Food product composition, consumer health, and public policy: Introduction and overview of special section

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ABSTRACT

As efforts to improve diets in high income countries intensify, attention has turned to how policies may influence diet composition. The case studies in this special issue contribute to our understanding of how two main types of policies have influenced food product composition and dietary outcomes: (1) policies affecting food manufacturers' input costs and (2) information policy affecting competition. Research on the first type of policy is relatively new, but suggests that US commodity policies would not be good policy instruments to influence diets, except through the long run impacts of agricultural research. Research on the impacts of information policy continues to demonstrate that it can spur food industry competition to introduce healthier products, but may not result in healthier diets. International comparisons show where the US experience may have relevance for other high income countries.

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Increasing attention to health and nutrition characterizes food markets and policies in high income countries. As understanding of the links between diet and health improves, and as obesity rates increase around the world, both the public and private sectors have initiated efforts to communicate diet-health information to consumers. But even as these efforts intensify, it has become clear that many dietary choices are predetermined or influenced by market forces that are beyond the control of individual consumers. Food product composition is one influence on diets that may itself be influenced by market forces and government policies.

The array of food products available in the market and their composition responds to market forces, including consumer demand, production costs, relative prices, and new technologies. A wide variety of foods are available in high income countries, and new products appear daily. The breadth of food choices can, however, mask overarching similarities in the composition of foods, including frequently used ingredients, standard product formulations, or changes in raw commodity nutrient content. Such changes can have wide-spread effects on diet quality and health.

Agricultural and food policies shape product content, by making some ingredients cheaper than others, by regulating food markets and firms, by providing information to consumers, or by research investments that introduce new food content or processing. In this special section, we present new studies of how policies have led to changes in US product content or in relative food prices, which have had broad based impacts on consumer diets, with possible consequences for public health. Such changes can occur without much consumer awareness, as when alternative oils are used in cookies or crackers, or when high fructose corn syrup replaces sugar in soft drinks. Table 1 provides examples of some of the changes in product composition that have occurred in the US during the past two decades. In some cases, these changes are unique to the US, and in others there are useful lessons from comparisons with different policy approaches in other high income countries. As efforts to encourage healthier diets intensify, this special section considers how policy might influence diets beyond encouraging consumer behavior change.

The case studies in this special issue contribute to our understanding of how two main types of policies have influenced food product composition: (1) policies affecting food manufacturers' input costs and (2) information policy affecting competition. Policies affecting input costs include such farm policies as farm-income support programs and commodity-price supports, and trade policies such as import quotas and tariffs, all of which may alter relative prices of major food product ingredients. The influence of this type of policy on consumer prices and nutrition has only recently been addressed by agricultural economists. Miller and Coble (2007) find that US government payments to farmers did not impact the affordability of food. Cash et al. (2006) discuss how Canadian commodity price policies have discouraged dietary substitutions that would have reduced saturated fat intake, but do not directly test this hypothesized effect.

In this special issue, Alston et al. (2008) explore how US farm policies may have influenced dietary outcomes, including price and income support, as well as agricultural research
investments. They examine the hypothesis that policy has shaped long run relative prices so as to make less healthy foods cheaper. In the second article in this section, Beghin and Jensen (2008) look at sugar price policies in the US and their potential role influencing the growing intake of added sugars. Both of these papers conclude with international comparisons to see how and whether US outcomes are unique. Taken together, the two papers provide strong arguments that commodity policy is largely divorced from nutritional outcomes, and that using such policies to influence diets would be largely ineffective. These results appear to extend to other countries, as the correlations among commodity policies, food prices, dietary patterns and nutritional outcomes across countries do not reveal any clear relationships among these variables.

Information policy, including mandatory disclosure, regulation of product claims, and nutrition education programs, provides an entirely different kind of influence on product composition. The impact of new US information policies during the past two decades has been widely studied. Such policies include partnership initiatives, such as between the cereal industry and the American Cancer Association to promote bran; the introduction of the mandatory nutrition label in 1993 to disclose calories, fat, sugars, and salt; and the impact of education campaigns, such as “Five-a-Day” to encourage fruit and vegetable consumption. Most studies have found that such efforts lead consumers to make healthier choices, at least among some subpopulations (e.g., Kim et al., 2000); or that these policies provide incentives for the food industry to reformulate products (e.g., Ippolito and Mathios, 1990; Mojduszka et al., 1999).

