

Invited Commentary

Linking agriculture and nutrition

Agriculture and food. We know they are connected, because we grow food and we eat food. But how often do we really think about the linkage between these two important components of the food system, at the levels of individuals and communities? And how do policies encourage or discourage positive changes in the food system? There is currently a revival of interest in all things food-related, but here I would like to focus on one particular policy realm: the linkage (or lack thereof) between US agricultural policy, nutrition policy and the embedded concept of sustainability.

The agricultural policy environment

Agricultural policy in the USA has two important characteristics: it is evolutionary and it is characterized by considerable inertia. Prior to the 1930s, US federal involvement in agriculture (at the level of farms and farmers) was minimal except for land settlement. The 1930s brought monumental change, with government intervention in many aspects of food production. While we might look at these policy interventions from the Great Depression as an interesting history lesson, that would be an oversight for a very simple reason: remnants of the Depression-era policies (ranging from supply control to conservation to lending) are clearly visible in the current policies and programmes of the US Department of Agriculture (USDA), mostly but not exclusively in the form of the Farm Bill.

The focus of these policies is not only on regulation or control of production and markets, but also the stimulation of a vast research base related directly to agricultural production. For the last five decades, this research base has had, as its primary objectives, yield (both crop and animal) and efficiency (both input/output and labour). Additionally, research has focused principally on commodities: corn, soya, wheat, cotton, sugar and dairy.

So what does this have to do with food systems and sustainability? Plenty. First, the supply of *commodities** has expanded very rapidly. Corn production, for example, has expanded to meet the needs of (i) an expanding US population, (ii) increased export demand and (iii) increased ethanol production (accounting for about a third of the annual corn crop), while still (iv) increasing the per capita caloric production. This has been accomplished

on a land base that has remained more or less constant since 1960, but involving far fewer farms and firms (agricultural and food businesses). Thus, the second point: whether or not these shifts in how these products are produced, and by whom, are sustainable or even desirable depends on your point of view. For example, there are negative environmental outcomes aplenty associated with our food system.† Further, looking through the lens of communities, as agriculture has become more industrial, agricultural households and agricultural communities have suffered.‡ On the other hand, we produce more than twice as much food as we did in the 1970s on the same land base and using about the same amount of energy. One of the principal outcomes of this has been to lower the price of food. It is hard to argue that these trends have not been beneficial for consumers, as the average US consumer spends a smaller proportion of income on food than consumers in any other country in the world. But while production efficiency plays a real role here, so does the fact that some of the costs of food production, including a substantial portion of environmental costs, are *not* included in the price of food.

The USDA is not the only player in the policies of US food production; many other agencies also actively influence the food system, including the US Environmental Protection Agency (EPA) and the Food and Drug Administration (FDA).§ While we might hope for a coordinated approach to food-related issues in the policy environment, there are many examples of agencies working at cross-purposes. The focus on industrialization and yield by the USDA, and the implementation of that approach at the level of farms (or even fields), has had significant environmental and food safety implications, which are addressed in a regulatory fashion by EPA and FDA. This is not to spotlight the negative aspects of the food system – as noted above, the amount of land used for agriculture has been constant, and the price to the consumer has plunged – but instead to spotlight the lack of intentional linkage between all of the entities concerned.

† Probably the best-known example is the impact of nitrogen from farms in the Mississippi drainage basin, which contains almost 40% of the contiguous USA, on the aquatic environment of the Gulf of Mexico, the so-called 'dead zone'. This phenomenon has become much more common at the outflow of major rivers around the globe.

‡ Witness not only the deep economic crisis in the Midwestern USA of the 1980s (caused by a combination of over-production, debt and political circumstance), but also the continuing crisis of the dairy industry (e.g. milk prices at the *farm level* undergo tremendous fluctuation, including falling by nearly 50% in recent years).

§ For a summary of non-USDA government policy related to the food system, see Gosselin⁽¹⁾.

* For the purposes of this discussion, agricultural commodities include: corn (maize), soya, wheat, rice, cotton, sugar and dairy. With some exceptions, there are either processed to be eaten or serve as inputs for other agricultural or non-agricultural industries.

