Edible fats and oils: the South African scenario

Although real, perceptions may be uninformed, misinformed and even invalid. If widely held such perceptions are extremely misleading, particularly to consumers, and adversely impact on their food choices and food purchasing patterns. With regard to nutrition, it is unfortunate that such perceptions abound on a number of issues, with edible fats and oils no exception.

In this edition of *SAJCN*, Vorster *et al*. (pp.44-52) summarise the contributions to the ILSI (International Life Sciences Institute) South Africa-sponsored symposium on 'Fats and oils — forbidden fruits but important nutrients', presented at the 2000 South African Nutrition Congress. They then go on to address the question of whether dietary fat recommendations to consumers should be more explicit, specific and detailed.

Regrettably, the vast majority of consumers — particularly in South Africa — know very little about food technology or nutrition and thus easily form perceptions based on what they hear, read in the popular press or, mostly, what they hear from other equally uninformed consumers. What impact then are dietary fat recommendations likely to have on these consumers? Certainly it can be argued that very few consumers will have an appreciation of what '30% of energy as fat' means, or be able to judge the amount of fat in any individual food, let alone in a complete meal.

A real appreciation of the differences between different fats is highly unlikely. The terms 'vegetable' and 'animal' fat would probably be reasonably well understood. 'Fish oil' will usually be taken to mean of 'marine' origin. This, however, may not always be the case as in the Western Cape, for instance, '*visolie*' is a common name for the liquid vegetable oil in which fish is fried. Any understanding of the actual compositional differences between individual oils is almost certainly limited.

The typical fatty acid composition of the more common vegetable fats and oils (Table I) can conveniently be divided into three main groups: (*i*) the 'lauric' oils (coconut and palm kernel) containing mostly lauric (almost 50%) and myristic acids; (*ii*) oils high in palmitic acid – mainly those from palm oil, and, to a lesser extent, cottonseed oil; and (*iii*) the 'soft' liquid oils – from maize, soya, sunflower, canola, groundnut and olive.

In practice, the South African consumer is likely to come across only the last category in the local supermarket, although small amounts of palm-derived oil have been marketed from time to time. Of this last category olive oil should probably be disregarded immediately, because of its significantly higher cost (approximately 20 - 30 times more expensive than the other oils), which effectively places it out of the reach of the average consumer. Groundnut (peanut) oil is also not often available. In essence, therefore, sunflower, canola, maize, soya and (some) cottonseed oils are likely to be encountered by the average consumer. Compositionally these are, with the exception of canola, rather similar in that the major fatty acid is linoleic acid (C18.2), together with similar levels of palmitic (C16) and stearic (C18) acids. As the level of C18.2 rises (typically sunflower) so the oleic (or C18.1) level decreases. In this regard, canola oil is an exception by virtue of its lower C18.2 and significantly higher C18.1 contents. The total saturated fatty acid level of canola oil is about half that of the other soft oils — but none of them is particularly high in saturated fat. Of these oils, only sunflower and canola are likely to be encountered under their own names as the other oils are usually blended and sold under individual brand names.

All these comments apply only to the unhydrogenated liquid oils. As soon as any oil is hydrogenated in order to produce a fat suitable for the manufacture of margarine, its fatty acid composition changes. Thus, any margarine claiming to contain only one type of oil, canola for instance, will not have the same fatty acid composition as the original oil.

Furthermore, the current tendency to group fatty acids into saturated (SAFA), mono-unsaturated (MUFA), poly-unsaturated (PUFA) and, increasingly, '*trans*' fatty acids without distinguishing between the individual compounds in these generic classes and explaining their impact on general health may be limiting. How often does one see any discussion on the relative 'undesirable' effects of lauric (C12), myristic (C14), palmitic (C16) and stearic (C18) acids — all saturated fatty acids? Stearic acid, for example, does not raise low-density lipoprotein (LDL) cholesterol. As such, it would be more correct to recommend a reduction in cholesterol-raising saturated fats (C12-C16) than all saturated fatty acids.[1]

Reference is also increasingly being made, in both the

Table I. Typical fatty acid composition (%) of various oils (for further details, including ranges, see Codex Standard 210e for Named Vegetable Oils at www.fao.org/codex)

