

TODD M. SCHMIT, NELSON L. BILLS

## **AGRIBUSINESS CONTRIBUTIONS AND INTER-INDUSTRY LINKAGES IN THE NEW YORK STATE ECONOMY**

*From Department of Applied Economics and Management  
of Cornell University of Ithaca, NY*

**ABSTRACT.** The objectives of this paper are: a) assemble baseline information on the current status and trends of New York State agribusiness economic activity, disaggregated by industry and agribusiness cluster sectors, b) estimate backward linkages and inter-industry relationships between food and agricultural production and other agribusiness industry clusters via the calculation of output multipliers, c) set the stage for continuing discussion of the challenges and opportunities for agribusiness development in New York State.

**Key words:** food and agricultural production, agribusiness industry, inter-industry linkages

### **Introduction**

Structural changes in the New York farm and food industry continue to raise new questions about the industry and its future prospects for economic growth and development. To remain successful, agricultural producers and associated agribusiness firms need to effectively and continuously adapt to changing economic conditions, consumer preferences, and technological advancements. To that end, firms are seeking innovative methods to attract new and growing markets for their commodities and products, vertically integrate their operations in both upstream and downstream markets, invest in value-added consumer-driven activities, and develop domestic and international joint ventures and strategic alliances. These activities suggest growing farm-to-food developments at the farm, as well as increased interaction and coordination with others in the agribusiness industry.

USDA ERS projections indicate that growing consumer incomes over the next two decades will lead to continued growth in demand for value-added food products<sup>1</sup>. Increases in value-added production may well imply increases in the share of consumer

---

<sup>1</sup> <http://www.ers.usda.gov/amberwaves/april03/features/consumerdrivenag.htm>.

food dollars to processors and retailers; however, many farm growers may also attract share by diversifying into high-valued specialty crops, vertically integrating operations, developing branded products, or collaborating with other industry partners in bringing their products to consumer markets. Other farm operators will continue to blend commodity production with employment off the farm or in alternate business pursuits to meet family lifestyle objectives.

Understanding the economic contributions and evolving linkages between agricultural production, agricultural service, food manufacturing, and distribution and marketing to consumer markets (domestically and abroad) is essential in defining appropriate firm, industry, and public policy strategies to strengthen opportunities for economic development and improve the competitiveness of our local New York agribusiness industry. The competitiveness of agribusiness firms in New York State relative to other regional or national firms is of growing concern. Common reasons for this sentiment include:

- lack of government incentives and burdensome regulatory standards,
- high costs of capital relative to neighboring states and other areas of the country,
- high energy costs, labor costs, and property and income taxes,
- limited availability of an adequate and qualified labor force.

The state and agribusiness community are working to address these issues, but a necessary condition to any policy or operational reform is a sound understanding of current economic conditions and past behavior. This paper serves as the beginning of a larger effort towards this cause, and is part of an ongoing effort to update and understand agriculture's impact on state and regional economies. The objectives of this paper are threefold:

- assemble baseline information on the current status and trends of New York State agribusiness economic activity, disaggregated by industry and agribusiness cluster sectors,
- estimate backward linkages and inter-industry relationships between food and agricultural production and other agribusiness industry clusters via the calculation of output multipliers,
- set the stage for continuing discussion of the challenges and opportunities for agribusiness development in New York State.

This work builds on the existing knowledge base in several important ways. In contrast to most previous evaluations, we expand economic contribution calculations to the entire farm and food system taking into account the entire food value chain. More precisely, we include agricultural and food industry sectors related to commodity production, input services, manufacturing, wholesale trade, retail trade, and food services. It is important in defining "agriculture's contributions" to thoroughly consider all elements along the food value chain and appropriately consider all agri-related sectors.

Equally as important is to understand the linkages and interdependencies between agri-related sectors, in order to appropriately develop policy mechanisms to improve the viability of the agricultural and food system. By undertaking a more comprehensive review of small area data sources, we are able to move beyond data conventions used in other studies. By integrating data sources, we are able to provide more detailed sub-industry-level estimates of total gross output, employment, and value added. While our particular attention here is directed towards the New York agribusiness economy, the hope is that this discussion will shed light on related developments in Poland and engage an ongoing discussion.

## Defining the agriculture and food system

To develop a base for describing the economic impacts of agribusiness activity to the NYS economy and in estimating and describing inter-industry linkages along the food value chain, we must first define the necessary elements included in the farm and food system. Figure 1 typifies this more general conception of agribusiness. To capture the full value chain associated with the agriculture and food system requires inclusion of agricultural production, agricultural input service, manufacturing, distribution, wholesaling, and retail consumption sectors.

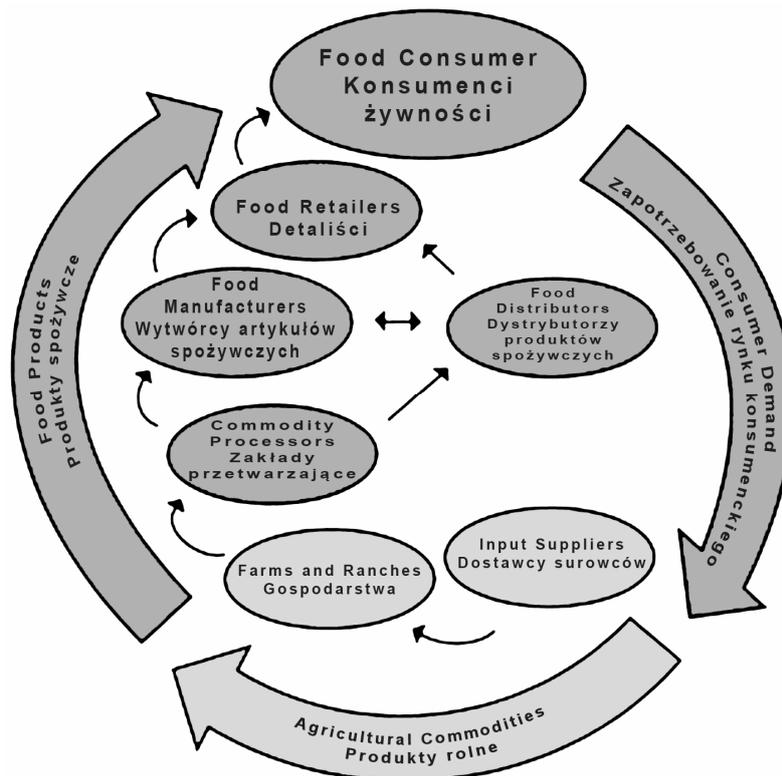


Fig. 1. Defining the Agriculture and Food System

Source: **Beierlein et al.** (2003).

Ryc. 1. Koncepcja agrobiznesu

Źródło: **Beierlein i in.** (2003).