The nutrition policy environment

Other than some regulatory policy (on adulteration of food, for example), US federal involvement in nutrition and nutritional outcomes postdates the Second World War. For example, the US National School Lunch Program was established in 1947, based on a national security imperative (incoming soldiers were suffering from undernutrition). Malnutrition would remain the focus of federal policy for more than 50 years, providing food to specific populations (urban and rural poor, woman and children). The expansion of the school food programme, WIC (the Special Supplemental Nutrition Program for Woman, Infants, and Children) and the Food Stamp Program (FSP) significantly impacted all of these populations, in some cases providing specific food groups and in others whole diet supplementation. Such programmes also functioned to move excess commodity production, with the government serving as the marketplace; this practice continues, and remains an important component of school food programmes. As with agricultural commodity programmes, many of these nutrition-related programmes are *also* authorized and implemented by USDA, originating either in the Nutrition Title of the Farm Bill^{||} or via the Child Nutrition Reauthorization Act.[¶]

The focus of federal nutrition policy has shifted noticeably in the last 10 years, as the incidence of obesity and diet-related diseases has increased in all age groups and in all parts of the country. The emphasis on encouraging the consumption of healthful foods (i.e. fruits, vegetables, whole grains, low-fat dairy, lean meat) and discouraging consumption of unhealthy foods is even more recent and includes advocates in government, non-profit organizations and industry. This occurs through many avenues, all of which try to provide access to healthier foods in the many places where consumers purchase and/or eat food – certainly at home, but also at school, in restaurants and at points of retail access ranging from farmers' markets to supermarkets. The policies and programmes addressing these issues also originate in a number of different agencies and departments, including not just the USDA, but also the Department of Health and Human Services and others. This (along with the continued occurrence of food safety scares) has also made the question 'where does our food come from?' all the more visible.

Connecting US agriculture and nutrition at different scales

As noted above, recent positive developments in US federal agriculture and nutrition policy include lower

^{||} The Nutrition Title of the Farm Bill is the largest expenditure in this omnibus legislation: in 2010, it accounts for 67% of Farm Bill spending.

[¶] At the time of writing, this reauthorization is stalled in the US Congress. It contains many innovative and important nutritional assistance programmes, including the Summer Food Service Program and appropriation for WIC.

food prices and efforts to increase consumption of healthful foods. However, it is also clear that there is not a broad, positive linkage between the *agricultural origin* of our food and the population- or individual-level *consumption of food*, raising the question: is there (or can there be) a sustainable linkage between agricultural and nutrition policy? Rather than cataloguing all of the myriad linkages that are possible (and desirable), below are three linkages that need to be strengthened, each at a different scale: local, regional and national.

Linkage at the local level – facilitating direct-to-consumer food sales

The USDA recently documented the continued expansion of farmers' markets in the USA, now totalling more than 6000.^{**} This includes more than 200 markets in urbanized states like Massachusetts with a relatively small agricultural sector, and a similar number in Iowa – a state where commodity agriculture *is* the landscape. Both are positive developments, exemplifying a direct linkage between producer and consumer. Still, other policy considerations might make this linkage more robust.

First, although there are confederations of farmers' markets in many states, these markets are still individual enterprises initiated at the local, community level. Each market that reaches some mature or stable phase (which is not guaranteed) establishes a set of relationships with farms and other businesses, and does so partly by trial and error. There are now many efforts to identify the factors that contribute to successful markets, to transfer that information to new (or potential) markets and to consolidate information and resources that can be used by new and existing markets,^{††} and these efforts should be expanded.

The second consideration regards *which* consumers are being linked to markets. In medium- to high-income areas, the growing demand at farmers' markets is attributed at least in part to increased attention to and preference for local food sources, as supporting locally produced foods reduces the time and energy needed to get food to the consumer and circulates money within the local (rather than global) community. However, access to healthful food is not uniform across populations and communities (e.g. see the recent USDA report on food deserts⁽²⁾), and the connection between income, food insecurity and negative health impacts is very much 'in the news' (see reference (3) for a recent example). There are barriers to establishing markets in low-income areas, where food access is compromised, and once established,

^{**} This and much more information on farmers' markets can be found at the USDA Agricultural Marketing Service website (<http://www.ams.usda.gov/AMSV1.0/farmersmarkets>).

