Original Article

Wheat bran equivalents based on faecal bulking indices for dietary management of faecal bulk

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Wheat bran equivalents for faecal bulking (WBE_{fb}) are defined as the gram quantity of wheat bran that would augment faecal bulk to the same extent as a given quantity of a specified food, and its development as a food datum for the dietary management of distal colonic bulk is discussed in this paper. The WBE_{fb} content of a food is derived from the faecal bulking index (FBI), which is a standardised physiological measure of the relative faecal bulking efficacy of foods on an equal edible weight basis. The FBI is defined as the increment in hydrated faecal matter per gram of a food consumed as a percentage of the increment due to the same weight of reference food (1 mm hard red wheat bran; FBI = 100). The FBI values allow the contribution of hydrated solids to the distal colon to be related to that of any reference of known FBI such as wheat bran, the suitability of which as a reference material is discussed. By expressing the increment in bulk as WBE_{fb}, the relative impact of any quantity of an individual food on faecal bulk may be determined, and the effect of foods in mixed diets approximated by summation. Examples are given of the dietary management of distal colonic bulk using WBE_{fb}, with one cup of wheat bran containing 27.5 g of dietary fibre – about the mean recommended daily fibre intake for adults - used as theoretical adequate daily intake of potential faecal bulk. The FBI and WBE_{fb} are proposed as examples of the types of evidence-based data sets that may complement food composition data in selecting foods for physiological function.

Key words: dietary fibre, faecal bulk, faecal bulking index, New Zealand, wheat bran equivalents.

Introduction

A dominant role for faecal bulk in preventing constipation, and probably a range of related disorders (Table 1), is one of the most robust findings in nutrition science.[1] However, despite the prevalence of constipation and the general consensus that we should eat a number of foods that provide faecal bulk, there is little information available to enable consumers, dietitians, and food developers to discriminate between products on the basis of faecal bulking efficacy. There has been a large amount of research on the faecal bulking effects of foods and dietary fibres,[2] but it has neither been standardised nor tailored to provide data sets suitable for evidence-based food choice or for quantitative dietetics.

Dietary fibre has for many years been used as a guide to the faecal bulking efficacy, but the bulking efficacy of fibre is very dependant on its properties.[3] Furthermore, faecal bulk is a response to food rather than to fibre, and is a function of digestion in the foregut, endogenous secretions, colonic fermentation of undigested food and of endogenous secretions, bacterial proliferation, and water retention by the combined mass of non-fermented residues, bacteria and gut secretions.[3] There is no single food component or current method of food analysis that can accommodate such complexity. The enormous disparity that exists between the amount of bacterial growth that occurs in the colon, and the amount that would be possible if non-starch polysaccharide were the only source of carbohydrate available to the colon,[4] indicates that much more than is measured by standard dietary fibre analyses enters the colon.

A further problem with using dietary fibre content as a guide to faecal bulking efficacy is that as recently redefined[5] it includes non-digestible polysaccharides, oligosaccharides, lignin and 'associated substances', that 'promote beneficial physiological effects including laxation, and/or blood cholesterol attenuation, and/or blood glucose attenuation'. This current definition extends so far beyond the original idea of dietary fibre as roughage,[6] and relates to so many health endpoints, that it is no longer useful for control of a particular food action, such as faecal bulking. Thus, a food containing hypocholesterolaemic but highly fermentable polysaccharide with little bulking action may be labelled as containing the same amount of fibre as another food that may augment faecal bulk with no effect on cholesterol levels. In short, there is no food datum that consumers, including dietitians, may use to choose foods specifically for faecal bulk, or any other physiological effect that has been attributed to dietary fibre.

