

Linking Agriculture, Food and Wellness for the Benefit of Canadians

Introduction

Plant and animal agriculture represents by far the largest source of food for Canadians and all peoples around the world. This clear linkage between the agricultural products and the foods we eat is too frequently overlooked in the emerging debate on the relationship between food, diet and health. According to the World Health Organization¹, over 90 percent of the deaths from non-communicable diseases, including obesity, heart disease, type II diabetes and stroke, can be attributed to four factors: the foods we eat, smoking, alcohol and lack of exercise. With food as a critical variable in human health and nutrition, much greater attention is needed on the complete food chain from agricultural inputs, plant and animal nutritional qualities, processing and consumption, not just the food retail to kitchen part of the chain.

A common statement is that agriculture can be a “solution provider” in the improvement of nutrition for Canadians. The statement is often ignored or forgotten, in part because the connection between agricultural products and food nutrition has not been carefully made or documented. The connection was apparently overlooked by the federal government in its most recent announcement on priorities for the Strategic Grants Program of the Natural Sciences and Engineering Research Council of Canada (November 2010). Indeed, the Quality Foods and Novel Bioproducts priority was discontinued. The purpose of this paper is to build the argument that agriculture research and technology can be a significant player in generating healthier products for Canadian consumers, and to outline possible approaches to achieving this goal.

Canada has had a history of developing new and healthy products of agriculture for human consumption, using a focused and funded partnership approach of federal and provincial governments, universities and private industry leaders. One example is the transformation of rapeseed, used originally as an inedible industrial oil, to canola, producing a premium edible oil for human consumption^{2,3}, as well as a high quality protein meal for livestock production. A similar transformation has taken place in flaxseed, with the development of edible seed and oil containing high levels of beneficial omega-3 polyunsaturated fatty acids³. Internationally, examples include rice varieties that have been developed with substantially improved nutritional quality, and corn varieties and hybrids with high lysine content, a necessary protein which cannot be synthesized by the human body^{4,5}. In all these cases, a long term program of research is needed, focused on clearly identified outcomes across many partners and countries.

The point is that improvement in nutritional value in the foods we eat can be achieved, but it takes a focused effort across several public and private partners with the required public funding to ensure progress.

The agriculture and veterinary faculties in Canada have played and continue to play an important role in agricultural and food research, as well as environmental issues in the food chain, nutrition and food quality and safety, representing nearly half of all research conducted on these topics. These faculties also are the primary source of undergraduate and graduate education for the

creation of highly qualified personnel for government and industry. As a major player in the development of technologies and people skills for agriculture and food, now and in the future, these faculties represent a critical resource for contributing to the improvement of human health in Canada and abroad.

Priorities and Opportunities for Research and Education

The relationships between agriculture and foods are obvious, and the links between diet and wellness are argued daily in our media. However, rarely do we hear of the potential for the agriculture and food sector to address many of our current and future health challenges. Nonetheless, the potential exists and is an extremely important one that will become even more so as our population in Canada continues to grey and diversify. What we grow, how we grow it, and how we process and store it all affect the safety and nutritional value of food. In turn, all of these things directly affect our health.

Among the most pressing of health issues in Canada are those related to obesity-related disease. It is no secret that Canadians eat too many highly processed foods and insufficient proportions of fruits, vegetables and other unprocessed foods. Consequently, our diet is very high in simple sugars, saturated fat and salt, and relatively low in diversity of sources of fibre, complex carbohydrates, polyunsaturated fats and naturally occurring micronutrients and anti-oxidants thought to contribute to health. This diet is associated with an ever-increasing rate of obesity⁶, accompanied by increases in obesity-related diseases such as type II diabetes, cardiovascular disease, colon cancer and others, as well as increases in the requirements for knee and hip surgeries⁷. As a potential solution provider, the agri-food sector can through research and development provide a wider array of choices for healthier foods, in formats that appeal to consumers. The importance of the linkage between agriculture and healthy food lies in the fact that agriculture can contribute substantially to lowering the rate of health care cost increases, with greater priority given to tailoring agriculture products through technology and research to improve the safety and nutrition of the foods we eat.

For example, identifying soil types and agronomic practices that enhance the quality and quantity of specific nutrients, and identifying the factors that facilitate processing and handling to maintain nutrient quality and consumer appeal, are important yet relatively unexplored areas of research. Similarly, little or no research has been performed to identify the genetic factors and agronomic practices that can minimize uptake of environmental toxins and synthesis by the plant or animal of undesirable compounds. As well, 'custom' agronomy in prior consideration of the desired processing, handling and storage has been practiced only for a narrow selection of crops. Finally, there is considerable opportunity through research to trace nutrient and toxin effects in many animal products, marker-assisted genetic selection for specific animal product nutrient traits such as desirable lipid profiles, in addition to a better understanding of the relative capacity of different animal breeds to convert feed efficiently and safely. Given the technological ability to trace foods from farm to plate, individualization of the initial agronomic practice is feasible and highly desirable, enabling production of a wide range of food products of high quality and taste, encouraging citizens to eat a healthier selection of foods. This preventative approach to

improve health requires full integration of the agri-food chain from soil treatment to food preparation by the consumer.