^{††} For example, the USDA Agricultural Marketing Service website on farmers' markets (<http://www.ams.usda.gov/AMSV1.0/FARMERSMARKETS>). Another example is the Farmers' Market Coalition (<http://farmersmarketcoalition.org/>).

there are still barriers to purchasing food at the market. The current emphasis from the USDA, foundations and others to provide incentives to consumers (e.g. SNAP (Special Nutrition Assistance Program, formerly FSP), WIC, SFMNP (Senior Farmers' Market Nutrition Program)) makes the need for strengthening this linkage more apparent. Some markets (or even individual vendors) participate in these incentive programmes, but many do not. There is a distinct lack of uniformity in how nutrition assistance programmes are implemented in markets, although this situation is slowly changing as farmers' market associations and networks become more common; this can be addressed via both state- and federal-level assistance (both technical and financial).

Linkage at the regional level – strengthening regional food systems

Direct-to-consumer food sales comprise less than 3% of food sales in most parts of the USA (averaging less than 1% for the country as a whole⁽⁴⁾), so the potential to improve access to healthful foods via markets, while important, is not the entire solution. The next scale is *regional food systems*, which present different opportunities and different challenges. Some types of food, like milk and other dairy products, tend to not be moved long distances (i.e. fluid milk generally does not move across the USA) and thus are still produced in different areas across the country. Other categories tend to be very concentrated geographically. For example, almost all (about 98%) of the lettuce produced in the USA is grown in two states: California and Arizona. Similarly, pork production is concentrated in Iowa, Minnesota and North Carolina⁽⁵⁾. ‡‡ Looking at this through the lens of food security at the regional level, especially given future prospects of water availability in the western USA, this geographic concentration of foods may not be optimal in the long term.

Because the food system is comprised of a connected set of businesses or firms, stimulating the establishment of supply chains (alternatively called 'regional value chains') represents an economic opportunity to rural areas, including areas that historically were agricultural areas like New England and New York. This involves a more complicated set of transactions than does a direct sale to a consumer, and by definition involves issues related to infrastructure. This can be business infrastructure (the chain of businesses that would be needed to transform and market food), but also physical and financial infrastructure. There is significant momentum in this area; for example, through developing a more general picture of what constitutes a successful regional value chain⁽⁶⁾, support from the USDA with new efforts

like Know Your Farmer, Know Your Food^{§§} and re-focusing existing programmes to include (at least in part) specific guidelines on support of local- to regional-scale food systems.

Linkage at the national level

At the national level, the focus on federal support for commodity products continues to be problematic, for the simple reason that these products do not form the base of a healthy human diet. Instead, they are used for livestock feed, fuel, or inputs to many industrial processes – i.e. they are *commodities*. They also tend not to be consumed whole; rather, they are the raw ingredients for processed foods. There is not an analogous set of incentives for the production of, for example, fruit and vegetables, and there is only a recent emphasis on fruit and vegetable production and consumption within the Farm Bill.

Altering diets and nutritional intake at the national level (say, to meet the Dietary Guidelines for all people in the USA) *must be linked* to changes in agricultural land use. An example published by the USDA Economic Research Service in 2006⁽⁷⁾ indicated that such a shift in consumption would necessitate a net increase of nearly 8 million acres to the production of fruits, vegetables and whole grains. This might seem like a sizeable shift in land use, but the arable cropland acreage in the US totals nearly 400 million acres. In the last 50 years, government policy (e.g. incentives for land retirement, etc.) has resulted in net reductions of cropland acreage of 50 million acres – twice (once in the 1960s and once in the 1980s). The primary issue is not the shift in land use, per se, but rather the required shift in production and distribution infrastructure that would need to coincide with land-use change – keeping in mind that fruit and vegetable production is much more capital-intensive (on a land area basis) than is commodity production.

Conclusion

There is a lot of discussion about food, some well-informed and some wishful, which is encouraging in itself. Beyond that, it is also heartening to see that the types of linkages discussed are being made – by researchers (agricultural, nutrition, and others), by practitioners and advocates, and by consumers. A wholesale restructuring of the food system is unlikely, but the levers that can lead to positive changes in production, access and consumption *are* becoming clearer and *are* being used.

Timothy Griffin
Agriculture, Food and Environment Program
Friedman School of Nutrition Science and Policy
Tufts University, Boston, MA

‡‡ In the pork industry, concentration also refers to individual farms, which are now much larger in size and much fewer in number. This farm-level concentration has also proved to be a significant environmental liability.

§§ Details of this USDA initiative can be found on website (<http://www.usda.gov/wps/portal/usda/knowyourfarmer?navid=KNOWYOURFARMER>).

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