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## *Chapter*

*First Draft*

# ECONOMIC DEVELOPMENT PLAN FOR THE AGRICULTURE SECTOR

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## **CHAPTER 1: PUERTO RICO'S AGRICULTURAL SECTOR AND SUB-SECTORS: A DIAGNOSIS<sup>1</sup>**

### **PART I. INTRODUCTION**

#### **OBJECTIVES**

Planning for the economic development of the agricultural sector, as part of Puerto Rico's overall economic development strategy provides a comprehensive overview of the economy, sets policy direction for economic growth and development, and identifies opportunities and establishes strategies, programs, and projects to improve the economic sector. This report includes a general historic background and diagnostic information on the Island's agriculture and the relevance of the agricultural sector as part of a balanced economic development plan. Finally it contains recommendations for the agricultural sector in the context of its relevance for Puerto Rico's economic development.

#### **SOURCE OF INFORMATION**

All analysis and recommendations will be based on data, not on opinions. Data will be collected from secondary sources such as Census of Agriculture, Economic Census, Statistical Appendix of Economic Report to the Governor, reports from the Office of Agricultural Statistics of the Department of Agriculture, Department of Labor and Human Resources.

#### **ROAD MAP (ORGANIZATION)**

A plan of the agricultural sector and its subsectors has been developed by the two Consultants. This report consists of five general chapters that contain: a diagnosis of the agricultural sector and its subsectors from an economic perspective based on available data and its analysis. The subsectors considered include crops, livestock. An analysis of identified strengths, weaknesses, opportunities and threats, or SWOT Analysis is presented in the second chapter. That leads to the establishment and definition is followed by Chapter 3 containing the vision, mission, goals and specific objectives established for the sector and its subsectors. The general and specific strategies for achieving the goals are identified for the subsectors for short run, mid run and long run development. The metrics for the evaluation of each strategy are suggested in Chapter 5.

Each chapter is organized by sections. Chapter 1 contains a section with a synopsis of Puerto Rico's agricultural economic history to give context to the report and the recommendations contained in it. A list of plans for agricultural development is provided and strategies extracted from three relevant plans are outlined. An overview of the sector with a time series analysis of macroeconomic variables such as Gross Domestic Product (GDP), Gross Domestic Product of Agriculture (GDP-A), Gross Farm Income (GFI), Aggregate Physical Agricultural Output, Food Consumption Expenditures and external trade is included. Then a section is dedicated to describe or characterize the economic sector, from the perspective of business structure, producers' profile and human resources employed. The behavior of the agricultural subsectors, by NAICS, are then analyzed for land area, production, contribution to GFI. Discussions of relevance of the agricultural sector to Puerto Rico's economy, risk in agriculture and recent public policy are included in separate sections. The chapter closes with a comparison of Puerto Rico's agriculture to regional trends in six selected states.

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## **PART II. THE AGRICULTURAL SECTOR IN PUERTO RICO'S ECONOMY**

### **PUERTO RICO'S AGRICULTURAL ECONOMIC HISTORY AT A GLANCE**

During the XVI to XVIII Centuries, Puerto Rico's economic history can be summarized as the time of colonization by Spain due to its military value for the strategic location. The main activities were subsistence agriculture and mining economy. Labor was based on slavery. The time between XVIII Century and 1898, the bases for a national economy were established. Puerto Rico was a net food importer and its agricultural activities were based on producing for the commodities sugar cane, coffee and tobacco for exports. The period from 1898-1940, known as the Pre-modern period witnessed the beginnings of a capitalistic system, devaluation of the local currency (peso), inflation and the sales by United States of America (hereafter, US) corporations of their land, buildings and assets. Agriculture was based on monoculture plantations, absentee owned agriculture being sugarcane destined to export to USA the main agricultural product. There was generalized poverty and the benefits of some federal legislation were extended to the Island, such as the New Deal; Puerto Rico Emergency Relief Administration (1933); Chardón Plan (1934) and Puerto Rico Reconstruction Administration (1935)

The history from 1941 to the present is known as the Modern Period. Some of the most relevant policies relevant to economic and agricultural development are the establishment of manufacturing plants owned and administered by government: PR Glass Corp., PR Pulp and Paper Corp., PR Shoe and Leather Co., PR Clay Products Corp., cement plant. There was an administrative reform that resulted in the establishment of institutions central to economic development such as: Puerto Rico Aqueduct and Sewer Authority, Minimum Wage Board, PR Electric Power Authority, PR Industrial Development Company (PRIDCO) , PR Planning Board, Budget Bureau, Central Office of Statistics. Considered by some as a milestone in our agricultural economic history, our Agrarian Reform became a reality with the enactment of the Land Act of 1941 and US Supreme Court Ruling dated March 5, 1940 on the expropriation by the Government of PR of sugarcane plantations, owned by US absentee corporations to redistribute to landless ("agregados"). The plantations were redistributed as Proportional benefit (coop) farms and 1 to 3 cuerdas land lots ("parcelas") of beneficial use ("usufructo"). The PR Land Authority was created to publicly administer farms with the intention to rent to individual farmers. The University of Puerto Rico's Agricultural Extension Service (established in 1934) and Agricultural Experiment Station (established in 1910 and transferred to UPR-M in 1933) delivered information and technology to the "new" farmers; the underlying proposal was to diversify agriculture to produce food for local consumption.

Two decisions that mark the start of the decline of agriculture as the main sector of Puerto Rico's economy, by design of policymakers are: the 1947 Industrial Incentives Act- "industrialization by invitation". The new PRIDCO had as goal to attract manufacturing capital from US to establish plants in Puerto Rico to produce goods for exports; Section 931 of US Internal Revenue Code provided a tax holiday for US investors. The second decision was the enunciation in 1948 of Operation Bootstrap. Both biased the Island's economic development against agriculture and placed manufacturing as the main sector in terms of income and employment generation and the driver of economic growth. What happened after that is the decline of agricultural activities, and a public image of agriculture as a sector representing poverty and backwardness with no potential to contribute to growth. Concepts such as food security, food sovereignty, food as a strategic good and the importance of food production for national security were not present in the minds of citizens or policymakers.

### **RECOMMENDATIONS OF PREVIOUS PLANS**

Over a dozen proposals to develop the agricultural sector of Puerto Rico's economy have been written throughout Puerto Rico's economic history. Some of the studies, plans and programs are included in the list in Appendix I. The list may not be complete due to lack of perfect knowledge.

These plans have differed in terms of the objectives. Some have included the agricultural sector as part of an integrated economic development plan. This type of plan has been prepared under the leadership of the Puerto Rico Planning Board and includes the interactions between agriculture and the other industrial economic sectors.

Strategic planning, as a variation of the comprehensive plan, is an attempt to design development of the industrial sector in the long run starting with its mission or role in the economy. A rational analysis of the internal and external conditions affecting the sector's development must be conducted in order to establish priorities and determine courses of action. Other types of plans deal with the design of plans at a lower or more specific level of analysis, or planning at the micro level. An example is a detailed operational plan parting from the general recommendations in a strategic or integrated plan.

Opinions about planning for Puerto Rico's agricultural development are divided. Some feel that (strategic) planning for Puerto Rico's agriculture does not exist therefore agricultural policy responds to crisis, lacking goals, and a vision of agriculture's role in Puerto Rico's agricultural development. As a result, programs implemented become permanent, and making adjustments or eliminating them is difficult or impossible.

Others think that the agricultural sector has been widely planned, pointing out the existence of integrated plans, investment plans, sub-sector analysis, essays written about plans for planting, harvesting and processing of specific crops, plans for agribusiness development, among others. But even in these plans, the vision, goals and recommendations lack coordination. Some attribute the non-existence of long term public policy to the wide diversity of non-articulated plans. Anecdotal evidence points to the lack of planning as a guide for the establishment of policy, strategies and specific programs. It seems like Puerto Rico has trusted general intuition to decide which actions to take in the agricultural sector.

Almost two decades have passed since the last well known written report containing some guide for the development of the agricultural sector. Endogenous and exogenous factors have changed, as well as the vision about the role of the agricultural sector. Land and water resources, human resources, technology and knowledge are some of the factors that have experienced changes in the past years. Consequences of globalization of economic activities, changes in terms of trade and climate change are emerging factors that ought to be considered in planning for agricultural development. There is an urgent need to plan agriculture, an industrial sector of Puerto Rico's economy that has the potential to drive and contribute significantly to growth and development.

All the plans, studies and programs prepared in the past have considered that increases in agricultural production are the basis and also the goal for developing the agricultural sector, directing all attention to the technical aspects of the production processes, to the farms and the farmers. The recommendations derived from this vision have resulted in programs directed to favor farm production, therefore based towards the supply side. There is a need to plan agricultural development from demand side; that is, taking into account to a great extent that consumers guide the market decisions and should be recognized as such and be explicitly included in the planning process. There is a need to have information about the factors that affect the consumers' decisions of buying or not agricultural goods and services produced in Puerto Rico. This will help in the formulation of recommendations and formulation of strategies to stimulate consumption, what will drive agricultural development from the demand side.

The strategies outlined by three of the plans follow in this section, the ones contained in the 1975 Echenique Report, the 1979 Krep Report and the Puerto Rico 2025 published in 2004. The Echenique Report (Informe Echenique), 1975, named Puerto Rico's Economic Development: A Strategy for the Next Decade presented the following strategies:

- Establish cooperatives in rural areas with training programs and productive economic activities focused on agriculture and manufacturing. (Page/Slide 125 y 127)
- Preserve natural resources and the environment. (Page/Slide 12)
- No tariff regulations over product imports with environmental benefits. (Page/Slide 68)
- Develop a system of family owned farms. (Page/Slide 93, 127)
- Complete a regulated land use plan accompanied by effective controls. (Page/Slide 113)
- Reevaluate the use of natural resource terrains to establish new industrial plants, and establish a penalty system for contamination. (Page/Slide 115)
- Production and Productivity - Identify, produce, and market those commodities which have the greatest economic comparative advantage for mainland and export markets and domestic consumption. (Page/Slide 290)
- Production and Productivity - Provide fertilizers, seeds or plant materials, machinery services, operating supplies, and technical assistance consistent with efficient production patterns. (Page/Slide 290)
- Marketing Efficiency and Product Quality - Develop handling, processing, and storage facilities and systems for consistent high-quality products produced by Puerto Rican farmers. (Page/Slide 290)
- Food Prices and Nutrition - Food and nutrition goals similar to those in the United States for eliminating hunger and malnutrition. (Page/Slide 291)
- Food Prices and Nutrition - Improving island food production and marketing efficiency to competitively provide cheaper and more nutritious diets. (Page/Slide 291)
- Expand the environmental quality concept and make it applicable to physical infrastructure (Page/Slide 71)
- Invest in education to foster consciousness of environmental responsibility (Page/Slide 71)
- Reduce environmental risks to health (Page/Slide 55)
- Establish environmental market-based systems to encourage self-administration by businesses and households (Page/Slide 71)
- Strengthen or modify current environmental laws, and explore new regulation schemes to ensure environmental conservation (Page/Slide 72)
- Define community compliance goals for environment safekeeping (Page/Slide 72)
- Harmonize government support mechanisms applied to agriculture with restrictions and agreements of free commerce. (Page/Slide 231)
- Maximize production on high value agricultural soils. (Page/Slide 26)
- Reinvent traditional industries (Page/Slide 28)

The Echenique Report was followed by Kreps Report (Informe Kreps) in 1979, named Economic Study of Puerto Rico. Some of the strategies outlined in this report included:

- Production and Productivity - Identify, produce, and market those commodities which have the greatest economic comparative advantage for mainland and export markets and domestic consumption.
- Production and Productivity - Provide fertilizers, seeds or plant materials, machinery services, operating supplies, and technical assistance consistent with efficient production patterns.
- Marketing Efficiency and Product Quality - Develop handling, processing, and storage facilities and systems for consistent high-quality products produced by Puerto Rican farmers.
- Food Prices and Nutrition - Food and nutrition goals similar to those in the United States for eliminating hunger and malnutrition.
- Food Prices and Nutrition - Improving island food production and marketing efficiency to competitively provide cheaper and more nutritious diets.

In 2004, the public report of the Puerto Rico 2015 Initiative was published Puerto Rico 2025: Una Nueva Visión para el Futuro de Puerto Rico. It included the following strategies:

- Expand the environmental quality concept and make it applicable to physical infrastructure
- Invest in education to foster consciousness of environmental responsibility

- Reduce environmental risks to health
- Establish environmental market-based systems to encourage self-administration by businesses and households
- Strengthen or modify current environmental laws, and explore new regulation schemes to ensure environmental conservation
- Define community compliance goals for environment safekeeping

## OVERVIEW OF THE AGRICULTURAL SECTOR IN PUERTO RICO'S ECONOMY

Puerto Rico's economy has transformed from one in which the agricultural sector represented 17.5 percent of Gross Domestic Product (GDP) and employed 35.9 percent of the labor force back in 1950 to one in which this economic sector represents less than 1 percent of the GDP and provides 1.6 percent of total employment in 2012p. Percentage wise 60 years ago the economy was eminently based in agricultural activities. By mid 20th century the general economy was relatively small with just some secondary and tertiary activities. Nowadays agriculture creates more income than what it did in 1950 in absolute figures. Employment is smaller both in absolute value as proportionally. Agriculture as an economic sector (NAICS code 11) includes farming or crop production (NAICS codes 111), animal production (NAICS code 112) forestry (NAICS 113), fishing, hunting and trapping (NAICS code 114) and other at the farm level. As a primary activity, raw materials for other economic sectors originate. It is the main source of food which is the most important economic good for humankind. Agriculture is also the source of other economic goods and services that are not exchanged in a market such as some environmental services which are secondary benefits of agricultural production activities. From an economic stand point the sector's importance or size is conventionally assessed by its share in the Gross Domestic Product (GDP) sector composition.

## PRODUCTION AND INCOME

Agricultural share of the GDP composition shows a downward trend since the second half of the 20th century (Table 1). In 1994 it represented less than 1% for the first time. In the years 1994 and 1995 as well as in several years following, the Gross Domestic Product of Agriculture (GDP-A) registered decreases when compared to previous years. Growth rate of GDP-A during the 2003-2012 period exceeded the growth rate of GDP.

Agriculture's share of GDP is an indicator of economic transformation (Norton, Alwang and Masters, 2007). Countries as United States of America, Japan and Germany have an agricultural sector that contributes a share similar to Puerto Rico's (Table 2).

**Table 1**  
**GROSS DOMESTIC PRODUCT, AGRICULTURE GROSS DOMESTIC PRODUCT AND**  
**GROSS FARM INCOME 1950-2012P**  
**(fiscal years, in millions of dollars)**

	Year						
	1990	1995	2000	2005	2010r	2011r	2012p
<b>Gross Domestic Product</b>	30,604	42,647	61,702	82,809	96,261	100,196	101,034
<b>Agriculture Gross Domestic Product</b>	434.1	318.4	407.3	499.3	553.2	795.6	817.8
<b>A-GDP/GDP</b>	1.4	0.7	0.7	0.6	0.6	0.79	0.81
<b>(%)</b>	725.1	687.1	721.4	793.6	821.8	789.5	784.5

Source: Gross Farm Income, Puerto Rico Department of Agriculture, Agricultural Statistics Office and Puerto Rico's Planning Board, "Informe Económico al Gobernador", selected years.

p: preliminary data

r: revised data

**Table 2**  
**NOMINAL GDP SECTOR COMPOSITION, 2012**  
**(in percentage)**

Country	Agriculture	Industry	Services
United States	1.12	19.10	79.70
Israel	2.40	32.00	65.60
Singapur	0.00	26.80	73.20
Ireland	1.60	27.90	70.50
Germany	0.80	28.10	71.10
Japan	1.20	27.50	71.40
India	17.40	25.80	56.90
Indonesia	14.30	46.90	38.80
Argentina	10.00	30.70	59.20
Colombia	8.90	38.00	53.10

Source: International Monetary Fund, World Economic Outlook

## FOOD CONSUMPTION EXPENDITURES IN PUERTO RICO

In 2012 food consumption expenditures in Puerto Rico were 8,925 million dollars (593.5 million in constant dollars), making up 14.64% of total consumption expenditures (Table 3). Total personal consumption expenditures, in current and constant dollars, has shown an increasing trend in the past two decades. In 2012 both statistics decreased, what may be explained by the decrease in population. Food consumption expenditures in current dollars show an increasing trend, but have been decreasing in constant dollars, with the exception of 2011 and 2012. Consumers spent a slightly higher percentage of personal income in food in the last two years. In terms of per capita personal food consumption expenditures, the decreasing trend shown in constant dollars, stopped in 2011. In 2012, food consumption expenditures were \$161.8 per person.

**Table 3**  
**PERSONAL CONSUMPTION EXPENDITURES, PERSONAL FOOD CONSUMPTION EXPENDITURES AND PER**  
**CAPITA PERSONAL FOOD EXPENDITURES**  
**(selected years current and constant 1954 dollars)**

		Year						
		1990	1995	2000	2005	2010	2011	2012p
Current	Personal Consumption Expenditures (in millions of dollars)	21,227	27,774	37,553	49,805	60,414	62,075	60,968
	Personal Food Consumption Expenditures (in millions of dollars)	3,779	4,296	5,099	6,535	8,560	8,850	8,925
	Food/Total (%)	17.80	15.47	13.58	13.12	14.17	14.26	14.64
	Per Capita Food Consumption Expenditures (in dollars)	1,071	1,167	1,336	1,710	2,300	2,387	2,434
Constant	Personal Consumption Expenditures (in millions of dollars, 1954=100)	5,513	6,532	8,250	9,538	9,685	9,805	9,774
	Personal Food Consumption Expenditures (in millions of dollars, 1954=100)	776.5	660.9	563.8	567.6	561.3	574.3	593.5
	Food/Total (%)	14.09	10.12	6.83	5.95	5.80	5.86	6.07
	Personal Per Capita Food Consumption Expenditures (in 1954 dollars)	220.2	179.4	147.7	148.5	150.8	155.5	161.8

Source: Puerto Rico's Planning Board, "Informe Económico al Gobernador", selected years

p: preliminary data



## EXTERNAL TRADE

Puerto Rico's economy has been characterized by a relatively high volume and magnitude of external trade, leading some to conclude it can be denominated as an open economy. The agricultural sector has historically been dedicated to producing for export market rather than for domestic consumption. That has been the case of crops such as sugar cane, coffee and tobacco. Since their decline, production has diversified. Nevertheless, the reduction in total physical production has resulted in a gap between production and consumption that has been filled by imports. Exports of agricultural products has been decreasing while exports of food products shows an increasing trend (Table 4). Imports of agricultural products and food products have increased at a higher rate than exports. Food exports surpass food imports due to the activity of the food industry in Puerto Rico.

A high proportion of staples in the Puertorrican diet are imported from other countries, Official estimates of the proportion of imports as part of total consumption vary by type of food product (Table 5). Food components of a typical diet such as meats, eggs, potatoes and other starchy foods, rice, beans and sugar are mostly of foreign origin. Official figures show that in 2007 an estimated 83 percent of all food groups in fresh and frozen form, consumed by our population are imported.

**Table 4**  
**AGRICULTURAL PRODUCTS AND FOOD IMPORTS AND EXPORTS**  
**(fiscal years 1990-2012, in millions of dollars)**

		Year						
		1990	1994	2000	2005	2010	2011	2012p
<b>Exports</b>	<b>Farm Products</b>	105.7	75.4	89.6	39	50.3	41.2	52.7
	<b>Food</b>	2703	2,764	3,746	3,626	3,611	3,980	3,670
<b>Imports</b>	<b>Farm Products</b>	251.7	463.4	448.2	496.3	511.3	539.6	530.7
	<b>Food</b>	2,083	1,609	1,821	2,163	2,988	3,178	3,385

Source: Puerto Rico's Planning Board, "*Informe Económico al Gobernador*," selected years

p: preliminary data

**Table 5**  
**IMPORTS AS PERCENTAGE OF ESTIMATED CONSUMPTION OF SELECTED**  
**AGRICULTURAL PRODUCTS\*: BY FOOD GROUP IN PUERTO RICO, 2007**

Food Group	Imports/Estimated Consumption (%)
<b>Milk and dairy products</b>	<b>53</b>
Milk and cream	17
<b>Coffee/Chocolate/Tea</b>	<b>78</b>
Coffee	36
<b>Meats</b>	<b>73</b>
Chicken meat	77
Beef	85
Pork meat	90
<b>Chicken Eggs</b>	<b>63</b>
<b>Fish and Sea foods</b>	<b>94</b>
<b>Soups and Spices</b>	<b>94</b>
<b>Oils and Fats</b>	<b>100</b>
<b>Cereals</b>	<b>100</b>
Rice	100
<b>Sugar</b>	<b>98</b>
<b>Starchy Products</b>	<b>65</b>
Plantains	0
Green bananas	0
Sweet potato	94
Yams	87
Tanier	91
Potatoes	100
<b>Vegetables</b>	<b>73</b>
Squash	1
Tomatoes	51
Peppers	50
Onions	73
<b>Legumes</b>	<b>98</b>
Pigeon Peas	82
Beans (dry)	99
<b>Fruits</b>	<b>95</b>
Fresh pineapple	89
<b>Total</b>	<b>83</b>

Source: Puerto Rico's Department of Agriculture, Agricultural Statistics Office, "Anuario Estadístico", selected year.

\* Only fresh and frozen: based at farm weight



### PART III. CHARACTERIZATION OF THE AGRICULTURAL SECTOR (NAICS 11 Agricultural, Forestry, Fishing and Hunting)

Natural capital such as space, soil organic nutrients, minerals and microorganisms, wind, CO<sub>2</sub>, water, solar radiation, pollinizing insects and birds among other environmental and natural resources, is an essential economic resource or input in the agricultural production function. Data on land in farms and in cultivated cropland show a decreasing trend through the years (Table 6). In 1950 a total of 1,844,886 cuerdas were in farms. Fifty seven years later the total land surface dedicated to agriculture has been reduced by over one million cuerdas to 557,530 cuerdas. Preliminary Census data show a further decrease to 584,985 in 2012. The number of farms has also decreased during the same period to 15,745 farms in 2007 and 13,159 farms in 2012, less than a third of the number in 1950. The average farm size showed a slight increase, 44.5 cuerdas, as a result of the change in the two variables, larger percentage wise for total land area.