For purposes of data enumeration and analysis, we define these inter-related sectors along the food value chain into “sub-clusters”, the compilation of which defines our Agribusiness Farm and Food Cluster. Using available data sources and coding classifications, the Agribusiness Farm and Food Cluster is defined in Table 1 and links the stylized clusters from Figure 1 into specific industries and sectors (we follow standard US data conventions here and use the North American Industrial Classification System

Table 1

## Defining the agribusiness farm &amp; food cluster (NAICS codes)

Sub-Cluster	Food-Ag Industries
Agricultural production (Source: IMPLAN, ERS/USDA)	Crop Production (111) Oilseed & Grain (1111), Vegetable & Melon (1112), Fruit & Tree Nuts (1113), Greenhouse, Nursery, Floriculture (1114), Other Crop Farming (1119) Animal Production (112) Cattle Ranching & Farming (1121) [Beef Cattle (11211) and Dairy Cattle & Milk Prodn. (11212)], Hog and Pigs (1122), Poultry & Eggs (1123), Sheep & Goats (1124), Animal Aquaculture (1125), Other Animal [incl. equine] (1129) Commercial Fishing (1141)
Agricultural services (Source: IMPLAN, ERS/USDA)	Agriculture Support Services (115 less -1153) Crop Production (1151), Animal Production (1152)
Farm and food manufac- turing (Source: IMPLAN, Economic Census)	Food Manufacturing (311) Animal Foods (3111), Grains & Oilseeds (3112), Sugar & Confectionary Prod- ucts (3113), Fruits and Vegetables (3114), Dairy Products (3115), Animal Slaughter & Processing (3116), Seafood Products (3117), Bakeries & Tortillas (3118), Other Food Products (3119) Beverage Manufacturing (3121) Soft drinks and Ice (31211), Breweries (31212), Wineries (31213), Distilleries (31214) Pesticide, Fertilizer, & Other Agricultural Chemicals (3253) Agricultural Implements (33311) Food Product Machinery (333294)
Farm and food whole- sale Trade (Source: Economic Census)	Grocery & Related Products (4244) General Line Grocery (42441), Packaged Frozen Food (42442), Dairy Products (42443), Poultry Products (42444), Confectionary Products (42445), Fish and Seafood (42446), Meat and Meat Products (42447), Fresh Fruit and Vegetables (42448), Other Grocery (42449) Farm Product Raw Materials (4245) Beer, Wine, & Distilled Alc. Bevs (4248) Beer and ale (42481), Wine and Distilled Alc. Bevs (42482) Farm and Garden Machinery (42382) Farm Supplies (42491) Flower, Nursery Stock, and Florists' Supplies (42493)
Farm and food retail trade (Source: IMPLAN, Economic Census)	Food & Beverage Stores (445) Grocery Stores (4451), Specialty Food Stores (4452), Beer, Wine, & Liquor Stores (4453) Nursery, Garden Center, and Farm Supplies (44422) Florists (4531)
Food service (Source: IMPLAN, Economic Census)	Food Service (722) Full-service Restaurants (7221), Limited-service Restaurants (7222), Special Food Services (7223), Drinking Places (alc) (7224)

Tabela 1

## Struktura agrobiznesu (według NAICS)

Agregat	Przemysł rolno-spożywczy
Produkcja rolna (Źródło: IMPLAN, ERS/USDA)	uprawy produkcyjne (zboża) (111) rośliny oleiste i nasiona (1111), warzywa i melony (1112), owoce i drzewa orzechowe (1113), szklarnie, szkółki, uprawy kwiatów (1114), inne rodzaje upraw produkcyjnych zbóż (1119) produkcja zwierzęca (112) hodowla bydła (1121) [bydło opasowe (11211) i mleczne oraz produkcja mleka (11212)], tuczniaki i świnię (1122), drobiarskie i jaja (1123), owce i kozy (1124), rybołówstwo (1125), inne zwierzęta [włączając konie] (1129) rybactwo komercyjne (1141)
Usługi rolnicze (Źródło: IMPLAN, ERS/USDA)	rolnicze usługi pomocnicze (115 less -1153) produkcja uprawowa (1151), produkcja zwierzęca (1152)
Gospodarstwa rolne i produkcja spożywcza (Źródło: IMPLAN, Economic Census)	produkcja spożywcza (311) żywność pochodzenia zwierzęcego (3111), ziarna i rośliny oleiste (3112), produkty z cukru i słodycze (3113), owoce i warzywa (3114), produkty mleczne (3115), ubój zwierząt i przetwarzanie mięsa (3116), produkty pochodzenia morskiego (3117), pieczywo i tortille (3118), pozostałe produkty spożywcze (3119) produkcja napojów (3121) napoje chłodzące (31211), piwo/browary (31212), winnice (31213), destylarnie (31214) pestycydy, nawozy i inne produkty chemiczne dla rolnictwa (3253) narzędzia rolnicze (33311) urządzenia dla przemysłu spożywczego (333294)
Hurtowy handel produktami rolno-spożywczymi (Źródło: Economic Census)	produkty spożywcze (4244) spożywcze ogólne (42441), pakowana żywność mrożona (42442), produkty mleczne (42443), produkty drobiarskie (42444), słodycze (42445), ryby i żywność pochodzenia morskiego (42446), mięso i jego przetwory (42447), świeże owoce i warzywa (42448), inne produkty owocowo-warzywne (42449) surowce spożywcze (4245) piwo, wino, inne destylaty (4248) piwo i ale (42481), wino i inne destylaty (42482) sprzęt ogrodniczo-rolniczy (42382) zaopatrzenie rolnictwa (42491) kwiaty, produkty szkółkarskie i zaopatrzenie hodowców kwiatów (42493)
Detaliczny handel produktami rolno-spożywczymi (Źródło: IMPLAN, Economic Census)	sklepy z żywnością i napojami (445) sklepy spożywcze (4451), sklepy z żywnością specjalną (4452), sklepy z piwem, winem i innymi alkoholami (4453) centrale zaopatrzenia szkółek, ogrodów i gospodarstw rolnych (44422) hodowcy kwiatów (4531)
Usługi w zakresie żywienia (Źródło: IMPLAN, Economic Census)	usługi w zakresie żywienia (722) restauracje z pełną ofertą usług (7221), restauracje z określoną ofertą usług (7222), usługi specjalne (7223), winnice, piwiarnie i inne (7224)

or NAICS code). For the manufacturing sector and other sectors “downstream”, we also disaggregate into “food” and “nonfood ag” components where appropriate. As our attention is directed around the “food system”, we will consider commercial fisheries but exclude from our analysis sectors involved in forestry, logging, and downstream wood and paper manufacturing and trade sectors. Similarly, while textiles and related manufacturing and trade are significant on the national agricultural stage, these economic activities are less important in New York and will be excluded from our analysis.

Given limited reporting of agricultural input service activities, the scope of this category follows a narrower definition to preserve access to published data sources (Table 1). In addition, it is often difficult to segregate input services to agriculture from published sources; e.g., financial services, transportation from the farm, repairs, etc. Suppliers of these input services often service both farm and nonfarm operators and there exists no way to effectively segment the data. The agricultural manufacturing sector is focused on food and beverage manufacturing, but also includes other product manufacturing in the farm and food sectors that indirectly serve as inputs into production or manufacturing. The wholesale trade sector is largely focused on food and beverage trade, but also includes other agricultural wholesaling operations that provide input services to retail operations. This often omitted sector provides significant economic activity and contributions with firms procuring farm or food products and moving products through the distribution channel to retail outlets.

The retail trade and food service sectors represent end consumption points of food products as well as retail outlets for nonfood ag-based operations (e.g., florists and farm supply stores). As food retailers (including supermarkets and convenience stores) sell both food and nonfood items, contributions apportioned solely to the food system cluster will need to be acknowledged in our analysis. For purposes here, we ignore this distinction because, for most retail operations, food sales represent a major portion of total retail sales. Finally, we delineate the food service cluster that includes restaurants, cafeterias, caterers, and food service operations. This cluster represents a growing sector of economic activity as consumers are demanding more convenient and healthy food choices.

Note that while our cluster definitions of agribusiness are arguably more exhaustive than previously enumerated, due to a lack of data availability and specificity, we are unable to account for other important ag-related contributions associated with the storage and warehousing industries. As with input services, oftentimes these firms are commonly servicing both farm and nonfarm customers or agricultural and nonagricultural products. A further gap in published statistics surround ag-based contributions from the transportation sector exists where statistics are commonly published based on mode of transportation (e.g., rail, barge, truck) rather than specific products hauled. To some degree, the ag-based transport contributions will be incorporated in the agricultural services, manufacturing, wholesale trade, and retail trade sectors where business activities include distribution services. Finally, as ag-based businesses respond to evolving market conditions, they may seek out opportunities to diversify, vertically integrate, and grow their businesses. Such firm transformations add another layer of difficulty in accurately describing the evolving farm and food sectors and appropriately parsing firm-level data, but in general firms are categorized based on their predominant activities.