The need for data for dietary management of distal colonic bulk was the impetus behind the recent development of a faecal bulking index (FBI).[7] The FBI provides a relative measure of the ability of a food to augment fully hydrated faecal mass, and is measured *in vivo* using an appropriately

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Accepted 27 November 2000

Table 1. Putative links between bulk in the distal colon and health

Immediate effects of bulk				Putative relationship to health
Effects directly attributable to bulk				
Bulk movement	→	Transit time reduced so dehydration minimized and hard stools avoided. Mass transfer of wastes. Less time for mutagen accumulation.	→	↓ Constipation ↓ Colorectal cancer
Distention	→	Defecation stimulated. Little mutagen accumulation.	→	↓ Colorectal cancer ↓ Constipation
Distribution of pressure	→	Localized pressure points avoided.	→	↓ Diverticulosis
Dilution	→	Toxin concentrations low.	→	↓ Colorectal cancer
Common indirect effects due to attributes of bulking matter				
Hydration		Distribution of pressure.	→	↓ Diverticulosis
Increased fermentable carbohydrate	→	Protein putrefaction avoided – low in ammonia and nitrogenous mutagens. Butyrate produced supports apoptosis.	→	↓ Colorectal cancer
Adsorption/binding	→	May bind a range of substances; bile acids, toxins, carcinogens.	→	↓ Colorectal cancer

configured rat model. Being based on hydrated faecal output it reflects the amount of non-fermented food residues, bacteria, and the water-holding capacity of both, which are the predominant factors in faecal bulking and are well-modelled for humans by the rat.[8] The FBI is defined as the increment in fully rehydrated faecal mass per unit weight of a food consumed, as a percentage of the increment due to consumption of an equal weight of a reference food.

$$\text{FBI} = \frac{\text{Increase over baseline in hydrated faecal weight per g of test food}}{\text{Increase over baseline in hydrated faecal weight per g of reference}} \times 100$$

Standardised indices such as FBI allow one to express the physiological impact of any food for which an index value has been obtained, in terms of quantities of any other food with an index value. Thus, faecal bulking efficacy may be expressed in terms of an appropriate reference material of known FBI such as wheat bran, that is, in wheat bran equivalents for faecal bulk (WBE_{fb}).

Equivalents for a range of food properties are possible using sets of indices based on appropriate reference materials, and are a potentially practical means of communicating food effects in an understandable and widely applicable manner. For instance, glycaemic glucose equivalents based on glycaemic indices have been developed for dietary management of postprandial glycaemia.[9] In this paper wheat bran equivalents based on faecal bulking indices are similarly developed for dietary management of faecal bulk, so two important physiological effects of food, postprandial glycaemia and faecal bulking, will have been addressed. Such data is increasingly being regarded as important,[10–12] especially with the advent of functional foods, because nutrition information panels seldom enable the relative efficacy of foods or dietary supplements as agents of physiological changes to be assessed, when such changes depend on physicochemical properties rather than simply on the amount of a food constituent.

In this paper derivation of WBE_{fb} from FBI values, the suitability of wheat bran as a reference material for faecal bulking, and the potential use of WBE_{fb} in dietary management of the faecal bulking response to foods and meals is described.

Methods

Measuring FBI

The procedure for determining FBI has been published in detail elsewhere.[7] An animal model consisting of adult Sprague–Dawley rats (400 ± 50 g) fed 25 g/day of either baseline, reference or test diet is used. The baseline diet is a standard, complete starch-based rat diet in which 500 g/kg of the starch is replaced by sucrose. The reference diet is the baseline diet in which a quarter of the sucrose has been replaced by 1 mm wheat bran (125 g bran/kg diet). Test diets are baseline diets in which sucrose is replaced by foods included dry at levels proportional to intakes recommended for humans. All diets contain a basal level of about 5% mixed dietary fibres to ensure a normal gut with an abundant and diverse hindgut flora and rapid clean-out upon changing diets. Trials involve a 10-day rotation including a 3-day baseline, 3-day clean-out, and 4-day balance periods. Feed intake is measured, and faeces are dried, weighed, fully rehydrated by passive imbibition and reweighed to determine equivalent hydrated faecal output per 100 g feed intake, from which FBI is calculated. The model is valid in so far as it is monogastric, is preadapted to a balanced diet containing mixed dietary fibres, test foods are included in proportion to intakes recommended for humans, and under the conditions used,

fermentation is similar to that in the human colon.[13] Rehydration restores faecal water content to within the range for human faeces.[2]

Bulking efficacy relative to stated fibre content

The reliability of available figures for dietary fibre in foods as a guide to their faecal bulking efficacy was expressed as the ratio of FBI of a food to its content of dietary fibre in g/100 g provided by the nutrient information panel of the same food sample as was used to measure FBI, where available, or from the New Zealand Food Composition Database.[14] The ratio is thus a comparison of two percentage figures as FBI is the faecal bulking response to a food as a percentage of the response to wheat bran.

