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CAN U.S. AGRICULTURE PRODUCE THE BASIC FOODSTUFFS CONSISTENT WITH THE DIETARY GUIDELINES?

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Introduction

Nutritionists at a recent Washington conference argued that Americans eat an unbalanced diet, contributing to numerous health problems (Schneeman).[1] Their position was supported by McNamara, Ranney, Kantor, and Krebs-Smith, who compared an aggregation of US food needs based on the Pyramid Dietary Guidelines to US food supply. McNamara et. al. found substantial deficits in fruit, vegetable (other than potatoes) and dairy consumption. If Americans are to eat a more balanced diet, food supplies will need to adjust to accommodate these nutritional needs, and more of the foods in deficit may need to be produced, while output of other foods could decline. This raises the questions: How would American agriculture cope with providing a better diet, and what forces (on the supply side) may prevent it from doing so now?

The initial purpose of this presentation is to examine the potential of American agricultural production to shift toward providing a healthier diet. As a trade economist, I believe that transition would be dictated by the interaction of production potential with export demand, and by consumer preferences and food processing and distribution firm marketing strategies – more so than by the capacity of American agriculture to fill identified gaps. While trade has not played an important role historically for the products in deficit, they are among the more rapidly growing components of US agricultural trade, and several factors identified here will make it easier for trade to meet any new demands in the future. Thus, if American consumers demand a healthier diet, adjustments will occur in both production and trade patterns.

This issue is explored by first considering the capacity of American agriculture to fill identified gaps, and the extent to which production responds to demand rather than need. Then reasons why trade has historically been less important for food products in deficit, but may become more important, are examined. The size of identified gaps, and the effects on international markets are then considered in the context of studies examining the capacity of world agriculture to meet demand and need. An example of tomato juice trade is then used to show implications of new trade theory for how international markets may in fact respond, and illustrate the importance of firm marketing strategies. Conclusions emphasize the importance of consumer demand driving production and trade outcomes.

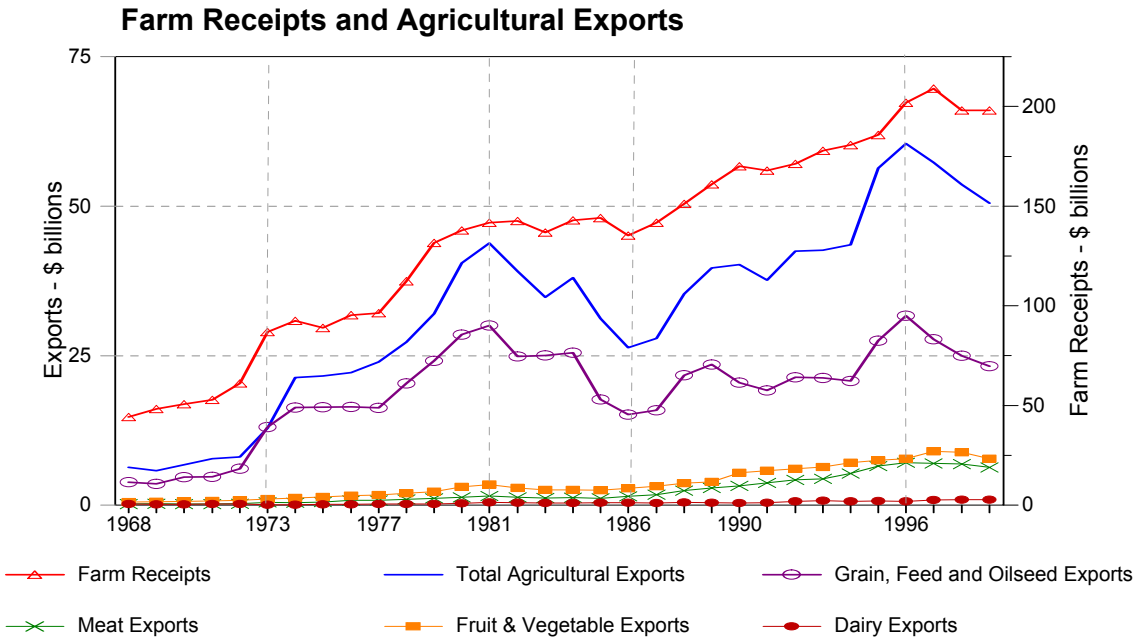
U.S. Production Potential

US agricultural production has grown faster than domestic demand over recent years, generating substantial exportable surpluses. US agricultural trade took off following the price spikes of the 1973 world food crisis, and US agricultural production followed that demand trend. When in

1981 export demand growth stalled, production growth slowed, but evidence of surplus capacity emerged. In 1986 export demand growth resumed, along with output growth.