### Valuing food, agriculture and agribusiness

Before turning our attention to specific sub-cluster economic contributions, it is useful to put the Agriculture and Food Cluster in perspective. Figure 2 provides a perspective of output value added up across sub-clusters. In 2003, cash farm marketings in New York State from production agriculture amounted to roughly U.S. \$ 3.3 billion, or roughly only 0.3% of total New York State (NYS) gross output. Adding in our narrower definition of agricultural services pulls in another \$ 1.4 billion. Food and agricultural manufacturing in the state had shipments valued at \$ 17.3 billion, pushing the contribution of total state gross output above 1%.

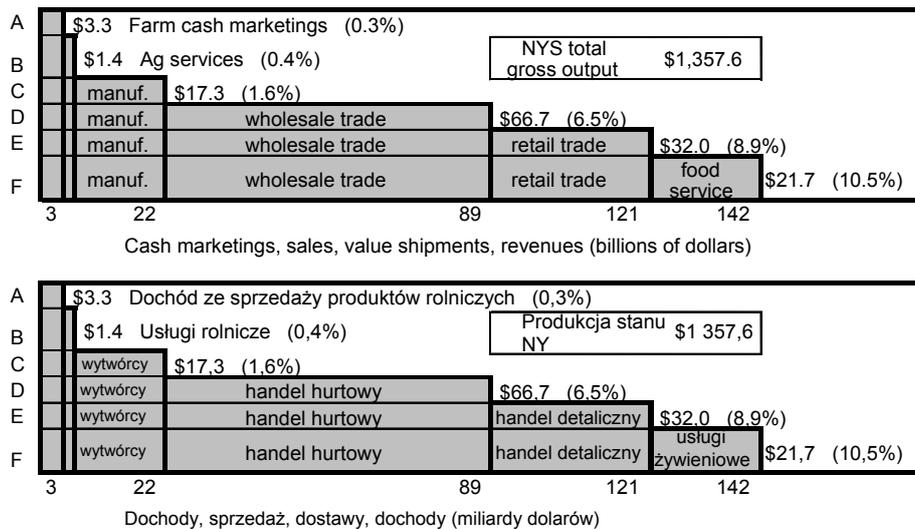


Fig. 2. Defining food and agriculture: value of output by industrial sector, New York State, 2003  
 Source: IMPLAN... (1996).

Ryc. 2. Wartość produkcji agrobiznesu w stanie Nowy Jork w 2003 roku  
 Źródło: IMPLAN... (1996).

Agricultural and food wholesale trade operations are significant in the state, with 2003 shipments valued at \$ 66.7 billion. Food and agricultural retail trade sales add another \$ 32 billion, and, finally food service operations accounted for sales of nearly \$ 22 billion dollars. When focusing only on production agriculture, agriculture’s contribution to the state economy is modest at best. However, when we incorporate the other inter-related and inter-dependent sectors, the agribusiness cluster provided more than 10% of New York’s total gross output.

While from one perspective, some of this may appear as ‘double counting’ as agricultural commodities are transformed and re-distributed through the various industries. However, each subcluster represents an essential linkage in the entire food value chain and all provide significant economic contributions in not only gross output, but also in employment, earnings, and value added.

## Trends in agricultural production

In developing a perspective on agribusiness economic contributions, we begin by briefly looking at recent trends in specific agricultural productions sectors of primary importance in New York State. Overall, cash farm marketings show increasing trends for crops and livestock, with year-to-year changes largely reflected by changes in commodity prices (Fig. 3). While the trend line is positive for both sectors, the relatively gradual slope likely does not outpace any comparable levels of inflation over this time period (i.e., in real terms the cash marketings are likely flat over this time period at best). Dairy farming and milk production represents the dominant farm industry in NYS with cash receipts at nearly \$ 2 billion in 2005 (Fig. 4). As such, trends in overall cash farm marketings largely mimic the results following dairy cash receipts.

Other livestock and meat animal marketings (e.g., poultry, beef, hogs, etc.) were more variable over this time period with no significant trend (Figs 5 and 6). Combined estimates from these two categories amounted to roughly \$ 550 million in cash farm

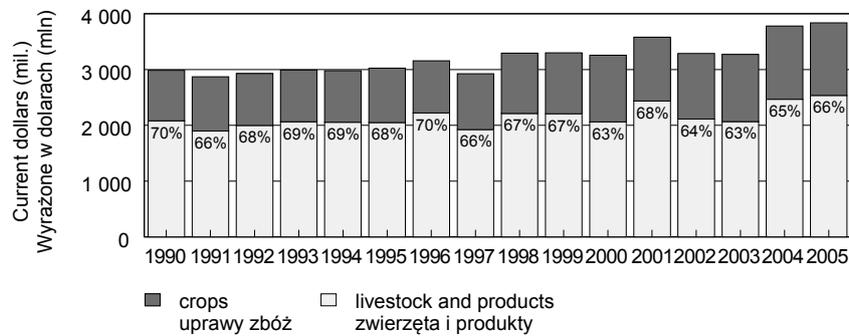


Fig. 3. Cash receipts from farm marketings, New York, 1990-2005

Source: Regional Economic Accounts.

Ryc. 3. Wpływy gotówkowe ze sprzedaży produktów rolniczych w stanie Nowy Jork w latach 1990-2005

Źródło: Regional Economic Accounts.

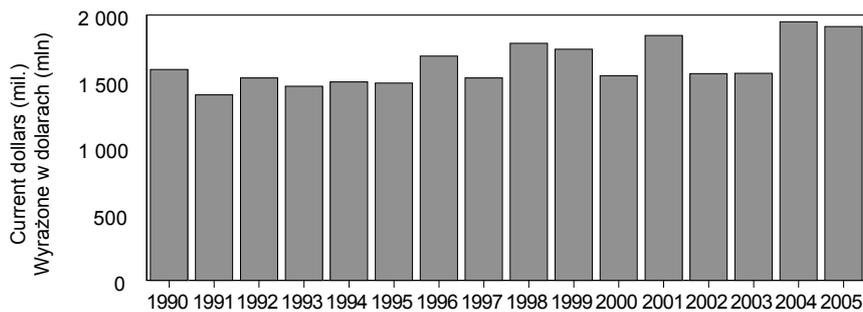


Fig. 4. Cash receipts from farm marketings: dairy products, New York, 1990-2005

Source: Regional Economic Accounts.

Ryc. 4. Wpływy gotówkowe ze sprzedaży produktów mleczarskich w stanie Nowy Jork w latach 1990-2005

Źródło: Regional Economic Accounts.

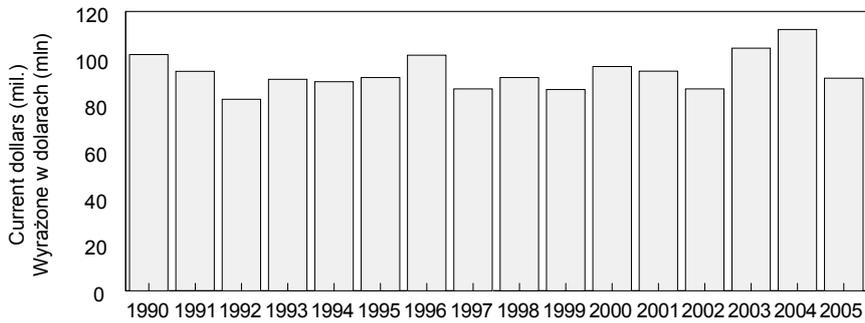


Fig. 5. Cash receipts from farm marketings: poultry and poultry products, New York, 1990-2005

Source: Regional Economic Accounts.

Ryc. 5. Wpływy gotówkowe ze sprzedaży produktów drobiarskich w stanie Nowy Jork w latach 1990-2005

Źródło: Regional Economic Accounts.