In this special section, new and more recent cases of information policy are examined to see if the lessons from the 1990s studies hold true. Mancino et al. (2008) examine the influence of the 2005 USDA Dietary Guidelines in spurring product development to provide more whole grains products for consumers. Unnevehr and Jagmanaite (2008) look at food industry response to the US Food and Drug Administration’s regulation requiring disclosure of trans fat content on nutrition labels beginning in 2006. The two papers support the lessons from the 1990s in their findings that competition in the food industry leads to fairly rapid reformulation of products in response to information policy. However, the ultimate impacts on public health may not be straightforward.

Despite the different intents and purposes of price and information policies, the way in which both kinds of policies play out in food markets and product composition are similar. The articles in the special section emerged from a set of case studies presented at a Farm Foundation sponsored conference in April 2007. In the remainder of this introduction, we summarize key observations that emerge from this special section and from the conference discussions. We close with some thoughts about future directions for research.

Policies affecting input costs have a muted effect on retail prices and consumer demand

Policies affecting commodity input costs have a muted effect on final retail prices and consumer food choices. In general, the lower the percentage value of the commodity in the final product and the more competitive the manufacturing and retail sector, the lower the effect of commodity price change on retail price (Leibtag, 2008). For example, commodity price changes have negligible effects on the retail prices of highly processed products with very

Sources:

a Beghin and Jensen (2008).
c Cash et al. (2006).
d Prattala (2003).
e USDA/ARS (2008).
f Alston et al. (2008).
g Unnevehr and Jagmanaite (2008).
h Mancino et al. (2008).
i Goddard (2007).
j Mojduszka et al. (1999).
k EUBusiness (2008).
Policy can influence food composition without first influencing consumer preferences

US producers and manufacturers are responsive to consumer demand and the types of products available for consumption reflect consumer preferences. This observation does not imply, however, that consumer demand drives all changes to the food supply. In fact, consumers may not even be aware of many reformulations or processing changes, particularly when taste and price remain unchanged. Input and processing costs – and policy affecting these costs – can play a major role in influencing the content and quality of the final mix of food products. Commodity support programs, tariff policy or food safety requirements can all affect input prices or production practices and trigger shifts in the content and quality of the food supply.

The shift from sugar to high-fructose corn syrup (HFCS) in US processed foods is a good example of how policy can influence product composition by changing relative input prices. US commodity programs raised the price of sugar relative to corn, resulting in the development and widespread use of HFCS as a sweetener in processed food products (Beghin and Jensen, 2008). The development of partial hydrogenation allowed soybean oil to replace saturated fats from animal and tropical oil sources in processed foods (Unnevehr and Jagmanaite, 2008). While this was partly in response to concerns about saturated fats in the diet, it also reflects the widespread availability and relatively low cost of soybean oil in the United States. This substitution led to the introduction of artificial trans fats into the US diet, as an unintended consequence of the partial hydrogenation process.

Nutrition education and information policy, such as labeling requirements, can also influence food composition without first influencing many consumers’ preferences, by prompting competitive strategies among food manufacturers. These strategies are discussed in more detail below.

Information policy can create new areas of competition

Information policy such as labeling regulations and nutrition information can create new areas of competition by raising consumer awareness and stimulating demand for new product attributes. Manufacturers and producers will reformulate as early as possible to capture first-mover profits. Such reformulation will occur even if many consumers are unconcerned about the health attribute in question. Thus, all consumers will see a change in diet composition, whether or not they were specifically seeking change. The 1980s information campaign regarding bran content of breakfast cereals is one example (Ippolito and Mathios, 1990).

Information policy stimulates competition for marginal consumers, particularly when manufacturers determine that they can reformulate to cater to the preferences of a very small group of consumers without alienating their core group of consumers. The more attributes manufacturers can “stack” in their products – eco-friendly, low-sugar, fair-trade, high-fiber – the more niche consumers they can attract. This strategy works best when the new ingredient or attribute does not affect taste or price.

Mancino et al. (2008) show how whole grain recommendations in the 2005 Dietary Guidelines for Americans triggered an explosion in whole-grain products and labeling, despite the fact that many consumers did not exhibit any desire for more whole grain options or any knowledge of the new recommendations. In 2003, Americans consumed 10 servings of grains, with whole grains accounting for a little more than one serving. In food intake surveys from 1999 to 2000, nearly 40% of Americans did not report eating any whole grains in an entire day. Yet after the 2005 release of the new Dietary Guidelines for Americans, numerous manufacturers changed their product formulations and introduced new whole-grain products. Few Cocoa Puff consumers can detect a difference between regular and “whole-grain” varieties. Evidently, General Mills is assuming that the whole-grain allure of reformulated Cocoa Puffs will attract new consumers but not push away their old ones.