Bulking effect of food expressed as wheat bran equivalents (WBE_{fb})

Weights of different foods that have an equivalent impact on fecal bulk can be determined from their FBI's. Thus, in general, the weight of Food B contributing the same bulk as Food A is given by:

$$\text{Wt Food B} = \text{Wt Food A} \times (FBI_{FoodA}/FBI_{FoodB}) \quad \text{Eqn 1.}$$

By making Food B wheat bran ($FBI_{\text{Wheat Bran}} = 100$), wheat bran equivalents (WBE_{fb}) of a given weight of Food A (Wt. Food A), with a faecal bulking index of FBI_A, were calculated from equation 1:

$$WBE_{fb} = \text{Wt Food A} \times (FBI_{FoodA}/100)\ (g).$$

The value for WBE_{fb} may be similarly derived from common standard measures (CSM) of Food A, by replacing WtFoodA with its equal, the product of the number of CSM ($No.CSM_{FoodA}$) and the weight of a CSM ($CSMwt_{FoodA}$) giving

$$WBE_{fb} = No.CSM_{FoodA} \times CSMwt_{FoodA} \times FBI_{FoodA}/100\ (g) \quad \text{Eqn 2.}$$

For example, the WBE_{fb} content of three medium slices of wholemeal bread (No. CSM = 3.0, CSMwt = 28 g, FBI = 12.6) is

$$WBE_{fb} = 3 \times 28 \times 12.6/100 = 10.6\ (g).$$

In other words, three slices of wholemeal bread would have the same effect on faecal bulk as 10.6 g wheat bran.

Wheat bran equivalents for faecal bulk (WBE_{fb}) is defined as the weight (g) of 1 mm hard red wheat bran that contributes the same amount of faecal bulk as a given quantity of a specified food.

An important advantage of using a faecal bulking reference material such as wheat bran is that it can be used to express the impact on faecal bulk of any quantity of any food with an FBI value. The relative bulking effect of combinations of foods should thus be able to be approximately determined by adding their individual contributions.

Adequate daily intake (ADI) of WBE_{fb}

Recommendations for daily addition of bulk to the distal colon do not yet exist. However, intakes of dietary fibre for the maintenance of large bowel health have been suggested. An average recommendation is about 30 g/day for adults (females, 25 g; males, 30 g).[15] As one cup of wheat bran (63 g) provides 27.4 g dietary fibre[14] by the Association of Official Analytical Chemists (AOAC) analysis,[16] it is reasonable to use a daily intake of one cup of wheat bran, or 63 WBE_{fb} per day as a theoretical adequate daily intake (ADI) standard against which to assess intakes of daily bulk for adults, although differences in individual requirements are likely to be quite large.[17]

Thus, using Equation 1**,** one can see that one cup of 'All Bran' (No. CSM = 1, CSMwt = 45 g, FBI = 57), for instance, would on its own provide

$$1 \times 45 \times 57/100 = 25.7\ WBE_{fb}$$

which, when expressed in ADI terms, is

$$25.7/63 \times 100 = 41\%\ \text{ADI for faecal bulk.}$$

Daily accumulation of WBEs

Table 3 illustrates accumulation of WBE_{fb} over the course of a day during which the bulking equivalent of 32.7 g of wheat bran has been consumed compared with the ADI target of 63 g per day, so there is a deficit of 30.3 g WBE_{fb} for the day. The amount of a food or supplement to reach the target WBE_{fb} intake is calculated using FBI values. For instance, using 'All Bran' to provide the missing bulk, the amount required is obtained by rearranging Eqn 2 for CSM of Food A ('All Bran'), as follows:

$$\text{CSM Food A} = WBE_{fb}/(CSMwt \times FBI_{Food}/100)$$
$$= (WBE_{fb} \times 100)/(CSMwt \times FBI_{Food}).$$

Amount of 'All Bran' (Food A; CSMwt = 45 g, FBI = 57) required to provide 30.3 WBE_{fb}

$$= (30.3 \times 100)/(45 \times 57)$$
$$= 1.3\ \text{cups.}$$

Thus, an additional 1.3 cups of 'All Bran' throughout the day would, on its own, satisfy the daily requirements for faecal bulk, although in reality, bulk would be contributed by a number of foods in most diets.