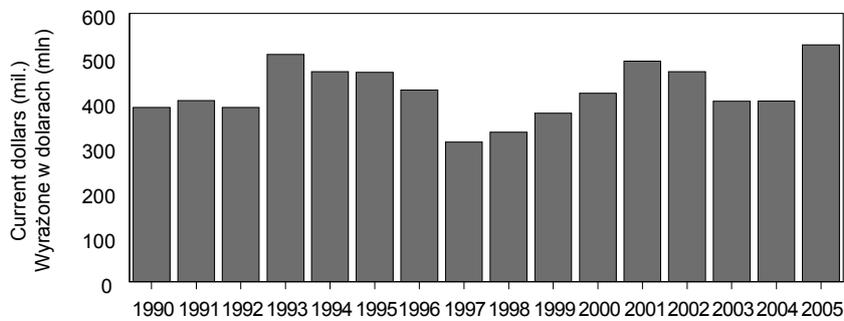


Fig. 6. Cash receipts from farm marketings: meat animals and other livestock, New York, 1990-2005

Source: Regional Economic Accounts.

Ryc. 6. Wpływy gotówkowe ze sprzedaży pozostałych produktów zwierzęcych w stanie Nowy Jork w latach 1990-2005

Źródło: Regional Economic Accounts.

marketings in 2005. Oil and grain crop cash receipts have been even more variable, reflecting some changes in planting acreages and, more importantly, larger swings in commodity prices (Fig. 7).

Moving away from livestock production, the farm-level fruit and vegetable production sectors and 'green' industries (e.g., greenhouse and nursery crops), present a more optimistic trend in recent years, likely reflective of increased consumer health awareness, rising consumer incomes, and increased availability of value-added consumer products. Some evidence of this exists in fruit crops (Fig. 8), albeit more modified than in other production sectors. Stronger growth has been realized in vegetable crops, growing from around \$ 200 million in cash farm marketings in 1990 to \$ 400 million in 2005 (Fig. 9). Similar increases have occurred in the greenhouse and nursery crop production sector, including consecutive increases in cash marketings every year since 1997 (Fig. 10).

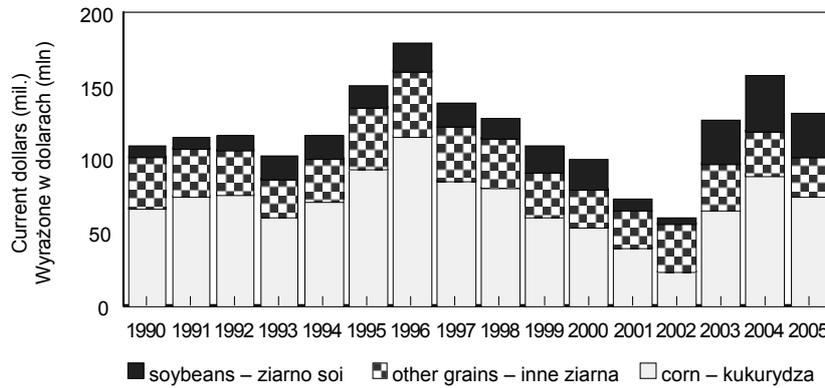


Fig. 7. Cash receipts from farm marketings: oil and grain crops, New York, 1990-2005  
Source: Regional Economic Accounts.

Ryc. 7. Wpływy gotówkowe ze sprzedaży roślin oleistych i zbóż w stanie Nowy Jork w latach 1990-2005

Źródło: Regional Economic Accounts.

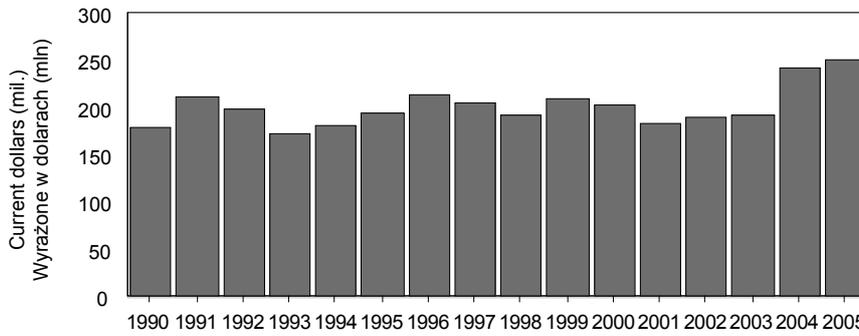


Fig. 8. Cash receipts from farm marketings: fruit crops, New York, 1990-2005

Source: Regional Economic Accounts.

Ryc. 8. Wpływy gotówkowe ze sprzedaży owoców w stanie Nowy Jork w latach 1990-2005

Źródło: Regional Economic Accounts.

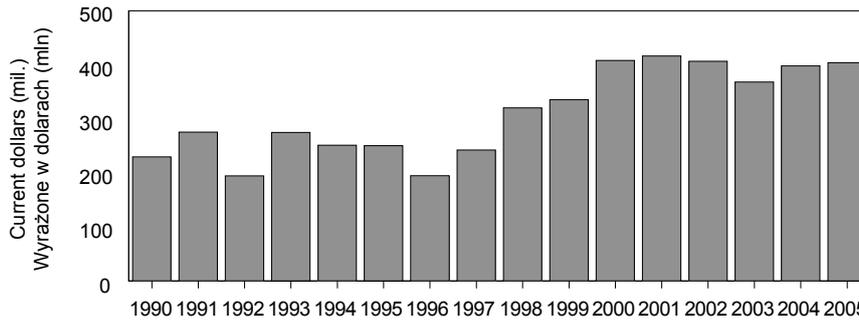


Fig. 9. Cash receipts from farm marketings: vegetable crops, New York, 1990-2005

Source: Regional Economic Accounts.

Ryc. 9. Wpływy gotówkowe ze sprzedaży warzyw w stanie Nowy Jork w latach 1990-2005

Źródło: Regional Economic Accounts.

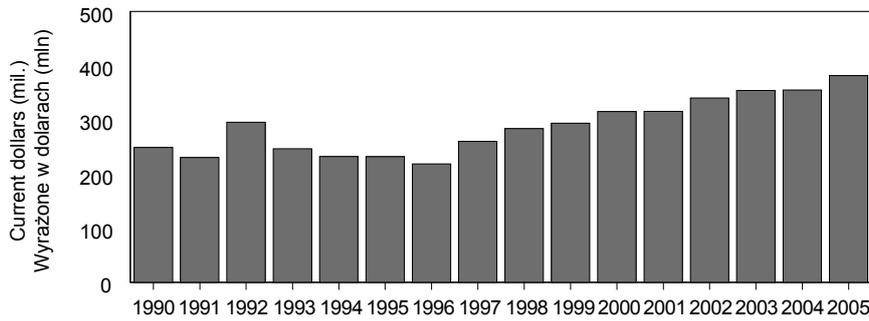


Fig. 10. Cash receipts from farm marketings: Greenhouse and Nursery Crops, New York, 1990-2005

Source: Regional Economic Accounts.

Ryc. 10. Wpływy gotówkowe ze sprzedaży upraw szklarniowych i szkółkarskich w stanie Nowy Jork w latach 1990-2005

Źródło: Regional Economic Accounts.

### Cluster trends – production, service, and manufacturing

Moving beyond production agriculture to a review of trends in related down-stream industries shifts our attention to agricultural support services and food manufacturing. Combined these three sectors accounted for over \$ 17 billion in gross output in 2003 (Fig. 2). We assess these sectors in terms of employment, value added, and employee compensation (earnings).