**Table 6**  
**INDICATORS OF THE STRUCTURE OF AGRICULTURE 1992-2012**

	1992	1997	2002	2007	2012
Number of Farms	22,350	19,951	17,659	15,745	13,159
Land in farms (cdas)	826,893	865,478	690,687	557,530	584,985
Proportion in farms (%)	36.7	24.7	30.6	38.4	25.9
Land in use (cdas)	272,596	533,081	453,433	392,728	433,563
Average farm size (cdas)	37	43.4	39.1	35.4	44.5

Source: 2012, 2007 and 2002 Agricultural Census, USDA, NASS

Agriculture shares some characteristics with the model of a competitive market structure. The number of buyers and producers is large relative to the market. Farm size measured by physical extension (cuerdas) and value of sales is relatively small. Almost three quarters (74. 5%) of farms are in the group with annual sales of \$10,000 or less (Table 7). Market concentration is not perceivable. The tenure of the majority (72.4%) of farm business is individually owned by locals and they are legally organized (88.7%) as individual business (Table 8). Corporate farming makes up less than four percent of farms. Farmers' average age is 59 years old, showing an increase relative to previous censuses. The young and beginning farmers' age groups, under 25 years and 25-34 years had the highest rates of decrease in the period (Table 9). When distributed by years of experience as farmers, more than half have been in the farm business for 10 or more years (Table 10).

**Table 7**  
**NUMBER OF FARMS BY VALUE OF SALES 1997- 2012**

Value of sales Group	Number of Farms			
	1997	2002	2007	2012
Less than \$10,000	14,481	13,154	11,729	8,718
\$10,000 to \$59,999	5,670	4,655	4,119	2,658
\$60,000 or more	1,452	1,287	1,208	1,366
<b>Average Value of Sales</b>	<b>29,707</b>	<b>32,932</b>	<b>32,752</b>	<b>n/a</b>

Source: 2012, 2007 and 2002 Agricultural Census, USDA, NASS

**Table 8**  
**TENURE AND LEGAL ORGANIZATION OF FARM BUSINESS 1992-2007**

	1992	1997	2002	2007	2012
<b>Tenure</b>					
Individual (#)	17,759	15,620	13,693	11,402	9,362
(%)	79.5	78.3	77.5	72.4	71.2
Part owners (#)	2,218	2,207	2,331	1,918	1,918
(%)	9.9	11.1	13.2	12.2	14.6
<b>Legal Organization</b>					
Individual (#)	19,911	17,887	15,843	13,958	11,938
(%)	89.1	89.7	89.7	88.7	90.7
Asociation (#)	288	211	162	49	117
(%)	1.3	1.1	0.9	0.3	0.9
Corporation (#)	382	437	595	575	738
(%)	1.7	2.2	3.4	3.7	5.6
Other (#)	1,769	1,416	1,059	1,163	366
(%)	7.9	7.1	6	7.4	2.8

Source: Source: 2007 and 2002 Agricultural Census, USDA, NASS, selected years

**Table 9**  
**FARMERS BY AGE GROUPS 1997-2012**

Year	Age Group							Average age
	Under 25 years	25-34 years	35-44 years	45-54 years	55-64 years	65 years and over	Not reported	
2012	20	487	1,369	2,936	3,612	4,735		59.0
2007	93	627	2,062	3,323	3,370	5,301	969	58.2
2002	21	873	2,001	3,672	5,477	5,615		58
1997	67	958	2,499	4,484	5,796	6,147		57.4
1992	170	1,348	3,887	5,177	5,191	6,577		55.7

Source: 2012, 2007 and 2002 Agricultural Census, USDA, NASS, selected years

**Table 10**  
**FARMERS BY YEARS OPERATING PRESENT FARM 1997-2007**

YEAR	Years Operating the Farm				
	Less than 2 years	2 to 4 years	5 to 9 years	10 years or more	Not reported
2012	773	1,339	2,437	8,610	
2007	1,055	1,428	2,302	9,427	1,533
2002	626	2,251	2,601	10,235	1,946
1997	611	2,102	3,469	12,095	1,674
1992	2,332	3,348	3,811	11,931	928

Source: 2007 and 2002 Agricultural Census, USDA, NASS

Gross Farm Income (GFI), used to gauge farm income for policy purposes, is the monetary and non-monetary income received by farm operators. Its main components include cash receipts from the sale of farm products, government payments, other farm income (such as income from custom work), value of food and fuel produced and consumed on the same farm, rental value of farm dwellings, and change in value of year-end inventories of crops and livestock. It has behaved in a similar pattern to GDP-A (Table 11). Value of farm sales or cash receipts from sales of farm products still represents over 90% of total GFI although state and federal subsidies have increased their share (Figure 1).

**Table 11**  
**GROSS FARM INCOME BY SOURCE/SUBSECTOR 1950-2012**  
(thousands of dollars)

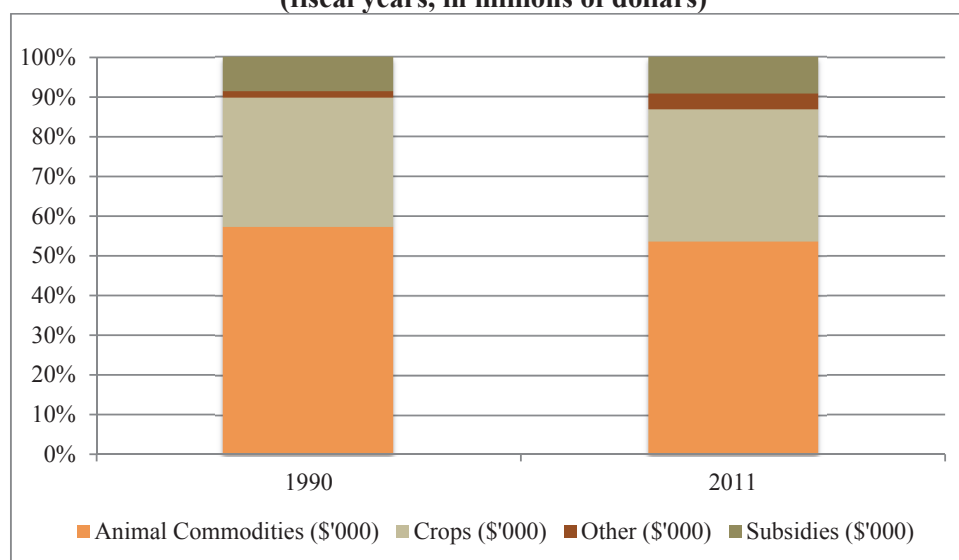
	1950	1960	1970	1980	1990	2000	2005	2010	2011	2012p
<b>GFI</b>	199,805	251,183	286,652	590,149	725,146	721,400	793,600	821,800	789,500	784,500
<b>Crops (\$)</b>	147,919	157,151	115,217	204,868	235,202	231,109	323,143	286,643	261,863	n/a
<b>Crops (%)</b>	74.03	62.60	40.20	34.70	32.40	32.30	40.31	36.30	33.20	n/a
<b>Animal Prod (\$)</b>	50,400	90,800	146,500	336,100	416,795	390,767	383,669	391,756	423,323	n/a
<b>Animal Prod (%)</b>	25.20	36.10	51.10	56.95	57.50	54.60	47.87	49.70	53.60	n/a
<b>Sea Food (\$)</b>	n/d	n/d	n/d	6,875	10,629	11,730	10,497	5,966	6,134	n/a
<b>Sea Food (%)</b>	n/d	n/d	n/d	1.20	1.50	1.60	1.31	0.80	0.70	n/a
<b>Inventory Change (\$)</b>	n/d	4,833	3,046	2,278	1,537	500	22,852	24,748	24,833	n/a
<b>Inventory Change (%)</b>	n/d	1.90%	1.06%	0.39	0.21	0.07	2.85	3.10	0.34	n/a
<b>Subsidies (\$)</b>	1,480	3,181	24,953	42,257	62,520	81,710	61,399	79,813	73,643	n/a
<b>Subsidies (%)</b>	0.74	1.30	8.70	7.20	8.60	11.41	7.66	10.10	9.30	n/a

Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income selected years

n/a: data not available

p: preliminary data

**Figure 1**  
**GROSS FARM INCOME DISTRIBUTION 1990 AND 2011P**  
(fiscal years, in millions of dollars)



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income selected years  
p: preliminary data

As illustrated by the Index of Physical Volume estimated by the Puerto Rico Department of Agriculture, Table 12, agricultural production showed an almost similar level to the base year (FY60-FY63) until the early 1990s (Figure 2). Starting in 1993 the agricultural sector total product has been decreasing due to a constant decrease in both subsectors, crops and animal products (Figure 3). The biggest reduction has been in crops which showed in 2010 a level of production that was 20.26 percent of production in the base year. Traditional crops such as sugar cane and

molasses, which were declining since 1990, disappeared completely in 2002 and tobacco production was not reported in 1990. Other crops (coffee, starchy roots, fruits, vegetables and legumes, ornamentals) have increased their share in total agricultural production but never reaching the levels that the historically traditional crops had in the past. Animal products or livestock production presents a trend to increase from the base year until 1990, reaching its peak which was twice the level of total agricultural production. Since then, livestock production has been decreasing at a similar rate to crop production.

**Table 12**  
**AGRICULTURAL PRODUCTION: INDEX OF PHYSICAL VOLUME 2000-2010P**  
**(Fiscal Year, 1959/60-962/63=100)**

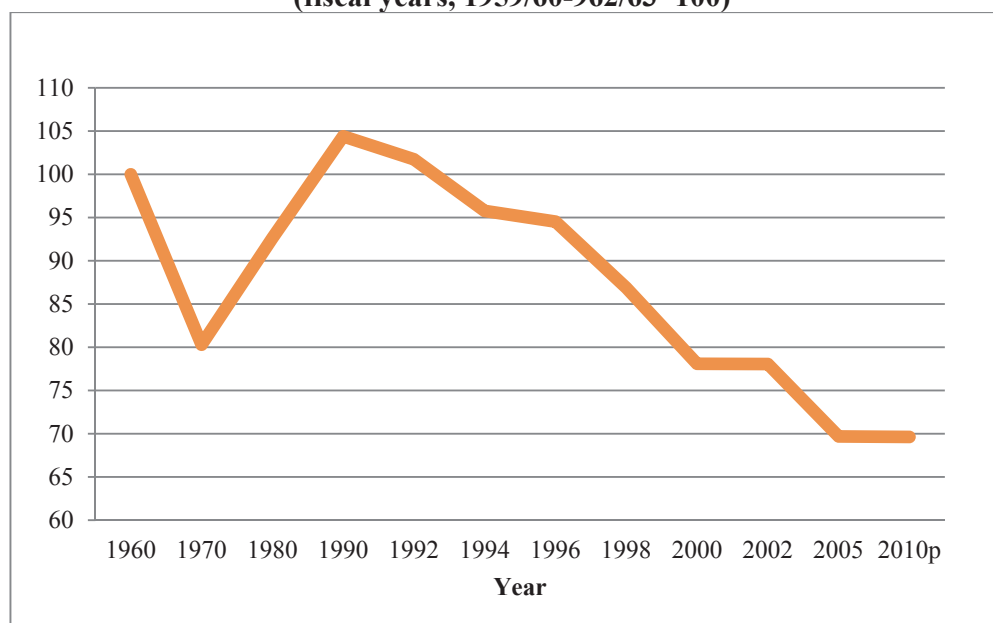
	Year								
	1990	1992	1994	1996	1998	2000	2002	2005	2010p
Total Agriculture	104.40	101.74	95.77	94.53	86.88	78.09	78.06	69.69	69.63
Crops	49.11	47.9	42.43	44.77	30.89	29.26	7.03*	22.51	20.26
Livestock	204.10	198.55	191.48	183.49	186.59	165.78	165.05	154.92	158.99

Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income selected years

p: preliminary data

\* Figure under revision

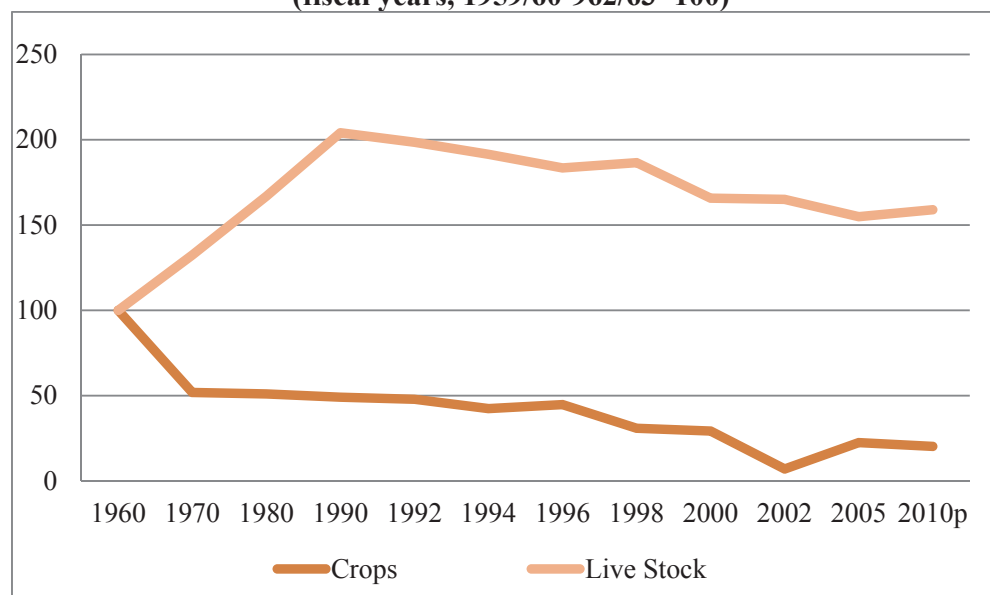
**Figure 2**  
**AGRICULTURAL PRODUCTION: INDEX OF PHYSICAL VOLUME 1960-2010P**  
**(fiscal years, 1959/60-962/63=100)**



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income selected years

p: preliminary data

**Figure 3**  
**CROPS AND LIVESTOCK PRODUCTION: INDEX OF PHYSICAL VOLUME 1960-**  
**2010P**  
**(fiscal years, 1959/60-962/63=100)**



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income (GFI) fiscal years  
 p: preliminary data

## EMPLOYMENT OF HUMAN RESOURCES

The number of persons employed in farms has been decreasing since the 1950s (Table 13). From a high figure of over one third of total employment in the first half of the 20th century, it stabilized in 2% by the 2010s (Figure 4). Various economic factors that may have contributed to the trend and mobility of human resources out of the agricultural sector in the 1950s to 1980s such as higher wages and rising opportunities for jobs in other economic sectors, especially in urban settings, lower minimum wages in most farm activities, ineligibility to receive federal transfer payments such as food assistance and housing subsidies for workers making an income, among other. Some sociological factors such as perception and image of agriculture as a backward activity, tough conditions of the field work and physical effort required from workers, and discouraging messages about staying in the farm may have played a role in the movement of the human resources out of agriculture. The human resources employed in agriculture are qualitatively different from those employed in the 1950s. Formal and informal education has built human capital, increasing marginal product of the workers. Agricultural and management practices used in the farm which have arrived with the adoption of new technologies have substituted labor with physical capital and higher yielding natural capital such as selected breeds, new seeds, varieties and races resistant to pests and diseases.

Agricultural activities require less human resources in the farm through time as the sector and the whole economy develop. It releases human resources which can be employed in other sectors and promotes employment creation as a secondary effect, in agribusiness (food industry, bio-industry), commerce, and transportation activities.

**Table 13**  
**TOTAL AND AGRICULTURAL EMPLOYMENT, FISCAL YEARS**  
**(in thousands of persons 16 years and older)**

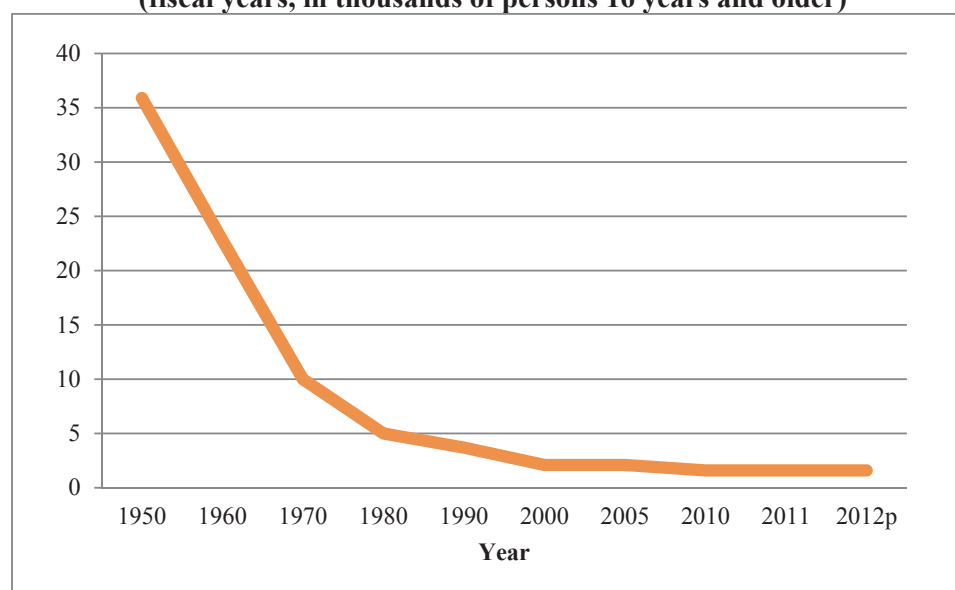
	Year					
	1990	2000	2005	2010r	2011r	2012p
<b>Total Employment</b>	963	1150	1213	1075	1047	1035
<b>Agricultural Employment</b>	36	24	25	17	17	17
<b>Agriculture/ Total (%)</b>	3.7	2.1	2.1	1.6	1.6	1.6

Source: Puerto Rico Planning Board, "Informe Económico al Gobernador", selected years

p: preliminary data

r: revised data

**Figure 4**  
**AGRICULTURAL EMPLOYMENT AS PERCENTAGE OF TOTAL EMPLOYMENT**  
**1950-2012P**  
**(fiscal years, in thousands of persons 16 years and older)**



Source: Puerto Rico Planning Board, "Informe Económico al Gobernador", selected years

p: preliminary data

## PART IV. PUERTO RICO'S AGRICULTURAL SUB-SECTORS

### AGRICULTURAL SUB-SECTORS

The following sections will present the diagnosis of production levels, prices and Gross Farm Income (GFI) for the most important agricultural commodities in Puerto Rico and those that have the highest potential to drive the development of the agricultural sector in Puerto Rico. The data presented in the following sections start with 1991 fiscal year as the base year since the goal to develop the agricultural sector in Puerto Rico should be to increase production levels to at least 1991 levels which is the year when total agricultural production started a constant descent that has not stopped as illustrated in Figure 2.

**ANIMAL PRODUCTION (NAICS 112 Animal Production and Aquaculture)**

Animal production, as a subsector, exhibits the highest Gross Farm Income (GFI) contributing in 2011 a total of 423.3 million dollars. Milk has the highest GFI with 237.1 million dollars and a share of 30.0 percent of the Total GFI. Table 14 shows the GFI for selected animal products and the percent change compared to the previous year for selected years. The highest increase of milk GFI occurred in 2011 with an 11.04 percent increase. Beef GFI in 2005 decreased by 22.25 percent, and decreased again in 2010 by 10.13 percent the following year. The decrease in income generated by beef production continued the decreasing trend, showing an increase of only by 4.3 percent in 2011. During the last two years of the period, 2010 and 2011, chicken GFI increased by 12.22 percent and 19.90 percent respectively. Income generated by pork production has been decreasing during selected years with the exception of 2000 where it increased by only 1.16 percent. Table eggs income decreased during the last two years of the period, 2010 and 2011, by 5.07 percent and 3.01 percent respectively. The other meats category includes goats, sheep, and rabbit meat. GFI for other meats presents an increasing trend, with the exception of years 1995 and 2011. The following section presents an analysis of production levels, farm prices, and GFI of selected animal commodities to show what factor determines the changes in income level.

**Table 14**  
**GROSS FARM INCOME AND PERCENT CHANGE FOR SELECTED ANIMAL**  
**COMMODITIES**  
**(in thousands of dollars, fiscal years)**

	1990	1995	2000	2005	2010	2011 <sup>P</sup>
<b>MILK</b>	\$201,588	\$195,196	\$194,383	\$184,632	\$213,537	\$237,107
<b>PERCENT CHANGE</b>	2.82	4.23	3.13	-1.38	-4.66	11.04
<b>BEEF</b>	\$49,402	\$37,130	\$28,438	\$30,002	\$24,548	\$25,604
<b>PERCENT CHANGE</b>	5.33	-11.55	-10.87	-22.25	-10.13	4.30
<b>CHICKEN</b>	\$77,416	\$94,549	\$98,626	\$82,290	\$74,392	\$89,225
<b>PERCENT CHANGE</b>	-3.90	1.54	14.91	0.75	12.22	19.94
<b>PORK</b>	\$34,679	\$25,771	\$20,968	\$23,385	\$17,101	\$16,542
<b>PERCENT CHANGE</b>	-1.38	-2.28	1.16	-9.29	-9.58	-3.27
<b>OTHER MEATS</b>	\$3,148	\$2,491	\$2,291	\$6,020	\$5,698	\$4,453
<b>PERCENT CHANGE</b>	38.50	-14.49	5.48	64.75	27.22	-21.85
<b>EGGS</b>	\$18,609	\$22,722	\$12,037	\$16,101	\$13,497	\$13,091
<b>PERCENT CHANGE</b>	-22.40	4.39	4.92	-7.28	-5.07	-3.01

Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income (GFI) fiscal years

## NATIONAL INDUSTRY OF MILK DAIRY CATTLE AND MILK PRODUCTION (NAICS 112120)

In the last decade the number of dairy farms has been continuously decreasing from 375 in 2002 to 324. In that year, the quantity produced was 276.9 million quarts of milk with an average of 855 thousand quarts per farm, Table 16. Figure 5 shows the location of dairy farms with the largest cow inventory in Puerto Rico in 2007 (NASS, 2007). Since the 1990s milk production has presented a decreasing trend, showing increases only in 2000, 2001, and 2007 (Figure 6). Although milk price is controlled by the Dairy Industry Regulation Office (ORIL, in Spanish), milk farm prices have been increasing during the last four years of the period, 2008 to 2011. Farm prices shown in this data set are the average milk price for dairy farms, which includes the regulated price paid for the established quota and the price of the milk surplus. In 2011 milk production in Puerto Rico was 280.0 million quarts while in 1991 production was 398 million quarts, representing a decrease of 118.0 million quarts. Income from milk sales in 2009 and 2011 increased due to price increases, Figure 7. In 2011 milk GFI was 237.1 million dollars and in 1990 income was 201.6 million dollars, or a 35.5 million dollar increase. This increment can be attributed to the increase of the average milk price paid to the dairy farmers.