Other food comparisons based on FBI

The CSM volume of foods that would theoretically have the same bulking effect as 63 WBE_{fb} (1 cup of wheat bran), the ADI for faecal bulk, can be determined from their FBI values. The weight of food is obtained simply by putting 63 g as Wt.Food A into Equation 1, and the required number of CSM of food is then obtained by dividing by the CSM weight of the food, obtained from food composition tables.[15]

Thus, where wheat bran (FBI = 100; ADI = 63 g) is Food A:

$$\text{Wt Food B} = \text{Wt Food A} \times (FBI_{FoodA}/FBI_{FoodB})$$
$$= 63 \times (100/FBI_{FoodB})$$
$$\text{and, CSMs Food B} = (63/CSMwt_{FoodB}) \times (100/FBI_{FoodB}).$$

The results of such a comparison is are shown in Table 4.

Results and discussion

The ranking of foods and fibre sources by FBI, that is, according to faecal bulking efficacy on an equal edible weight basis, is shown in Fig. 1. It is noteworthy that under the experimental conditions used to measure FBI the highest

value obtained was for the laxative Mucilax, which contains about 49% of highly hydrating but fermentation-resistant psyllium dietary fibre. Pectin, however, which is nearly 100% dietary fibre, but is readily fermented, has an FBI of only a few per cent.

The relationship between dietary fibre content stated in nutrition information panels or in food composition tables and faecal bulking efficacy is expressed in Fig. 2 as the ratio of FBI to percent dietary fibre content. The data in Fig. 2 confirms that dietary fibre data available to consumers is not a dependable guide to hydrated faecal bulk, and may be a particularly poor guide when ingredients or supplements that are highly hydrating and fermentation-resistant, such as psyllium, and not usually a large component of human foods, are involved. Figure 2 shows why there is a need for a standardised measure, such as the FBI, if foods and supplements are to be selected on the basis of faecal bulking efficacy.

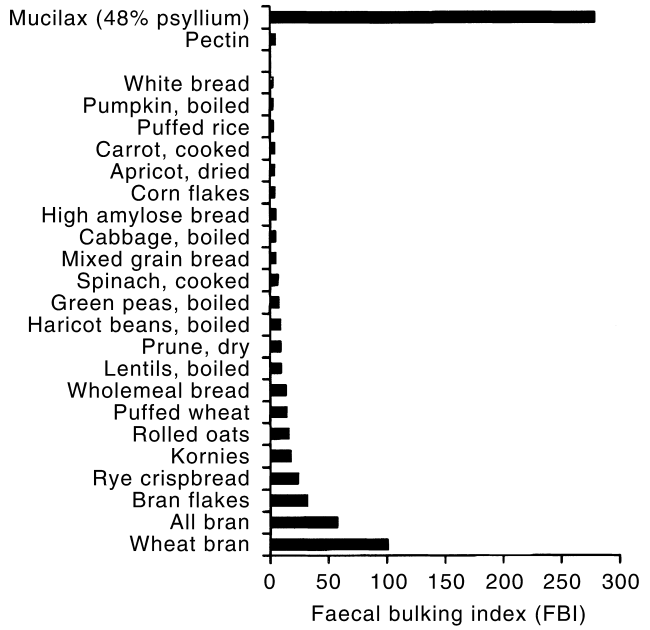

Figure 1. Ranking of foods by faecal bulking efficacy per unit edible weight.

