mg
	Convenience type foods	0 – 2 mg
Vitamin C	Cereal products	20 mg – 69 mg
	Milk & dairy products (rare)	9 mg – 10.2 mg
	Fat spreads/cooking	----
	Beverages	4 mg – 70 mg
	Convenience type foods	9.4 mg – 24 mg
Vitamin B1 (Thiamin)	Cereal products	0.14 mg – 2 mg
	Milk & dairy products	0.084 mg – 0.24 mg
	Fat spreads/cooking	----
	Beverages	0.06 mg – 0.28 mg
	Convenience type foods	0.08 mg – 0.28 mg
Vitamin B2 (Riboflavin)	Cereal products	0.24 mg – 2.3 mg
	Milk & dairy products	0.15 mg – 0.27 mg
	Fat spreads/cooking	----
	Beverages	0.24 mg – 0.32 mg
	Convenience type foods	0.09 mg – 0.32 mg
Vitamin B6 (Pyrodixin)	Cereal products	0.32 mg – 3.0 mg
	Milk & dairy products	0.13 mg – 0.9 mg
	Fat spreads/cooking	----
	Beverages	0.08 mg – 0.4 mg
	Convenience type foods	0.1 mg – 0.4 mg

Functional ingredient	Food (group)	Concentration per 100g [min-max]
Niacin (Vitamin PP)	Cereal products	5.2 mg – 20 mg
	Milk & dairy products	1.08 mg – 2.7 mg
	Fat spreads/cooking	----
	Beverages	0 - 2.7 mg
	Convenience type foods	----
Pantothenic acid (Vitamin B5)	Cereal products	0.96 mg – 6 mg
	Milk & dairy products	0.6 mg – 1.02 mg
	Fat spreads/cooking	----
	Beverages	0.45 mg – 0.9 mg
	Convenience type foods	0 – 0.26 mg
Biotin	Cereal products	24 µg – 150 µg
	Milk & dairy products (rare)	22.5 µg – 26 µg
	Fat spreads/cooking	----
	Beverages	22.5 µg – 25 µg
	Convenience type foods	----
Vitamin B12 (Cobalamine)	Cereal products	0.15 µg – 1 µg
	Milk & dairy products	0.15 µg – 0.65 µg
	Fat spreads/cooking	----
	Beverages	0 - 0.15 µg
	Convenience type foods	----
Folic acid (vitamin B9)	Cereal products	30 µg – 340 µg
	Milk & dairy products	18 µg – 308 µg
	Fat spreads/cooking	----
	Beverages	0.06 µg – 40 µg
	Convenience type foods	0 – 16 µg
Vitamin D	Cereal products (rare)	0.8 µg – 7.7 µg
	Milk & dairy products	0.75 µg – 1.2 µg
	Fat spreads/cooking (rare)	0 - 5 µg
	Beverages	----
	Convenience type foods	----

Functional ingredient	Food (group)	Concentration per 100g [min-max]
Minerals/trace elements		
Calcium (with or without Vitamin D)	Cereal products	170 mg- 1400 mg
	Milk & dairy products	100 mg – 150 mg
	Fat spreads/cooking fats	----
	Beverages	80 mg – 120 mg
	Convenience type foods	0 – 124 mg
Magnesium	Cereal products	5.7 mg – 420 mg
	Milk & dairy products	15 mg – 30 mg
	Fat spreads/cooking	----
	Beverages	28 mg – 45 mg
	Convenience type foods	----
Iron	Cereal products	3.4 mg – 17 mg
	Milk & dairy products	----
	Fat spreads/cooking fats	----
	Beverages	----
	Convenience type foods	----
Zinc	Cereal products (rare)	7 mg – 15.5 mg
	Milk & dairy products	0.7 mg – 1.05 mg
	Fat spreads/cooking fats	----
	Beverages (rare)	0 - 2.26 mg
	Convenience type foods	----
PUFA (poly unsaturated fatty acids)		
Omega 3 and/or 6 FA	Cereal products	----
	Milk & dairy products	(n-3) 75 mg (PUFA 155)
	Fat spreads/cooking fats	(n-3) 2.1 g – 6 g (n-6) 10.7 g – 27.5 g (PUFA 27 g – 64 g)
	Beverages	----
	Convenience type foods	----

