

Role of Minimally Processed Fruit and Vegetables on the Diet of the Consumers in the XXI Century

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Keywords: food service, minimal processing, fruits, vegetables, consumers, nutritional value

Abstract

An increasing number of people have at least one meal away from home, making use of public or private foodservices. Special groups of consumers, namely children and an increasing number of elderly spend most of the day or even the whole day in institutions. In this context industrial kitchens need to prepare and cook large numbers of meals in a short time, often without enough staff, equipment or even physical conditions. At the same time consumers became more health conscious about their food choices and developed a higher interest in fresh-convenient products with reduced use of chemicals. Reliable information on nutritional value of these kinds of products is also necessary to promote consumption in all kind of consumers. Incorporation of the concept of brand labelling, market segmentation and quality assurance must be part of food company management.

INTRODUCTION

In the last decade a tremendous revolution occurred within the family structure. The inclusion of women in the labour force has caused a radical change in the life style, characterized by a reduced time to prepare healthy meals (Poulain, 2002; INE, 2003). Trends in industrialized countries include rising purchasing power, aging population and smaller households. These developments could prompt changes in the demand for food away from home that will affect both, the supply of restaurant foods and services as well as the diet and health of the consumers who demand those items (Stewart et al., 2004).

The new economic model of household behaviour holds that the costs of consumption can include prices as well as time spent eating food, preparing food, and cleaning up after a meal or snack. A household must therefore decide whether to spend time on all aspects of the activity of eating a meal (i.e. prepare food at home) or outsource some aspects like preparation and cleaning up (i.e. purchase food away from home). The final decision depends on many factors, including the household income, the opportunity cost of its manager's time, and how well the household can cook. Other factors influencing this aspect include number of people in the household, education level of the household manager, region of residence and race and ethnicity (Stewart et al., 2004).

Households with higher incomes tend to spend more on products and services, including leisure, variety, and dining amenities. Food away from home is a form of leisure, when considering leisure as time spent outside of both the labour force and household production. A married couple with children is likely to have different preferences and preparation capabilities than a single person household. On the other hand, members of single-person households may be more likely to socialize and date than members of a traditional family. A household's structure can have significant implications for how it buys and prepares food (Stewart et al., 2004).

An increasing number of people have at least one meal away from home, making use of public or private foodservices. Special groups of consumers, namely children and

an increasing number of elderly spend most or all of the day in institutions. In this context industrial kitchens need to prepare and cook large numbers of meals in a short time, often with limited staff, equipment and physical resources (Rocha et al., 2003). At the same time consumers have become more health conscious about food choices and have developed interest in fresh, convenience products (Reed et al., 2004).

CONSUMPTION OF FRUITS AND VEGETABLES AND HEALTH

Despite the increasing knowledge about the health benefit of diets high in fruits and vegetables, data show that Americans consume only half as much as recommended by the Food Guide Pyramid. Vegetable consumption is close to recommendations, although French fries, potato chips, and iceberg lettuce – vegetable forms that are either high in fat or low in nutrients – constituted a third of total daily vegetable servings (Putnam et al., 2000). One argument for not consuming recommended levels of fruits and vegetables is that they are expensive, especially when purchased fresh (Reed et al., 2004). Since many fruits and vegetables contain much that is non-edible in the purchase weight, cost per kg may not be a good indicator of cost per kg consumed. However, fresh fruits and vegetables may be less expensive to eat than minimally processed ones. For some consumers, this price difference may be a small price to pay for the convenience, i.e. the value of longer shelf life, ease of preparation, and greater availability associated with processed forms (Reed et al., 2004).

Dietary patterns in Eastern and Northern European countries are distinct from those of the Southern European countries bordering the Mediterranean Sea (Naska et al., 2006). The concept of the Mediterranean diet has been around since the mid 1940s and it is now well accepted that a dietary pattern based on fruit and vegetables, bread and other cereals, olive oil and fish is good for health (Martinez-Gonzalez et al., 2002; Schroder et al., 2002). The trends reported in most industrialised countries include increases in the consumption of fruit and a decrease in the consumption of fat-containing foods. However, in Southern European countries, traditionally characterized by a ‘Mediterranean diet’, opposite and less favourable trends have been reported (Marques-Vidal et al., 2006). In Portugal trends indicate that it is moving away from the traditional Mediterranean diet (Rodrigues and de Almeida, 2001). Dietary intakes have changed dramatically over a decade in Portugal, for example, among adults under 65 years. The average number of daily meals and the consumption of soup and fish have decreased, the consumption of meat, vegetables and milk has increased, the consumption of pasta, potatoes and rice has remained approximately constant and the consumption of fruit has decreased slightly between 1995 and 1999 (Marques-Vidal et al., 2006).