Microcomponents and micronutrients are discussed widely in the popular press, with advocates of “natural products” attributing health benefits to a wide array of compounds. Agricultural products can be enhanced with such compounds, and provide a truly natural source if the science supports the health benefits claimed. However, current labeling regulations for such products and associated health claims are cumbersome, and make it difficult to distinguish fads from fact. In turn, the lengthy approval process for making health claims regarding food products discourages innovation in this direction – while it is true that many of Canada's health problems are related to simple over-consumption, the rapid advancement of individualized health care would be well-served by a science-based system to provide individualized diets, enhanced by customized foods.

There is also inconsistent but significant concern regarding the impact of the agricultural environment on food quality in relation to potential toxicity, the use of pesticides, for example. The relationships between most environmental toxins and human disease are not well understood. Without that information, the approach in agriculture is to ensure that food products in Canada are free from high levels of pesticides and certain toxins through a science-based regulatory program administered through the federal government.

In future, a simple but effective system needs also to be developed to enable optimum production and use of land and carbon sources that establishes confidence in the consumer that Canadian food is also free of heavy metals and other residual toxins that build up in plant and animal tissues. In terms of research required, little is known about whether certain plants or animals have a greater or less ability to resist accumulation, under what conditions this is true and whether or not there is a genetic basis for it. As the impacts of these residuals on human health become better understood, it will be more important for agriculture to lead the way in minimizing human exposure through diet.

The most obvious link among agriculture, food and health relates to food safety. Canada has a complex network of prescriptive regulations and guidelines regarding the application of various compounds to land for agriculture, the feeding and treatment of animals, and the handling and processing, as well as the labeling, of food products. The regulatory network involves various levels of government, and different agencies within governments concerned with agriculture itself, environment, human health, animal welfare. Foods produced from Canadian agricultural produce are subject to the network throughout the value chain, whereas imported foods and foods prepared from imported agricultural produce are subject to the regulations and procedures in the country of their production with oversight from the Canadian Food Inspection Agency.

The diversity of regulatory regimes, combined with ever-present downwards pressure on food costs, has resulted in significant importation of agri-food products from countries with less expensive regulatory and other production costs. This not only compromises the ability of Canadian agricultural producers and processors to compete, it may in some cases present a risk in terms of food safety. Canada needs to ensure that its regulatory framework is as efficient as possible in terms of minimizing the cost burden on Canadian agricultural products, and also to

enable effective labeling to convert the use of our regulatory safety measures into a competitive advantage. Canadian food products are among the safest in the world, and their positive contribution to human health should be promoted.

Partnerships, Priorities and Funding

There are two significant initiatives underway in Canada to examine the relationships between agriculture, food and health at the policy level. One is the Canadian Agricultural Policy Institute's Health and Wellness Panel, which is in its second year of activity and expected to finalize its policy recommendations and proposed actions in 2011. This group includes leaders in primary agriculture, food science and processing, dietetics and health policy. From a high level, the panel is examining the ways in which primary agriculture can be linked to improving health of Canadians, addressing many of the concerns of this discussion. The second effort is through the Conference Board of Canada, an initiative only recently begun and slated for outcomes in 2014.

Collectively, the Canadian Faculties of Agriculture and Veterinary Medicine (CFAVM) recognize the strong links between agriculture, food and wellness, and that their faculties have a significant role to play in conducting the research and education needed to ensure that Canadians continue to have access to a healthy food supply and develop more options for healthy eating. Partnerships across several agencies are needed to fully recognize and develop the technologies and regulatory systems. These include the establishment of the priority for focused attention to these issues by the national granting councils and as well, partnerships across universities and the federal and provincial research agencies in agriculture, environment, health and natural resources.

Recommendations

The CFAVM recommends that governments establish a clear priority and funding for identifying specific research priorities and programs to develop and utilize technologies to improve the nutritional quality of agricultural products on which food for Canadian consumers is based. This includes the research and technology development component as well as the appropriate regulatory systems to enable Canada to fully exploit these opportunities. Based on the broad commitment above, the recommendations are:

- that preventative health care through improvement of the Canadian diet be adopted by health agencies and Canadians as a key mechanism to address spiraling health concerns and costs
- that the federal government, through the Ministry of Science and Technology, consider the establishment of cross-departmental research priorities and funding related to addressing the research gaps identified in the agriculture, food and wellness continuum. More specific priorities include the need for research on:

- agronomic practices and genetic influences that affect crop/animal product quality in terms of micro and macronutrient composition, yield, and environmental compound uptake
- relationship between environmental management practices and soil suitability for cropping
- processing and storage practices that increase the consumer appeal of food products while maintaining a healthy nutrient profile
- that the federal government, working through both federal and provincial government departments of agriculture, environment, health, science and technology and others implement the recommendations of the Canadian Agri-Food Policy Institute's Reports regarding Food and Wellness⁸⁻⁹.
- that governments at both federal and provincial levels engage universities and business leaders to develop an integrated incentive-based regulatory plan that promotes both food safety, the individualization of the Canadian diet, and innovation. This system must support both small and large business enterprises to maximize the innovation potential, and reduce the regulatory burden by providing a single point of access.

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