Functional ingredient	Food (group)	Concentration per 100g [min-max]
"Dietary fiber"		
Prebiotics: - FructoOligosaccharides (FOS) and/or Inulin (I)	Cereal products	(FOS/I) 1.0 g – 9.5 g
	Milk & dairy products	(FOS/I) 0 – 2 g
	Fat spreads/cooking fats	----
	Beverages	(I) 0 –2g
	Convenience type foods	(FOS/I) 0 g – 12 g
Phytochemicals		
Phytosterols/ plant stanol ester	Cereal products	----
	Milk & dairy products	----
	Fat spreads/cooking fats	7 g – 8 g
	Beverages	----
	Convenience type foods	----

µg =microgram= 10⁻³ milligram (mg)

Annex 2 Recommended dietary intakes of nutrients and non nutrients recognised as key functional ingredients

Functional ingredient	Reference values for nutrient intakes	Tolerable upper intake levels #
"Vitamin mix" Anti-oxidants A-E-C, B-vitamins		
Vitamin A (Retinol equivalent RE*)	DACH [§] (w) 0.8 mg/d (m) 1 mg/d	β -carotene insufficient scient. basis Vit A 3000 μg = 3 mg/d; postmenopausal women 1.5 mg/d
Vitamin E (Tocopherol equivalent)	DACH (w25-65) 12 mg/d (m25-51) 14 mg/d (w65+) 11 mg/d (m51-65) 13 mg/d (m65+) 12 mg/d	300 mg/d
Vitamin C	DACH (w) 100 mg/d (m) 100 mg/d	Insufficient scientific data, but most probably at 1g/d / ## 2g/d
Vitamin B1 (Thiamin)	DACH (w) 1 mg/d (m25-51) 1.2 mg/d (m51-65) 1.1 mg/d (m65+) 1.0 mg/d	No numerical UL derived UL at individual countries: 500 mg/d
Vitamin B2 (Riboflavin)	DACH (w) 1.2 mg/d (m25-51) 1.4 mg/d (m51-65) 1.3 mg/d (m65+) 1.2 mg/d	No numerical UL derived No health risk at intake range of 1.5-3mg/d (supplements up to 5 mg)
Vitamin B6 (Pyridoxin)	DACH (w) 1.2 mg/d (m25-65) 1.5 mg/d (m65+) 1.4 mg/d	25 mg/d
Niacin (Vitamin PP) (Niacin equivalent)	DACH (w) 13 mg/d (m25-51) 16 mg/d (m51-65) 15 mg/d (m65+) 13 mg/d	Nicotinamide 900 mg/d (generally used for supplements and addition to foods) [Free nicotinic acid 10 mg/d]
Pantothenic acid (Vitamin B5)	DACH (w) 6 mg/d (m) 6 mg/d	No numerical UL derived. No health risk at intakes of up to 14 mg/d

Functional ingredient	Reference values for nutrient intakes	Tolerable upper intake levels [#]
Biotin	DACH (w) 30-60 µg/d (m) 30-60 µg/d	No numerical UL derived
Vitamin B12	DACH (w) 3 µg/d (m) 3 µg/d	No numerical UL derived; no health risks observed at intakes of up to 100 µg/d
<i>Folic acid</i> (vitamin B9; folate equivalent)	DACH (w) 400 µg/d (m) 400 µg/d	1000 µg = 1 mg/d
Vitamin D	DACH (w25-65) 5 µg/d (m25-65) 5 µg/d (w65+) 10 µg/d (m65+) 10 µg/d	50 µg/d
Calcium	DACH (w) 1000 mg/d (m) 1000 mg/d	2500 mg/d (= 2.5 g/d)
Magnesium	DACH (w) 300 mg/d (m) 350 mg/d	250 mg/d <u>only</u> concerning Mg in supplements or added to foods
Iron	DACH (w25-51) 15 mg/d (m) 10 mg/d (w51-65+) 10 mg/d	No data available / ^{##} 45 mg/d
Zinc	DACH (w) 7 mg/d (m) 10 mg/d	25 mg/d
Omega 3/6 FA (essential FA; PUFA)	DACH omega3 0.5 % of energy intake omega 6 2.5 % of energy intake	No data available
Prebiotics (FructoOligoSaccharides, Inulin) → dietary fibre	Guideline: 30+ g/d or about (w) 3 g/MJ; (m) 2.4 g/MJ	Only data for FOS in infant formulae (EFSA-Q-2003-020)
Phytochemicals – Phytosterol/-stanols	----	3g/d (EFSA-Q-2003-075)

[§] DACH - Reference values for nutrient intakes (Referenzwerte für die Nährstoffzufuhr). DGE, ÖGE, SGE, SVE (eds.) Frankfurt a.M., Umschau Braus, 2000. These values correspond to the concept of the US RDA = Recommended Dietary Allowances, that is values intended to help people maintain their health. The average daily dietary intake level that is sufficient to meet the nutrient requirement of nearly all (97-98%) apparently healthy individuals in a particular life stage and gender group. Used as goal for daily intake by individuals.