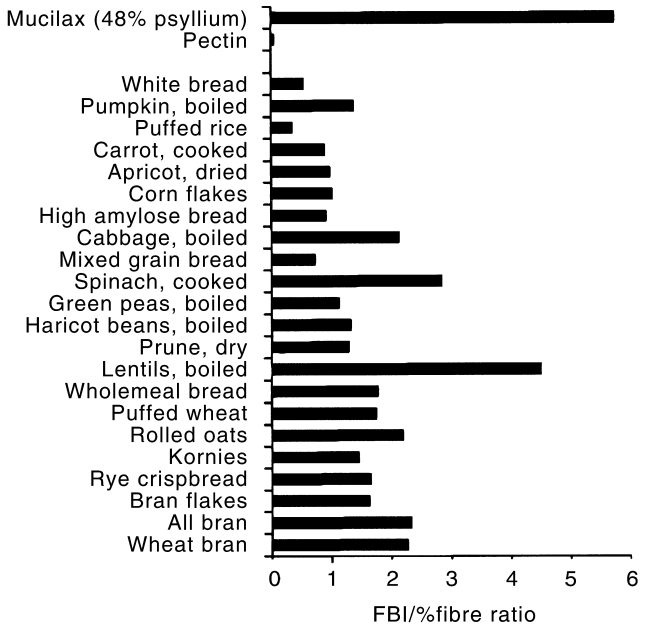

Figure 2. Relationship between faecal bulking efficacy of foods and their stated dietary fibre content (FBI/ % dietary fibre). FBI, faecal bulking index.

The FBI values may be useful for standardised comparison of equal weights of foods, but cannot be easily used to directly manage distal colonic bulk because they are indices unrelated to food weights and therefore to serving sizes. The WBE_{fb} values are more easily used as they are expressed per quantity of food and provide a common bulking currency for any foods of known FBI, so may be used easily to manage fecal bulking response to diets and meals containing a number of foods.

The content of wheat bran equivalents in a range of foods is given in Table 2 as WBE_{fb} per g of food, and as the content per CSM. Wheat bran as the reference contains 1 WBE_{fb}/g. Foods containing wheat bran, such as 'All Bran', bran flakes, miniwheats, and wholemeal bread contain a higher WBE_{fb} content per gram than most fruit and vegetables or foods based on white flour or white flour enriched with resistant starch. These differences no doubt reflect the fact that wheat bran consists largely of lignified, fermentation-resistant cell walls and is therefore able to retain its space-occupying cellular structure in the colon, whereas fruit and vegetable structure is based on non-lignified, pectin-rich, primary cell walls that are readily fermented and resistant starch.[18,19]

Table 3 shows how WBE_{fb} can be used to monitor the accumulation of potential distal colonic bulk in a diet, by adding the WBE_{fb} contributions of each food. If the daily requirement for bulk is known in WBE_{fb} any shortfall can be immediately quantified and remedied with an appropriate food or bulking supplement. It is not envisaged that individuals would continually monitor their intakes in the detail shown in Table 3, but as an educative aid and perhaps in some medical conditions such an approach could be useful in establishing appropriate patterns of intakes. Table 3 also shows the calculations that a computerised nutrition management system would perform if WBE_{fb} were to be treated in dietary analysis as a food component, in the same way that glycaemic glucose equivalents have been used alongside nutrient composition to display the glycaemic impact of a meal.[9]

The data in Table 4 show quantities of foods that are theoretically equivalent in faecal bulking impact. The figures can be quite striking when expressed in CSM, thus, 2.5 cups of 'All Bran' wheat bran would provide the same bulk as 62 cups of corn flakes. It is not suggested that anyone would eat 62 cups of corn flakes to obtain their daily requirements for bulk, or even that such an extrapolation is physiologically valid. Table 4 simply provides an alternative view of the relative faecal bulking efficacies of a range of foods based on FBI values.

Wheat bran as a reference for faecal bulking efficacy

Bulking equivalents to a reference material allow faecal bulking efficacy to be expressed in consumer-acceptable terms, without the need to mention faeces or colons, and provide a great deal of flexibility for managing distal colonic bulk by

Table 2. Wheat bran equivalents (WBE_{fb}) in foods per gram and per common standard measure (CSM)

