codex alimentarius commission

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

WORLD HEALTH ORGANIZATION

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Agenda Item 3 **CX/NFSDU 03/3**
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JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX COMMITTEE ON NUTRITION AND FOODS FOR SPECIAL DIETARY USES

DISCUSSION PAPER INCLUDING PROPOSALS FOR A DEFINITION, METHOD OF ANALYSIS AND CONDITIONS FOR DIETARY FIBRE CONTENT

Prepared by drafting group led by France

Backround

During the 24nd session of the Codex Committee on Nutrition and Foods for Special Dietary Uses (CCNFSDU), the delegation of France, with participation of Cuba, Japan, New Zealand, Poland, Switzerland, United Kingdom, United States, CIAA, IBFAN, IDF, ISDI, was requested to draft a working document including proposals for definition, method of analysis and conditions for nutritional claims on fibber content, in order to facilitate further discussion.

The following document has been drafted, using the comments from the delegations of United-Kingdom, Netherlands, Japan, Poland, New Zealand, Sweden, IDF and ISDI.

1. Definition of Dietary Fibre

Definition

Dietary fibre consists of :

Edible non digestible plant material composed of carbohydrate polymers (Degree of polymerisation (DP) ≥ 3).

It may include fractions of lignin and/or other compounds[1] when associated with polysaccharides in the plant cell walls and if these compounds are quantified by the gravimetric analytical method which has been adopted for dietary fibre analysis (AOAC),

ARE ALSO INCLUDED IN THIS DEFINITION :

Carbohydrate polymers (DP ≥ 3), processed (by physical, enzymatic or chemical means) or synthetic listed in annex 1 (the content of which may change on the basis of scientific evaluation).

IN ADDITION dietary fibre is neither digested nor absorbed in the small intestine. It has at least one of the following properties:

- Increase stools production
- Stimulate colonic fermentation
- Reduce fasting cholesterol levels

- Reduce post-prandial blood sugar and /or insulin levels.

Comments

It is proposed to exclude animal origin from the definition of dietary fibre with the aim of maintaining the consistency of the nutritional message, which gives priority to foods of plant origin .
Mentioning an animal origin of dietary fibre in the definition could be confusing for the consumer.
The promotion of fibre should be mainly associated with the consumption of foods of plant origin such as wholegrain cereals, pulses, fruit and vegetables.

However, the Netherlands, New-Zealand, ISDI and IDF are against an exclusively vegetal origin of dietary fibre. They consider that the Trans-Galacto-OligoSaccharides, also called T-GOS or TOS, contained in milk, should be considered as dietary fibre.]
The USA and Japan also mentioned chitin and chitosan as substances that are potentially "functional fiber".

[1]Fractions of lignin and the other compounds (proteic fractions, phenolic compounds, waxes, saponins, phytates, cutin, phytosterols, etc.) intimately "associated" with plant polysaccharides are often extracted with the polysaccharides in the AOAC 991.43 method.
These substances are included in the definition of fibre insofar as they are actually associated with the poly- or oligosaccharidic fraction of fibre. However, when extracted or even re-introduced into a food containing non digestible polysaccharides, they cannot be defined as dietary fibre. When combined with polysaccharides, these associated substances may provide additional beneficial effects.

The statement "Stimulation of colonic fermentation" is added to take into account the effects resulting from the fermentation of fibre (production of metabolites, modification of the flora, effects associated with acidification of the lumen contents, with modification of certain enzymatic activities (e.g. effect on glycuro-conjugated estrogens) or the production of a large quantity of short chain fatty acids and in particular butyrate which is thought to contribute to the proper functioning of the colonic mucosa and which might be beneficial in the prevention of several types of colon disease, including colon cancer.
The physiological effects of fibre cannot be restricted to the colon. Epidemiological and interventional studies have demonstrated that protective properties of fibre are –above all- observed on cardiovascular diseases. See references listed in annex 2.

2. Methods for analysing dietary fibre

Name	*Quantified compounds*	**Reference**	**Type**
AOAC 991.43	Soluble + insoluble polysaccharides + lignin + (RS 3)		Enzymatic-gravimetric
AOAC 995.16	beta-glucans	McCleary & Codd, 1991	Enzymatic
AOAC 2002-02	Resistant starch and algal fibre	McCleary & Monaghan, 2002	Enzymatic
AOAC 999.03	Fructans (oligofructans, inulin derivatives, fructooligosaccharides)	McCleary & Blakeney, 1999 McCleary *et al.*, 2000	Enzymatic & colorimetric
AOAC 997.08	Fructans (oligofructans, inulin derivatives, fructooligosaccharides)	Hoebregs, 1997	Enzymatic & HPAEC
AOAC 2000.11	Polydextrose	Craig *et al.* 2001	HPAEC

Comments

All the above methods are based on the AOAC techniques. These methods have the advantage of being used worldwide as well as being easily used in routine analysis and give relatively satisfactory results for foods

that contain neither added indigestible oligosaccharides (e.g. FOS) nor resistant starch (RS) (in particular those which are not measured by the AOAC method: RS 1 and 2).