[#] Tolerable upper intake levels (UL) for vitamins and minerals. The European Commission has requested the Scientific Committee on Food SCF to review the upper intake levels of daily intake of individual vitamins and minerals that are unlikely to pose a risk of adverse health effects. http://europe.eu.int/comm/food/fs/sc/scf/out80_en.html (30.8.2004). After April 2003 opinions of remaining micronutrients were or will be prepared by the European Food Safety Authority (EFSA: opinion of the Scientific Panel on Dietetic Products, Nutrition and Allergies on a request from the Commission related to the UL). http://www.efsa.eu.int/science/nda/nda_opinions/catindex_en.html (30.8.2004).

^{##} Where no European UL is defined, that of the US Institute of Medicines risk assessment is indicated (DRIs).

- 1 mg Retinol Equivalent = 1 mg Retinol = 6 mg all-trans β-carotene(corresponds to provitamin A declaration on foods) = 12 mg of other pro-vitamin A-carotenoids.
- 1 MJ = 239 kcal or 1 kcal = 4.184 kJ = 0.004184 MJ

Annex 3 Estimated daily intake of functional ingredients in men (μg =microgram, mg= milligram; g= gram).

P50 (Median), P95, Maximum and proportional coverage of reference values for nutrient intakes (DACH) (% Ref.) (see Annex 2).

N= 117 men identified as FuFo consumers.

Men (N=117)	Range of minimal concentrations in foods ¹						Range of maximal concentrations in foods ¹					
	P50	% Ref.	P95	% Ref.	Max	% Ref.	P50	% Ref.	P95	% Ref.	Max	% Ref.
Vitamin A (RE) ($\mu\text{g}/\text{day}$)	36.20	3.62	678.16	67.82	950.14	95.01	109.01	10.90	1599.00	159.90	2477.80	247.78
Vitamin E (mg/day)	0.35	2.69	2.12	16.31	6.02	46.31	1.70	13.08	18.95	145.77	30.85	237.31
Vitamin C (mg/day)	2.94	2.94	29.33	29.33	59.33	59.33	11.14	11.14	381.44	381.44	456.70	456.70
Vitamin B1 (mg/day)	0.03	2.73	0.38	34.55	0.68	61.82	0.13	11.82	1.68	152.73	2.58	234.55
Vitamin B2 (mg/day)	0.06	4.62	1.40	107.69	1.99	153.08	0.15	11.54	1.92	147.69	2.93	225.38
Vitamin B6 (mg/day)	0.04	2.76	0.51	35.17	0.98	67.59	0.27	18.62	2.76	190.34	5.93	408.97
Niacin (mg/day)	0.12	0.82	2.43	16.56	4.36	29.72	0.92	6.27	16.28	110.97	26.42	180.10
Pantothenic acid (mg/day)	0.13	2.17	2.72	45.33	5.01	83.50	0.31	5.17	5.43	90.50	9.29	154.83
Biotin ($\mu\text{g}/\text{day}$)	4.85	10.78	135.64	301.42	220.19	489.31	7.80	17.33	150.74	334.98	248.70	552.67
Vitamin B12 ($\mu\text{g}/\text{day}$)	0.01	0.33	0.26	8.67	0.61	20.33	0.08	2.67	1.35	45.00	3.49	116.33
Folic acid ($\mu\text{g}/\text{day}$)	0.96	0.24	35.18	8.80	73.0	18.25	34.94	8.74	556.43	139.11	1473.20	368.30
Vitamin D ($\mu\text{g}/\text{day}$)	0.03	0.40	1.33	17.73	3.03	40.40	0.17	2.27	2.98	39.73	4.92	65.60
Calcium (mg/day)	21.57	2.16	482.85	48.29	863.64	86.36	69.53	6.95	733.92	73.39	1295.45	129.55
Magnesium (mg/day)	4.50	1.29	161.26	46.07	221.55	63.30	14.42	4.12	263.85	75.39	392.22	112.06
Iron (mg/day)	0	0.00	0.51	5.10	1.47	14.70	0	0.00	2.55	25.50	7.37	73.71
Zinc (mg/day)	0.13	1.30	2.09	20.90	3.27	32.70	0.53	5.30	12.89	128.90	17.89	178.90
PUFA (n3, n6 FS) (g/day)	0	n.a.	2.70	n.a.	3.98	n.a.	0.23	n.a.	6.78	n.a.	10.07	n.a.
Prebiotics (dietary fibre) (g/day)	0	0.00	0.15	0.50	0.43	1.43	1.47	4.90	16.88	56.27	24.86	82.87
Phytosterols (g/day)	0	n.a.	0.70	n.a.	1.03	n.a.	0	n.a.	0.80	n.a.	1.18	n.a.