Food	CSM	CSM wt (g)	Wheat bran equivalents (/g food)	(/CSM)	%ADI* /CSM
Wheat bran (Reference)	cup	63	1.00	63.0	100.0
All Bran	cup	45	0.57	25.5	40.5
Wheat germ, raw	cup	98	0.37	36.0	57.2
Bran flakes	cup	40	0.31	12.3	19.5
Ryvita crispbread	biscuit	11.5	0.23	2.6	4.2
Miniwheats	cup	71	0.20	14.5	23.0
Kornies	cup	26	0.17	4.3	6.9
Rolled oats	cup	90	0.15	13.1	20.9
Puffed wheat	cup	14	0.13	1.9	2.9
Oat bran	cup	120	0.13	15.7	24.9
Wholemeal bread	med slice	28	0.13	3.5	5.6
Wheatmeal bread	med slice	28	0.12	3.2	5.1
Anzac biscuit	biscuit	15	0.11	1.6	2.5
Vita crunch	cup	114	0.10	10.9	17.3
Lentils, boiled	cup	200	0.09	17.0	27.0
Prune, dry	10 prunes	84	0.08	6.9	11.0
Haricot beans, boiled	cup	180	0.08	14.3	22.7
Digestive biscuit, plain	biscuit	14	0.08	1.1	1.7
Green peas, boiled	cup	165	0.07	10.8	17.1
Molenberg Swiss Bake	med slice	28	0.07	1.8	2.9
Spinach, cooked	cup	168	0.06	10.0	15.8
Burgen mixed fruit loaf	med slice	34	0.05	1.8	2.8
Burgen mixed grain	med slice	28	0.04	1.1	1.8
Cabbage, boiled	cup	147	0.04	5.9	9.4
Fibre White bread	med slice	26	0.04	1.0	1.6
Corn flakes	cup	32	0.03	1.0	1.6
Apricot, dried	10 halves	35	0.03	1.1	1.7
Carrot, cooked	cup slices	157	0.03	4.4	7.0
Puffed rice	cup	14	0.02	0.3	0.4
Pumpkin, boiled	cup	220	0.02	3.3	5.2
White bread	med slice	26	0.01	0.4	0.6

*% ADI = % theoretical adequate daily intake; assuming for the sake of illustration that 1 CSM of wheat bran (63 g; 27.5 g dietary fibre) provides 100% ADI. CSM, common standard measure.

Table 3. Example of the use of wheat bran equivalents in managing distal colonic bulk

Days intake	CSM	CSMwt	Food weight	FBI_{Food}	WBE_{fb}*	%ADI
5 prunes	10 prunes	84	42	8.2	3.4	5.5
1 cup corn flakes	1 cup	32	32	0.8	0.26	0.4
400 mL milk					–	–
2 med. slices white bread	1 slice	26	52	1.4	0.72	1.2
1 cup cooked spinach	1 cup	168	168	5.9	9.9	15.7
2 eggs					–	–
2 plain digestive biscuits	1 biscuit	14	28	7.8	2.18	3.5
1 cup pumpkin	1 cup	220	220	1.5	3.3	5.2
1 cup cabbage	1 cup	147	147	4.0	5.9	9.3
0.5 cups haricot beans	1 cup	180	90	7.9	7.1	11.3
200 g braised beef					–	–
				Total	32.7	52
				Requirement	63.0	100
				Deficit	30.3	48

CSM, common standard measures; FBI, faecal bulking index; *% ADI = % theoretical adequate daily intake; assuming for the sake of illustration that 1 CSM of wheat bran (63 g; 27.5 g dietary fibre) provides 100% ADI.

* WBE_{fb} = No. CSM food × CSMwt × $FBI_{Food}/100$ = Food Wt × $FBI_{Food}/100$.

Table 4. Food quantities to provide theoretical adequate daily intake of potential faecal bulk (1 cup (63 g) of wheat bran)