These trends are shown in Figure 1, along with some detail on the composition of US agricultural trade growth. They show volatility in trade of grains, feeds and oilseeds leading to observed variations in farm income and output trends. Trade in meats, fruits and vegetables has been steadily increasing since 1986, having been quite small before then. These data and the market history behind them are intended to support the claim that demand (in this case exports) induces supply growth in these markets, and that when demand is growing production catches up.

Figure 1.



Behind these trends, though not shown in these graphs, are price trends which reinforce this story, and reinforce as well the belief that agriculture is one sector of the economy where price incentives are critical to production trends. For increased output in fruit, vegetable and dairy sectors, farmers will need to realize higher prices and profits. If price signals indicate that the demand for more of certain agricultural products exists, production patterns will follow. Hence, most economists at the Dietary Guidelines conference saw production potential as a non-issue in this debate. The key concern was whether consumer demand will call for healthier foods.

Two participants at the Washington conference with closer ties to production agriculture also argued, from their different perspectives, that American agriculture could meet demands placed on it, and would better serve nutritional needs if demand patterns better reflected those needs. Zilberman noted that the concern to be examined is whether resources used in agriculture are adequate, and can shift, to meet differing production patterns. His answer was yes, and he explicitly observed that irrigated areas in California can shift to higher value crops to accommodate nutritional need. Duxbury and Welch offered a similar perspective from two

agronomists, noting that most regions in the US were far more self-sufficient in fruit and vegetable production in the past, and could be again if incentives permitted them to profitably do so. The market has at this point has permitted California's dominance in these products, and has determined the observed, specialized production and trade patterns.

Each of these perspectives suggests that the resource capacity exists to meet consumption patterns more closely related to nutritional need. Moreover, it is argued here that capacity will not be heavily taxed if Americans do demand a better diet, as adjustments will depend more on how international trade interacts with demand to meet need.

Role of Trade in US Food Supply

International trade and agricultural production overseas have historically played only a small role in meeting U.S. food needs, especially for fruits, vegetables and dairy products. Table 1. demonstrates this point while at the same time reporting the extent of food gaps by product group. It shows the considerable surpluses generated by American agriculture for grains, and that for most other products self-sufficiency ratios are near or above 100%. For grains, international trade has at times been viewed as a residual demand component utilizing excess U.S. production capacity. Market characteristics are quite different for the other products, where in spite of self-sufficiency there are often imports, which are in a few cases substantial. Explaining this requires that we note the existence of substantial two-way trade (exports and imports coexisting), a phenomenon inconsistent with all but the most modern theories behind why trade patterns are what they are (Ethier). For fruits, vegetables and dairy products, seasonality in production and demand for variety account in part for these trade flows, and raise issues of product differentiation (read marketing strategy) to explain why trade occurs as it does.

The capacity of international markets to supply products in deficit coupled with recent, accelerating trends in trade in those commodities points to the enormous potential for trade to contribute to filling any US food supply gaps. Rapid growth in the last 15 years for products in deficit raise the question why did the US not rely in trade in these products earlier, and what has changed to encourage both imports and exports of these products?

Why trade has been unimportant as a source of US supplies?

Several reasons explain the earlier trade patterns, and low trade levels for fruits vegetables and dairy products. Most countries, including the U.S., have been largely self-sufficient, especially in vegetables and dairy. This has been determined by policy decisions and transportation costs limiting international flows of these products.

Perish ability and quality losses make transportation costly. This is true of agricultural goods relative to industrial goods, accounting in part of greater self-sufficiency in agricultural trade, and is especially true of fruits, vegetables and dairy. Where transportation is less costly -- for grains and oilseeds -- the share of product traded is generally much higher. In the past for some products, when there was trade it was largely in a highly processed form, such as for non-fat dry milk, which was much easier to transport.