¹ see Annex 1: range of functional ingredients concentrations in different food groups [min; max] per 100g.

Annex 4 Estimated daily intake of functional ingredients in women (μg =microgram, mg= milligram; g= gram).

P50 (Median), P95, Maximum and proportional coverage of reference values for nutrient intakes (DACH) (% Ref.) (see Annex 2).

N= 168 women identified as FuFo consumers.

Women (N=168)	Range of minimal concentrations in foods ¹						Range of maximal concentrations in foods ¹					
	P50	% Ref.	P95	% Ref.	Max	% Ref.	P50	% Ref.	P95	% Ref.	Max	% Ref.
Vitamin A (RE) ($\mu\text{g}/\text{day}$)	57.09	7.14	391.50	48.94	876.61	109.58	174.56	21.82	1010.18	126.27	2118.63	264.83
Vitamin E (mg/day)	0.54	4.70	2.23	19.39	3.95	34.35	2.47	21.48	12.93	112.43	26.62	231.48
Vitamin C (mg/day)	4.75	4.75	24.38	24.38	55.27	55.27	13.80	13.80	213.68	213.68	434.99	434.99
Vitamin B1 (mg/day)	0.05	5.00	0.31	31.00	0.61	61.00	0.23	23.00	1.32	132.00	2.46	246.00
Vitamin B2 (mg/day)	0.12	10.00	0.75	62.50	1.67	139.17	0.26	21.67	1.50	125.00	2.80	233.33
Vitamin B6 (mg/day)	0.08	6.67	0.43	35.83	0.83	69.17	0.48	40.00	2.57	214.17	4.33	360.83
Niacin (mg/day)	0.30	2.31	2.29	17.62	4.21	32.38	1.99	15.31	11.44	88.00	20.17	155.15
Pantothenic acid (mg/day)	0.30	5.00	2.14	35.67	3.58	59.67	0.77	12.83	4.16	69.33	6.90	115.00
Biotin ($\mu\text{g}/\text{day}$)	12.48	27.73	87.75	195.00	168.08	373.51	18.61	41.36	104.82	232.93	188.22	418.27
Vitamin B12 ($\mu\text{g}/\text{day}$)	0.02	0.67	0.27	9.00	0.59	19.67	0.23	7.67	1.31	43.67	2.64	88.00
Folic acid ($\mu\text{g}/\text{day}$)	2.82	0.71	32.62	8.16	70.20	17.55	92.87	23.22	618.30	154.58	1212.46	303.12
Vitamin D ($\mu\text{g}/\text{day}$)	0.10	1.33	1.34	17.87	2.93	39.07	0.37	4.93	2.60	34.67	4.72	62.93
Calcium (mg/day)	52.20	5.22	370.69	37.07	627.00	62.70	121.93	12.19	603.52	60.35	1140.41	114.04
Magnesium (mg/day)	10.37	3.46	87.00	29.00	190.05	63.35	29.00	9.67	193.50	64.50	314.10	104.70
Iron (mg/day)	0	0.00	0.47	3.76	1.02	8.16	0	0.00	2.36	18.88	5.10	40.80
Zinc (mg/day)	0.24	3.43	1.89	27.00	2.73	39.00	1.13	16.14	9.43	134.71	15.10	215.71
PUFA (n3, n6 FS) (g/day)	0	n.a.	2.30	n.a.	3.78	n.a.	0.23	n.a.	5.59	n.a.	9.11	n.a.
Prebiotics (dietary fibre) (g/day)	0	0.00	0.14	0.47	0.30	1.00	2.00	6.67	12.88	42.93	55.77	185.90
Phytosterols (g/day)	0	n.a.	0.60	n.a.	0.98	n.a.	0	n.a.	0.68	n.a.	1.12	n.a.

¹ see Annex 1: range of functional ingredients concentrations in different food groups [min; max] per 100g.