

Price and Income Affect Nutrients Consumed From Meats

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Red meat and poultry products are a major source of key nutrients, such as protein, iron, and B vitamins, in most American diets, but they also contribute fat (particularly saturated fat) and cholesterol. Medical evidence has linked high levels of saturated fat and cholesterol in the typical American diet with increased risk of heart disease (a leading cause of death in the United States).

Although health concerns may influence the decision of whether or not to eat meat, or how often and how much to eat, economic factors, such as meat prices and consumers' incomes, also influence the choice of consuming meat. USDA's Economic Research Service (ERS) estimates that expenditures on red meat and poultry products account for about one-third of the food spending in American households. Therefore, changes in meat prices or consumers' incomes could not only affect meat purchases, but also other food purchases, thereby affecting the type and level of nutrients consumed.

For example, if the price of beef goes up while the price of chicken remains lower than beef, consumers

will likely buy less of the relatively more expensive beef and buy more of the relatively less expensive chicken. Consumption of other foods could also be affected. If consumers buy less beef, such as hamburger meat, they might also buy less cheese and fewer hamburger rolls, because of their complementary uses. Changes in consumers' incomes also affect the mix of foods people buy. Therefore, changes in food prices and consumers' incomes could translate into changes in nutrients available for consumption.

Meat Consumption in the American Diet

The American diet in the last two decades has shown a trend toward consumption of more poultry meat and less red meat (table 1). In 1990-94, Americans consumed an average

of 66 pounds of beef, 51 pounds of pork, and 76 pounds of chicken (retail-weight with bone basis). That is 21 percent less beef, about the same amount of pork, and 90 percent more chicken since 1970-74.

The change in consumption of beef and chicken is partly related to the relatively higher beef price. Over the last 20 years, beef prices increased 257 percent, pork prices increased 252 percent, and chicken prices increased 220 percent. Thus, the price of chicken relative to beef dropped by 14 percent during 1970-74 and 1990-94. Also, chicken has likely benefited from consumer health concerns regarding fat in the diet and the greater offering of convenience products like cut up, pre-cooked, and other processed chicken products.

Beef, pork, and chicken contributed about 34 percent of total

Table 1
Consumption of Chicken Overtakes Beef

Period	Beef	Pork	Chicken
<i>Pounds</i>			
1970-74	84	54	40
1975-79	88	47	43
1980-84	78	52	52
1985-89	75	51	62
1990-94	66	51	76

Source: Compiled from *Food Consumption, Prices, and Expenditures, 1970-93*, SB-915. USDA, Economic Research Service. Dec. 1994.

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protein available in the U.S. food supply on average in 1990-94, with beef contributing 13 percent, pork 8 percent, and chicken 13 percent (table 2). These meat products contributed 29 percent of total fat, of which 11 percent came from beef, 12

percent from pork, and 6 percent from chicken. They also contributed 35 percent of cholesterol, with beef contributing 12 percent, pork 9 percent, and chicken 14 percent (slightly higher than beef because of higher chicken consumption).

Chicken contributed a significant share of other nutrients in the U.S. food supply: vitamin A (12 percent), niacin (17 percent), and iron (5 percent). Also, pork was an important source of thiamin (14 percent), and beef was an important source of iron (8 percent). (See box for the nutritive value of meats per pound.)

Nutritive Value of Meat

In order to link food quantities and prices, this study uses aggregate data from ERS food disappearance series, which measure supplies moving through U.S. marketing channels for domestic consumption. The nutritive value of each of the three meats—beef, pork, and chicken—is calculated by USDA's Agricultural Research Service. It is a composite value based on the whole dressed, raw carcass. Different cuts of meat provide different amounts of nutrients, and some lean cuts of beef and pork are as low in fat as chicken. However, the aggregate food disappearance data used in this study do not allow one to differentiate between lean and fatty cuts of meats. Therefore, beef, pork, and chicken are each considered a single good, with one price, and one nutrient profile.

U.S. beef and pork supplies provide relatively higher food energy

per pound than chicken—1,063 and 1,398 calories, respectively, compared with 665 calories (see table below). Each meat provides a similar amount of protein, ranging between 52 and 63 grams per pound, but fat contents differ markedly. Chicken has the least fat (46 grams per pound), beef double that amount, and pork triple that amount. Although certain cuts of pork—such as the loin and tenderloin—are relatively low in fat, these data include fatty cuts, such as bacon. The cholesterol levels are about the same for these meats, ranging between 272 and 281 milligrams per pound. Chicken is relatively rich in vitamin A compared with beef and pork (if we exclude liver, which is extremely high in vitamin A), with 720 retinol equivalents (re) per pound, while pork is rich in thiamin (2.2 milligrams per pound).

Preliminary data show that beef consumption rose slightly in 1995 and 1996 due to larger supplies and lower prices. With high beef prices in the early 1990's, cattle producers expanded their herds to increase profitability. Since it takes slightly more than 2 years from breeding until slaughter weight, the supply of beef increased especially after 1995, causing beef prices to decrease and stimulating demand for beef. In spite of growing diet and health concerns, this recent increase of beef consumption indicates that prices remain an important factor in food selection for many Americans.

Meat Prices and Income Effects on Nutrients Consumed

Meat consumption in recent years, and therefore overall nutrients consumed at the national level, is affected by changes in meat prices and income. These results are drawn from a larger ERS study that estimated the net change in the availability of 15 nutrients from among 35 food groups in response to specific changes in food prices and per capita income. Although this article focuses on the effect of a change in nutrients consumed from a change in the price of one of three types of meats, the results include the effects of the change in meat prices on the interrelated consumption patterns of all 35 food groups.