Table 1. Contribution of International Trade Toward Filling the US Food Supply Gap

US	Food Supply Gap	Self - Sufficiency	Import Contribution
Grains	10.5%	335.0%	27.7%
Vegetables		101.6%	8.9%
Potatoes	*-47.9%*	101.6%	6.3%
Others	31.0%	101.7%	11.7%
Fruit		81.9%	39.0%
Citrus	68.8%	91.8%	29.9%
Other fruit	64.3%	75.1%	45.2%
Dairy	46.8%	95.6%	6.4%
Meat	14.5%	103.5%	4.8%
Poultry	14.5%	113.8%	0.0%
Fish	15.4%	74.1%	53.4%
Eggs	13.6%	100.0%	0.0%

Food Supply Gap is (Dietary Requirements/Food Supply) - 1, expressed in %
Self-suffciency equals 1-(Net Imports / Food Supply), expressed in %
Import Contribution is (Gross) Imports/ Food Supply, expressed in %

Sources: McNamara, Ranney, Kantor and Krebs-Smith (1998) for US Food Supply Gap and Abbott (1998) for for calculations using the FAO (1998) Agrostat Database Collection.

Agricultural policy has a producer bias, especially in the US for these products. That policy has raised prices to protect farmer incomes, and may have discouraged to a limited extent consumption. With large marketing margins and low price and income elasticities for these products, the demand effects of policy are likely to be small, while domestic supplies may well have been increased due to protection (Kinsey). Trade policy has reinforced producer support. Import quotas on dairy remain today, while non-tariff barriers for fruits and vegetables (grades and standards applied to imports) have been used to limit imports as well as meet food safety requirements. Moreover, U.S. agricultural trade policy has promoted exports to dispose of surplus production. The dairy export incentive program (DEIP) continues to subsidize exports even after the 1994 GATT agreement. GSM -102 credit guarantees are used to help exporters of most agricultural commodities. The Foreign Agricultural Service (FAS) acts as an export promotion entity, as viewing their web page will quickly show.

The combination of costly transportation and protection of domestic agricultural producers at one point limited trade, but changes in these and other factors have recently encouraged much more trade in higher value agricultural goods.

Why trade may play a greater role in the future?