A growing body of research shows that fruits and vegetables are critical to promoting good health (Steinmetz and Potter, 1996; Schroder et al., 2002; González et al., 2002; Fruit and vegetable policy in EU, 2005; Lock et al., 2005). To consume recommended quantities, most people need to increase consumption of fruits and vegetables (Tables 1 and 2). Fruits and vegetables contain essential vitamins, minerals, and fibre that may help protect consumer from chronic diseases. According to Sjoströmm et al. (2005), the average consumption/availability of vegetables and fruits, excluding potatoes and vegetables and fruit juices, must be considered as an indicator for monitoring public health nutrition. Those who eat more generous amounts as part of healthful diet are likely to have reduced risk of chronic diseases, including stroke and perhaps other cardiovascular diseases, and certain cancers (Steinmetz and Potter, 1996; Schroder et al., 2002; Lock et al., 2005; Sjoströmm et al., 2005). Nutrients should come primarily from foods such as fruits and vegetables which not only contain the vitamins and minerals that are found in supplements, but also other naturally occurring substances that may help protect from chronic diseases (Lock and Pomerleau, 2005).

Many diseases such as cardiovascular diseases, certain types of cancer, obesity, and diabetes are linked to dietary behaviour and the associated costs are high. According to the World Health Organization (WHO, 2002), diet related diseases account for more than 3 million premature deaths each year in Europe. The risks of dietary inadequacies

and adverse health effects are most serious in households consuming small amounts of healthy foods or large amounts of unhealthy foods. One of the six leading diet-related risk factors is a low intake of fruits and vegetables. Nutrition experts recommended that fruit and vegetable consumption should be, at least, doubled in Northern Europe (Kafatos and Codrington, 2000). Nutrition experts have proposed to lower the price of healthy foods to increase consumption. Gustavsen and Rickertsen (2004) reported that increased health information may be a more efficient policy tool than price decrease to increase the consumption of vegetables.

ROLE OF MINIMAL PROCESSED PRODUCTS ON NUTRIENT INTAKE

This scenario created an opportunity for a new category of products: minimally processed fruits and vegetables. The production of high quality goods, convenient, minimally processed must be the aim of producers and the food industry (Soliva-Fortuny and Martin-Belloso, 2003). A considerable number of fruits and vegetables are already on the market playing an important role on the nutrient intake of an increasing number of consumers. Minimally processed products are one of the major growing segments in food retail establishments (Soliva-Fortuny and Marti-Belloso, 2003). Traditional technologies have been able to provide microbiologically safe food products with acceptable quality characteristics for fully processed products. The next step is to design mild but reliable treatments in order to achieve fresh-like quality products with a high nutritional value (Soliva-Fortuny and Martin-Belloso, 2003). Knowledge of the nutritional impact of minimal processing operations is a valuable tool for the industry that produces them and for the consumers who want a variety of highly convenient products (Rocha et al., 2003).

Today, consumer demand is a driving force of agricultural production and the agri-food industry. They demand an increasingly varied range of high quality food together with food safety assurance, and at the same time they require that food should be quick and easy to prepare (Duquesne et al., 2005). New methods of marketing fresh produce, such as pre-cut vegetables or salad bars present promising alternatives for informed and concerned consumers looking for those characteristics associated with convenience. Several studies have evaluated the impact of minimal processing operations on nutritional quality of fruits and vegetables (Table 3). Most of these studies found non-significant impact of minimal processing operations on the nutritional quality of fruits and vegetables indicating this category of goods as a promising alternative to improve quality on diet for XXI century consumers.