**Table 15**  
**Quantity Produced, dairy farms, yearly and daily average production, 2002-2011**  
**(fiscal years)**

YEAR	QUANTITY PRODUCED (THOUSAND QUARTS)	NUMBER OF DAIRY FARMS	YEARLY AVERAGE QUANTITY (THOUSAND QUARTS)	DAILY AVERAGE QUANTITY
2002	367,527	375	980	2,685
2003	372,929	375	994	2,725
2004	361,587	372	972	2,663
2005	349,897	364	961	2,634
2006	333,354	353	944	2,587
2007	345,277	350	987	2,703
2008	307,914	349	882	2,417
2009	299,224	337	888	2,433
2010	283,620	330	859	2,355
2011	276,929	324	855	2,342

Source: "Informe Anual de la Industria Lechera," fiscal years

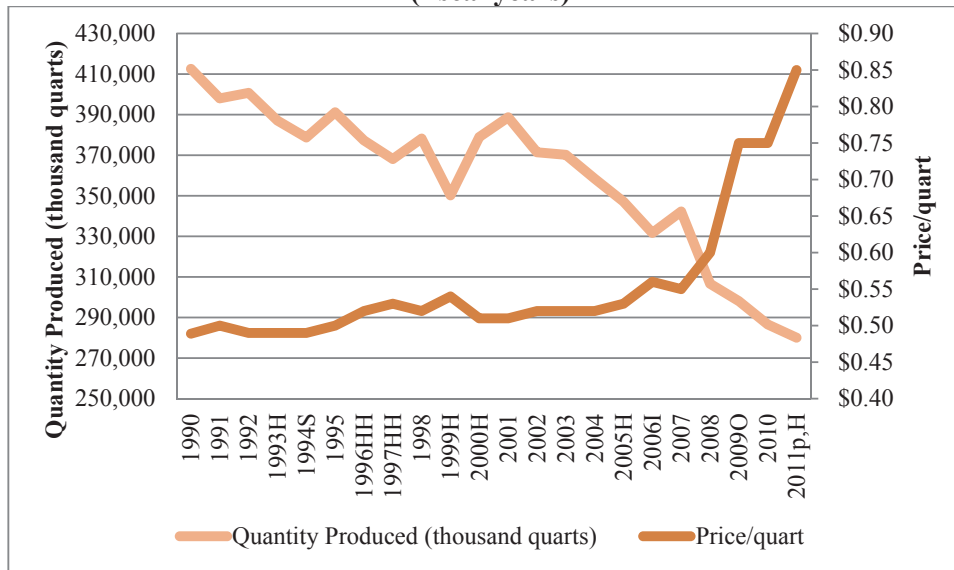
**Figure 5**  
**DAIRY FARM LOCATION IN PUERTO RICO**



Source: USDA/NASS, PR Census of Agriculture, 2007

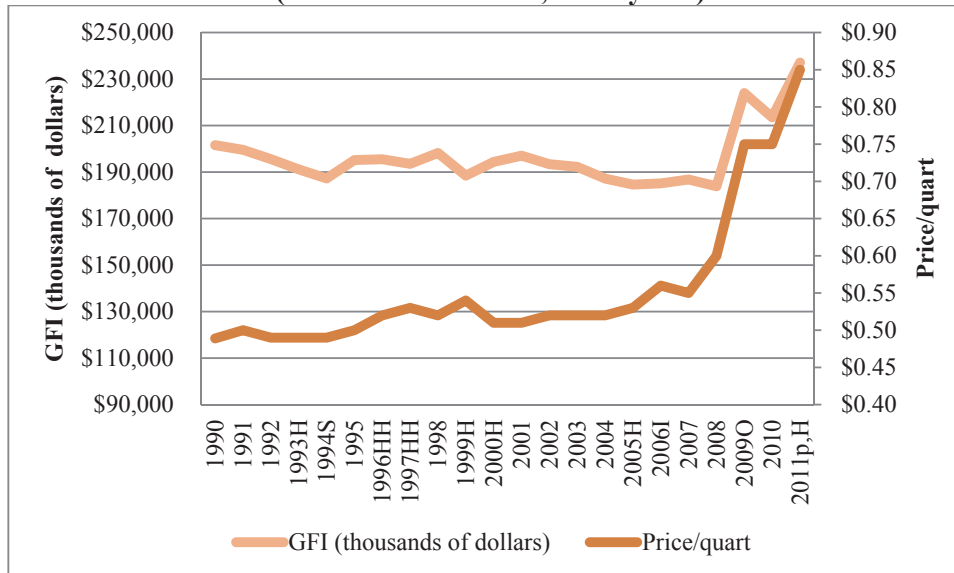


**Figure 6**  
**QUANTITY PRODUCED AND PRICE FOR MILK, 1990-2011**  
**(fiscal years)**



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income fiscal years  
p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

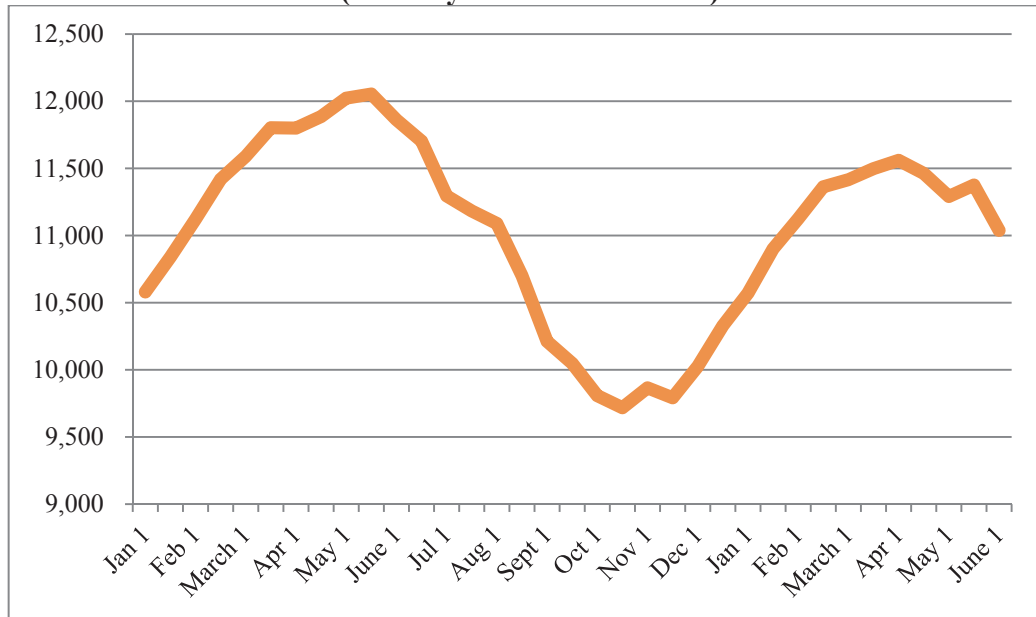
**Figure 7**  
**GFI AND MILK PRICE, 1990-2011**  
**(thousands of dollars, fiscal years)**



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income fiscal years  
p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

Holstein dairy cattle are the most common breed used by dairy farms in Puerto Rico given their characteristics, specifically their capacity to produce milk. This breed is common in temperate zones. Figure 8 shows the biweekly milk production in Puerto Rico for January 2011 to June 2012, showing a cyclical trend which can be attributed to the breed of cows used to produce milk, given that production decreases during the months with higher temperatures and increases in the months with lower temperatures.

**Figure 8**  
**BIWEEKLY MILK PRODUCTION**  
**(January 2011 to June 2012)**



Source: "Informe Anual de la Industria Lechera," selected years

#### **NATIONAL INDUSTRY OF BEEF BEEF CATTLE RANCHING AND FARMING (NAICS 112111)**

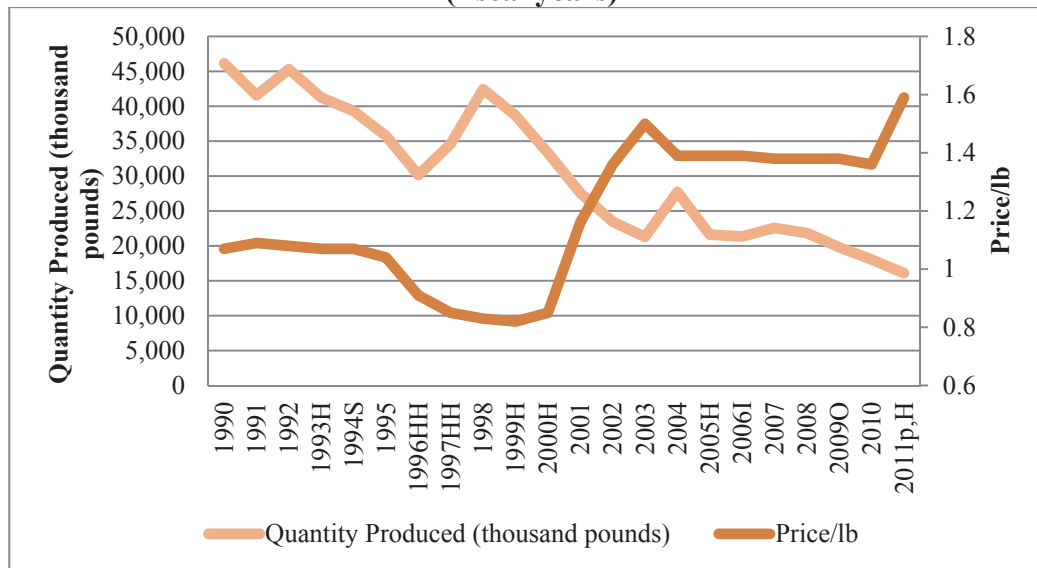
In 2007 Puerto Rico had 4,671 beef cattle (NASS, 2007) ranchers. Figure 9 shows the location of ranchers with the largest inventory of beef cattle in Puerto Rico (NASS, 2007). Beef production in Puerto Rico shows a decreasing trend during the period of 1990 to 2011, Figure 10. Beef prices at the farm level show a trend to increase from 2000 to 2003, a stabilize period from 2005 to 2010 and a higher price in 2011. Although production has been decreasing, GFI for beef ranged from 25.6 to 31.9 million dollars in the last decade which can be attributed to increase in farm prices, Figure 11.

**Figure 9**  
**BEEF RANCHERS' LOCATION IN PUERTO RICO**



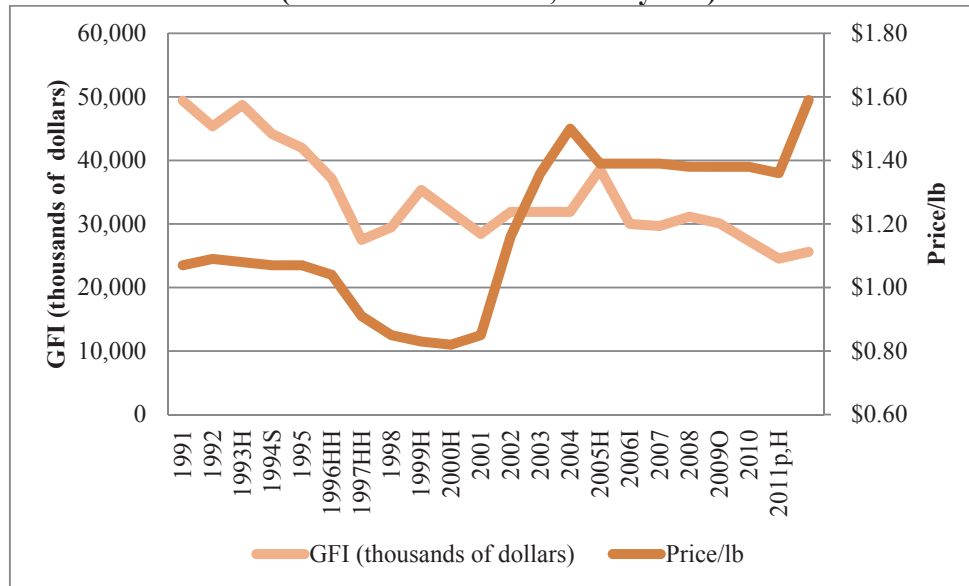
Source: USDA/NASS, PR Census of Agriculture, 2007

**Figure 10**  
**QUANTITY PRODUCED AND PRICE FOR BEEF, 1990-2011**  
**(fiscal years)**



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

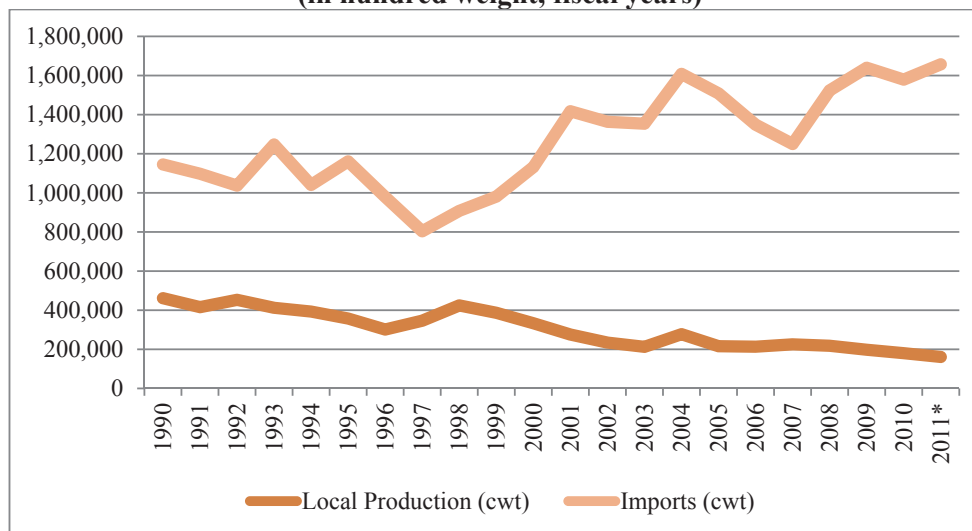
**Figure 11**  
**MARKET VALUE OF SALES AND PRICE OF BEEF, 1990-2011**  
(thousands of dollars, fiscal years)



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

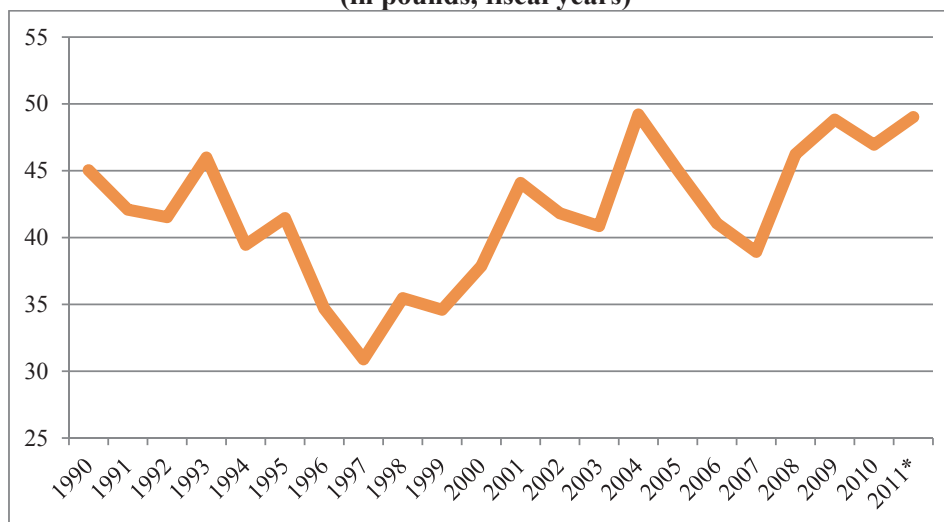
Figure 12 shows the imports and local production level of beef in Puerto Rico. While production of beef in Puerto Rico had been decreasing, imports showed an increasing trend. The gap between local production and imports has been increasing, especially during the last four years of the period. In 2011 the per capita consumption of beef in Puerto Rico was 49.02 pounds a year, Figure 13. From 1994 to 1997 per capita consumption of beef shows a decreasing trend, followed by an increasing trend until 2004. After 2007 per capita consumption started an increasing trend.

**Figure 12**  
**LOCAL PRODUCTION LEVEL VS. IMPORTS OF BEEF, 1990-2011**  
(in hundred weight, fiscal years)



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Consumption Table  
\* Preliminary data

**Figure 13**  
**ANNUAL PER CAPITA CONSUMPTION OF BEEF, 1990-2011**  
 (in pounds, fiscal years)



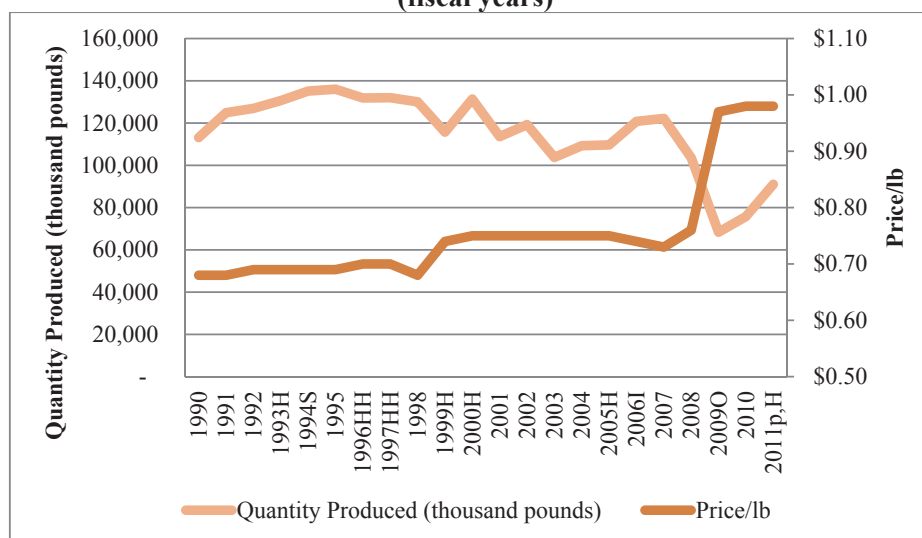
Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Consumption Table

\* Preliminary data

#### NATIONAL INDUSTRIES FOR BROILERS AND OTHER MEAT TYPE CHICKEN PRODUCTION (NAICS 112320)

Broiler production in Puerto Rico in the 1990s ranged between 124.9 and 130.1 million pounds, being the 1999 production an outlier with 115.8 million pounds, Figure 14. During that year one of the processing plants ceased operations. In 2011 Puerto Rico's total production was 91.0 million pounds representing 22.1 million pounds less than in 1990. Farm prices for broilers in the period of 1991 to 2008 ranged between \$0.68 and \$0.76 per pound, while in 2009 to 2011 price at the farm level ranged between \$0.97 and \$0.98 per pound. Figure 15 shows the market value of sales of broilers. Between 2000 and 2003, the contribution of broilers to GFI shows a decreasing trend, that stopped in 2003 and started going down again in 2007. The market value of broiler sales showed increases during the last three years of the period. The driving factor of the GFI has been the level of production.

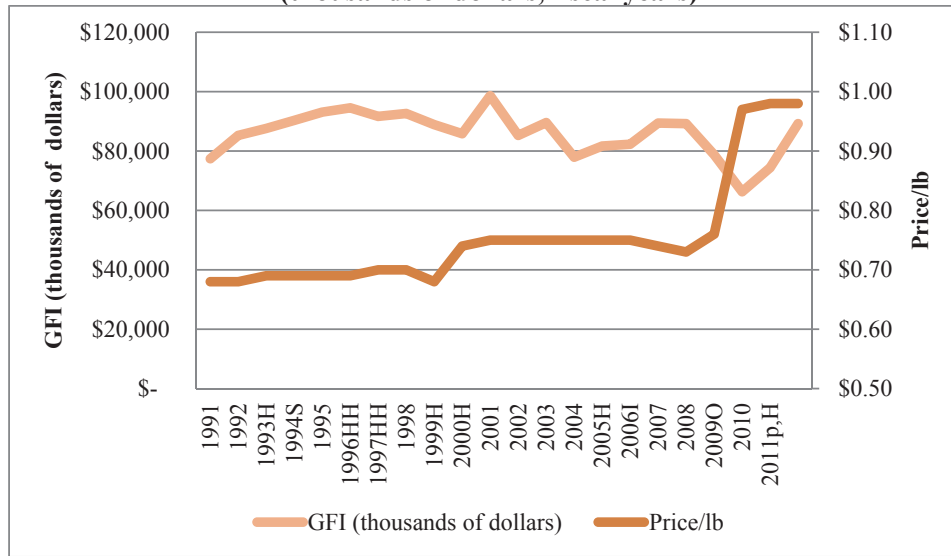
**Figure 14**  
**QUANTITY PRODUCED AND PRICE FOR BROILERS, 1990-2011**  
 (fiscal years)



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income fiscal years

p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

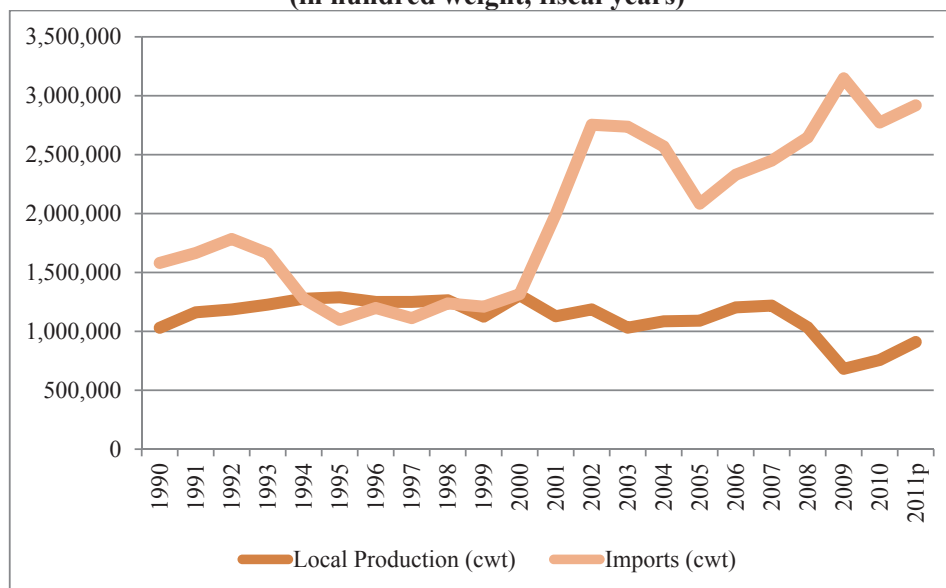
**Figure 15**  
**CONTRIBUTION OF BROILERS TO GFI AND PRICE, 1990-2011**  
(thousands of dollars, fiscal years)



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Puerto Rico Gross Farm Income, fiscal years

Figure 16 shows the imports and local production level of poultry in Puerto Rico. As mentioned before, production of chicken increased in the last three years. On the other hand, imports of chicken has been increasing since 2000, with the exception of the period 2002 to 2005 and the year 2009. The gap between local production and imports has been increasing since the year 2000 to the present. In 2011 the per capita consumption of poultry in Puerto Rico was 103.4 pounds a year, Figure 17. Per capita consumption shows an increasing trend starting in 1990, with the exception of the 2003 to 2005 period. After 2005 per capita consumption maintained its increasing trend.