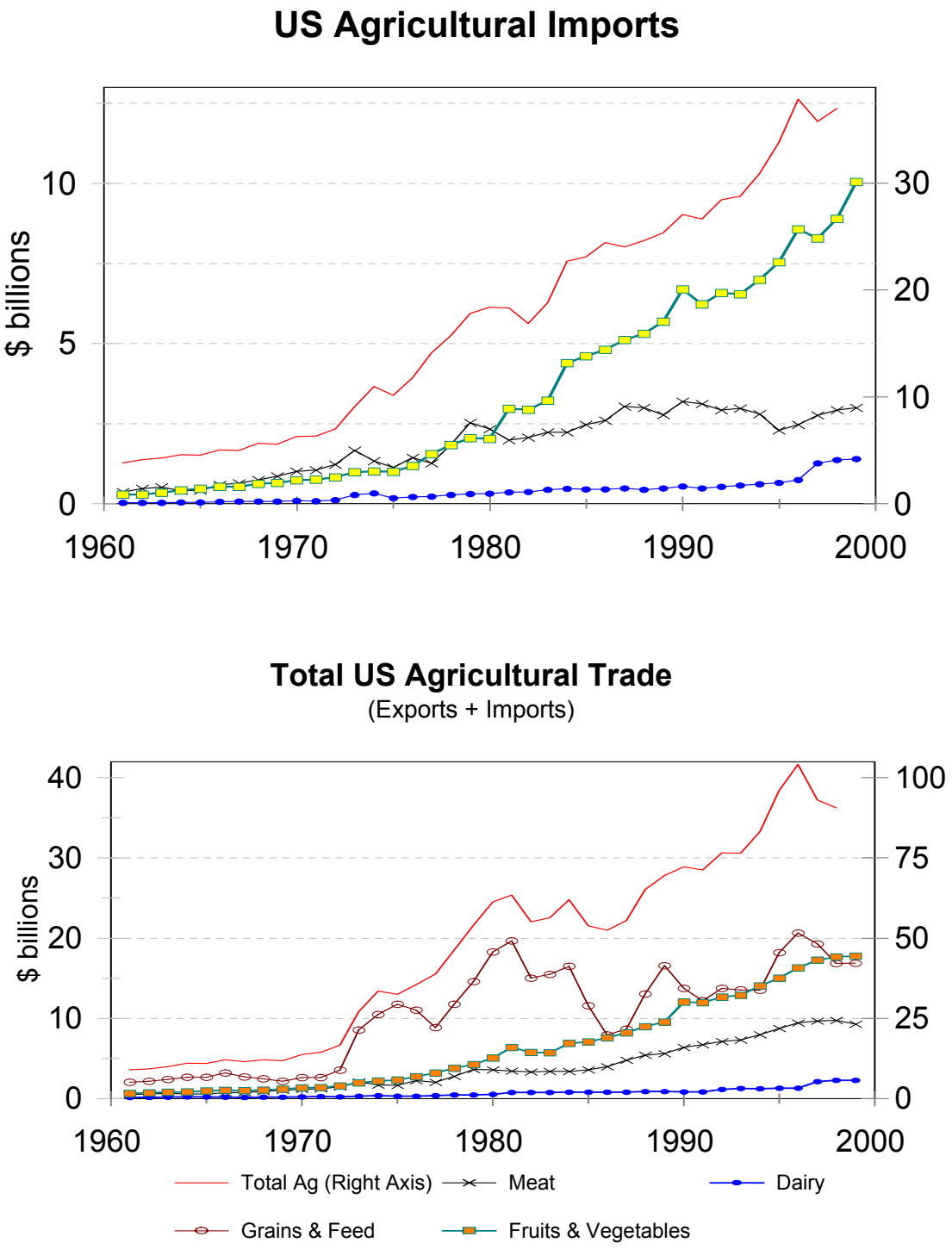
Fruits and vegetables are among the most rapidly growing agricultural imports, as shown in Figure 2. In addition, exports of these products are growing rapidly as well, with growth taking off around 1986. Lack of dynamics in dairy trade until 1995 reflect import quotas which fix trade levels, and which were finally relaxed as part of the 1994 Uruguay Round Agreement. Trends in high value and processed food trade have been recognized for quite a while, and several reasons have been put forward to explain these trends (Henderson, Handy and Neff).

Improvements in transportation have been important to these trends (Trypus). Containerization has greatly facilitated shipment of perishable commodities, and smaller lots of goods. Accurate climate control inside containers preserves quality and shelf life of foods, enabling shipments via less expensive sea freight of goods which previously had to use expensive air freight. Regularly scheduled shipping and modern port handling equipment have improved logistics greatly. Processing has been used to facilitate transportation, as well, and technical change has found better ways of processing perishable goods for transport and storage. Information now moves more easily, as well. Each of these has lowered the cost of transportation, especially for higher value and processed agricultural products.

Numerous agricultural policy reforms have reduced (if not eliminated) the producer bias of agricultural policy. Policy reforms in 1992 and 1996 Farm bills decoupled producer income support from prices, taking away disincentives to consumption and incentives to overproduce (Stovall and Hathaway; Young and Wescott). This was reinforced by the US position and its offer in the 1994 Uruguay Round GATT Agreement, which also emphasized decoupling of producer support from price incentives and reduction of export subsidies. Dairy price supports are being phased out by 1999, and dairy export subsidies are to decline, while new export subsidies for the other products are not permitted. Another initiative of the World Trade Organization, the international entity created to administer the GATT agreement, is to establish harmonized grades, standards and rules governing agricultural trade, and basing those standards more on scientific principles (Roberts). Thus, these regulations will be less likely to be used a protectionist devices limiting fruit and vegetable trade, and more as devices to preserve food safety (Unnevehr, Kramer and Deaton). A similar initiative succeed in NAFTA, reducing non-tariff barriers in agricultural trade with Canada and Mexico (Raney and Shagam).

While certainly there have been other reasons behind the growth in high value and processed food trade, including greater ease in sharing market information internationally, the reforms of policy and technical improvements of transportation have reduced principle factors limiting trade in fruits, vegetables and dairy products. Recent trends have already shown consequences of these changes.