Fatty acid*	C8	C10	C12	C14	C16	C16'	C18	C18'	C18''	C18'''	C20	C20'	C20''	C20'''+	C22	C22'	C22''	C22'''+	C24
Coconut	6	6	48	19	9		3	7	3										
Palm kernel	4	3	47	17	9		3	13	3										
Palm oil				2	45		5	40	8										
Palm olein				2	39		4	43	11										
Palm stearin				2	60		5	25	6										
Cotton				1	25		3	18	52										
Maize					11		3	33	52										
Soy(a)					10		4	24	55	7									
Sunflower					7		7	18	67										
Rape (canola)					4		2	62	21	10		1							
Groundnut					10		5	40	35		2	1			4				2
Olive (Codex)					8 - 20	0.3 - 3.5	0.5 - 5	55 - 83	3.5 - 21										
Pilchard				8	20	10	4	16	2		1	3	1	22		3	2	9	

*Names of major fatty acids: C12 = lauric; C14 = myristic; C16 = palmitic; C16' = palmitoleic; C18 = stearic; C18' = oleic; C18'' = linoleic; C18''' = linolenic.

scientific and popular literature, to the 'undesirable effects' on health of '*trans*' fatty acids along with recommendations to reduce their consumption. Much of this comment is based on the situation in the USA where soya bean oil is by far the most common oil in use.[2] The linolenic acid (C18.3) content of this oil is particularly prone to oxidation which leads to the development of unpleasant odours and flavours. Consequently, much of the oil used for commercial frying has been partially hydrogenated to improve oxidative stability. This, in turn, results in many US frying oils containing *trans* fatty acids. This is not the case in South Africa where unhydrogenated sunflower oil (of particularly good quality) is the oil of choice for both frying and margarine manufacture.

Another common recommendation is to reduce trans fatty acid intake and to avoid 'hard' or 'brick' margarines. In the South African context, this may not necessarily be correct since some local market-leader brands of brick margarine are so formulated as to contain effectively no *trans* fatty acids (N Martin, Unilever Bestfoods Robertsons — personal communication). It must also be borne in mind that *trans* fatty acids, which impart very desirable 'quick' oral melting properties to a margarine, cannot simply be replaced by 'desirable' mono- or polyunsaturated fatty acids without affecting product quality. Furthermore, the elimination of *trans* fatty acids from margarine (or any other solid fat product) is usually accompanied by an increase in saturated fatty acids. To quote the FAO/WHO Joint Expert Consultation on Fats and Oils in Human Nutrition: 'High intakes of *trans* fatty acids are undesirable, but it is, as yet, uncertain whether the use of *trans* or saturated fatty acids is preferable where such fatty acids are required to formulate food products.'[1]

Increasingly, consumers are being advised to increase their intake of omega-3 fatty acids. Desirable as this intake may be thought to be, it is best achieved not by 'eating more fish' but rather by 'eating more oily fish'. For example, hake (commonly referred to as 'white' fish) contains only about 1% fat compared with typical levels of 4 - 7% in pilchards, snoek and mackerel (E Timme, Council for Scientific and Industrial Research — personal communication).

Similarly, not all soya products but rather only full-fat soya products (i.e. soya from which the oil has not been removed) will contain omega-3 fatty acids. Yet, most soya products available in South African supermarkets, such as low-cost dehydrated mince and stew mixes, are based on textured soya produced from the fat-free 'meal'

which remains after the oil has been removed from the beans by extraction. These products will, therefore, contain no omega-3 fatty acids. By contrast, even 'brick' margarines contain about 35 - 40% liquid vegetable oil, which, depending on the source of this oil, may well contribute to the daily omega-3 fatty acid intake in the diet.

In summary, the closing comments of Vorster *et al*. that 'the advice [about quantity and quality of fat intake] must be translated for consumers in terms of acceptable, available and affordable foods' and that 'the challenge to nutritionists [and food scientists and technologists] is to educate and motivate consumers to follow optimal diets' are crucially important but undoubtedly difficult to implement successfully. Perhaps 'to understand' could usefully be added to this challenge.

Above all, professionals involved with food, be they nutritionists, dietitians, food scientists or food technologists, need to ensure that they do not, unwittingly, increase the already large reservoir of incorrect perceptions in the mind of the South African consumer.

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1. Food and Agricultural Organisation/World Health Organisation. FAO/WHO Food and Nutrition Paper 57: Fats and Oils in Human Nutrition, Report of Joint Expert Consultation, October 1993. Rome. (See also **www.fao.org** for downloadable text.)
2. List GR. Decreasing *trans* and saturated fatty acid content in food oils. *Food Technology* 2004, **58**(1): 23-31.