**Figure 16**  
**LOCAL PRODUCTION VS. IMPORTS OF POULTRY, 1990-2011**  
(in hundred weight, fiscal years)



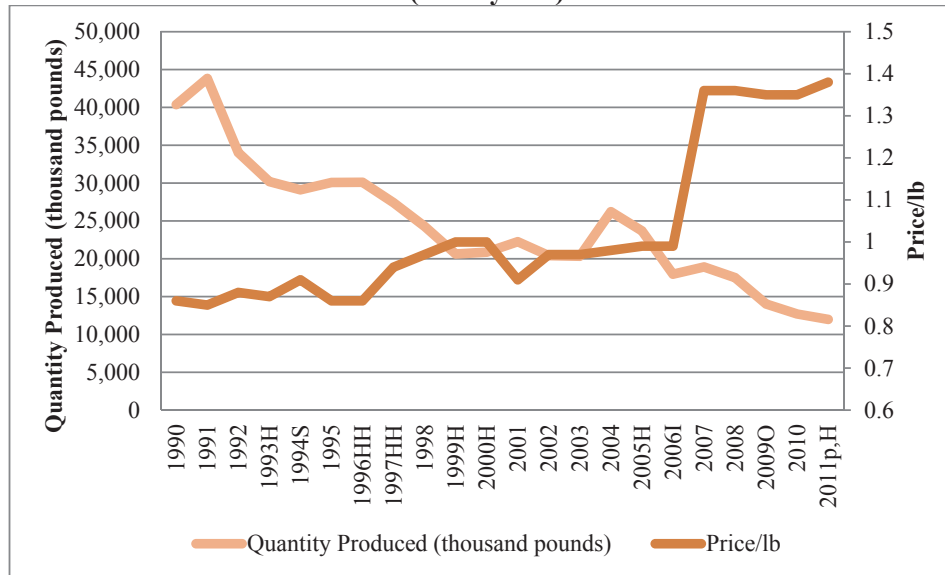
Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Consumption Table  
p: Preliminary data



In 2007 Puerto Rico had 1,513 swine farms (USDA-NASS, 2007). Figure 18 shows the location of swine producers. The largest inventory of porks in Puerto Rico is registered for year 2007. Production of hogs in Puerto Rico has been decreasing during the period 1990 to 2011, with the exception of a slight increase in 2004, Figure 19. Farm prices for pork meat ranged between \$0.85 to \$0.99 in the period of 1991 to 2004. For the rest of the period, 2007 to 2011, farm prices have ranged between \$1.35 and \$1.38. As the behavior of production, the market value of sales for hogs shows a decreasing trend, with few exceptions, Figure 20.

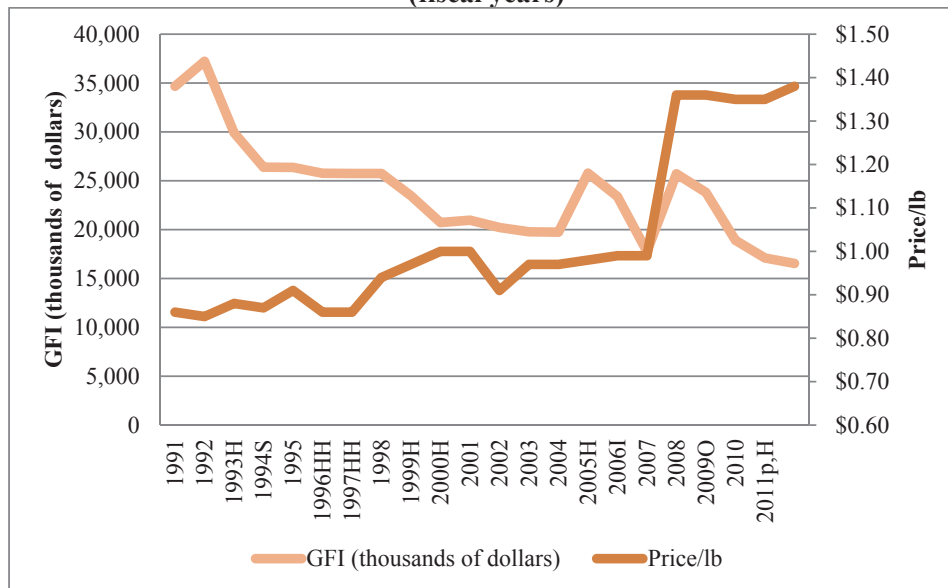
 PUERTO RICO PLANNING BOARD 23

**Figure 19**  
**QUANTITY PRODUCED AND PRICE FOR PORK MEAT**  
**(fiscal years)**



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income fiscal years  
p: preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical

**Figure 20**  
**MARKET VALUE OF SALES AND PRICE OF PIGS, 1990-2011**  
**(fiscal years)**

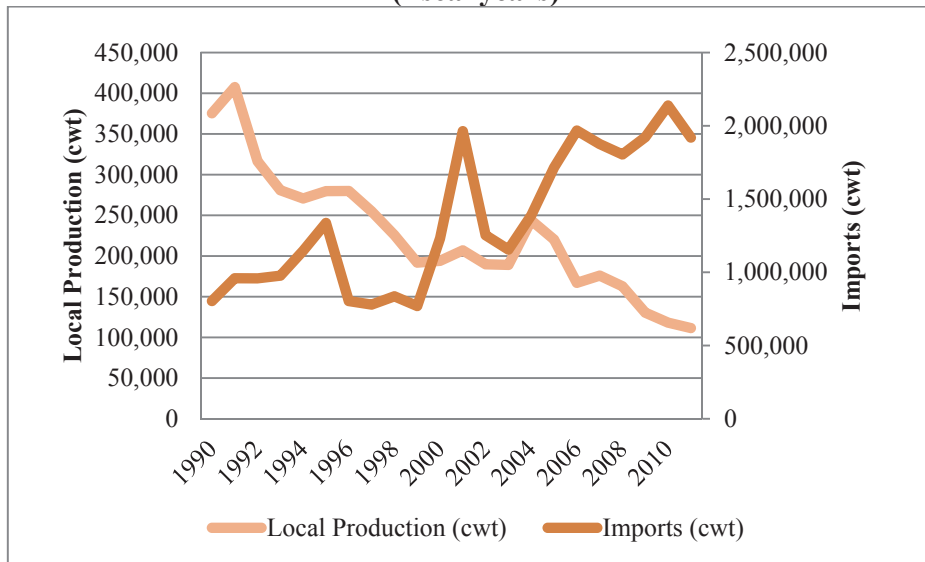


Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical

Figure 21 shows the imports and local production level of pork meat in Puerto Rico. As mentioned before, production of pork meat in Puerto Rico has been decreasing. On the other hand, import of pork meat shows an increasing trend, during these years, contributing to an increase in the gap between local production and imports since 2003. In 2011 the per capita consumption of beef in Puerto Rico was 54.68 pounds a year, Figure 22. From 2003 to 2011 per capita consumption of pork meat shows an increasing trend.

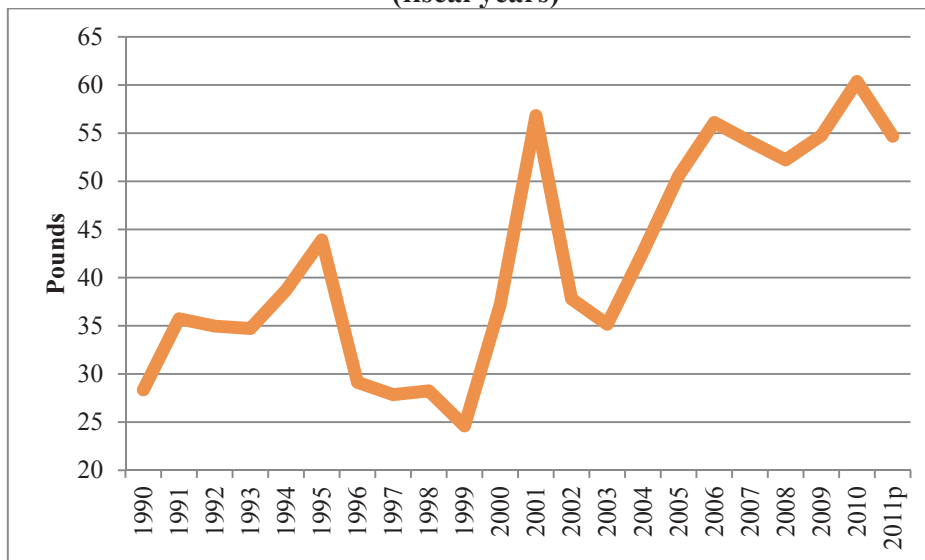


**Figure 21**  
**LOCAL PRODUCTION AND IMPORTS OF PORK MEAT, 1990-2011**  
**(fiscal years)**



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Consumption Table  
p: preliminary data

**Figure 22**  
**ANNUAL PER CAPITA CONSUMPTION OF PORK MEAT, 1990-2011**  
**(fiscal years)**

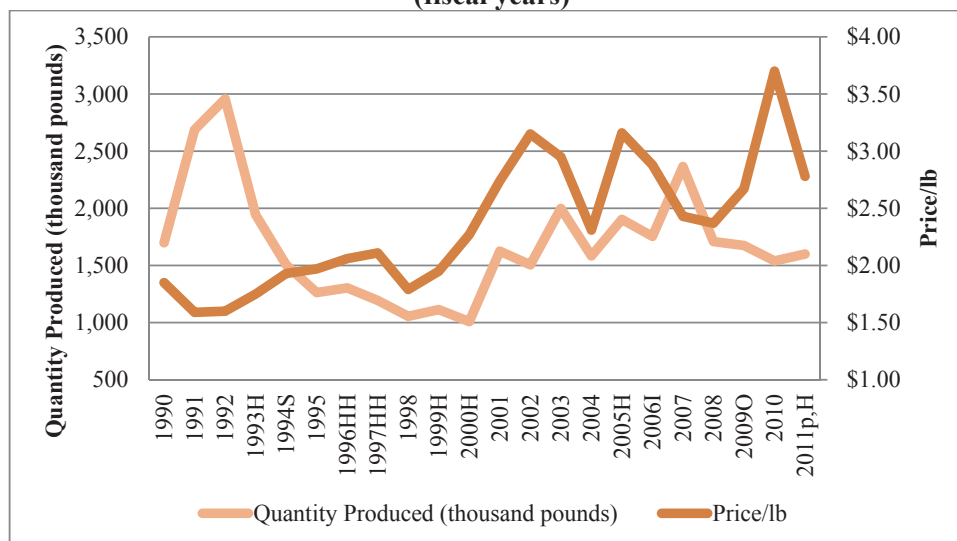


Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Consumption Table

### NATIONAL INDUSTRIES FOR OTHER POULTRY PRODUCTION (NAICS 112390) SHEEP FARMING (NAICS 112410) GOAT FARMING (112420) ALL OTHER OTHER ANIMAL PRODUCTION (NAICS 112990)

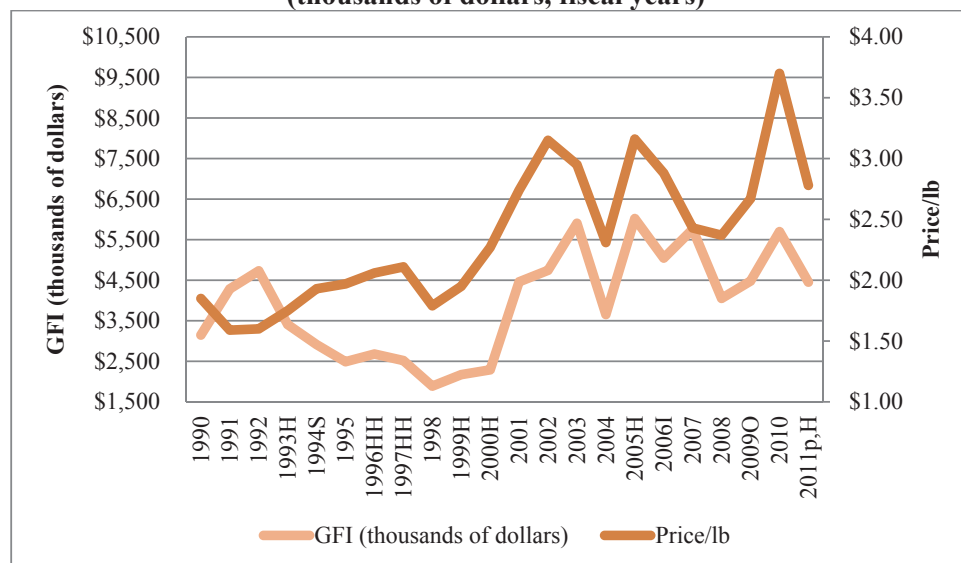
Production of other meats which includes rabbit, goats and sheep exhibited decreases during the 1993 to 2001 period, Figure 23. Starting in 2002 production increased until 2008 and after that year production of other meats has constantly decreased. Farm prices of other meats registered increases from 1993 to 2002 with the exception of the year 1998. After 2003 farm prices have been somewhat unstable, increasing and decreasing every two years. The contribution of other meats to the GFI decreased annually during the 1993 to 1998 period and increased after that until 2004, Figure 24. During the last seven years, 2004 to 2011, farm value of sales has not been stable, but has shown increases and decreases almost every other year due to changes in farm prices, Figure 24.

**Figure 23**  
**QUANTITY PRODUCED AND PRICE FOR OTHER MEATS, 1990-2011**  
**(fiscal years)**



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

**Figure 24**  
**MARKET VALUE OF SALES AND PRICE FOR OTHER MEATS, 1990-2011**  
**(thousands of dollars, fiscal years)**

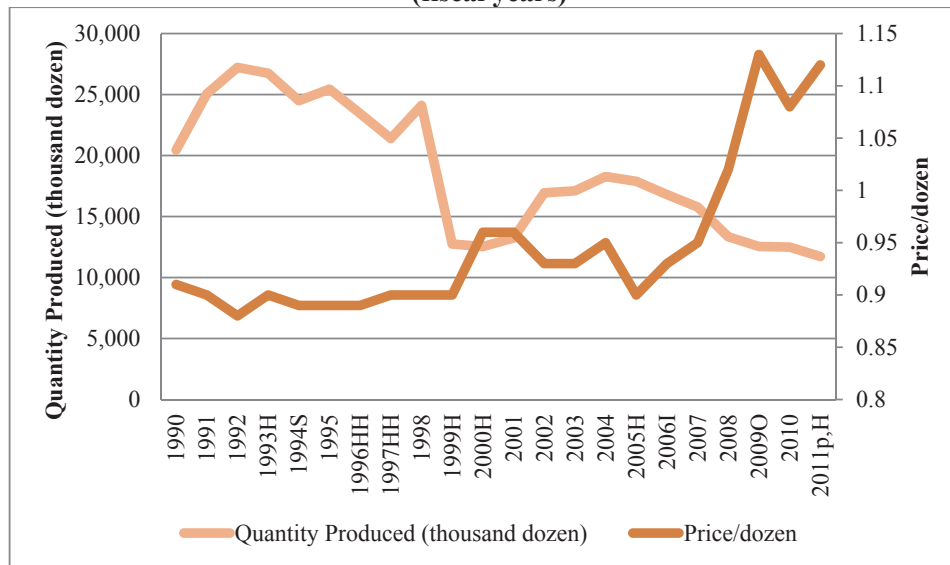


Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

## NATIONAL INDUSTRY FOR CHICKEN EGG PRODUCTION (NAICS 112310)

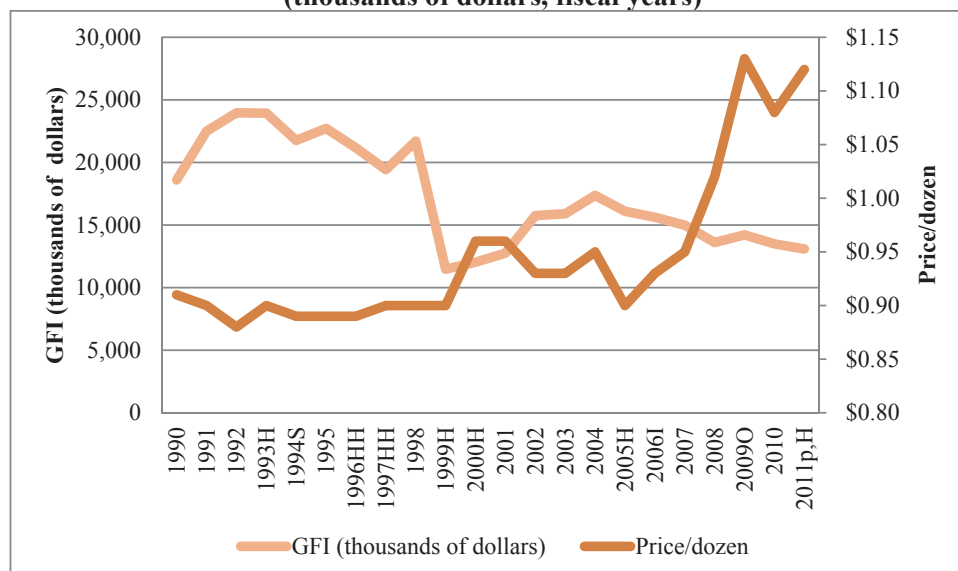
In 2011 Puerto Rico produced 11,723 thousand dozens of chicken eggs (PR Department of Agriculture, 2011), Figure 25. Chicken egg production in Puerto Rico from 1991 to 1998 ranged between 21,400 and 27,222 thousand dozens, decreasing to about half of that level in 1999. Chicken egg production is susceptible to atmospheric phenomena and extreme weather conditions; given that a drop in production happened after a hurricanes destroyed many ranches and the flock. Farm prices paid for chicken at the farm level was relatively stable from 1991 to 1999, ranging between \$0.88 and \$0.96. After this period coinciding with the drop in production levels and behaving in a similar fashion, farm prices jumped to \$1.12/doz., the maximum price, in 2011(Figure 26)

**Figure 25**  
**QUANTITY PRODUCED AND PRICE FOR EGGS, 1990-2011**  
(fiscal years)



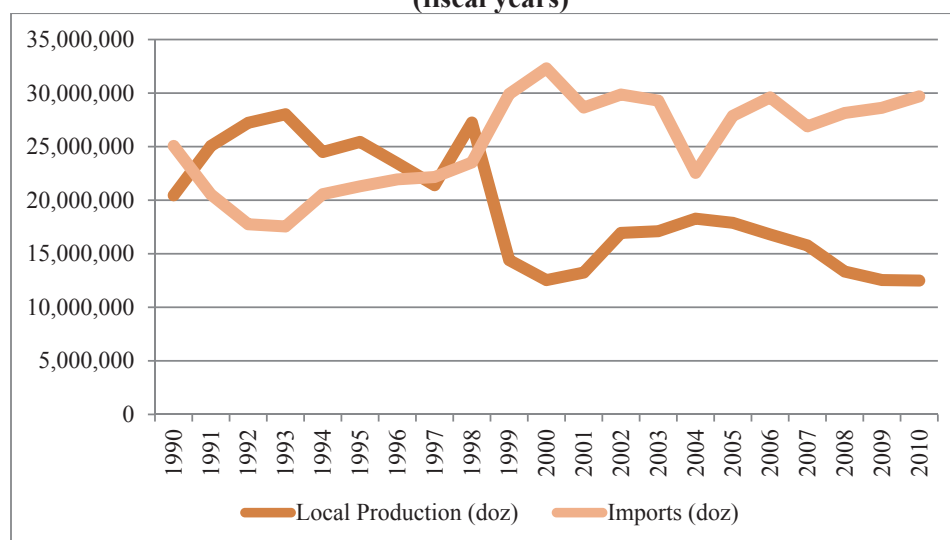
Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

**Figure 26**  
**MARKET VALUE OF SALES AND PRICE FOR CHICKEN EGGS, 1990-2011**  
(thousands of dollars, fiscal years)



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

**Figure 27**  
**LOCAL PRODUCTION VS. IMPORTS OF CHICKEN EGGS , 1990-2011**  
 (fiscal years)



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Consumption Table

## SUMMARY ANIMAL PRODUCTION

Table 16, Table 17, and Table 18 presents a comparison of the quantities produced in 1990 and 2011 for animal products: milk, beef, pork meat, poultry, chicken eggs, and other meats. All categories of animal products show a decrease during the period. Milk production decreased by 125.4 million liters. When comparing beef, pork meat, chicken and other meats, production levels also decreased by 30.0, 22.1, 28.4, and 0.99 million pounds respectively, a total of 80.6 million pounds in all the meats. Chicken egg production decreased by 160.1 million units.

**Table 16**  
**Milk production, 1990 and 2011**  
 (fiscal years)

COMMODITY	1990	2011 <sup>p</sup>	DIFFERENCE
Milk	412,582,000	265,014,154	-147,567,846
<b>TOTAL LITERS</b>	<b>412,582,000</b>	<b>265,014,154</b>	<b>-147,567,846</b>

Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years

p: Preliminary data

**Table 17**  
**Beef, chicken, pork, and other meats production, 1990 and 2011**  
 (fiscal years)

COMMODITY	1990	2011 <sup>p</sup>	DIFFERENCE
Beef	46,140,000	16,103,000	-30,037,000
Chicken	113,159,000	91,022,000	-22,137,000
Pork meat	40,371,000	11,987,000	-28,384,000
Other meats	1,699,000	1,600,000	-99,000
<b>TOTAL POUNDS</b>	<b>201,369,000</b>	<b>120,712,000</b>	<b>-80,657,000</b>

Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years

p: Preliminary data

**Table 18**  
**Chicken egg production in Puerto Rico, 1990 and 2011**  
**(fiscal years)**

COMMODITY	1990	2011 <sup>p</sup>	DIFFERENCE
Eggs	245,436,000	140,676,000	-104,760,000
<b>TOTAL UNITS</b>	<b>245,436,000</b>	<b>140,676,000</b>	<b>-104,760,000</b>

Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years

p: Preliminary data

## **CROPS SUBSECTOR OR CROP PRODUCTION (NAICS 111 CROP PRODUCTION)**

### **INDUSTRY GROUP FOR VEGETABLE AND MELON FARMING (NAICS 1112) AND FRUIT AND TREE NUT FARMING (NAICS 1113): STARCHY PRODUCTS**

The group with the highest share of Gross Farm Income (GFI) within the crops subsector are the starchy crops. Plantains and bananas have been the main contributors to the subsectors during the last two decades, Table 19 and Table 20. In 2012 the number of farms producing plantains, and taniens increased compared to 2007. Eventhough the number of farms for cassava, sweetpotato and taniens decreased, the land dedicated to grow these crops increased, rising the the average size of a farm. Although plantains have shown the highest value of sales within the group it has been decreasing since 2009. In 2011 the value of sales for plantains decreased by 33.9 percent compared to 2010 value. The contribution of bananas to GFI decreased in 2010 by 12.8 percent, while in 2011 this product reported a 21.6 percent increase. The third commodity in terms of contribution to the group's GFI was yams which registered a value of 5.2 million dollars in 2011, an increase of 285% compared with the previous year. Even with such high increase its value does not reach the levels of 1991. Another commodity that had a relatively high GFI was sweet potato, with a value of 3.0 million dollars in 1990, a decrease 20.5 percent compared to the previous year, while in 2011 it dropped to 0.71 million dollars a reduction of 77.3 percent compared to the previous year.