Figure 2. US Agricultural Trade Composition.



Source: Economic Research Service data.

Potential for increased exports

Another reason why trade is likely to be critical to the evolution of American agriculture, should dietary preferences change, is that there now exist a number of exporting countries with the potential to supply the US market who are aggressively seeking larger market shares. Table 2 shows that countries in Latin America and the Mediterranean often have producer prices for fruits and vegetables at or below levels found in the US. This can be used a crude test of comparative advantage -- where producer prices and hence production costs are lower, freer trade should allow these countries to expand exports. Those countries with producer prices below or near US levels may well be able to cost effectively sell to the US market.

Several of these countries, especially in the Mediterranean, had advantageous entry into the European Union due to Lome Convention concessions which were lost following the recent GATT agreement. As exporters (similar to the US), their policy has also encouraged surpluses, and exports now more than before are needed to dispose of those surpluses.

Will Improving US Diets Create Problems for Food Supplies Elsewhere?

Table 1 is reproduced below as Table 3 using data for world supply and utilization of agricultural commodities. The world food gaps are found simply by scaling the U.S. food requirements upward by the ratio of world population to US population. This exercise shows much greater world food supply gaps, and deficits for most commodities, than in the US case. This suggests larger, though different, nutritional problems outside the US, and begs the question whether using trade to improve US nutritional standing will make the rest of the world worse off. This exercise also provides an opportunity to consider the capacity of world agriculture to meet increased demand.

Three caveats must be borne in mind before addressing the adequacy of world food supplies to meet these nutritional requirements. First, the dominant policy concern over most of the last three decades has been surplus disposal, not inadequacy of supply. Only twice have capacity concerns risen to the head of the debate -- during the 1973 world food crisis and with the price run-up in 1995-96 -- and in each case those concerns received less attention once surpluses reemerged. Second, nutritional standards may reflect high U.S. calorie consumption, cultural biases, and lack of balance in US diets rather than nutritional deficiencies -- especially in the case of meat. Thus, world food gaps reported here may well overstate the problem. Third, nutritional need does not determine demand. Effective demand occurs when consumers need something and have the income to choose it. In spite of poverty and malnutrition, effective demand for food has often been inadequate to maintain prices of agricultural commodities, and so does not provide incentives for increased production. Rather, surpluses have emerged as production has outstripped effective consumer demand.

Table 2. Vegetable, Fruit and Dairy Producer Prices in 1994 Relative to U.S. Producer Prices

Country	CABBAGE	TOMATO	PEPPERS	GR BEAN	CARROT	ORANGE	APPLE	PEACH	GRAPE	MELON	MILK
USA	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
CANADA	***0.77***	***0.88***	1.06	***0.48***	***0.58***		1.06	1.69	1.04	***0.66***	1.41
Latin America											
MEXICO	***0.53***	1.34	0.99	***0.43***	***0.62***	***0.39***	***0.89***	1.60	***0.63***	***0.54***	**0.68**
CHILE	***0.87***	2.13	***0.71***	***0.71***	***0.64***	1.25	***0.57***	***0.75***	***0.87***	0.93	**0.79**
North Africa & Middle East											
ISRAEL	0.97	1.27	***0.76***	***0.44***	0.96	0.98	2.58	1.92	1.34	1.11	0.88
MOROCCO		0.95		***0.46***	0.99	1.72	3.01	1.56	1.38	1.09	1.10
TUNISIA	0.91	***0.71***	***0.86***	***0.61***	***0.67***	2.03	1.77	1.91	1.04	0.87	1.11
EGYPT	***0.26***	0.44	***0.23***	***0.14***	***0.17***	0.99	***0.73***	***0.65***	***0.53***	0.41	1.13
Europe											
SPAIN	1.19	2.03	1.29	1.71	***0.81***	1.43	1.08	1.67	1.57	1.10	1.16
NETHERLANDS	2.77	8.49	3.64	1.12	1.61		3.27	9.06	11.64	5.30	2.00
FRANCE	0.91	5.70	1.58	3.05	1.32	3.52	2.00	3.71	4.26	3.75	1.25
Asia											
JAPAN	3.86	16.53	4.85	6.90	6.50	12.80	8.01	13.67	25.03	11.17	3.00
CHINA	***0.17***	***0.31***	***0.10***	***0.17***	***0.23***	1.09	***0.80***	***0.61***	***0.71***	***0.23***	**0.47**
INDONESIA	***0.44***	***0.89***	1.68	***0.21***	***0.62***	4.74					0.90
THAILAND	***0.87***	1.70		***0.47***		4.02			2.83		1.11
NEW ZEALAND						8.20	1.34	3.07	1.22		**0.67**