In a similar manner, Unnevehr and Jagmanaite (2008) show how the trans fat labeling requirements led to major product reformulations to capture the marginal consumer interested in this health attribute. Prior to recent media attention to trans fats, most consumers were unaware of this issue. Yet, efforts have been underway for almost a decade to reformulate processed products on grocery shelves and to find alternative fry oils for the food service industry. With the implementation of mandatory trans fat labeling in January 2006, and the December 2006 New York City ban on trans fats in food services, the food industry has increased the visibility and pace of efforts to find substitutes.

Manufacturers may also choose to reformulate as part of a strategy to build brand reputation. Well-advertised investments in new “healthy” ingredients and processes can improve a brand’s image with consumers. These investments build the brand’s reputation for wholesomeness, healthfulness and social responsibility. General Mills widely advertised their whole grain shift in anticipation of the 2005 Dietary Guidelines (Business Network, January 12, 2005). Manufacturers may also reformulate and adopt expensive process changes in an effort to raise de facto industry quality standards to create effective barriers to entry. Campbell’s investment in salt substitute research and introduction of reduced sodium products may be an example of this strategy (MSNBC, February 18, 2008).

Competition over health attributes may not result in healthier foods or address the overconsumption of calories

Whole grain and trans fat case studies illustrate that substitute ingredients or reformulated products may not be any more healthful than the products they replace. Whole grain reformulations are not regulated, and it is often unclear what “whole grain” claims on food product labels indicate. An effort to develop a private standard for such labels may or may not succeed in providing better information and product formulation to consumers (Mancino et al., 2008). This case demonstrates the limitations of current information policy with respect to this health attribute.

In the case of trans fats, substitution possibilities are limited to saturated fats in many of the most important sources of trans fats in the diets – specifically pastries and cookies. Analysis of food label data shows that relatively healthful oil substitutes are used in...
chips, while less healthful substitutes dominate in reformulated cookies (Unnevehr and Jagmanaite, 2008). Many difficult reformulations require considerable adjustment time to achieve. The process of finding substitutes is ongoing, but whether it ultimately results in greater consumption of saturated fats is still unclear. Industry and consumer fatigue for reformulation and fats-related health claims may set in.

Foods successfully reformulated to avoid one particular ingredient may still not be healthier overall if the reformulation includes the addition of ingredients that diminish the nutritional profile of the food. For instance, Beghin and Jensen (2008) discuss the growth in sweetener use in “low fat” processed food to offset taste changes caused by reduced fat. Mancino et al. (2008) discuss possible increases in sugar, salt or fat to increase palatability of whole grain foods.

The use of food icons or other front-of-the-package healthy labeling such as “heart healthy” or “double health checks” could spur competition over healthy attributes, but the ultimate effect on diet quality depends on whether the reformulated product is actually healthier than the one it replaces. In addition, reformulated “healthy products” could produce a halo effect where consumers eat more of the product than is part of a healthy diet, a particular danger for the energy dense foods that are now advertising zero trans fats (Unnevehr and Jagmanaite, 2008).

The extent of reformulation depends on the adaptability of production practices, with implications that extend all the way through the supply chain.

The extent of reformulation – whether triggered by input cost changes or information policy – depends on the ability of existing production practices to accommodate the input or processing change. Large changes in relative input prices or demand for reformulation could have little short-term effect on product composition if the cost of adapting existing processing methods to the new input is higher than the projected cost savings.

In their case study, Mancino et al. (2008) discuss both farm-level and plant-level constraints to increased whole-grain wheat production. At the farm level, the shift from red winter wheat to the more palatable white winter wheat may take a season or two, or it may not be possible in some areas of the country. White winter wheat varieties developed for specialized whole grain use in processed products also require longer term plant breeding efforts. At the plant level, some machinery cannot handle the corrosiveness of whole grain processing.

In the case of trans fats, both technical processing issues and farm level supply response were found to be at issue in making the reformulation (Unnevehr and Jagmanaite, 2008). Reformulation has meant designing and investing in new equipment, as older equipment was designed for the texture and stability of the trans-fat-containing oils. New soy and canola crop varieties with more desirable oil characteristics, such as greater shelf-life, have been developed, speeded by the tools of modern biotechnology. Building up a reliable supply of these new varieties takes time, with a three-year planning horizon required to meet any new source of demand from the food industry. In both the trans fat and whole grain cases, the competition to reformulate products stimulated new incentives through the supply chain all the way back to the input market for seeds.