Table 19

## NUMBER OF FARMS, LAND IN FARMS, AND QUANTITY HARVESTED OF SELECTED STARCHY PRODUCTS, SELECTED YEARS

STARCHY PRODUCT	YEAR				
	1992	1998	2002	2007	2012
<b>PLANTAINS</b>					
NUMBER OF FARMS	6,681	7,434	6,340	4,569	4,737
LAND IN FARMS (cuerdas)	20,061	28,584	26,582	18,034	22,719
QUANTITY HARVESTED (thousands)	265,732	291,089	391,758	249,948	405,256
<b>BANANAS</b>					
NUMBER OF FARMS	4,898	4,101	3,958	2,196	1,828
LAND IN FARMS (cuerdas)	9,289	12,490	11,071	7,015	6,639
QUANTITY HARVESTED (hundred units)	322,667	328,462	360,808	373,667	295,488
<b>YAMS</b>					
NUMBER OF FARMS	1,509	1,071	995	985	565
LAND IN FARMS (cuerdas)	2,299	1,516	1,461	1,282	923
QUANTITY HARVESTED (hundred units)	75,922	53,744	69,253	70,191	42,217
<b>CASSAVA</b>					
NUMBER OF FARMS	717	354	318	243	233
LAND IN FARMS (cuerdas)	1,206	561	258	204	499
QUANTITY HARVESTED (hundred units)	9,696	11,906	12,011	11,702	34,373
<b>SWEETPOTATOES</b>					
NUMBER OF FARMS	502	327	220	438	103
LAND IN FARMS (cuerdas)	1,126	811	645	299	333
QUANTITY HARVESTED (million pounds)	82,703	41,923	42,778	23,274	40,360
<b>TANIERS</b>					
NUMBER OF FARMS	1,514	1,068	785	464	583
LAND IN FARMS (cuerdas)	1,611	1,559	734	463	492
QUANTITY HARVESTED (cwt)	22,428	32,152	21,910	2,075	15,993

Source: 2012, 2002, and 1992 Agricultural Census, USDA, NASS, selected years

Table 20

FARM VALUE OF SALES for selected starchy products  
(fiscal years)

	1990	1995	2000	2005	2010	2011 <sup>p</sup>
<b>PLANTAINS</b>	\$31,899	\$43,533	\$59,911	\$39,992	\$69,140	\$45,719
<b>PERCENT CHANGE</b>	-21.53	48.48	103.61	-29.65	-11.4	-33.88
<b>BANANA</b>	\$11,669	\$6,451	\$22,841	\$22,438	\$9,616	\$11,692
<b>PERCENT CHANGE</b>	31.38	14.21	145.12	28.19	-12.82	21.59
<b>YAM</b>	\$7,142	\$4,271	\$4,796	\$2,708	\$1,357	\$5,226
<b>PERCENT CHANGE</b>	-8.51	-11.88	48.97	-10.19	-16.17	285.07
<b>CASSAVA</b>	\$935	\$232	\$386	\$231	\$447	\$469
<b>PERCENT CHANGE</b>	-4.71	-19.13	294.69	21.55	-10.2	4.96
<b>SWEET POTATO</b>	\$3,023	\$1,144	\$1,909	\$2,509	\$314	\$71
<b>PERCENT CHANGE</b>	-8.23	-29.7	15.14	12.23	11.87	-77.33
<b>TANIERS</b>	\$2,397	\$669	\$1,211	\$2,650	\$1,183	\$793
<b>PERCENT CHANGE</b>	-99.93	1.68	48.72	13.88	-15.52	-33

p: Preliminary data

## NATIONAL INDUSTRIES FOR OTHER NON CITRUS FRUIT FARMING: PLANTAINS (NAICS 111339)

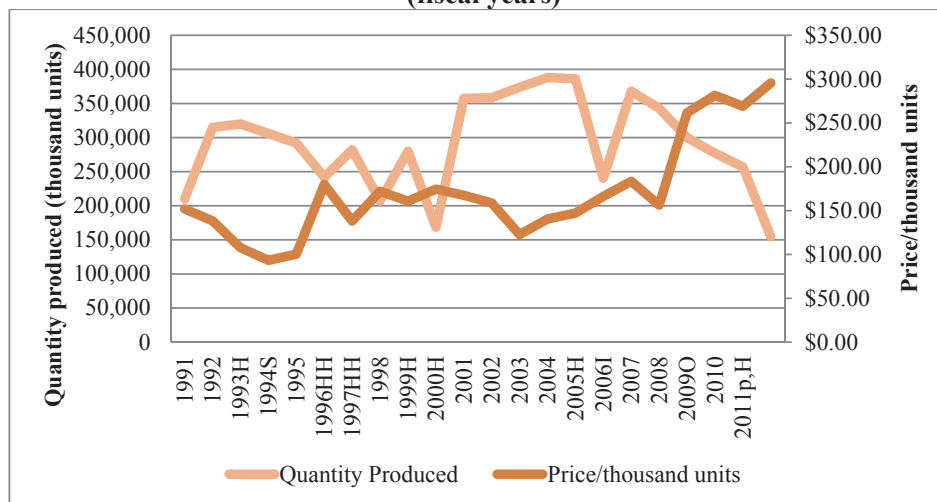
In 2012 Puerto Rico the number of farms dedicated to grow plantains was 4,737, an increase of 168 when compared to 2007 year (USDA-NASS, 2012), Table 19. Additionally, Agricultural Census shows that there was an increment in farm land dedicated to grow plantains in 2012. Figure 28 shows the towns with the highest cropland area dedicated to plantain production in Puerto Rico. During the last two decades plantain production has ranged between 154,643 and 388,086 thousand units, being the last one the maximum historic level of production, Figure 29. Plantain and bananas plants are vulnerable to winds of more than 12 mph, making these crops susceptible to hurricanes and even tropical depression or storm force winds. This fact may explain most of the variations in production during the 1990s given the fact that this decade had the most active hurricane season. That period also included two droughts. Production of plantains decreased by 55,357 thousand units between 1990 and 2011. From 2003 until 2011, farm price of plantain shows an increasing trend, with the exception of a slight decrease in 2007 and 2010. Figure 30 shows the behavior of plantain farm prices and GFI which follows the same trend, with the exception of period 1999 to 2005.

**Figure 28**  
**LOCATION OF THE TOWNS WITH THE HIGHEST CROPLAND AREA OF PLANTAINS**



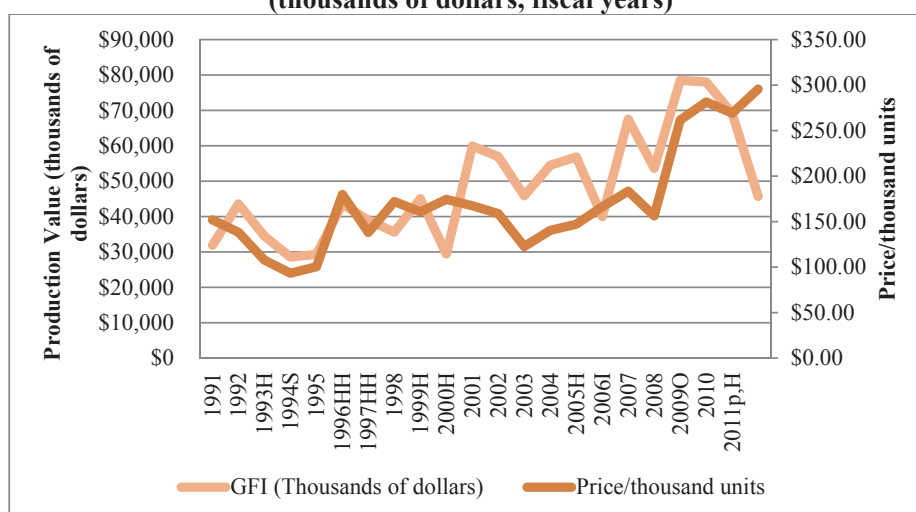
Source: USDA/NASS, PR Census of Agriculture, 2007

**Figure 29**  
**QUANTITY PRODUCED AND PRICE OF PLANTAINS, 1990-2011<sup>p</sup>**  
**(fiscal years)**



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

**Figure 30**  
**FARM VALUE OF SALES AND PRICE FOR PLANTAINS, 1990-2011p**  
 (thousands of dollars, fiscal years)

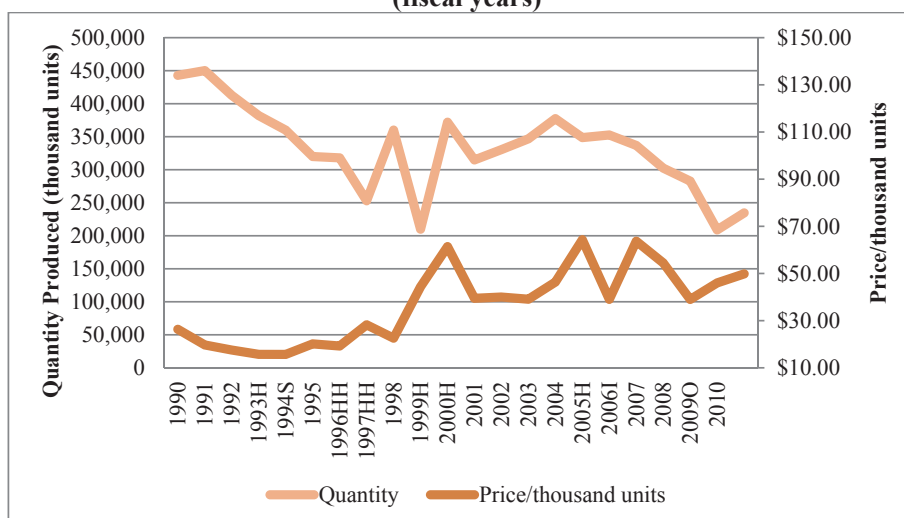


Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
 p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

### NATIONAL INDUSTRIES FOR OTHER NON CITRUS FRUIT FARMING: BANANAS (NAICS 111339)

In 1991 the production of banana was 450,010 thousand units, while in 2011 it dropped to 234,629 thousand units, a reduction of 47.9%, Figure 31. As plantains, banana are herbaceous which are also susceptible to tropical depression or storm force winds. Most plantations are located in central mountain range area making them more vulnerable due to strengths in winds. Since the 1990s decade had the most active hurricane seasons and also two drought, drastic changes in production were due to climate conditions. Banana production shows slow increases for two consecutive years, 2002 and 2003, that stopped in the period 2005 to 2010 and registered a small increase in 2011. Banana production decreased by 215,471 thousand units from 1991 to 2011. Meanwhile, the price of banana shows an increasing trend during the 1990s while during the 2000s it fluctuated in every other year. Figure 32 presents the GFI and price for bananas. The contribution of bananas to GFI was somewhat stable from 1991 to 1999 followed by an unstable period that started in 2000 until 2011 (Figure 32). The fluctuations in GFI during the 2000 to 2011 period can be explained by the movements of banana prices at the farm level.

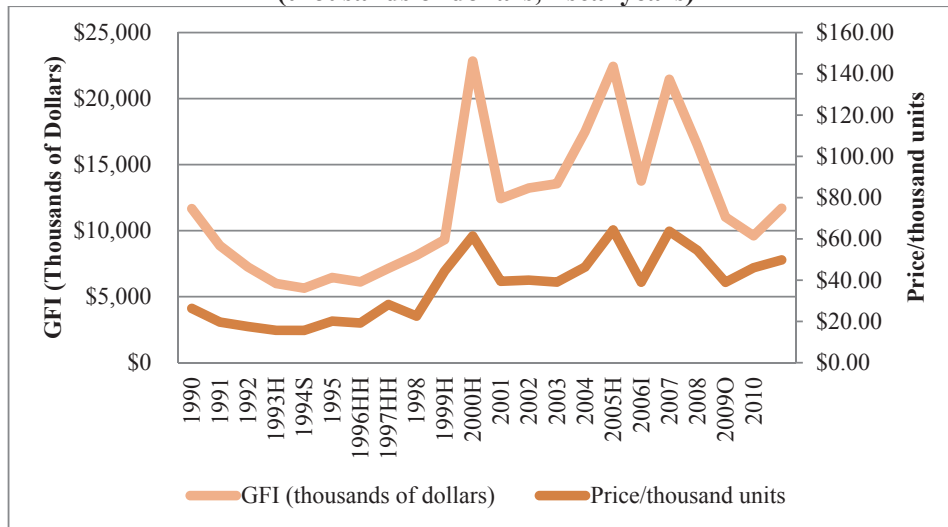
**Figure 31**  
**QUANTITY PRODUCED AND PRICE FOR BANANAS, 1990-2011**  
 (fiscal years)



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
 p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression



**Figure 32**  
**FARM VALUE OF SALES AND PRICE OF BANANAS, 1990-2011**  
 (thousands of dollars, fiscal years)

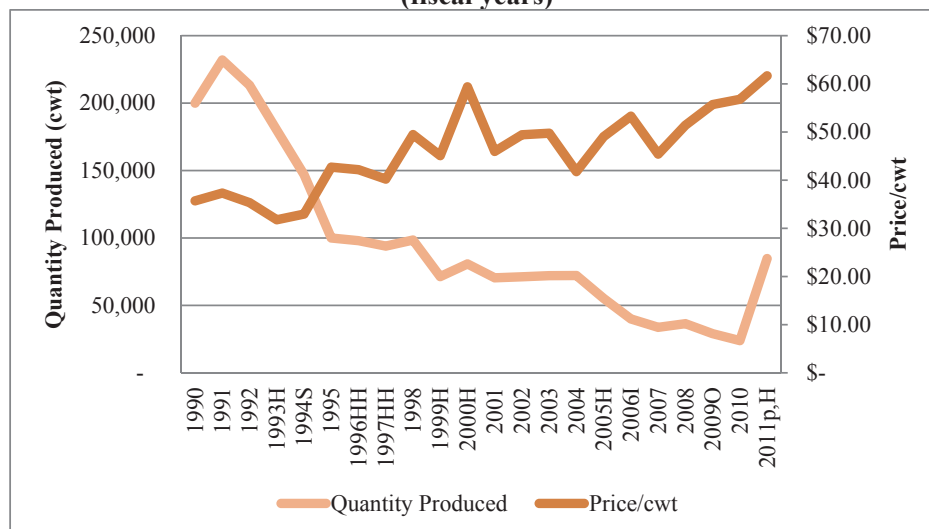


Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
 p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

### NATIONAL INDUSTRIES FOR OTHER VEGETABLE (EXCEPT POTATO) AND MELON FARMING: YAMS (NAICS 111219)

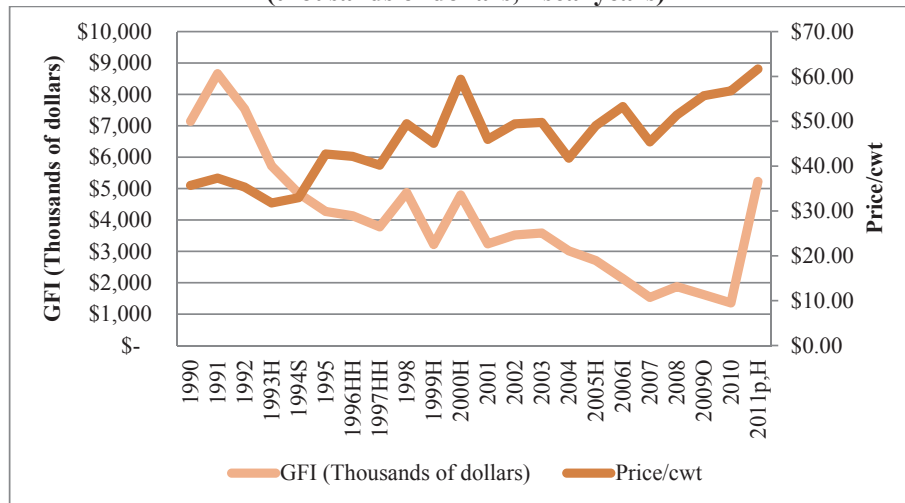
Yam production has shown a decreasing trend from 1990 to 2010, registering a drop of 189,404 hundred weight during the period, Figure 33. In 2010 production levels started showing signs of recuperation when the level of production reached 84,749 hundred weight in 2000. Yam production had decrease by 147,251 hundred weight from 1990 to 2011. Figure 33 shows increasing but fluctuating trend in farm prices. From 2008 to 2011 price stabilized and tended to increase slowly reaching the highest price of the period at \$61.67/hundred weight. Contribution of yams to GFI and price at farm level are represented in Figure 34. Farm value of sales for yams during the 1990 to 2010 period shows a decreasing trend, showing an increase 2011.

**Figure 33**  
**QUANTITY PRODUCED AND PRICE FOR YAMS, 1990-2011**  
 (fiscal years)



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
 p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

**Figure 34**  
**FARM VALUE OF SALES AND PRICE OF YAMS, 1990-2011**  
 (thousands of dollars, fiscal years)

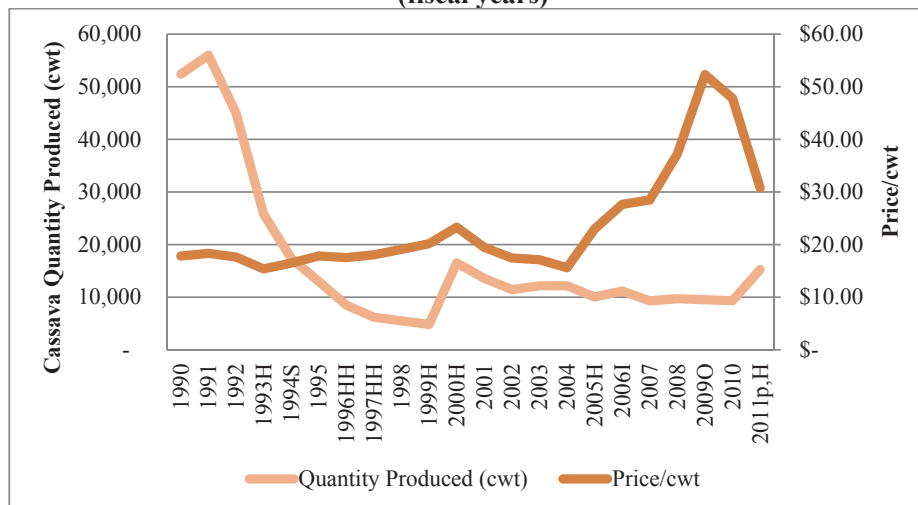


Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
 p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

### NATIONAL INDUSTRIES FOR OTHER VEGETABLE (EXCEPT POTATO) AND MELON FARMING: CASSAVA (NAICS 111219)

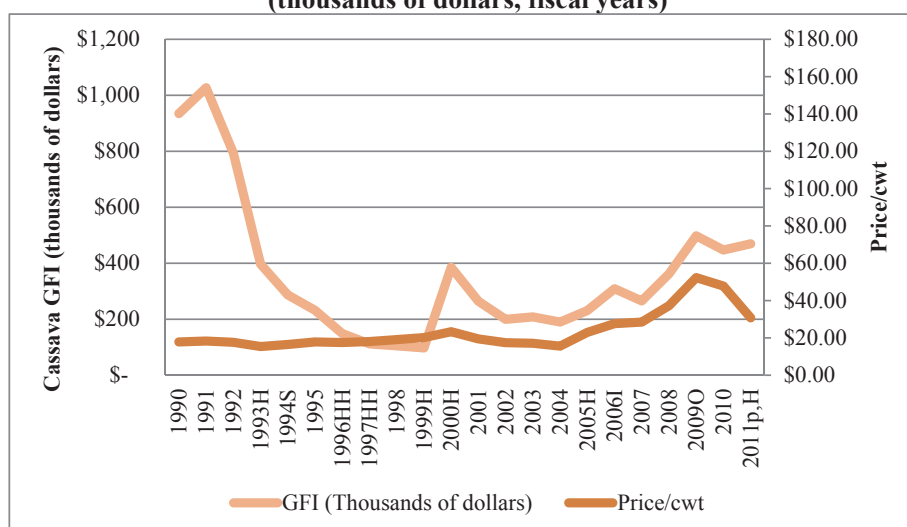
Cassava production shows a decrease during the period 1991 to 1999, Figure 35. The decrease in production can be partially explained by extreme weather conditions and atmospheric phenomena that occurred in that period. In 2000 production increase to 16,531 hundred weight. Since 2001 to 2010 production levels of cassava had remained relatively stable, ranging between 13,580 and 9,359 hundred weight. In the last year of the period, 2011, production was 15,257 hundred weight. Farm prices for cassava shows increasing trends from 1993 to 2000 and from 2004 to 2009. GFI for cassava decreased at a fast rate during 1991 to 1999, following the same behavior of production levels, Figure 36. Income from cassava sales went up sharply in 2010 and 2011 due to increases in the price and production.