Farm employment decreased from around 70 000 jobs in 1990 to around 51 000 in 2005 (Fig. 11). Obviously, part of this reduction is due to increases in labor productivity and growth in farm size over time. Interestingly though, job making in agricultural services has been relatively stable. This may be due, in part, to increases in technical and related services as farming operations become more complex, larger, or enter into other vertically-integrated operations. Food manufacturing also saw a moderate decline during

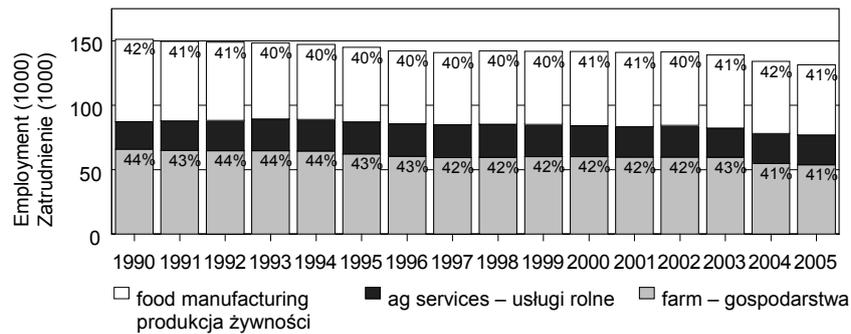


Fig. 11. Food and agriculture employment, New York, 1990-2005

Source: Regional Economic Accounts.

Ryc. 11. Zatrudnienie w agrobiznesie w stanie Nowy Jork w latach 1990-2005

Źródło: Regional Economic Accounts.

this time period, mirroring job losses in production agriculture, and with employment numbers now relatively comparable between the two sectors. Overall, reductions in employment in these sectors saw much more tempered declines than for the period of 1977-1998 (Bills 2001).

Moving away from employment as a metric for growth trends provides some differing interpretations. Value added is defined as total gross output less cash business expenses or, alternatively, the dollars available to capital consumption, interest and rental payments, and employee compensation (both wage and proprietor's income). Value added originating in farming has been relatively stable recently and has been showing an upward trend since 1998, accounting for over \$ 2 billion of value added in the New York farm sector (Fig. 12). Agricultural services, as with employment have been relatively stable. Food manufacturing has also been relatively stable, but has shown modest declines in value added since 2001. Note, however, that while value added contributions appear to be 'holding their own' recently in these sectors, the changes in value added reflect movements in both relative prices and quantities produced (i.e. they are nominal measures). While not done here, converting these relatively stable nominal measures to real value added measures (i.e., deflating them to constant dollar bases) would likely represent declines in real value added for all three sectors. Such 'stagnant' growth in nominal terms should be a concern regarding New York agribusiness firm competitiveness and sustainability moving forward.

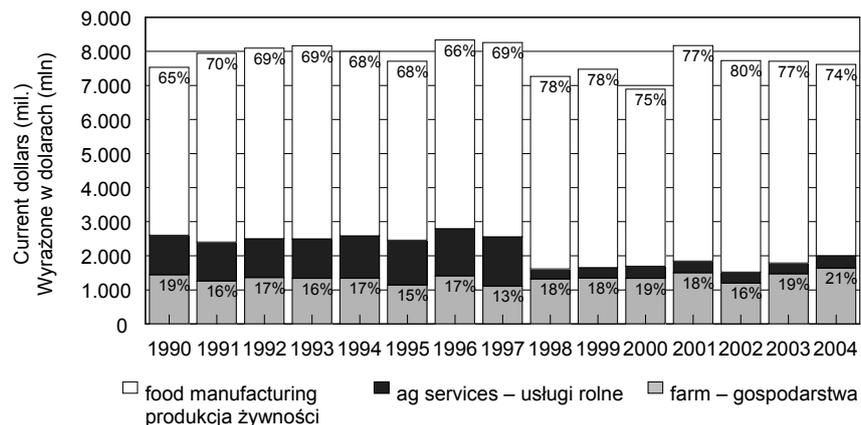


Fig. 12. Value added originating in food and agriculture, New York, 1990-2004 (1998-2005 estimates use NAICS industry classifications)

Source: Regional Economic Accounts.

Ryc. 12. Wartość dodana agrobiznesu w stanie Nowy Jork w latach 1990-2004 (w latach 1998-2005 wykorzystano dane według klasyfikacji NAICS)

Źródło: Regional Economic Accounts.

Additional insights on recent trends can be gained by measuring movements in earnings (or personal income). Production agriculture generated earnings in the range of \$ 500 million to over \$ 1 billion per year (Fig. 13). As expected, earnings in farming remain relatively volatile, with often abrupt changes from year to year due to fluctuating commodity prices or changing weather conditions (Bills 2001). In contrast, earnings originating in agricultural services have consistently increased, generating about \$ 1.3

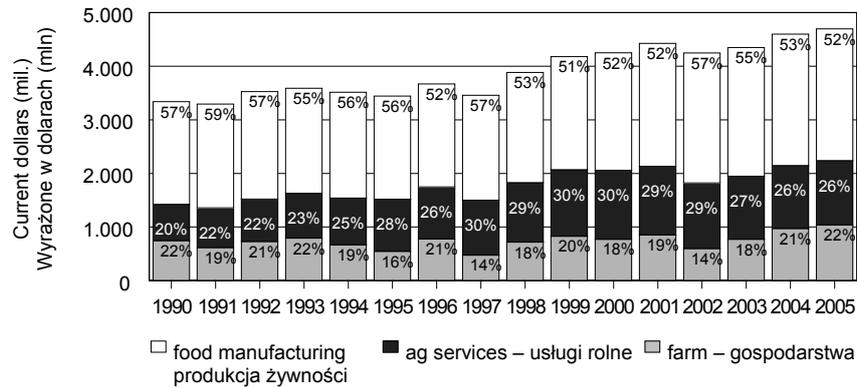


Fig. 13. Employee compensation (earnings) originating in food and agriculture, New York, 1990-2005

Source: Regional Economic Accounts.

Ryc. 13. Dochody z pracy najemnej w agrobiznesie w stanie Nowy Jork w latach 1990-2005

Źródło: Regional Economic Accounts.

billion in earning in 2005, above that generated by production agriculture. Like agricultural services, earnings in food manufacturing have increased each year, but in the face of constant to declining employment. The level of employment in this inter-dependent sector to production agriculture, however, cannot be understated – 2005 earnings stood at approximately \$ 2.2 billion, over two times that in the farm production sector.

### Cluster specifics – food and beverage manufacturing

Utilizing Economic Census data from 1997 and 2002, we can compare trends in the manufacturing sectors, as well as detailed comparisons for agricultural-based wholesale trade, retail trade, and food services. Starting first where we left off above, we begin some assessments in the food and beverage sub-cluster. Relative to the total New York manufacturing sector (ag and nonag based), changes in food and beverage manufacturing fared better in terms of establishment numbers, employees, payroll, and value of shipments (Table 2). The food and beverage manufacturing sector is an important contributor to total manufacturing activity in the state where, depending on the metric used represents 8 to 11% of total manufacturing sector contributions.

However, while ag-based manufacturing has fared better than other manufacturing sectors in the state, relative to changes in U.S. food and beverage manufacturing, New York has fared considerable worse. As such, New York's share of national food manufacturing activity from 1997 to 2002 decreased 7.7%, 10.3%, and 5.5% in the number of establishments, value added, and values of shipments, respectively. Understanding appropriate firm operational adjustments, and developing appropriate state economic development policies and business incentives appears crucial to this sector in order to improve firm competitiveness and long-term sustainability.