Entries are local producer prices, converted to US dollars, and divided by US producer prices.
Sources: FAO (1998), Agrostat Database Collection, for producer prices in local currency
IMF (1997), International Financial Statistics, for exchange rates.

Table 3. Contribution of International Trade Toward Filling the World Food Supply Gap

World	Food Supply Gap	Self - Sufficiency	Import Contribution
Grains	*-19.2%*	72.7%	27.3%
Vegetables		93.5%	6.5%
Potatoes	-19.2%	90.6%	9.4%
Others	-19.2%	95.0%	5.0%
Fruit		79.9%	20.1%
Citrus	-19.2%	66.3%	33.7%
Other fruit	-19.2%	83.5%	16.5%
Dairy	-19.2%	84.9%	15.1%
Meat	-19.2%	90.8%	9.2%
Poultry	-19.2%	91.4%	8.6%
Fish	-19.2%	50.8%	49.2%
Eggs	-19.2%	97.5%	2.5%

Food Supply Gap is (Dietary Requirements/Food Supply) - 1, expressed in %
Self-suffciency equals 1-(Net Imports / Food Supply), expressed in %
Import Contribution is (Gross) Imports/ Food Supply, expressed in %
World Food Supply Gap is based on US dietary requirements and World to US Population

Sources: McNamara, Ranney, Kantor and Krebs-Smith (1998) for US Food Suppy Gap
and Abbott (1998) for for calculations using the FAO (1998) Agrostat Database Collection.

While studies have not focused specifically on the world's capacity to produce the foods in deficit in the US diet, several studies have examined the overall capacity of world agriculture to feed an increasing population. While extreme claims exist, the studies by USDA, FAO, the World Bank, and in the International Food Policy Research Institute's Vision 20/20 project can all be classified as cautiously optimistic (WAOB; Alexandratos; Mitchell and Ingco; Islam). They suggest that world agriculture can keep up with demand, provided that sufficient investments, including efforts in research and development, are made. They do raise the concern that the surplus mentality which has persisted since 1986, along with the low prices which accompanied it, have discouraged investments, especially in research, accounting for slowing in agricultural production relative to population. Price incentives are seen as key to insuring adequate incentives to farmers and agribusiness, and to insuring sufficient food supplies in the future.

Another factor relevant to this paper's objectives is that US imports, and its food supply gaps, are only a small fraction of worldwide supplies. Increased imports would not unduly strain the production capacity of the world to meet increased demand, though prices would need to rise to redirect product to our market.

Lessons from the 1973 food crisis, and from famine management support a similar position (Islam and Thomas). As noted above, the coexistence of famine and food surpluses is explained by the importance of effective demand, not supply capacity, in determining what people eat. Increasing supply capacity but not demand will only add disincentives to future production growth. As in the other arguments here, demand levels are key to the evolution of markets and their ability to provide healthier diets.

How world food markets now function - Implications of Two- way trade

An important characteristic of the rapidly growing vegetable, fruit and dairy trade is that it is two-way -- imports and exports coexist. Why this occurs, and its implications for future trade outcomes, is best seen by an example.

Tomato juice served on Royal Air Maroc, the state owned airline of Morocco, on flights to France, is processed in California from tomatoes grown there. Several aspects of this "trade flow" make it remarkable. First, tomatoes have been historically exported from Morocco to France, but Spain's position in the EU, and recent policy reforms required under GATT have given the advantage to Spain in the French market. A long standing policy dispute continues over Moroccan access to the EU as a result, since France has remained Morocco's primary export destination, and it has experienced only limited success in penetrating other EU markets. In spite of this dispute, Morocco is "exporting" tomatoes to France as juice in this example, but with tomatoes which are not of Moroccan origin. This, in turn, is in spite of the Moroccan efforts, to some extent successful, to sell processed tomato products in the US market. This effective "US export" is of a product in which we are experiencing a nutritional deficit according to the food gap analysis, while some of the good (tomatoes) is being imported.