**Figure 35**  
**QUANTITY PRODUCED AND PRICE FOR CASSAVA, 1990-2011**  
 (fiscal years)



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
 p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

**Figure 36**  
**FARM VALUE OF SALES AND PRICE FOR CASSAVA, 1990-2011**  
 (thousands of dollars, fiscal years)

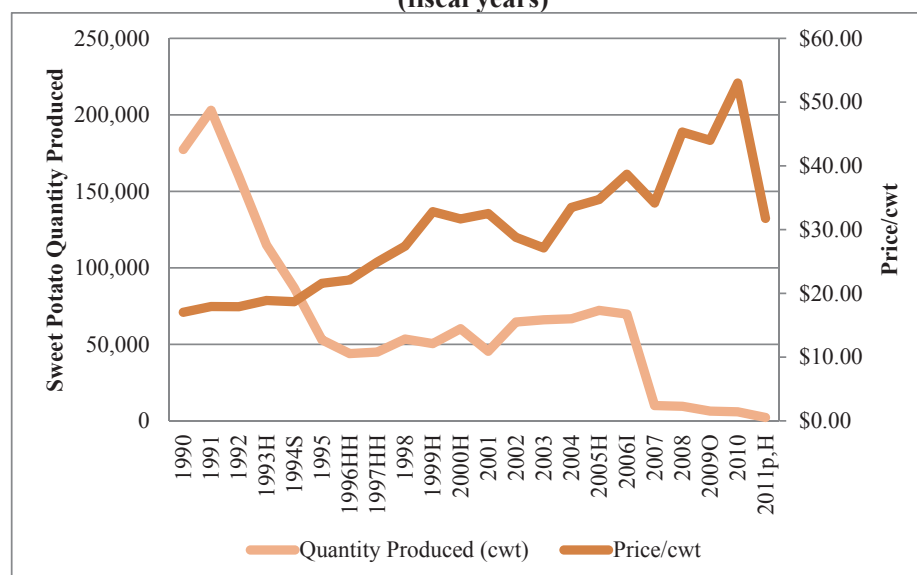


Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
 p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

### NATIONAL INDUSTRIES FOR OTHER VEGETABLE (EXCEPT POTATO) AND MELON FARMING: SWEETPOTATO (NAICS 111219)

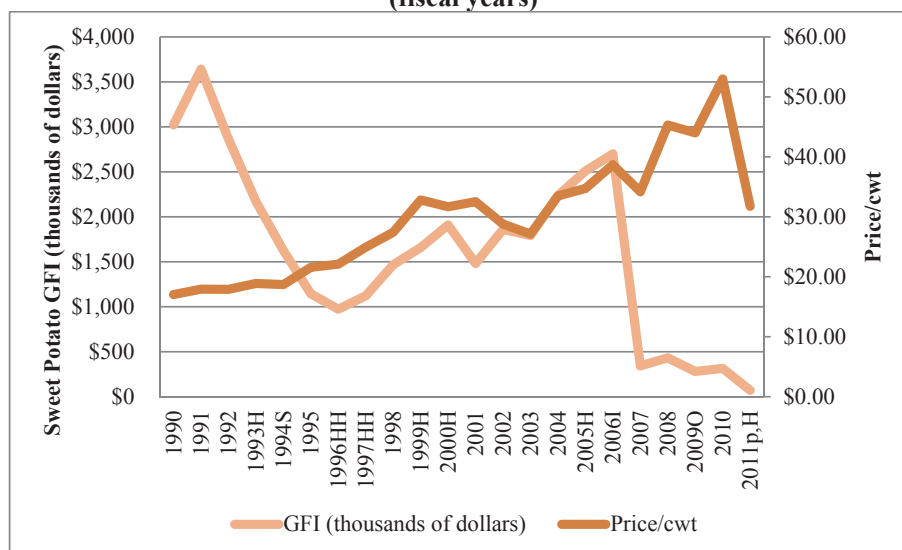
During the 1990s, production of sweet potatoes declined very rapidly especially from 1990 to 1996, Figure 37. From 1996 to 2006 fluctuation were not very notizable, so the levels were relatively stable. During 2006 to 2011 decreased again reaching the lowest production level in 2011 with only 2,244 hundred weight. Although, farm prices for sweet potatoe shows an increasing trend, prices were not high enough to encourage farmers to increase their production level. Income from sweet potato sales decreased for the first six years of the 1990s and from 2007 to 2011, Figure 38. GFI decreased from 3.6 million dollars to 71 thousand dollars, 3.5 million dollars less when 1991 and 2011 are compared.

**Figure 37**  
**QUANTITY PRODUCED AND PRICE FOR SWEETPOTATOE, 1990-2011**  
 (fiscal years)



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
 p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

**Figure 38**  
**FARM VALUE OF SALES AND PRICE FOR SWEETPOTATOE, 1990-2011**  
 (fiscal years)

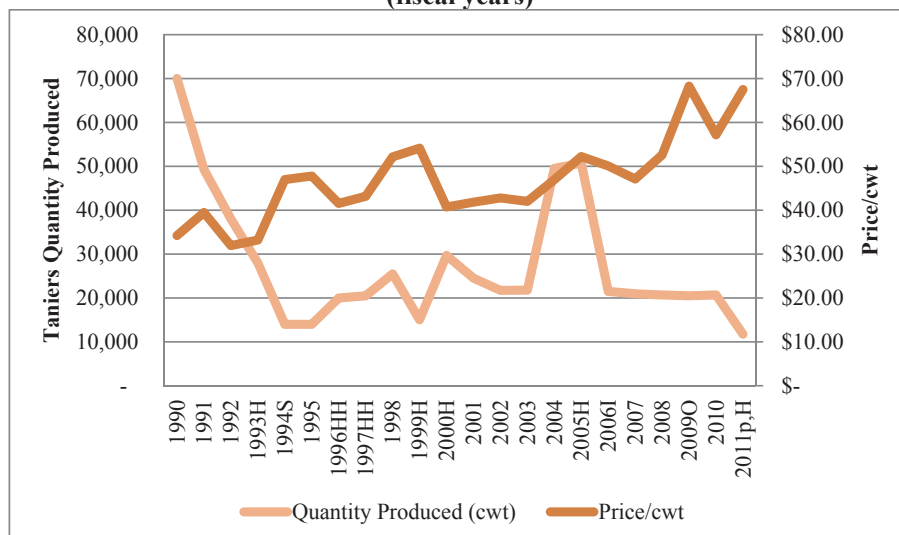


Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
 p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

### NATIONAL INDUSTRIES OTHER VEGETABLE (EXCEPT POTATO) AND MELON FARMING: TANIER (NAICS 111219)

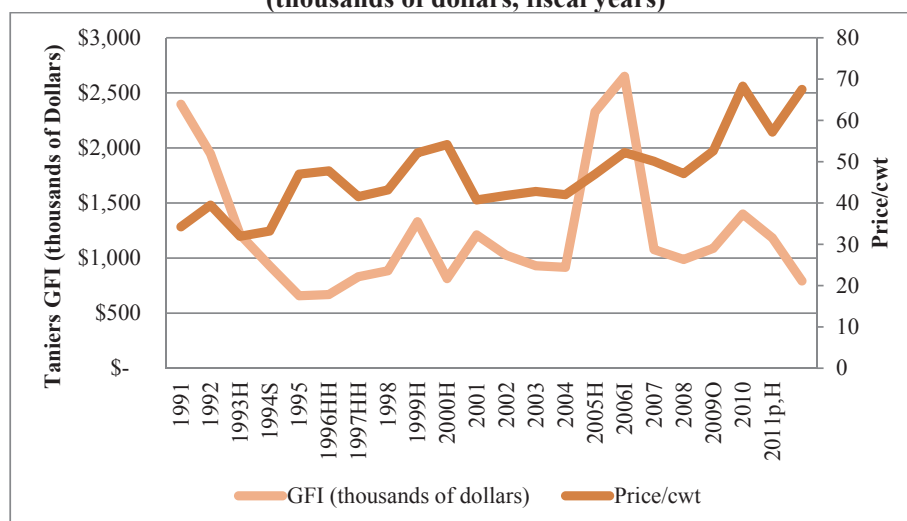
Tanier production exhibits a sharp decline of 24,000 hundred weight in a five year period from 1990 to 1994, Figure 39. During the years 1996 to 2005 production presents an increasing trend, with yearly fluctuations, after which production decrease until 2011. In 2011 production reached the lowest level of the period with 11,743 hundred weight, a drop of 37,557 hundred weight relative to 1990. The overall trend of farm prices for taniers from the 2000 decade is to increase, with an exception for 2010. Figure 40 shows the price and the contribution of taniers to GFI, from 1991 to 2011. As production, tanier income from sales declined very rapidly from 2005 to 2011, reduced by 1.8 million dollars, reaching the lowest level of the period in 2011 with a contribution of 0.8 million dollars.

**Figure 39**  
**QUANTITY PRODUCED AND PRICE FOR TANIERS, 1990-2011**  
 (fiscal years)



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
 p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

**Figure 40**  
**FARM VALUE OF SALES AND PRICE FOR TANIERS, 1990-2011**  
 (thousands of dollars, fiscal years)



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
 p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

## SUMMARY OF INDUSTRY GROUP FOR VEGETABLE AND MELON FARMING (NAICS 1112) AND FRUIT AND TREE NUT FARMING (NAICS 1113)

Table 21 and Table 22 present the quantities produced in 1990 and 2011 for selected starchy commodities. In the last two decades Puerto Rico's production of plantains and bananas decreased by 55.4 and 208.4 million units respectively. During the same period Puerto Rico's production of yams, cassava, sweet potato, and tanier decreased by 11.5, 3.7, 17.5 and 5.8 million pounds respectively, a total of 42.6 million pounds less in this period.

**Table 21**  
**Plantains and banana production in Puerto Rico**  
 (fiscal years)

COMMODITY	1990	2011	TOTAL
Plantains	210,000,000	154,643,000	-55,357,000
Bananas	43,000,000	234,629,000	-208,371,000
<b>TOTAL UNITS</b>	<b>653,000,000</b>	<b>389,272,000</b>	<b>-263,728,000</b>

Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years

**Table 22**  
**Yams, cassava, sweet potato, and tanier production in Puerto Rico**  
 (fiscal years)

COMMODITY	1990	2011	TOTAL
Yams	20,000,000	8,474,900	-11,525,100
Cassava	5,240,000	1,525,700	-3,714,300
Sweetpotatoe	17,740,000	224,400	-17,515,600
Tanier	7,000,000	1,174,300	-5,825,700
<b>TOTAL POUNDS</b>	<b>49,980,000</b>	<b>11,399,300</b>	<b>-38,580,700</b>

Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years

## INDUSTRY GROUP FRUIT AND TREE NUT FARMING (NAICS 1113) AND VEGETABLE AND MELON FARMING (NAICS 1112): FRUITS

The number of farms dedicated to fruit crops has been declining for the last two decades to almost half from the 1992 level, Table 23. Land dedicated to fruits has been declining but not at the same rate as the number of farms, indicating that average farm size has increased. Within this group, the main contributors to Gross Farm Income (GFI) are oranges with 4.5 million dollars, followed by papaya, mangos, watermelon, pineapple and avocados with 2.2, 2.1, 2.0, 1.6 and 1.1 million dollars respectively in 2011, Table 24. Although contribution of oranges to GFI was the highest among the group in 2010, it declined by 52.9% compared to the previous year. Most fruits contribution to GFI during the period ranging from 1990 to 2011, being water melon and papaya the only ones showing a slight increase that did not make up for the drastic reduction in all the other fruits. The following sections present the main fruit commodities in Puerto Rico and statistics for production, farm prices, and farm value of sales.

**TABLE 23**  
**NUMBER OF FARMS, CUERDAS AND QUANTITY HARVESTED FOR SELECTED FRUITS, SELECTED YEARS**

FRUIT	YEAR				
	1992	1998	2002	2007	2012
ALL FRUITS					
NUMBER OF FARMS IN FRUIT CROPS	5,486	4,737	4,538	2,663	2,579
NUMBER OF CUERDAS	15,033	18,085	13,548	12,261	14,959
PINEAPPLES					
NUMBER OF FARMS	152	57	59	124	106
NUMBER OF CUERDAS	3,174	1,091	2,337	330	330
QUANTITY HARVESTED (tons.)	58,764	15,644	18,908	2,145	2,186
ORANGES					
NUMBER OF FARMS	4,488	4,252	3,972	2,346	1,979
NUMBER OF CUERDAS	8,535	10,895	7,339	7,133	8,759
QUANTITY HARVESTED (hundred units)	550,940	808,551	1,008,786	916,166	786,309
AVOCADOS					
NUMBER OF FARMS	1,508	1,106	1,217	737	503
NUMBER OF CUERDAS	1,034	1,616	1,138	1,114	797
QUANTITY HARVESTED (hundred units)	34,560	85,012	79,258	52,837	21,425
MANGOES					
NUMBER OF FARMS	460	255	264	97	157
NUMBER OF CUERDAS	2,684	2,433	2,666	2,197	3,113
QUANTITY HARVESTED (hundred units)	34,560	85,012	79,258	52,837	251,618
WATERMELONS					
NUMBER OF FARMS	75	940	743	45	35
NUMBER OF CUERDAS	334	4,543	4,039	863	661
QUANTITY HARVESTED (million pounds)	3	19	16	14	16
PAPAYA					
NUMBER OF FARMS	367	204	170	76	84
NUMBER OF CUERDAS	231	479	642	419	874
QUANTITY HARVESTED (cwt)	25,383	93,630	99,817	92,001	160,298

Source: 2012, 2002, and 1992 Agricultural Census, USDA, NASS, selected years

**Table 24**  
**GFI for selected fruits in Puerto Rico, selected years**  
**(thousands of dollars)**

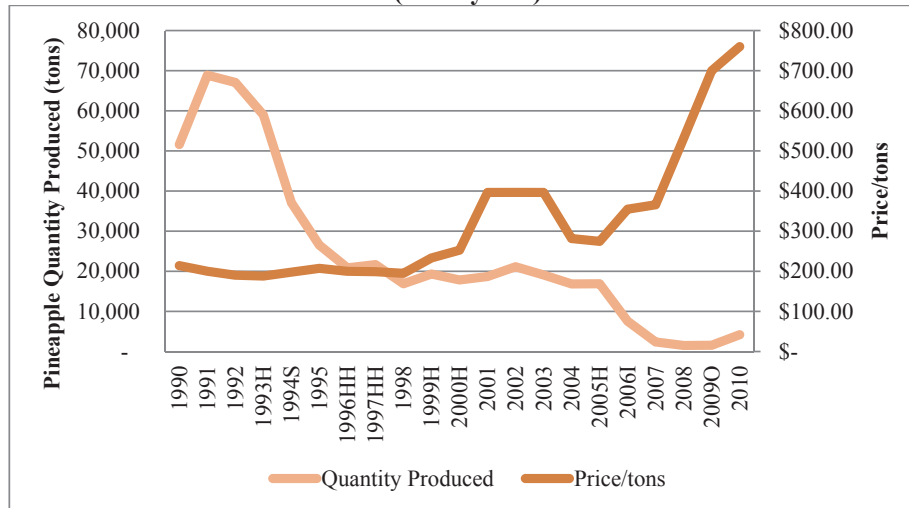
	1990	1995	2000	2005	2010	2011
<b>FRUITS TOTAL</b>	<b>\$36,471</b>	<b>\$25,505</b>	<b>\$38,952</b>	<b>\$40,369</b>	<b>\$22,364</b>	<b>\$16,413</b>
<b>PINEAPPLE</b>	\$11,051	\$5,500	\$4,509	\$4,641	\$3,192	\$1,629
<b>PERCENT CHANGE</b>	-20.73	-25.11	0.02	-2.21	190.08	-48.96
<b>PERCENT FRUITS</b>	30.30%	21.56%	11.58%	11.50%	14.27%	9.93%
<b>MANGO</b>	\$9,865	\$8,126	\$12,806	\$17,454	\$6,955	\$2,130
<b>PERCENT CHANGE</b>	37.78	-9	-13.72	55.51	-14.34	-69.37
<b>PERCENT FRUITS</b>	27.05%	31.86%	32.88%	43.24%	31.10%	12.98%
<b>ORANGES</b>	\$5,365	\$4,040	\$11,285	\$7,514	\$4,285	\$4,463
<b>PERCENT CHANGE</b>	9.28	-3.7	119.7	17.54	-52.94	4.16
<b>PERCENT FRUITS</b>	14.71%	15.84%	28.97%	18.61%	19.16%	27.19%
<b>AVOCADOS</b>	\$3,533	\$2,329	\$3,365	\$2,858	\$715	\$1,149
<b>PERCENT CHANGE</b>	-6.89	-19.3	42.96	-59.46	-81.59	60.79
<b>PERCENT FRUITS</b>	9.69%	9.13%	8.64%	7.08%	3.20%	7.00%
<b>WATERMELON</b>	\$756	\$643	\$2,434	\$1,818	\$2,100	\$2,021
<b>PERCENT CHANGE</b>	188	71.11	42.75	-1.52	-4.6	-3.75
<b>PERCENT FRUITS</b>	2.07%	2.52%	6.25%	4.50%	9.39%	12.31%
<b>PAPAYA</b>	\$665	\$758	\$642	\$3,399	\$2,083	\$2,200
<b>PERCENT CHANGE</b>	-47.38	-4.02	11.02	-8.35	19.73	5.62
<b>PERCENT FRUITS</b>	1.82%	2.97%	1.65%	8.42%	9.31%	13.40%

Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years

### **NATIONAL INDUSTRIES FOR OTHER NONCITRUS FRUIT FARMING: PINEAPPLES (NAICS 111339)**

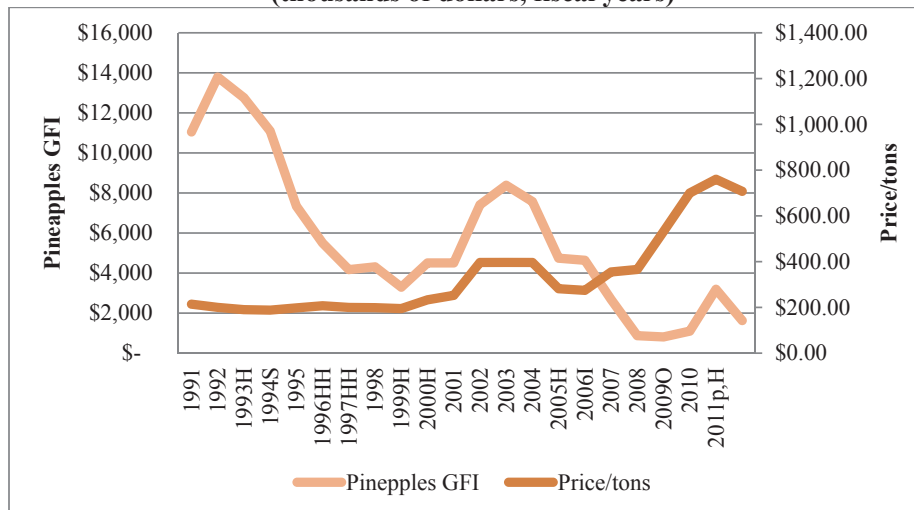
The overall trend of pineapple production in Puerto Rico shows a constant decreasing trend from 1990 to 2011, Figure 41. In 2011 production was 2,303 tons, 49,298 tons less than 1990. The reduction in production levels can be attributed to several factors such as atmospheric phenomena, extreme weather conditions and public policy since in 1998 the Land Authority of Puerto Rico (LAPR) sold the pineapple processing plant. The LAPR sales contract with the buyer stipulated that for the first three years the processor had to buy fruit from local farmers. Farm prices for pineapples show an increasing trend for the entire period, with only few exceptions. Figure 42 shows the price and contribution of pineapples to GFI. During the first seven years of the 1990s, pineapple value of sales shows a decreasing trend. In 2011 the value of sales of pineapples was 1.6 million dollars while in 1990 pineapple GFI was 11.0 million dollars, 9.4 million dollars less. Although the trend for pineapple production was downward, the price showed an increasing trend, with \$722.46 per ton being the average price for the last three years of the period.

**Figure 41**  
**QUANTITY PRODUCED AND PRICE FOR PINEAPPLES, 1990-2011**  
**(fiscal years)**



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

**Figure 42**  
**GFI AND PRICE FOR PINEAPPLES, 1990-2011**  
**(thousands of dollars, fiscal years)**



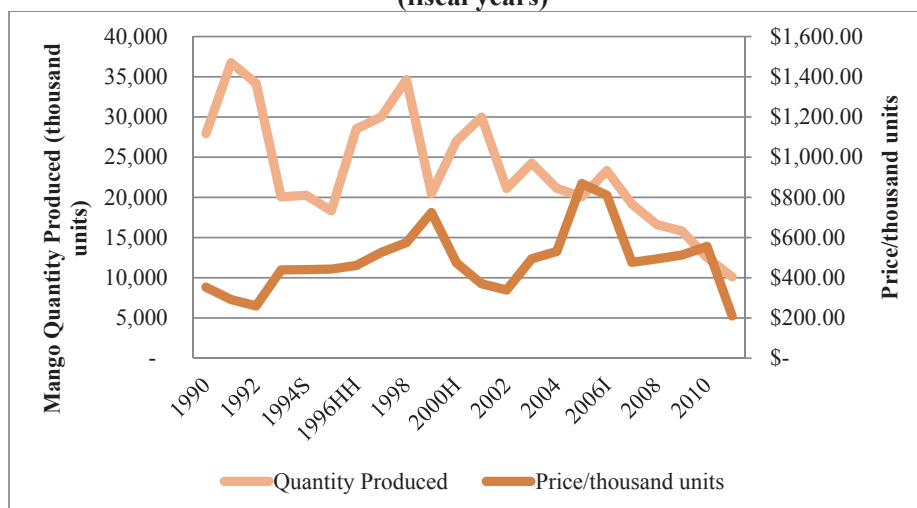
Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

## NATIONAL INDUSTRIES OTHER NONCITRUS FRUIT FARMING: MANGOES (NAICS 111339)

Production of mangoes shows a decreasing trend from 1990 to 1995, Figure 43. The following ten years, 1995 to 2005, production ranged between 18,333 and 20,092 thousand units. In 2010 production was 10,125 thousand units, 17,813 thousand units less compared to 1990. Farm prices shows increases during the first nine years of the period, and being unstable until the last year of the period. Figure 44 shows farm prices and farm value of sales of mangoes. Farm value of sales in 1998 was at its maximum level with 19.9 million dollars. The last five years, 2007 to 2011, farm value of sales shows a decreasing trend. In 2011 the contribution of mangoes to GFI was 2.1 million dollars while in 1990 it registered a value of 9.86 million dollars, a reduction of 7.7 million dollars during the period.