**Table 2**

**Cluster specifics – NYS food & beverage manufacturing (employers only)**  
**Charakterystyka przemysłu wytwarzającego żywność i napoje w stanie Nowy Jork**  
**(tylko pracodawcy)**

	Establishments Firmy		Employees Pracownicy		Payroll (\$ mil) Płace (mln \$)		Value Added (\$ mil) Wartość dodana (mln \$)		Shipments (\$ mil) Dostawy (mln \$)	
	2002	change zmiany % 1997	2002	change zmiany % 1997	2002	change zmiany % 1997	2002	change zmiany % 1997	2002	change zmiany % 1997
NY FBT Mfg Produkcja żywności i napojów w stanie Nowy Jork	2 295	-1.8	57 684	0.9	1 896	15.8	8 114	10.2	16 849	2.4
NY Total Mfg Całkowita produkcja w stanie Nowy Jork	21 066	-11.9	641 434	-18.4	25 374	-4.3	83 932	10.6	147 317	0.4
% FBT:Total Produkcja żywności i napojów (%)	10.9		9.0		7.5		9.7		11.4	
US FBT Mfg Produkcja żywności i napojów w Stanach Zjednoczonych	30 940	6.4	1 667 237	1.2	52 443	15.8	270 339	22.8	564 501	8.4
US Total Mfg Całkowita produkcja w Stanach Zjednoczonych	350 828	-3.6	14 699 536	-13.0	576 171	0.7	1 887 793	3.4	3 916 137	1.9
% FBT:Total Produkcja żywności i napojów (%)	8.8		11.3		9.1		14.3		14.4	
New York Share: Udział stanu Nowy Jork										
FBT Mfg % Produkcja żywności i napojów (%)	7.4	-7.7	3.46	-0.3	3.61	0.0	3.00	-10.3	2.98	-5.5
Total Mfg % Całkowita produkcja (%)	6.0	-8.6	4.36	-6.2	4.40	-5.0	4.45	7.0	3.76	-1.5

Source: Economic Census [1997, 2002].

Note: Exclude Beer, Wine & Distilled Alc. Beverage Wholesalers due to 1997 disclosure issue (2002: Establishments = 66, Employees = 1650, Payroll = \$ 55.5 M, Value Added = 153 M, Shipments = \$ 341 M).

Źródło: Economic Census [1997, 2002].

Uwaga: wykluczono sprzedaż hurtową piwa, wina i destylowanych produktów alkoholowych zgodnie z informacją opublikowaną w 1997 roku (2002: firmy = 66, pracownicy = 1650, płace = 55,5 mln \$, wartość dodana = 153 mln \$, dostawy = 341 mln \$).



Table 3 – cont.

1	2	3	4	5	6	7	8	9
GR WT % Handel hurtowy (%)	9.6	4.1	6.50	11.9	6.91	6.6	6.92	-8.3
Total WT % Całkowity handel hurtowy (%)	8.2	-0.9	7.02	-1.8	7.61	-5.9	7.41	-5.9

Source: Economic Census [1997, 2002].

Note: Excludes NonFood Ag Manufacturing due to disclosure issues in 1997 (2002: Establishments = 381, Employees = 6226, Payroll = \$ 658 M, Sales = \$ 9074 M).

Źródło: Economic Census [1997, 2002].

Uwaga: wykluczono niezwywnościowy przemysł rolniczy zgodnie z informacją opublikowaną w 1997 roku (firmy = 381, pracownicy = 6226, płace = 658 mln \$, sprzedaż = 9074 mln \$).

U.S. grocery and raw product wholesale trade operations saw considerably larger losses in establishment numbers and employment, while at the same time maintaining their nominal value of shipments (Table 3). As such, as New York showed gains in national shares of establishments and employment in this sector, their share of wholesale trade activity (or more precisely value of shipment activity), took a hit of over 8%. Some of this decline may be explained by changes in food manufacturing and processing operations that are dealing more directly with food retail establishments than in the past, but, even so, the more acute differences in New York state raises a 'red flag' to the industry to understand and confront the underlying reasons.

### Cluster specifics – ag and food retail trade

Things start becoming more optimistic as we move closer to the final user – the consumer. Agriculture and food retail trade represents around 20% of total retail trade contributions in the state (Table 4). While relative gains in number of establishments (4.5%) has outpaced the retail industry as a whole (1.6%), increases in sales, while relatively strong on a nominal basis (16.2%), is far behind the retail industry as a whole (27.8%). This difference is not unique to New York and likely reflects the differences in a mature industry sector, like food, that is looking for ways to add value and increase sales at the margin, compared to newer, fast-paced, new product, and growing industries, such as computers and electronics.

Other than payroll increases that have not kept pace with the growth in U.S. ag and food retail payrolls (relative share decreased 1.4%), New York retail ag and food firms have increased national shares in establishment numbers, +6.2%, employees, +0.9%, and sales, +2.7% (Table 4). Higher sales increases may be reflective of the trend in more valued-added (and higher priced) food products combined with a strategic advantage of being closer to large metropolitan areas along the Boston-Washington corridor with relatively higher personal incomes per capita.

Table 4

**Cluster specifics – NYS ag and food retail trade (employers only)**  
**Charakterystyka handlu detalicznego artykułami rolno-spożywczymi w stanie Nowy Jork**  
**(tylko pracodawcy)**

	Establishments Firmy		Employees Pracownicy		Payroll (\$ mil) Płace (mln \$)		Sales (\$ mil) Sprzedaż (mln \$)	
	2002	change (%) zmiany 1997	2002	change (%) zmiany 1997	2002	change (%) zmiany 1997	2002	change (%) zmiany 1997
NY Ag Cluster Retail Trade Handel detalicz- ny artykułami rolno-spożyw- czymi w stanie Nowy Jork	17 336	4.5	199 274	-1.0	3 406	17.5	30 997	16.2
NY Total RT Całkowity handel detalicz- ny w stanie Nowy Jork	76 425	1.6	837 806	4.0	18 153	26.7	178 068	27.8
% Ag:Total Handel deta- liczny (%)	22.7		23.8		18.8		17.4	
US Ag Cluster Retail Trade Handel detalicz- ny artykułami rolno-spożyw- czymi w Stanach Zjednoczonych	188 257	-1.5	3 099 423	-1.8	53 358	19.3	489 970	13.2
US Total RT Retail Trade Całkowity handel detalicz- ny w Stanach Zjednoczonych	1 114 637	-0.3	14 647 675	4.7	302 114	27.4	3 056 422	24.2
% Ag:Total Handel deta- liczny (%)	16.9		21.2		17.7		16.0	
New York Share Udział stanu Nowy Jork								
NY Ag Cluster Retail Trade % Handel deta- liczny artyku- łami rolno- spo- żywczymi (%)	9.2	6.2	6.43	0.9	6.38	-1.4	6.33	2.7
NY Total RT % Całkowity han- del detaliczny w stanie Nowy Jork	6.9	1.9	5.72	-0.6	6.01	-0.5	5.83	2.9

Source: Economic Census [1997, 2002].  
 Źródło: Economic Census [1997, 2002].

### Cluster specifics – food service

Gains in the Food Service sectors are strong in both New York and the U.S. as a whole from 1997 to 2002. As food service represents the predominant industry with the “food service and accommodations” sector (as defined by the Economic Census). We will focus our attention on trends in this sub-cluster relative to the U.S. as a whole. The New York food service industry has shown strong growth in all economic categories. Establishment numbers are up 4.0%, employment increased 12.5% with associated payroll increase 32.6%, and sales increasing over 30% during this 5-year time horizon (Table 5).