Over time, as the capital stock depreciates, machinery designed to process the new input will come on line and the benefits of lower-cost inputs or expanded demand for niche attributes will be realized. Since the rate of depreciation depends on such market conditions as interest rates and returns to production, changes in market conditions will influence the economic lifespan of capital investments. Changes in relative prices and or new market opportunities can shorten the economic life of some investments and breathe life into others.

As increased demand for corn for ethanol drives up the price of HFCS, sugar becomes a more attractive input option. However, manufacturers who invested in high-tech machinery designed to efficiently process HFCS cannot easily change to sugar (Beghin and Jensen, 2008). Only those producers still using older machinery, like many in Mexico, can switch easily between sugar and HFCS. This rigidity in processes is now reflected in a weaker link between farm level prices of sweetener sources and food product prices, making price policy an inefficient lever for future reformulation change.

For any healthy product reformulation to succeed, it must also taste good. Manufacturers will not adopt a price-saving input or technology if the final product does not taste good. This is illustrated by the search for replacements for partially hydrogenated oils in the food service industry. Fry oils must not only be stable so as to reduce the need to replace them, they must also convey the right taste, texture and mouth-feel. Fast food vendors do not want to lose customers by reducing perceived product quality. For example, some substitute oils may give a product the right taste, but the product will feel too “greasy.” The right fry oil will vary for different fast food products. Finding the right blend to meet the needs of particular food service chains is a complex undertaking.

The case studies highlight the role of research in supporting private investments in product composition change. Alston et al. (2008) find that perhaps the most significant impact of agricultural policies on diets is through research investments. Less research investment in fruits and vegetables relative to grains has made the former relatively more expensive over time, and this discouraged fruit and vegetable consumption. Research can assist product reformulation in the short and medium term. Breeding programs for both low linoleic soy varieties and white winter wheat varieties adapted to specific uses drew on previous publicly-funded research to identify desired processing characteristics. Development of new uses for whey byproducts from dairy is a result of publicly-funded research, and brings a new dimension to dairy pricing and returns to milk composition (Gould, 2007). Another important change in US diets – the reduction in fat composition of pork products – was the result of research supported by the pork industry check-off program, a mechanism for research support created by federal agricultural policy (USDA/ARS, 2008).

What lessons can be learned from international comparisons?

The experiences in the US may provide points of comparison with other countries. Table 1 summarizes where policies or outcomes differ in other countries for several cases where US policy may have influenced product composition. Policies have sometimes been more pro-active in other countries. One example is the Danish ban on trans fats, which forced their elimination more readily than the US approach of mandated disclosure of trans fat content. However, given the lower use of partially hydrogenated soy oil in Europe, and possibly different taste preferences for fried foods, a ban may have been more readily accepted by the food industry. The Danish ban did provide a point of reference for US proponents of more stringent regulation of trans fats. In other cases US policies have been more pro-active, as in the case of mandatory nutrition labeling for calories, fat, sugar and salt since 1995. In early 2008, the EU commission proposed mandating similar labeling on the front of packaged food labels, perhaps as a result of the US example. The studies referenced above and included in this special issue suggest that this EU mandate can be expected to spur product reformulation, as it has in the US.
Unfortunately, international comparisons also reveal that agricultural policies and information policies will not solve the widespread problem of overconsumption. While Alston et al. (2008) find that higher food prices are associated with lower rates of obesity, Beghin and Jensen (2008) show that rising intake of added sugars is occurring in all high income countries, regardless of sugar price policy. Furthermore, while information policy may have spurred product reformulation, it is clear that overconsumption of energy dense food is widespread in high income countries. As discussed above, healthier products do not always lead to healthier diets.

Concluding comments

The complex linkages between agricultural and food policies and long-term health outcomes from diets is a relatively under-studied area. This special section provides an introduction to what will likely be a growing field of inquiry, especially as new public and private initiatives emerge in high income countries. The studies in this special section highlight the need for further research to address the following unanswered questions:

What kind of information might best succeed in creating market incentives for healthier diets, and not just for product reformulation? A focus on individual product ingredients may or may not result in overall healthier diets, and may lead to consumer confusion.

How does the growing importance of the food service industry influence the impact of information policies on diets? Most information policies have not included food service, which is an important source of calories in high income countries.

Can agricultural research support healthier diets, either through making healthier foods less expensive or through changing the nutrient profile in commodity sources of energy dense foods, such as oils, fats, and sugars?

We look forward to further research that can enhance the available policy tool kit for improving diets in high income countries.

References