Food	Weight of food (g)	Quantity containing ADI for bulk (CSM)
Wheat bran (Reference)	63	1.0 cup
All bran	111	2.5 cups
Wheat germ, raw	171	1.7 cups
Bran flakes	205	5.1 cups
Ryvita crispbread	274	24 biscuits
Miniwheats	308	4.3 cups
Kornies	378	15 cups
Rolled oats	431	4.8 cups
Puffed wheat	476	34 cups
Oat bran	481	4.0 cups
Wholemeal bread	500	18 med slices
Wheatmeal bread	545	20 med slices
Anzac biscuit	602	40 biscuits
Vita crunch	658	5.8 cups
Lentils, boiled	740	3.7 cups
Prune, dry	766	9.1 ten prunes
Haricot beans, boiled	794	4.4 cups
Digestive biscuit, plain	806	58 biscuits
Green peas, boiled	964	5.8 cups
Molenberg Swiss Bake	970	35 med slices
Spinach, cooked	1062	6.3 cups
Burgen mixed fruit loaf	1203	35 med slices
Burgen mixed grain	1554	56 med slices
Cabbage, boiled	1570	11 cups
Fibre White bread	1639	63 med slices
Corn flakes	1969	62 cups
Apricot, dried	2055	59 ten halves
Carrot, cooked	2250	14 cup slices
Puffed rice	3393	242 cups
Pumpkin, boiled	4240	19 cups
White bread	4663	179 med slices

CSM, common standard measure; ADI, adequate daily intake.

allowing the bulking capacity to be expressed in the same terms for differing amounts of any foods for which FBI values are available.

A reference material for faecal bulking should be:

- Widely obtainable
- Familiar/Identifiable - well known to consumers
- Understood - known to have a particular effect
- Relevant - occurs widely in the normal diet
- Effective - exhibiting the property of interest to at least a moderately high degree
- Constant - not varying in the relevant properties

Wheat bran meets all of the above six criteria; it is widely available, familiar, has a reputation for its laxative effects, is a widespread component in the diet, and is a highly effective faecal bulking agent.[2,7,17] This is because it is relatively resistant to fermentation and has a cellular structure which it is able to retain, even after prolonged residence in the colon.[18] It is also available as a certified American Association of Cereal Chemists (AACC) reference material.

Despite a poor general understanding of the impact of foods and fibres on colonic bulk, most consumers know that wheat bran and wholemeal foods counteract constipation.[20,21] Wheat bran therefore has some meaning, and is very suitable from the point of view of consumer familiarity and understanding. However, any other material of known FBI, such as 'All Bran' could be used as the reference as long as it satisfied the above criteria, in much the same way that glucose and white bread are used interchangeably in glycaemic index measurements.

Putting FBI into practice

The WBE could provide consumers with the capability to self-monitor and manage the accumulation of bulk in the distal colon by providing a guide to the relativities between foods as consumed, with respect to faecal bulking. The absence of information on the absolute requirements of individuals for bulk and the large inter-individual differences is therefore not an issue, as individuals would need to experiment to establish their own requirements using WBE_{fb} content as a guide to food selection.

The FBI was developed because of the importance of fecal bulk in laxation. Other factors such as organic acids, a large fermentive load, and abrasive particles can play a role, but faecal bulk is the dominant factor when foods are consumed in moderate amounts in a mixed diet.[21] The FBI values may not predict laxation so well under the extraordinary conditions that are frequently imposed in trials of the effects of foods and dietary fibres on faecal bulk, when there is often an overloading of a particular food or fibre. The intake limits within which relationships between foods reflected in FBI remain constant are not yet known.

This paper has proposed an approach to managing distal colonic bulk that depends on acquisition of more data before being put into practice. It is now necessary to obtain FBI values for many more foods, develop resources, and test the applicability of WBE_{fb} in a community/clinical setting. Further clinical validation of the model used to obtain FBI values and agreement on appropriate reference materials would be helpful, as would definition of an ADI of wheat bran equivalents, and the effects of such factors as age, activity, bodyweight, health status, on it.

Conclusion

Wheat bran equivalents are potentially useful to consumer groups interested in self-management of faecal bulk, to dietitians, and to food producers who wish to develop healthier food products and communicate their benefits in terms of evidence-based measures relevant to consumers, that is, in terms related to the actual effect that the food is likely to have. Data to facilitate selection of foods according to their physiological effects are likely to be increasingly needed as more foods containing functional ingredients are marketed.

The values for WBE_{fb} are not seen as replacing dietary fibre values, because faecal bulking/laxation is only one of a range of benefits of dietary fibre, or of foods containing dietary fibre. Rather, WBE_{fb} should be seen as complementary to dietary fibre, providing the option of selecting foods according to a specific physiological effect, faecal bulking, which is not possible with the present all-inclusive definition of dietary fibre, as it specifies only that one or more effects be beneficial.

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