Table 5

#### Cluster specifics – NYS food service (employers only) Charakterystyka sektora usługowego w agrobiznesie w stanie Nowy Jork (tylko pracodawcy)

	Establishments Firmy		Employees Pracownicy		Payroll (\$ mil) Płace (mln \$)		Sales (\$ mil) Sprzedaż (mln \$)	
	2002	change (%) zmiany 1997	2002	change (%) zmiany 1997	2002	change (%) zmiany 1997	2002	change (%) zmiany 1997
NY FS Usługi w agrobiznesie w stanie Nowy Jork	36 865	4.0	449 358	12.5	6 020	32.6	21 024	30.2
NY Total A&FS Całkowite usługi w stanie Nowy Jork	39 428	3.6	527 649	11.4	7 972	30.6	27 836	28.4
% FS:Total Usługi w agrobiznesie (%)	93.5		85.2		75.5		75.5	
US FS Usługi w agrobiznesie w Stanach Zjednoczonych	504 641	3.6	8 307 625	7.1	92 599	31.7	321 401	27.6
US Total A&FS Całkowite usługi w Stanach Zjednoczonych	565 590	3.8	10 120 951	7.1	127 554	31.5	449 499	28.3
% FS:Total Usługi w agrobiznesie (%)	89.2		82.1		72.6		71.5	
New York Share Udział stanu Nowy Jork								
NY FS % Usługi w agrobiznesie (%)	7.3	0.3	5.41	5.0	6.50	0.7	6.54	2.1
NY A&FS % Całkowite usługi (%)	7.0	-0.1	5.21	4.1	6.25	-0.7	6.19	0.1

Source: Economic Census [1997, 2002].

Źródło: Economic Census [1997, 2002].

New York gains are even larger than U.S. gains as a whole implying increasing shares of national economic activity. Notably, national employment share increased 5.0% and share of sales increased over 2%. As discussed earlier, these strong economic gains likely reflect the growing demand for convenient and healthy foods for the increasingly fast-paced society. As above, geographic proximity to large urban consumer markets is likely a contributing factor to national share growth.

### **Agribusiness cluster summary**

Table 6 provides a summary and highlights the relative economic contributions of the Agribusiness Farm and Food Clusters to the respective total industry sectors considering both ag-based and nonag-based activity. In addition, by utilizing data from the Economic Census' Nonemployer Statistics, we are able to incorporate contributions from non-employers (i.e., establishments without payroll). While our overall attention to nonemployers is limited here, some comments here are appropriate and a more detailed and comprehensive analysis is forthcoming that will pay closer attention to the important structural differences in the organization of farm and food businesses.

From reviewing previous literature, steps have not been taken to level the playing field and take into account ALL farm and food businesses, including those who do not maintain a payroll. Nonemployers are relatively common in the agricultural production sector, given the relatively low sales threshold (\$ 1,000) used to define a 'farm' in the US. Estimates based on the Census of Agriculture show that of the 38 000 NYS farm establishments in 2002, 72% had no payroll. Labor and management inputs are furnished either by the proprietor, family members, or labor services secured under contract. While production or output is dominated by farm firms who do establish payroll and employ farmworkers, such diversity in the organization of farm businesses needs to be recognized in the development of agricultural policies and development programs in order to meet intended program impacts and reach to defined beneficiaries.

Just as importantly, comparisons with farm related businesses further down the value chain must be arranged with more care than demonstrated in previous studies and explicitly take nonemployers into account. Indeed, only a moment's reflection demonstrates that the prevalence of "small" agribusiness operations dependent on proprietors and family members for labor and management is hardly unique to the farm production sector. Quite the opposite, such arrangements are one of the hallmarks of the American small business scene. Reviewing 2002 data from the US Census Bureau, defined over our agribusiness clusters, reveals a similar characterization in these downstream industries. Specifically, of the roughly 101 000 agri-related (nonfarm) establishments in NYS, over 38% were classified as establishments without payroll (Table 6). Federal data providers use an identical \$ 1000 sales threshold to define and describe a nonemployer, nonfarm business. Unfortunately, previous studies, which rely on counts of establishments with payroll and their employees, completely miss this element of the farm and food industry. Our preliminary review of the small area data suggest the obvious: gross output generated by nonemployers is very modest compared to employer establishments (under 2%), but in defining appropriate development policies and targeted beneficiaries, understanding these distributions are important, if not crucial.

**Table 6**

**Agribusiness cluster summary of economic indicators, employers and nonemployers, 2002**  
**Agrobiznes w stanie Nowy Jork w 2002 roku**

Agribusiness Cluster Sektor agrobiznesu	Establishments Firmy	Total Sector Łącznie (%)	Employees Pracownicy	Total Sector Łącznie (%)	Payroll (\$ mil) Płace (mln \$)	Total Sector Łącznie (%)	Revenue (\$ mil) Dochód (mln \$)	Total Sector Łącznie (%)
Manufacturing Wytwarzanie								
Employer Pracodawca	2 361	11.2	59 334	9.3	1 951	7.7	17 190	11.7
Nonemployer Inna osoba	1 984	11.2	1 984				70	8.4
Wholesale Trade Handel hurtowy								
Employer Pracodawca	5 643	15.7	76 675	18.5	3 188	16.1	66 232	19.3
Nonemployer Inna osoba	3 859	12.5	3 859				481	16.4
Retail Trade Handel detaliczny								
Employer Pracodawca	17 336	22.7	199 274	23.8	3 406	18.8	30 997	17.4
Nonemployer Inna osoba	13 660	12.6	13 660				1 017	20.4
Food Service Sektor usług żywnościowych								
Employer Pracodawca	36 865	93.5	449 358	85.2	6 020	75.5	21 024	75.5
Nonemployer Inna osoba	19 282	82.9	19 282				704	79.1
Total Employer Pracodawcy łącznie	62 205	36.0	784 641	32.4	14 565	20.4	135 443	19.4
Total Nonemployer Inne osoby łącznie	38 785	21.5	38 785	21.5			2 272	23.6
Total Ogółem	100 990	28.6	823 426	31.7			137 714	19.5

Source: Economic Census [1997, 2002].  
 Źródło: Economic Census [1997, 2002].

Relative to total NY sector contributions, agri-related contributions are significant. Factoring both employers and nonemployers, nonfarm agribusiness cluster establishments numbered nearly 101 000 in 2002 and represented nearly 29% of all New York establishments in the manufacturing, wholesale trade, retail trade, and food service sectors (Table 6). These agribusiness cluster firms account for over 820 000 people employed, representing a whopping 31.7% of total New York employment in these sectors. Gross revenues tallied more than \$ 137 billion in 2002, accounting for nearly 20% of all revenue within the broader industry sectors.

### Backward linkages – agribusiness clusters

Before concluding, it is useful to more fully investigate the interdependencies between the various agribusiness sectors and quantify the backward linkages between them. The implications of these interdependencies are that the expansion or contraction in one industry is likely to have far reaching implications. Because of these structural relationships between sectors, new production in a particular sector will generate successive rounds of transactions as firms backward linked also adjust their production and output to meet the growing intermediate needs (Bills 2001).

Output multipliers provide a useful tool in this regard in that they estimate these generative effects, taking into account the first dollar of direct requirements along with the dollar value of additional production required to sustain the unit increase in farm and food production. Analogously, employment multipliers can be computed derived from increases in initial employment in one sector and then backward-linked throughout the market system.

Output multipliers are computed for selected farm and food sectors and shown in Figure 14. Multipliers represent a snapshot at a particular point in time. Here, we compute and compare multipliers reflective of 1996 and 2003 for the agricultural production (livestock, crops, and commercial fishing), agricultural support services, and food manufacturing sectors. Focusing on the 2003 results, we see output multipliers ranging from around 1.5 to nearly 2. An output multiplier of 2 implies that for each new dollar of (particular) farm and food output for the state, brings in additional production valued at \$ 1.

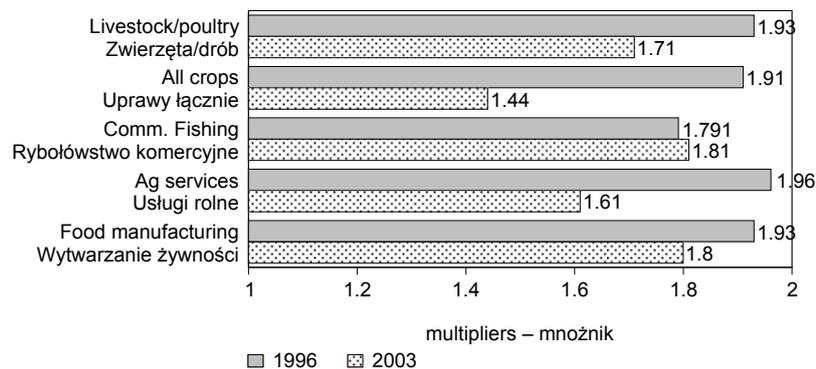


Fig. 14. Output multipliers for selected farm and food sectors, New York, 1996 and 2003

Source: IMPLAN... (1996).