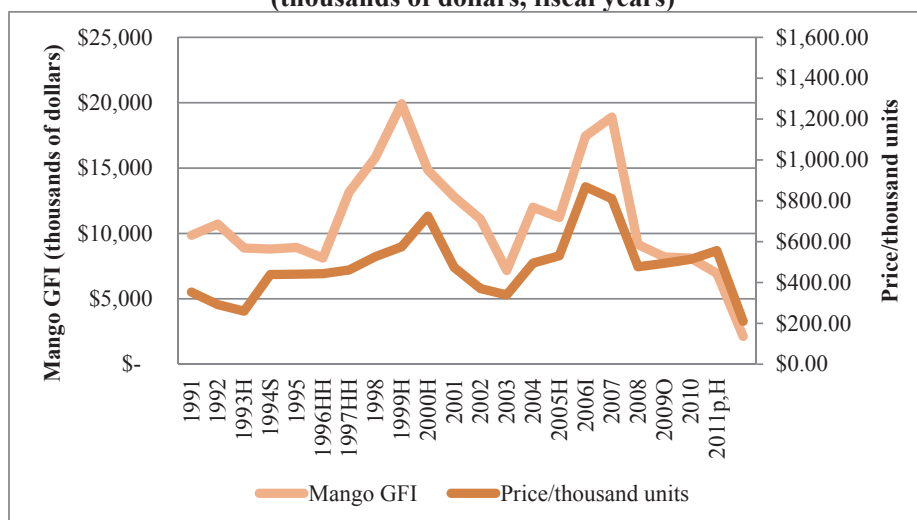


**Figure 43**  
**QUANTITY PRODUCED AND PRICE FOR MANGOES, 1990-2011**  
**(fiscal years)**



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
 p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

**Figure 44**  
**FARM VALUE OF SALES AND PRICE FOR MANGOES, 1990-2011**  
**(thousands of dollars, fiscal years)**

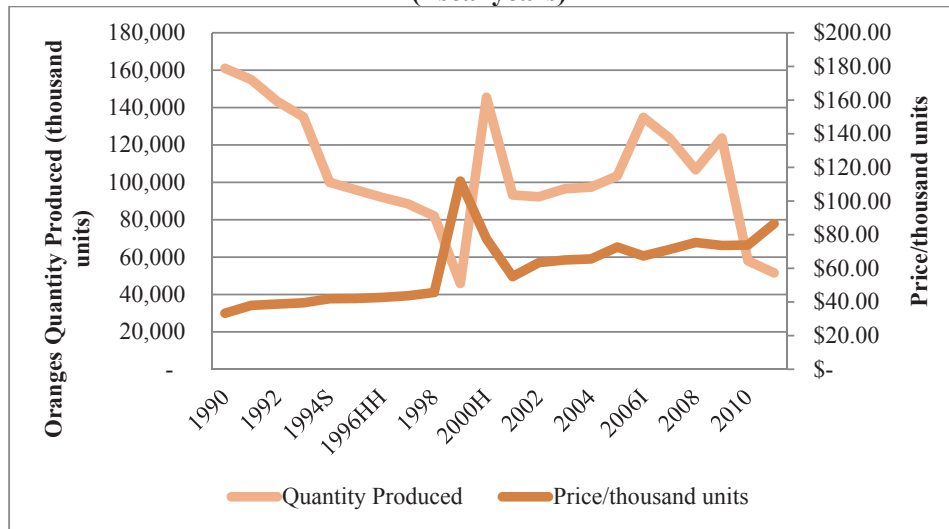


Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
 p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

## NATIONAL INDUSTRIES FOR ORANGE GROVES (NAICS 111310)

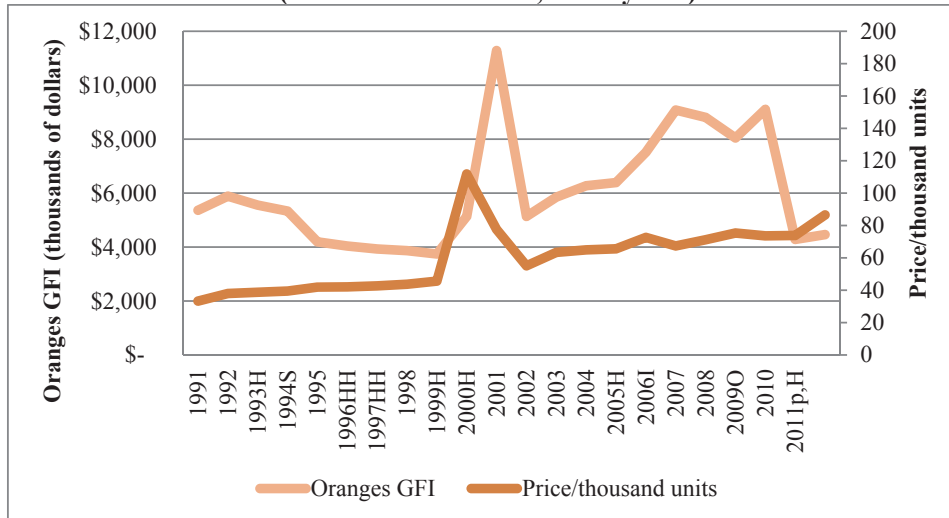
Oranges production during the first nine years shows a decreasing trend, increasing by 99,543 thousand units in 2000, Figure 45. Oranges production shows a decreasing trend ranging between 2000 and 2011 in 145,469 to 51,572 thousand units, a reduction of 103,428 thousand units. The maximum price for oranges was \$111.85 per thousand units in 1999. Since 2006 to 2011 farm prices shows a increasing trend. Figure 46 shows the price and contribution of oranges to GFI. In 2011 farm value of sales was 4.5 million dollars while in 1990 was 5.9 million dollars, a reduction of 1.4 million dollars.

**Figure 45**  
**QUANTITY PRODUCED AND PRICE FOR ORANGES, 1990-2011**  
**(fiscal years)**



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

**Figure 46**  
**FARM VALUE OF SALES AND PRICE FOR ORANGES, 1990-2011**  
**(thousands of dollars, fiscal years)**

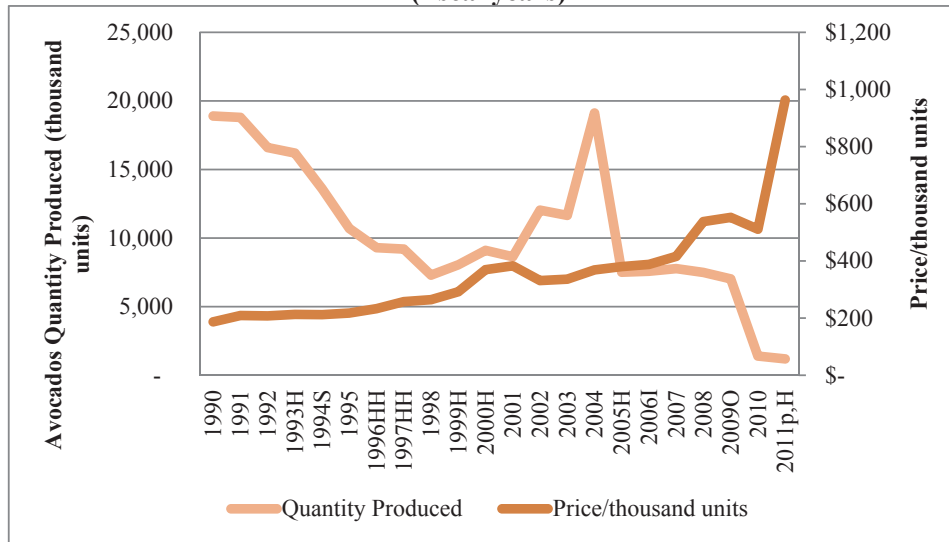


Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

## NATIONAL INDUSTRIES OTHER NONCITRUS FRUIT FARMING: AVOCADOS (NAICS 111339)

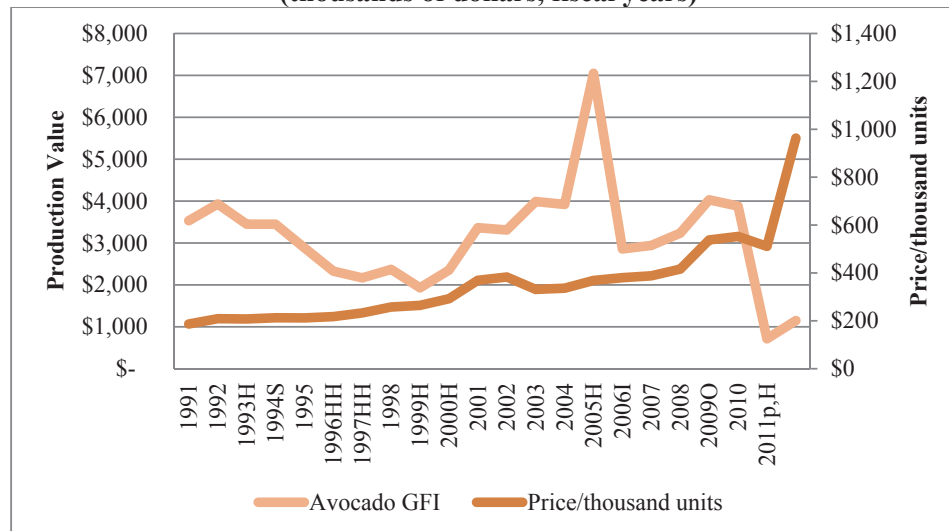
The 2012 Agricultural Census reports that there were 503 farms and 797 cuerdas planted with avocados, Table 23. In the first eight years production shows a decreasing trend, while in 1998 to 2004 production levels show an increasing trend, Figure 47. In 2011 production was at the lowest with 1,193 thousand units a reduction of 17,707 thousand units compared to 1990. Price shows an increasing trend reaching the maximum price of \$963.01 per thousand units in 2011. Figure 48 shows the price and GFI of avocados. During the first eight years of the period the avocado GFI presents a decreasing trend while in the latest years GFI for avocado has been decreasing. In 2011 farm value of sales was 1.1 million dollars with a reduction of 2.8 million dollars compared to 1990.

**Figure 47**  
**QUANTITY PRODUCED AND PRICE FOR AVOCADOS**  
**(fiscal years)**



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

**Figure 48**  
**FARM VALUE OF SALES AND PRICE FOR AVOCADOS, 1990-2011**  
**(thousands of dollars, fiscal years)**

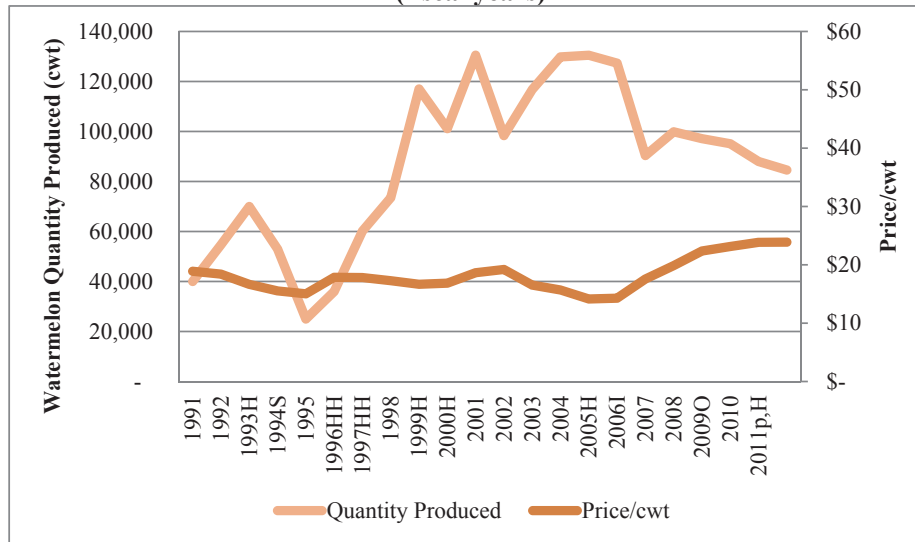


Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

## NATIONAL INDUSTRIES FOR VEGETABLE AND MELON FARMING: WATERMELON (NAICS 111219)

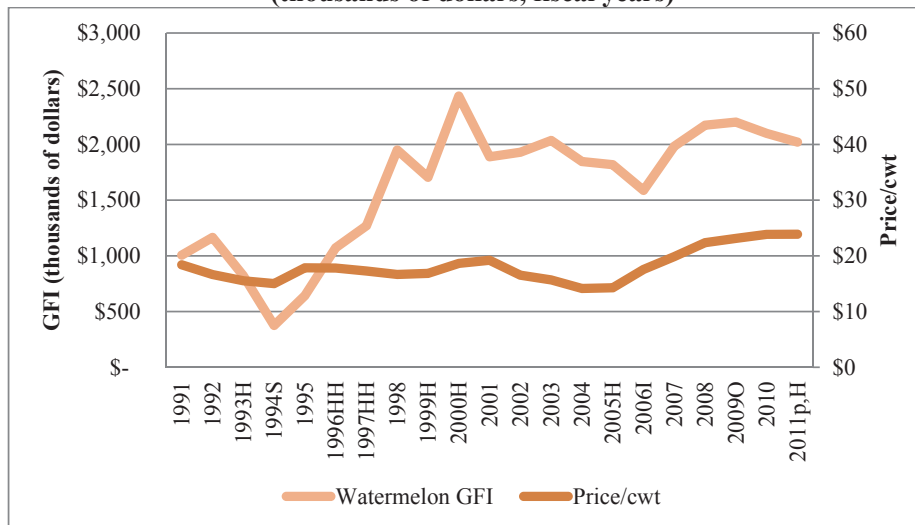
The 2012 Agricultural Census reports that there were 35 farms with watermelons production and 661 cuerdas of land dedicated to this crop, Table 23. Production shows an increasing trend between 1995 to 2000 and a decreasing trend since 2006 to 2011, Figure 49. In 2011 production was 84,594 hundred weight, representing 44,592 hundred weight more than in 1990. The price shows an increasing trend for the entire period, reaching a maximum price at \$23.89 per hundred weight in 2011. Figure 50 shows the price and contribution of watermelon to GFI. In 2011 watermelon value of sales was 2.0 million dollars an increase of 1.0 million dollars compared to 1990.

**Figure 49**  
**QUANTITY PRODUCED AND PRICE FOR WATERMELON, 1990-2011**  
**(fiscal years)**



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

**Figure 50**  
**FARM VALUE OF SALES AND PRICE FOR WATERMELON, 1990-2011**  
**(thousands of dollars, fiscal years)**

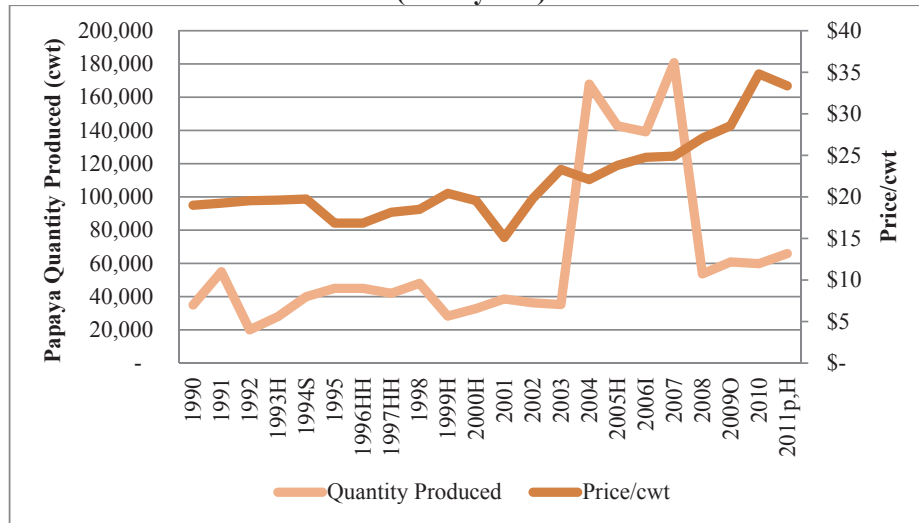


Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

## NATIONAL INDUSTRIES FOR OTHER NONCITRUS FRUIT FARMING: PAPAYA (NAICS 111339)

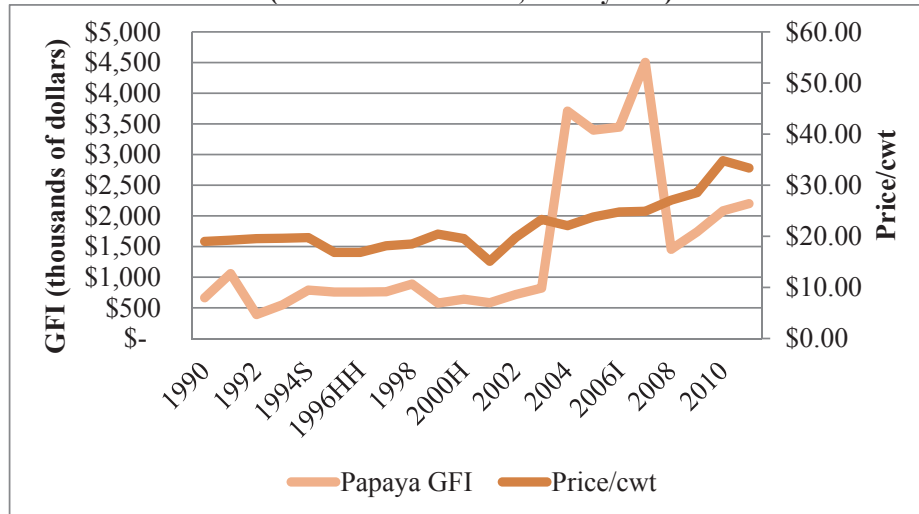
In 2012 there were 84 farms and 874 cuerdas of land dedicated to papaya (NASS, 2012), Table 23. During the last two decades production of papaya has shown an increasing trend, ranging between 35,000 to 65,924 hundred weight in 1990 and 2011, Figure 51. In 2004 and 2007 papaya reached its two historical maximum production levels, dramatically decreasing in 2008. For the last three years of the period production shows a slight increase. In 2011 production was 65,924 hundred weight, an increase of 10,924 hundred weight compared to 1990. Between 1990 and 2011 farm prices ranged between \$19.00 and \$33.37 per hundred weight. Figure 52 shows farm prices and farm value of sales of papaya. In 2004 and 2007 papaya production reached its two maximum historic levels of farm value of sales, 3.7 million dollars and 4.5 million dollars respectively. In 2011 farm value of sales was 2.2 million dollars an increase of 1.1 million dollars compared to 1990.

**Figure 51**  
**QUANTITY PRODUCED AND PRICE FOR PAPAYA, 1990-2011**  
**(fiscal years)**



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

**Figure 52**  
**FARM VALUE OF SALES AND PRICE FOR PAPAYA, 1990-2011**  
**(thousands of dollars, fiscal years)**



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

## SUMMARY INDUSTRY GROUP FRUIT AND TREE NUT FARMING (NAICS 1113) AND VEGETABLE AND MELON FARMING FOR WATERMELONS (NAICS 1112)

Table 25 and Table 26 present the quantities produced in 1990 and 2011 for selected fruit commodities. During the last two decades Puerto Rico's pineapple production has decrease by 133.2 million pounds, while watermelon and papaya have increased 2.99, and 1.1 million pounds respectively. In addition, Puerto Rico's production of mangoes, oranges, and avocados have decreased by 26.6, 103.4, and 17.6 million units respectively, reducing availability in 276.8 million units.

**Table 25**

**Pineapple, watermelon, and papaya production in Puerto Rico, 1990 and 2011**  
(fiscal years)

<b>COMMODITY</b>	<b>1990</b>	<b>2011</b>	<b>TOTAL</b>
Pineapple	103,202,000	4,606,000	<b>-98,596,000</b>
Watermelon	5,470,000	8,459,200	<b>2,989,200</b>
Papaya	5,500,000	6,592,400	<b>1,092,400</b>
<b>TOTAL POUNDS</b>	<b>114,172,000</b>	<b>19,657,600</b>	<b>-94,514,400</b>

Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years

**Table 26**

**Mangoes, oranges, and avocado production in Puerto Rico, 1990 and 2011**  
(fiscal years)

<b>COMMODITY</b>	<b>1990</b>	<b>2011</b>	<b>TOTAL</b>
Mangoes	27,938	10,125,000	<b>10,097,062</b>
Oranges	155,000,000	51,572,000	<b>-103,428,000</b>
Avocados	18,800,000	1,193,000	<b>-17,607,000</b>
<b>TOTAL UNITS</b>	<b>173,827,938</b>	<b>62,890,000</b>	<b>-110,937,938</b>

Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years

## **INDUSTRY GROUP FOR VEGETABLE AND MELON FARMING (NAICS 1112); GREEN HOUSE, NURSERY AND FLORICULTURE PRODUCTION (NAICS 1114); AND OTHER CROP FARMING (NAICS 1119): VEGETABLES**

The number of farms dedicated to production of vegetables has been decreasing until 2007, and increasing in 2012 by 523 farms compared to 2007, Table 27. Land dedicated to vegetable crops has changed throughout time, showing in 2012 a decrease of 792 cuerdas when compared to 1992. Within the vegetable products group the main contributor to GFI in 2011 was tomatoes with 31.4 million dollars, followed by squash, cilantro, spiny coriander, cubanelle peppers, and onions with 2.4, 2.2, and 2.2, 1.9, and 0.7 million dollars respectively, Table 28. In 2011 tomatoes contributed 70.92 percent to the value of sales of vegetables. The following sections presents the principal vegetable commodities and their statistics for production, farm prices and GFI.