DISCUSSION

Busy life styles can benefit from food that is nutritious, yet easy to eat on-the-go, like fresh fruits and vegetables (Hering et al., 2006). Children at school, students at universities and businessmen and women can make use of this alternative in order to improve the quality of the diet. Considering the aging population, most of who live alone, with increased incapacity to permit routine shopping or meal preparation. Convenient fresh products may help improve the nutrition status of the elders, supplying important nutrients for this age group (Volkert, 2005; Synopsis WP3, 2006). Faced with choices between seven vegetables soups varying in levels of convenience, elderly European choices were driven by freshness, naturalness, taste and health benefits. In spite of this, in traditional countries like Portugal, elderly consumers identify the benefits but do not trust this category of product (Synopsis WP2, 2006).

These kinds of products respond to expectations of food services since they allow reduced labour work and expenses, minimize preparation time, decrease wastage, and reduce water and energy consumption (Letamendia, 2000). The high cost of space areas on restaurants and food service at different kind of social, educational institutions may benefit from the use of these products, saving space and money.

CONCLUSIONS

Research on fresh cut produce is still needed to guarantee microbiologically safe

products, preserve their nutritional value and their sensory quality. At the same time the shelf lives attained for these products have to be enhanced to allow distribution and marketing. One of the main goals in this field is the search for new natural compounds that may be used on these products that appear to be healthier for consumers and allow better preservation and convenient use.

Reliable information on nutritional value of these kinds of products is also necessary to promote consumption in all kinds of consumers. The concept of extending the shelf life of a product at an acceptable level of quality must be discarded for one that provides premium quality within an acceptable window of distribution (Shewfelt, 1987). Making people aware of benefits of this kind of product it is important to promotion of healthy eating habits.

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Tables

Table 1. Recommended dietary intake ranges for Europe.

Dietary factor	Recommended dietary intake ranges
Total fat	15-30% E
Polyunsaturated fatty acids	6-10% E
Saturated fatty acids	<10% E
Trans fatty acids	<1% E
Total carbohydrate	55-75% E
Free sugars	<10% E
Protein	10-25% E
Cholesterol	<300 mg
Salt (sodium)	<5 g (<2 g)
Fruit and vegetables	>400 g
Total dietary fibre/ Non-starch polysaccharide	>25 g from whole grain, cereals, fruit and vegetables

E = Energy (Kafatos and Codrington, 2000)

Table 2. Countries meeting nutrient recommendations.

Dietary factor	Criterion	Number of countries meeting the recommendation*				
		1961- 1963	1969- 1971	1979- 1981	1989- 1991	1999- 2001
Total fat	15-30% E	10	10	13	14	14
PUFAs	6-10% E	12	12	7	6	5
Saturated fatty acids	<10% E	9	10	11	13	12
Total carbohydrate	55-75% E	8	12	13	14	14
Free sugars	<10% E	8	11	10	9	10
Protein	10-25% E	0	1	1	1	1
Cholesterol	<300 mg	10	10	13	14	14
Fruit and vegetables	>400 g	6	9	9	12	14

*Maximum is 14 (Schmidhuber and Traill, 2006)

Table 3. Examples of studies concerning impact of minimal processing on nutritional value of fruits and vegetables.

Product	Nutritional parameter evaluated	Shelf life	Hurdles	Authors, year
Cut lettuce	Sugars, organic acids	4 weeks	Vacuum and refrigeration	Bolin and Huxsoll, 1991
MP papaya	Sugars, organic acids, ascorbic acid	5 months	Combined methods	López-Malo et al., 1994
Orange	Vitamin C	8 days	Refrigeration	Rocha et al., 1995
Apple	Sugars and organic acids	10 days	Refrigeration and additives	Rocha et al., 1998
Apple	Sugars and organic acids	7 days	Refrigeration and CA	Rocha and Morais, 2000
Apple cubes	Phenolics	7 days	Refrigeration	Rocha and Morais, 2001
Peeled potatoes	Phenolics, organic acids, sugars	7 days	Vacuum and refrigeration	Rocha et al., 2003
Apple cubes	Phenolics	7 days	Refrigeration CA and additives	Rocha and Morais, 2005
Shredded orange carrots	Carotenoids and phenolics, anthocyanins	13 days	Refrigeration and modified atmosphere	Alasalvar et al., 2005
Grated carrot	Carotenoids and sugars	10 days	Vacuum and refrigeration	Rocha et al., 2007
Peeled carrot	Phenols, sugars, carotenoids	7 days	Vacuum and refrigeration	Rocha et al., 2007