Two methods can be used to quantifiy the fructans. However, the AOAC 999.03 method is easier to carry out.

The AOAC 991.43 method does not quantify starches but quantifies part of the resistant starch fractions (retrograded starches, RS3). Therefore, it is necessary to quantify residual starch in the fibre residue, and to analyse RS independently.

The UK and New-Zealand mentioned the Englyst method, which is not used worldwide and can't be used in routine analysis.

3. Levels for the source and rich claims criteria

Definitions

The claim "source of fibre" corresponds to a quantity of 3g/100g or 1.5g/100 kcal
The claim "rich in fibre" corresponds to a quantity of 6g/100g or 3g/100 kcal

Comments

The average fibre content of fruits (1.2 g/100 g) and vegetables (2.3 g/ 100 g) is too low to allow nutritional claims, whereas the mode of expression “g/100 kcal” enables these products of high nutritional density to claim at least “source of fibre”.

The expression in “g/100 kJ” should be added in order to correspond to the International System of Units.

Because of the diversity of portion sizes, the claim justification using the mode of expression “x g of fibre per portion” was not accepted.
However, the reference to the portion could be adapted and defined by each country and for each country if it remains compatible to the expression “g/100 g” or “g/100 kcal”. For instance, a 50 g-portion would require 1.5 g of fibre for a “source of fibre” claim and twice as much for a “rich in fibre” claim.
Sweden believes that the values are too strict and would make it difficult to claim source of fibre for ordinary food, and might give advantage to fibre claims for products with added fibre.
The claim "source of fibre" corresponds to a quantity of 2.5 g/MJ
The claim "rich in fibre" corresponds to a quantity of 3,6 g/100 MJ.

Annex 1 : List of carbohydrate polymers, either processed (by physical, enzymatic or chemical means) or synthetic, likely to be accepted within the definition of fibre.

The products we are proposing for immediate inclusion are in bold type. The others require further examination by scientific bodies.

Substance	Process	Recognised physiological properties	Validation(s) by public bodies
OLIGOSACCHARIDES (DP<10)[1]			
Fructo-oligosaccharides	**Enzymatic synthesis from saccharose**	**Inclusion in the category of DF Bifidogenic ingredient**	**CEDAP (13/09/95) Scientific Committee for Food (DGXXIV, Brussels) (July 1997)**
Polymer Polyfructose	**Isolated from inulin by removing all units with a DP<10**	**idem**	**idem**
Oligofructose	**Enzymatic hydrolysis of inulin in chicory root**	**idem**	**idem**
Oligofructose	**Enzymatic hydrolysis of inulin in chicory root**	**idem**	**idem**
β-galacto-oligosaccharides or transgalactosyl oligosaccharides (TOS)	Enzymatic transgalactosylation of lactose	Prebiotic effect (to be confirmed)	
Glucooligosaccharides (□-GOS)	Enzymatic transglucosidation of glucose	Prebiotic effect (few trials, none in humans)	
Xylooligosaccharides (XOS)	Enzymatic hydrolysis of polyxylan of *Trichoderma sp*.	Prebiotic effect (to be confirmed)	
Polydextrose (E1200)	Heat polymerisation of glucose in the presence of sorbitol and acid (permitted) as catalyser		Being studied by AFSSA
Resistant maltodextrins	Heat and enzyme treatment applied to maize starch	Prebiotic effect (to be confirmed)	
POLYSACCHARIDES (DP≥10)[1]			
Resistant starch	Hydrothermal treatment of tapioca maltodextrins and enzymatic debranching	Stimulates colonic fermentation Source of butyrate	Should be deemed to be an ingredient by the European Union

[1] FAO Food and Nutrition Paper 66. report of a Joint FAO/WHO Expert Consultation. FAO, Rome 1998.

Annex 2 : references *(à compléter)*

- Liu S., Manson J.E., Lee I.M., Cole S.R., Hennekens C.H., Willett W.C., Buring J.E. - Fruit and vegetable intake and risk of cardiovascular disease : the Women's Health Study. *Am J Clin Nutr*., 2000, 72, 922-928.

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- Lairon D, Bertrais S, Vincent S, Arnault N, Galan P, Boutron MC, Hercberg S. - Dietary fibre intake and clinical indices in the French Supplémentation en Vitamines et Minéraux AntioXydants (SU.VI.MAX) adult cohort. *Proc Nutr Soc.*, 2003 Feb ; 62(1):11-5.