Several lessons are apparent from this example, especially if one considers why the US tomato juice processor may have succeeded in this market. First, tomato juice is not a common product in either French or Moroccan diets - the product is an innovation. Second, for the airline, the convenience provided by the packaging (the can) is of greater importance, and may well have cost more than the tomatoes inside. The processor was marketing a differentiated product (juice), and importantly, service embodied with the product (the can, and timely deliveries to the airline). Successful marketing by the processor enabled the US to profitably export a product where a food gap existed. Processing, including packaging to facilitate transportation, both differentiated and increased the value of that export, and facilitated transportation. The driving force for this transaction was the "consumer" demand by the airline -- not only for tomatoes, but also for a particular product and service -- and the marketing strategy of the juice processor, who succeeded in the face of an opposing policy environment and an apparent comparative disadvantage.

This example of a US firm targeting an exporting country as a market for a differentiated product, resulting in profitable two-way trade, is a concrete example of New Trade Theory, and

goes a ways toward explaining the differing perspectives of comparative advantage and competitiveness.

Competitiveness and Two way Trade

According to the theory of comparative advantage, low cost producers will export those products where costs and prices in the absence of trade (autarky) and below free trade world prices. Factor endowments and technical differences can bestow this comparative advantage on a country. Several characteristics of modern trade patterns contradict the predictions and implications of this theory (Either), and may enable a seemingly higher cost producer to win in a market. Two-way trade is one important contradiction. I view the important difference between comparative advantage and competitiveness as arising as a consequence of the elements found critical to the New Trade Theory, and which explain these contradictions - economies or scale, product differentiation, and imperfect competition (Abbott, 1998).

In the above example, product differentiation is a key factor determining success of an exporter strategy, and leading to observed trade flows. Marketing and distribution are seen, especially for higher value agricultural products, as important to determining profitable trade outcomes. Transactions costs (transportation and marketing margins) and institutions (airline food service as the source of demand) are as critical to how markets will evolve. Food manufacturers will respond to consumer demand in the context of these constraints and opportunities. Better diets will be provided only if consumer preferences make providing healthier diets one of the driving forces behind those opportunities.

Conclusions

Consumer demand, not production potential, is key to how food markets will evolve and whether there are improvements in U.S. diets. In virtually all of the perspectives presented above, it was seen that demand trends drive production, not vice versa. Consumer preferences and education will determine that demand. Supply adjustments may not be immediate, and price increase will lead supply adjustments, but production in both the U.S. and abroad can accommodate the needs projected in U.S. food supply gaps. International trade will determine how adjustments occur, even for the key products in deficit - vegetables, fruits and dairy.

Transportation system improvements and policy reform will make contribution of international trade toward this goal easier than in past. Technical improvements in international shipments of food products have reduced costs and logistical barriers to trade in the key products identified here. Policy reforms in the 1991 and 1996 farm bills, and in the 1994 GATT Agreement as well as NAFTA, have reduced the producer biases of agricultural policy which worked against trade contributing to food supplies in these cases. Rapidly increasing processed food and higher value agricultural product trade indicate this change agricultural trade composition is already underway.

US agricultural production, food manufacturers, and international trade can provide the variety and service consumers demand. Price incentives and marketing strategy of processors and distributors matter to what portion of increased demand may be seen by American farmers, and whether healthier diets will in fact arise in the future. Policy is at greater risk of being a deterrent

to, rather than a stimulus to this process, which will be largely market determined.

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Endnotes

1. The Proceedings of the conference "Toward Convergence on the Dietary Guidelines: Research and Policy Needs" sponsored by the Economic Research Service of USDA, the National Cancer Institute, the Farm Foundation and Cornell University, held on October 13 -14, 1998 in Washington, DC. Will appear in the April 1999 issue of Food Policy. See Abbott as well as several other cited papers for a fuller discussion of issues raised here.