AN OVERVIEW OF THE RAPESEED ASSOCIATION OF CANADA BOOKLET: CANADIAN RAPESEED OIL - PROPERTIES, PROCESSES AND FOOD QUALITY

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This booklet will be presented by the Rapeseed Association of Canada as a source of information about Canadian rapeseed oil for the use of practising professionals in areas such as food technology, dietetics, and home economics. The significance of rapeseed oil in the Canadian diet has increased rapidly from its first introduction in 1948 to the present where it accounts for close to 30% of the domestic production of deodorized oils for use in margarines and shortenings. It has been estimated that rapeseed oil made up about 8 g of the 103 g fat in the "average" diet of Canadians in 1971, or approximately 3% of total calories.

Yet up-to-date information about rapeseed oil has not been readily accessible to food professionals. North American textbooks on food science may omit reference to it, because rapeseed is not a commercial crop in the United States. Furthermore, rapeseed oil characteristics have been changing extensively during the past twenty-five years because it is a product of the designed food era. Rapeseed cultivars have been systematically modified by plant breeding to improve production and nutritional characteristics. The nutritional and functional consequences of these changes have been documented in the research literature, but this is not always available to professionals in the field.

There are six main chapters in the booklet. The first deals with the potential for rapeseed oil on the domestic market. It is particularly appropriate for producers and processors to review the state of the art in rapeseed oil technology, because maintaining or expanding the home market will likely require a wider variety of products. The high total fat intake of Canadians has alerted public health authorities to encourage moderation in fat consumption. Specific guidelines have been written for the consumer. These include recommendations to limit the intake of high calorie, high fat desserts and snack items, table spreads and cooking fats. Attention is directed to include a source of linoleic acid in the diet. The food industry is encouraged to develop food products consistent with these recommendations. One way is to focus on the design of reduced fat analogs of traditional foods such as low fat spreads and dressings, and to lobby for the use of vegetable fats in combination with dairy fats. The latter practice is currently permitted in only two of Canada' s ten provinces.

Regulations governing rapeseed oil in food products are summarized in a second chapter for the benefit of those people who do not have ready access to the Canadian Food and Drugs Law. These regulations limit the content of C22 monenoic fatty acids in foods to no more than 5%. For this reason edible rapeseed oil, in Canadian usage, means specifically the low erucic acid type and high erucic acid oils are of only historical interest. The standards of composition for visible fat products are included in this section to point out the levels of fat specified and the food additives permitted.

The remaining four chapters deal in turn with: chemical and physical properties, processing, sensory features of significance, and nutritional characteristics. In each of these sections, the essential properties have been defined and related to the qualities of the main products of rapeseed oil: salad oil and dressings, frying fats, shortenings and table spreads. Distinctions are made between the known properties of present products, current areas of research and prospects for future development. It is expected that audience appreciation for different sections will vary with background. For example, dietitians and home economists will welcome the processing information which may be new to them, while food technologists, who generally have less rigorous education in the sensory and nutritional sciences, may find the sections on these topics the most helpful.

The novelties in the fatty acid composition of rapeseed oil are pointed out in the discussion of its chemical and physical properties. Because of its relatively high linolenic acid content, special attention is paid to current literature dealing with the stability of rapeseed oil to photochemical and heat-accelerated autoxidation. Polymorphism and melting behavior are considered in light of the homogeneity of this oil in which 90% of the total fatty acids are C18. The information collated in this section on properties such as specific gravity, viscosity and smoke point may help in the preparation of a standard description of rapeseed oil, which is presently lacking in our Food and Drugs Regulations.

The processing section includes descriptions of the commercial processes that are necessary to extract oil from rapeseed and make it edible. It is helpful for consumer educators like home economists to have access to facts such as the temperature and pressure conditions necessary to achieve specific chemical and physical changes. The nutritional consequences of a process can then be viewed in light of their functional advantages. For example selective hydrogenation is used by the industry in preference to non-selective hydrogenation because it favors the formation of trans-isomers which help to make oils firm without saturating the double bonds. Unfortunately the trans isomers of linoleic acid no longer qualify metabolically as essential fatty acids. Research on processes like interesterification that may achieve firmness without geometric isomerization of the polyunsaturates is encouraging.

The chapter dealing with the sensory features of rapeseed oil products links information on properties and processes with the qualities that consumers find make a food pleasing. For example the size of the crystals in table spreads has implications for the appreciation of the flavor of table spreads as well as determining the mouthfeel characteristic of smoothness. Wherever possible, the limits of a physical property that make a difference to consumers are specified. A case in point is oil viscosity. Low erucic acid oil tends to be more viscous than traditional rapeseed oil. Nevertheless sensory measurements show that the instrumentally-monitored differences in apparent viscosity would not be perceptibly different in thickness to consumers.

Foods fried in rapeseed oil are generally considered as popular as foods fried in other oils. However when it is heated to frying temperatures (190C), rapeseed oil, like soybean oil, has an unpleasant "room odor". While home users of rapeseed oil seldom complain about the phenomenon, it seems likely that this odor might limit the use of rapeseed frying fats in institutional kitchens and restaurants. Current research suggests that hydrogenation tends to modify the problem.

The ultimate judgment of food quality is made on its nutritional value. Rapeseed oil has "grown up" during a period of increasing nutrition awareness among consumers. This awareness includes concern about their calorie consumption as it relates to obesity and concern about the kind of fat they feed their families as it relates to the prevention of cardiovascular disease. The final chapter of this booklet presents information about rapeseed oil that is related to these concerns. From the caloric standpoint, rapeseed oil would be expected to be the same as other normal fats. It is 99% digestible by the human in contrast to more limited digesibility in some animals. With regard to cardiovascular disease, rapeseed oil has been associated with the reduction of serum cholesterol levels in normal adults. This happens even though the oil contains only about 20% linoleic acid whereas soybean, corn and sunflower seed oils contain 50-60% of this polyunsaturated fatty acid. Rapeseed oil may favor low serum cholesterol because it is particularly low in saturated fatty acids. The booklet includes a summary of the research on the safety of rapeseed oil as judged by animal feeding trials. The cardiac lipidosis previously observed in several species of animals fed traditional rapeseed oil appears to have been corrected by reducing the erucic acid in the oil. However some cardiac necrosis still results in rats fed rapeseed oil for extended periods of time. The anomaly is that other species such as swine and monkeys generally do not exhibit this problem. Accordingly the nutritional scrutiny of rapeseed oil continues to be an active area within research on the quality of all major sources of dietary fats.

Of necessity this booklet on rapeseed oil qualities is a survey. While it may satisfy the questions of some readers, those who require more information may use it as a starting point and consult the references cited for more detail.