Ryc. 14. Efekt mnożnikowy w wybranych typach gospodarstw i gałęziach przemysłu żywnościowego w stanie Nowy Jork w latach 1996 i 2003

Źródło: IMPLAN... (1996).

The levels of these multipliers are relatively strong across industries. In general, however, we see output multipliers that decreased from 1996 to 2003. Why might this be the case? Two contributors are hypothesized here. First, data issues are important to consider. Between 1996 and 2003 the data compilation for which these calculations are

based was changed. In 1996, the Standard Industrial Classification (SIC) system was in place, while by 2003 the classification system changed to the NAICS system. The NAICS is an effort to harmonize data throughout North America. While many of the code transitions were relatively simple, in some sectors, data structures and coding operations were materially altered. Consequently, the underlying data structure has changed, and so direct comparisons are not entirely appropriate and need to be qualified as such.

Second, we may well be able to translate changes in multipliers relative to the industry economic activity and contributions highlighted above. Notably, relatively low milk prices in 2002 decreased farm marketings in the dairy sector. Commodity price reductions also decreased livestock sector marketings between 1996 and 2003. On the crop production side, both fruit and corn marketings decreased considerably in 2002 relative to 1996, reflective of reductions in farm commodity prices. Finally, gross output in food manufacturing was down somewhat between the two selected years.

Output multipliers for several aggregated sectors of the New York economy were also computed to compare the agriculture and food sectors. These results allow one to compare the generative effect of new farm and food production with those associated with new output in nonfarm sectors of the New York State economy. Looking at the aggregated sectors suggests that output multipliers for food and agricultural sectors compare reasonably well with those in the non-farm sectors (Fig. 15).

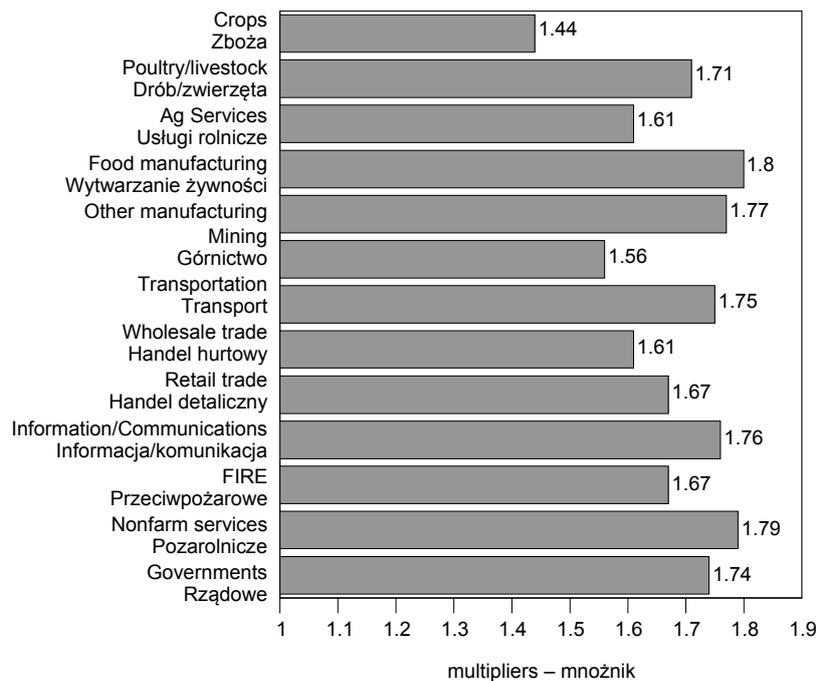


Fig. 15. Output Multipliers for Selected Industrial Sectors, New York, 1996 and 2003

Source: IMPLAN... (1996).

Ryc. 15. Efekt mnożnikowy w wybranych gałęziach przemysłu w stanie Nowy Jork w latach 1996 i 2003

Źródło: IMPLAN... (1996).

## Conclusions

In order to capture the full economic contributions associated with the agriculture and food system in New York State, appropriate accounting of the inter-dependent activities associated with agricultural production, service, manufacturing, distribution, wholesaling, and retail consumption sectors is necessary. Accordingly, understanding these evolving inter-industry linkages is essential toward the development of appropriate firm, industry, and public policy strategies to strengthen opportunities for economic development and improve the competitiveness of our local New York agribusiness industry. In this work we have provided expanded economic contribution calculations encompassing the entire farm and food system taking into account the entire food value chain.

Agribusiness operations in the state were found to make significant and continuous economic contributions to the New York State economy. In 2003, such contributions represented over 10% of total annual gross output in the state. Furthermore, defined "Agricultural and Food System Clusters" were shown to contribute nearly 20% of total sales and over 30% of employment in their respective total industry sectors.

Agricultural output multipliers in the production and manufacturing sectors were relatively strong with important implications to overall growth in the New York State economy. Output multipliers from 1.5 to 2.0 imply that for each new dollar of farm and food output for the state, brings in additional production valued from \$ 0.5 to \$ 1.0. Furthermore, agricultural output multipliers are comparable in magnitude to non-ag based industries.

Important and growing linkages exist between agribusiness sectors, requiring a broader view of agriculture within our economies. A better understanding of this broader view is necessary in designing agricultural policies and development programs in order to meet intended objectives and to reach defined beneficiaries.

## Literature

- Beierlein J.G., Schneeberger K.C., Osburn D.D.** (2003): Principles of Agribusiness Management. Waveland Press: Long Grove, IL.
- Bills N.L.** (2001): Agriculture-Based Economic Development: Trends and Prospects for New York. Department of Applied Economics and Management, E.B. 18, Cornell University.
- Census of Agriculture, New York State and County Data. U.S. Department of Agriculture. National Agricultural Statistics Service. [http://www.nass.usda.gov/Census\\_of\\_Agriculture/index.aspx](http://www.nass.usda.gov/Census_of_Agriculture/index.aspx). 1997 and 2002, accessed April 2007.
- Economic Census. U.S. Census Bureau. <http://www.census.gov/econ/census02/>, 1997 and 2002, accessed April 2007.
- IMPLAN Pro Users Guide. 1996. Minnesota IMPLAN Group, Inc. Stillwater, MN.
- Nonemployer Statistics. U.S. Census Bureau. <http://www.census.gov/econ/census02/>, 1997 and 2002, accessed April 2007.
- Regional Economic Accounts. U.S. Department of Commerce, Bureau of Economic Analysis. Online at <http://www.bea.gov/regional/index.htm>, accessed April 2007.
- U.S. and State Farm Income Data. U.S. Department of Agriculture. Economic Research Service. Online <http://www.ers.usday.gov/data/FarmIncome/finfidmu.htm>, accessed April 2007. Washington DC.

ROLA AGROBIZNESU I JEGO POWIĄZANIA MIĘDZYGAŁĘZIOWE  
W GOSPODARCE STANU NOWY JORK

S t r e s z c z e n i e

W artykule zdefiniowano pojęcie przemysłu rolno-żywnościowego i ukazano jego znaczenie w gospodarce stanu Nowy Jork. Przedstawiono podstawowe wskaźniki ekonomiczne, tj. liczbę podmiotów gospodarczych, wielkość zatrudnienia, przeciętne płace, dochody oraz wartość produkcji sprzedanej w poszczególnych ogniwach agrobiznesu.