Nutritive Profile of Meats Varies

Nutrient	Unit	Beef	Pork	Chicken
----- Contents per pound -----				
Energy	kcal	1,063	1,398	665
Protein	g	63.3	51.8	57.4
Fat	g	87.9	130.5	46.4
Cholesterol	mg	272	274	281
Iron	mg	6.7	2.6	4.1
Vitamin A	re	0	9	720
Thiamin	mg	.3	2.2	.2
Niacin	mg	12.9	14.3	20.8

Notes: The units are kcal (food calorie), g (gram), mg (milligram), and re (retinol equivalent). Source: Compiled from *Agricultural Handbook*, various issues, USDA, Human Nutrition Information Service.

A 10-percent increase in beef prices would reduce beef consumption by 6.2 percent and cause changes in the mix of all foods purchased. This shift of food choices would reduce per capita protein intake by 0.91 percent, iron by 0.96 percent, and niacin by 0.72 percent, but increase vitamin A by 0.64 percent (table 3). The increase of vitamin A is related to higher consumption of carrots (exceptionally rich in vitamin A) in response to an increase in beef prices. A 10-percent increase in pork prices would produce generally smaller nutrient re-

ductions than beef price increases with the exception of thiamin consumption which was reduced by 0.99 percent. A similar increase in chicken prices would produce smaller nutrient changes than beef price increases for all eight nutrients.

Table 3 presents the percentage change of eight selected nutrients in response to a 10-percent increase in meat prices or income. Most estimated nutrient effects are small, partly because the 10-percent increase in meat prices produces small changes (less than 10 percent) in

food quantities. Also, there are offsetting changes in nutrient intakes between complementary foods and substitute foods. For example, an increase in beef prices would decrease consumption of cheese but increase consumption of pork, causing only a small net change in nutrient intakes.

Likewise, the amount of nutrients consumed will increase along with increases in consumers' incomes. When consumers' incomes go up so do their purchases of more expensive foods, such as meats. An ERS food demand study found that a 10-percent increase in per capita income would increase consumption of beef, pork, and chicken by 3.9, 6.6, and 0.8 percent, respectively. These changes increase nutrients consumed in the range of 2.17 to 3.88 percent (table 3). A 10-percent increase in per capita income would increase energy intake by 2.66 percent, protein by 2.77 percent, fat by 3.88 percent, and iron by 2.17 percent.

Changes in all eight nutrient availabilities calculated by ERS vary, depending on how meat prices and income changes manifest themselves through interdependent food demand relationships. However, the disappearance data used in this analysis do not distinguish nutritive values based on different food preparation methods. For example, chicken fried in animal fat or vegetable oil has far different properties from those of roasted chicken. Therefore, further collaborative research between economists and nutritionists is needed to develop a comprehensive food demand and nutrition study.

These nutrient responses along with other ERS estimates representing a total consumer nutrient profile are useful information in developing a model for studying food program effects on the quality of consumer

Table 2
Meats Contain Large Share of Nutrients

Nutrient	Beef	Pork	Chicken	Other foods
Energy	6.5	6.5	4.4	82.6
Protein	13.0	8.0	12.7	66.3
Fat	10.9	12.2	6.2	70.6
Cholesterol	12.1	9.1	13.5	65.4
Iron	8.2	2.4	5.4	84.1
Vitamin A	0	.1	12.3	87.6
Thiamin	2.4	14.2	1.8	81.6
Niacin	9.9	8.3	17.2	64.6

Note: Other foods include 32 other food groups.

Table 3
Price and Income Affect Nutrients Consumed

Nutrient	Increase meat prices by 10 percent			Increase income by 10 percent
	Beef	Pork	Chicken	
Percent change in nutrient intake				
Energy	-0.27	-0.11	-0.03	2.66
Protein	-.91	-.28	-.30	2.77
Fat	-.25	-.20	-.09	3.88
Cholesterol	-.25	-.31	-.21	3.06
Iron	-.96	0	0	2.17
Vitamin A	.64	-.04	.61	3.44
Thiamin	-.41	-.99	.15	2.57
Niacin	-.72	-.31	-.48	2.29

diets. For example, these nutrient income responses can be a starting point in evaluating the effects of income changes on dietary quality when food stamp recipients' benefits are cut or increased. One way to accomplish this task is to simulate alternative food policy scenarios and explore the effects of meat prices and income changes on food purchases and nutrients consumed.

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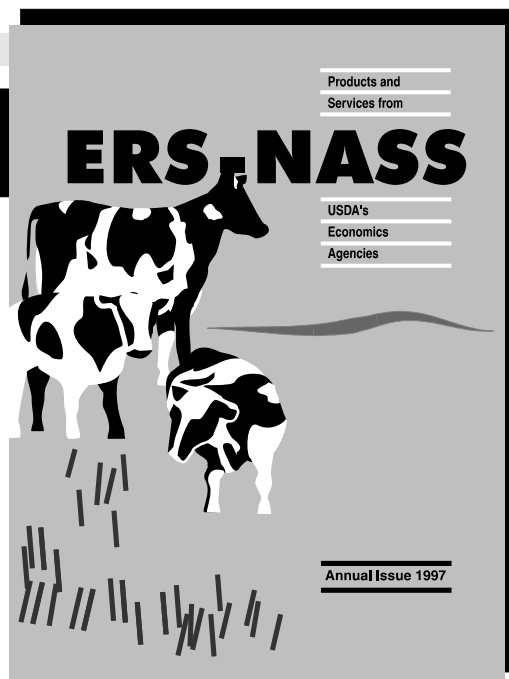
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