Table 27

## NUMBER OF FARMS, LAND IN FARMS AND QUANTITY HARVESTED FOR SELECTED VEGETABLES, SELECTED YEARS

VEGETABLE	YEAR				
	1992	1998	2002	2007	2012
ALL VEGETABLES					
NUMBER OF FARMS IN VEGETABLE	2,077	1,639	1,288	1,008	1,531
CROPS					
NUMBER OF CUERDAS	7,806	11,628	9,082	8,146	7,014
QUANTITY HARVESTED (lbs.)	52,639,276	123,675,323	119,015,510	117,627,077	107,352
TOMATOES					
NUMBER OF FARMS	148	91	55	95	120*
NUMBER OF CUERDAS	12,226	557	694	894	784*
QUANTITY HARVESTED (tons.)	16,354,817	9,155,723	N/A	N/A	N/A
PEPPERS (ALL VARIETIES)					
NUMBER OF FARMS	1,030	596	534	508	727**
NUMBER OF CUERDAS	1,450	1,432	1,135	1,783	1,332**
QUANTITY HARVESTED (hundred units)	10,531,743	14,238,482	8,687,639	11,109,499	N/A
SQUASH					
NUMBER OF FARMS	1,209	940	743	342	677
NUMBER OF CUERDAS	3,180	4,543	4,039	2,305	2,678
QUANTITY HARVESTED (hundred units)	13,055,754	24,543,745	31,149,920	23,256,021	27,964,504
HERBS AND SPICES					
NUMBER OF FARMS	NR	209	251	361	395*
NUMBER OF CUERDAS	NR	400	536	448	223
QUANTITY HARVESTED (lbs.)	NR	7,316,122	5,144,635	2,578,033	3,797,884

Source: 2012, 2002, and 1992 Agricultural Census, USDA, NASS, selected years

\* Includes hydroponics

\*\* Excludes hydroponics

NR = data not reported

N/A = data not available

**Table 28**  
**GFI for selected vegetables in Puerto Rico, selected years**  
 (thousands of dollars, fiscal years)

	1990	1995	2000	2005	2010	2011
<b>VEGETABLES TOTAL</b>	<b>\$39,700</b>	<b>\$23,418</b>	<b>\$30,440</b>	<b>\$40,662</b>	<b>\$56,844</b>	<b>\$44,250</b>
<b>TOMATO</b>	\$20,010	\$6,861	\$9,466	\$14,206	\$35,715	\$31,382
<b>PERCENT CHANGE</b>	76.46	1.37	-1.2	24.87	171.98	-12.13
<b>PERCENT VEGETABLES</b>	50.40%	29.30%	31.10%	34.94%	62.83%	70.92%
<b>CUBANELLE PEPPER</b>	\$3,911	\$3,347	\$3,700	\$3,725	\$3,295	\$1,932
<b>PERCENT CHANGE</b>	34.58	-2.51	41.26	9.83	39.52	-41.38
<b>PERCENT VEGETABLES</b>	9.85%	14.29%	12.16%	9.16%	5.80%	4.37%
<b>SQUASH</b>	\$8,132	\$6,372	\$9,075	\$9,464	\$4,077	\$2,422
<b>PERCENT CHANGE</b>	-3.03	-10.59	47.83	54.8	-29.08	-40.61
<b>PERCENT VEGETABLES</b>	20.48%	27.21%	29.81%	23.27%	7.17%	5.47%
<b>ONION</b>	\$535	\$1,518	\$2,544	\$2,344	\$1,148	\$696
<b>PERCENT CHANGE</b>	-0.73	29.61	25.13	19.77	-25.89	-39.4
<b>PERCENT VEGETABLES</b>	1.35%	6.48%	8.36%	5.76%	2.02%	1.57%
<b>CILANTRO</b>	\$530	\$691	\$990	\$3,275	\$3,422	\$2,210
<b>PERCENT CHANGE</b>	-22.74	48.28	1.54	168.64	-7.88	-35.43
<b>PERCENT VEGETABLES</b>	1.34%	2.95%	3.25%	8.05%	6.02%	4.99%
<b>SPINY CORIANDER</b>	\$256	\$504	\$273	\$1,299	\$1,684	\$2,154
<b>PERCENT CHANGE</b>	-9.63	31.5	14.23	38.75	3.67	27.91
<b>PERCENT VEGETABLES</b>	0.64%	2.15%	0.90%	3.19%	2.96%	4.87%
<b>SWEET PEPPERS</b>	\$416	\$679	\$446	\$738	\$858	\$619
<b>PERCENT CHANGE</b>	-11.07	11.34	143.69	37.82	18	-27.87
<b>PERCENT VEGETABLES</b>	1.05%	2.90%	1.47%	1.81%	1.51%	1.40%

\* Preliminary

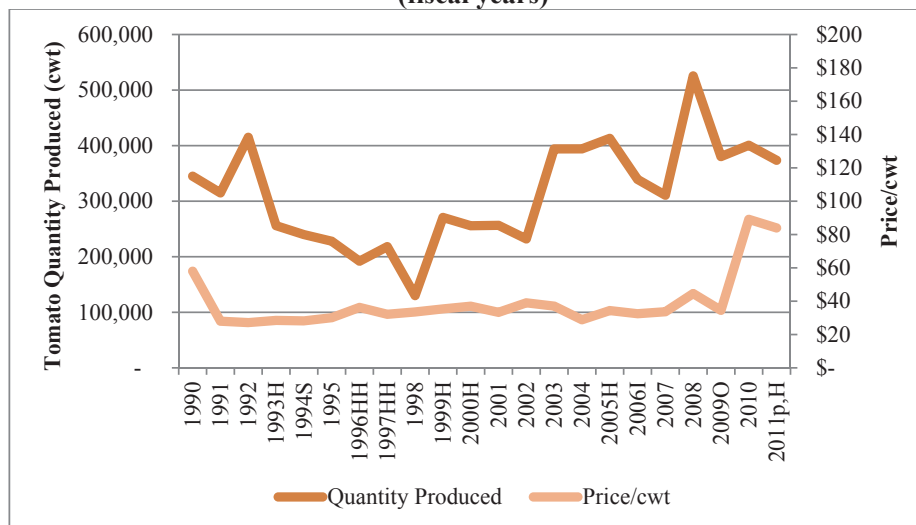
Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years

### **NATIONAL INDUSTRIES FOR GREEN HOUSE, NURSERY AND FLORICULTURE PRODUCTION (NAICS 111419) AND OTHER VEGETABLE (EXCEPT POTATO) AND MELON FARMING (NAICS 111219): TOMATOES**

In 2012 there were 120 farms producing tomatoes and 784 cuerdas planted, includes hydroponic production, Table 27. During the period 1990 to 1999 tomato production showed a decreasing trend, Figure 53. Since 1999, tomato production has been increasing and decreasing, reaching the historic maximum level in 2008. In 2011 tomato production was 373.7 thousand hundred weight an increase of 28.7 thousand hundred weight compared to 1990 levels. Farm prices for tomatoes in Puerto Rico were stable during the 1990s and part of the 2000s decade. In 2009 farm prices increased by \$54.61, a 158.2% compared to the previous year. Between 1992 to 1998 farm value of sales was decreasing slowly, after which it started increasing, reaching the historic maximum level in 2010 at 35.7 million dollars Figure 54.

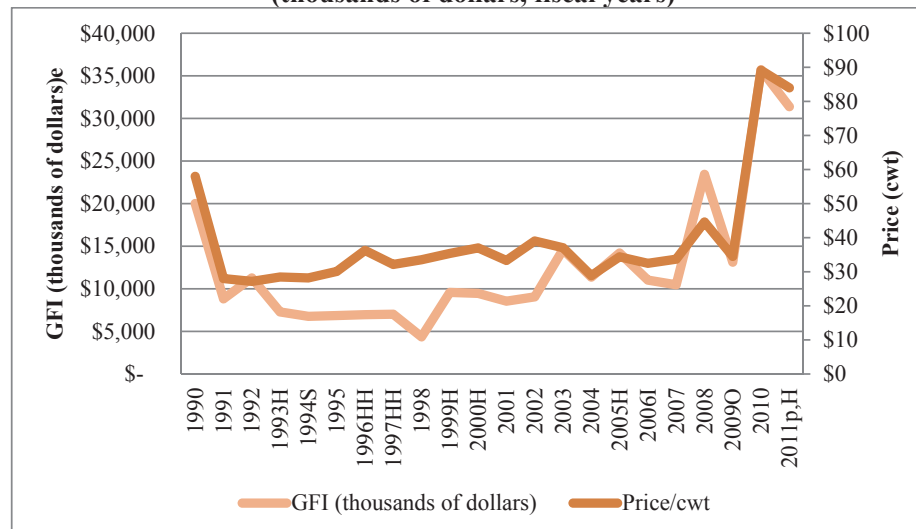


**Figure 53**  
**QUANTITY PRODUCED AND PRICE FOR TOMATO, 1990-2011**  
**(fiscal years)**



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
 p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

**Figure 54**  
**FARM VALUE OF SALES AND PRICE FOR TOMATOES, 1990-2011**  
**(thousands of dollars, fiscal years)**

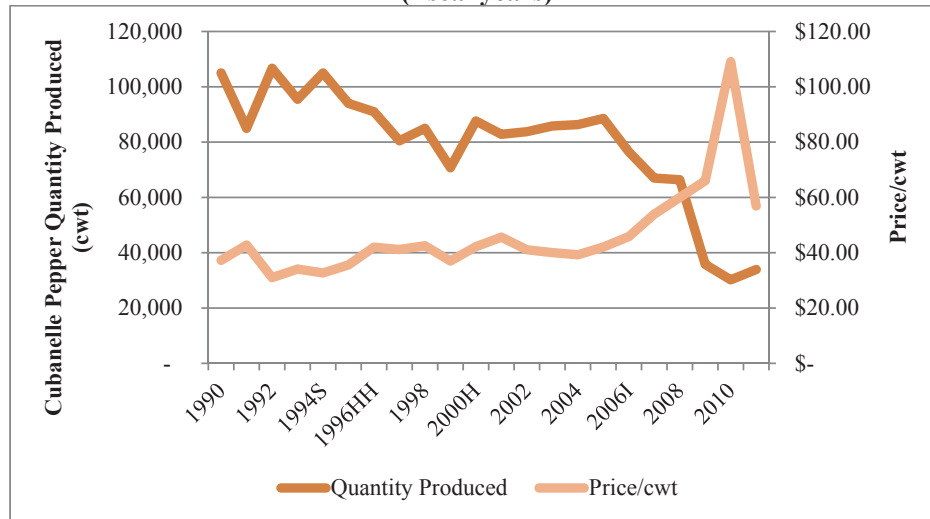


Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
 p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

### **NATIONAL INDUSTRIES FOR GREEN HOUSE, NURSERY AND FLORICULTURE PRODUCTION (NAICS 111419 ) AND OTHER VEGETABLE (EXCEPT POTATO) AND MELON FARMING (NAICS 111219): CUBANELLE PEPPERS**

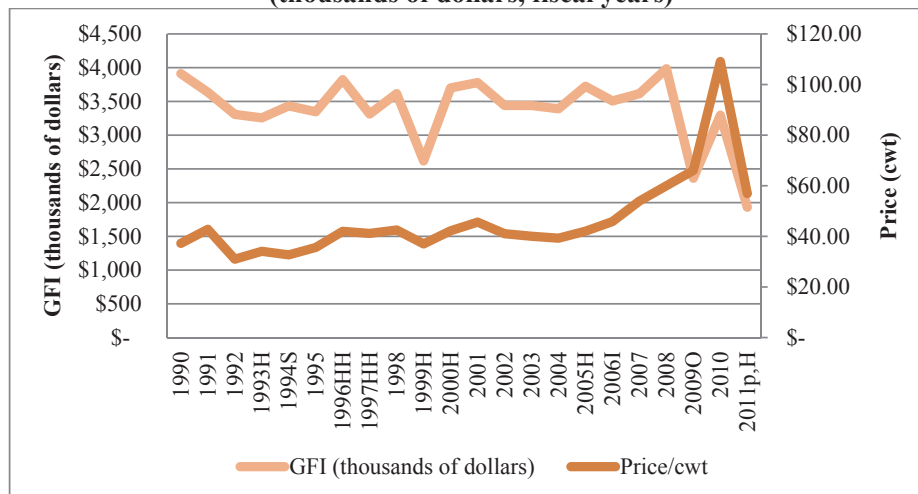
The Agricultural Census for 2012 reports that there were 727 farms with 1,332 cuerdas dedicated to pepper production, not including hydrponic production, Table 27. Cubanelle production shows a decreasing trend between 1994 and 1998, which can be attributed to extreme weather conditions and atmospheric phenomena that occurred throughout that decade, Figure 55. In 2011 production of cubanelle peppers increased by 3,723 hundred weight compared to the previous year. Farm prices during 1996 and 2006 ranged between \$37.02 to \$45.84 per hundred weight followed by an increasing trend and reaching the maximum historic level in 2010 with \$106.09 per hundred weight. Farm value of sales in 2000 was 3.9 and in 2011 was 1.9 million a reduction of 2.0 million dollars, Figure 56.

**Figure 55**  
**QUANTITY PRODUCED AND PRICE FOR CUBANELLE PEPPERS, 1990-2011**  
(fiscal years)



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

**Figure 56**  
**FARM VALUE OF SALES AND PRICE FOR CUBANELLE PEPPERS, 1990-2011**  
(thousands of dollars, fiscal years)

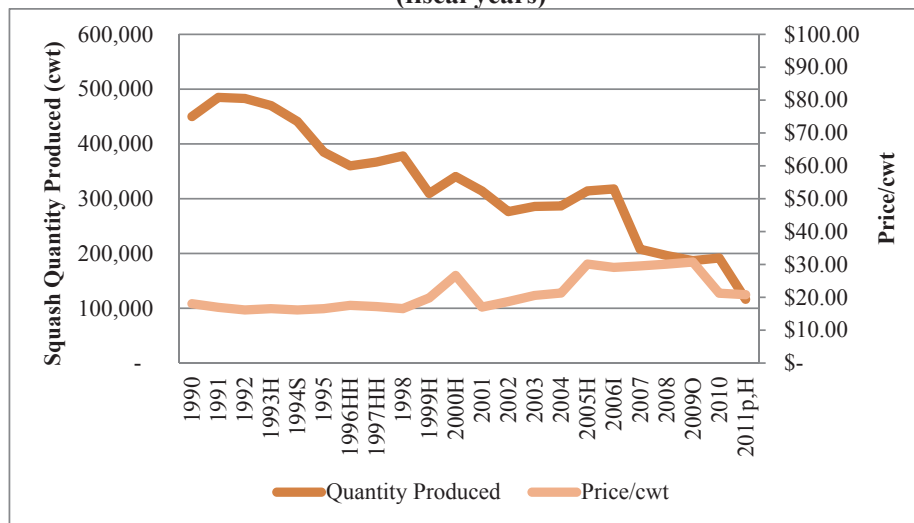


Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

## NATIONAL INDUSTRIES FOR OTHER VEGETABLE (EXCEPT POTATO) AND MELON FARMING (NAICS 111219): SQUASH

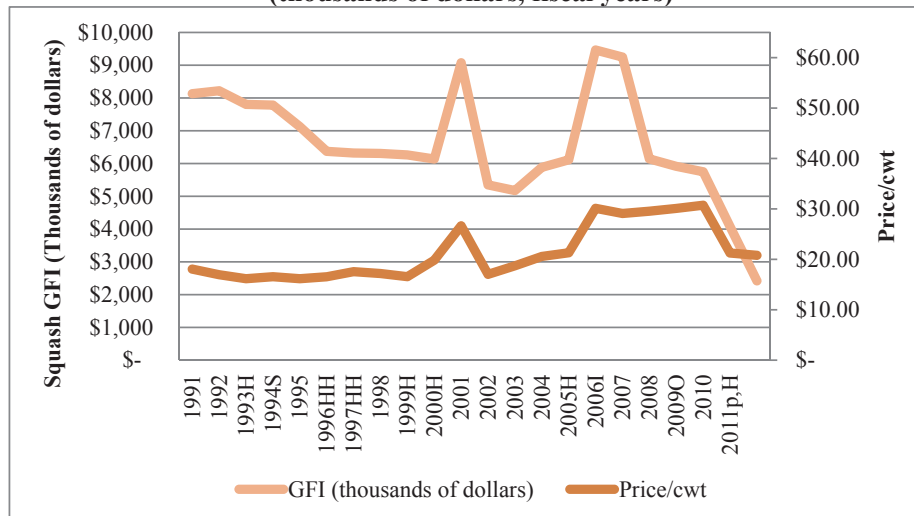
In 2012 there were 677 farms and 2,678 cuerdas dedicated to squash production, Table 27. Squash production in Puerto Rico presents a decreasing trend during the period, Figure 57. The historic maximum level of price was \$30.74 per hundred weight in 2009, while the historic minimum was \$16.16 per hundred weight in 1994. Farm value of sales decreased during the 1990s, Figure 58. Between 2000 and 2011 the contribution of squash to GFI ranged from 9.1 to 2.4 million dollars, a reduction of 6.7 million dollars.

**Figure 57**  
**QUANTITY PRODUCED AND PRICE FOR SQUASH, 1990-2011**  
(fiscal years)



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

**Figure 58**  
**FARM VALUE OF SALES AND PRICE FOR SQUASH, 1990-2011**  
(thousands of dollars, fiscal years)

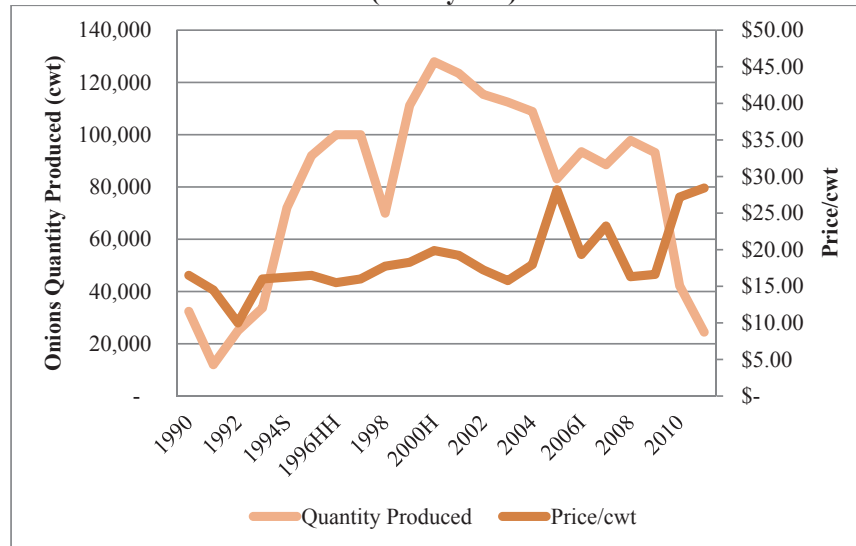


Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

## NATIONAL INDUSTRIES FOR OTHER VEGETABLE (EXCEPT POTATO) AND MELON FARMING: ONIONS (NAICS 111219)

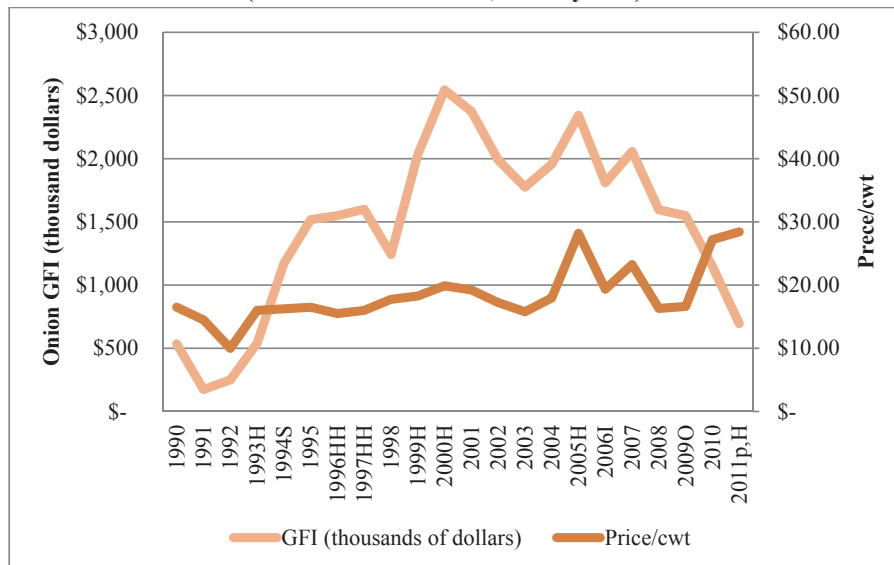
In the 1990s production levels of onions shows an increasing trend, with the exception of 1998, Figure 59. Between 2000 and 2011 production ranged from 127,917 and 24,472 hundred weight. In 2011 farmers produced 24,477 hundred weight of onions, a reduction of 103,440 hundred weight compared to 2000. Farm prices ranged between \$10.00 and \$28.43 per hundred weight during the period. As production, farm value of sales GFI for onions increased during the 1990s, with the exception of 1998, Figure 60. Since the 2000 decade, farm value of sales have been decreasing, reaching the minimum historic level in 2011.

**Figure 59**  
**QUANTITY PRODUCED AND PRICE FOR ONIONS, 1990-2011**  
(fiscal years)



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

**Figure 60**  
**FARM VALUE OF SALES AND PRICE FOR ONIONS, 1990-2011**  
(thousands of dollars, fiscal years)

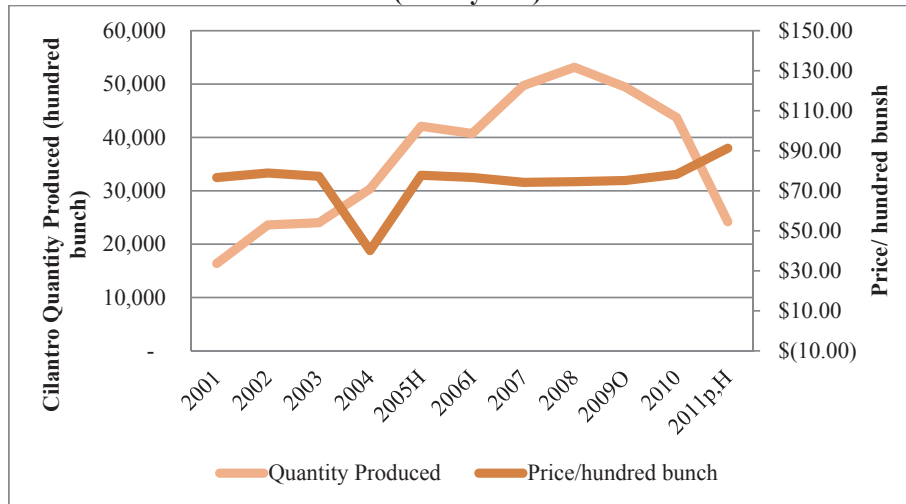


Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

### **NATIONAL INDUSTRIES GREEN HOUSE, NURSERY AND FLORICULTURE PRODUCTION: (NAICS 111419) AND ALL OTHER MISCELLANEOUS CROP FARMING (111998): CILANTRO**

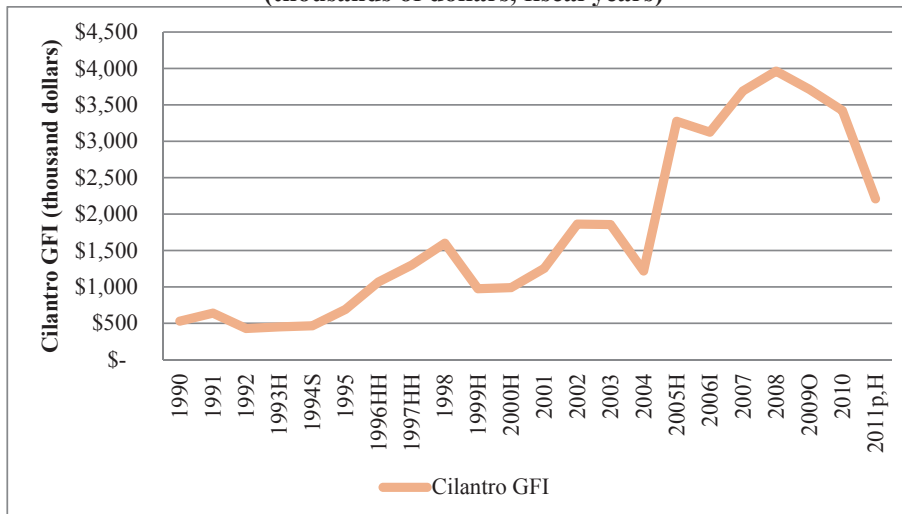
The Agricultural Census started reporting herbs and spices data since 1997. NASS reports that the number of farms with herbs and spices production was 395 in 2012 and there were 223 cuerdas dedicated to these crops, including hydroponics Table 27. In Puerto Rico the ASO of DAPR started publishing data for cilantro in 1983. Between 1987 and 2000 they published only farm value of sales and in 2001 they published production levels and farm prices. Between 2001 and 2008 production levels of cilantro presents an increasing trend, Figure 61. From 2008 to 2011 production shows a decreasing trend but production levels were higher than 2001 levels. During the period, farm prices have been relatively stable. Figure 62 shows farm prices and the contribution of cilantro to GFI from 1990 to 2011. Between the years 2000 and 2011 cilantro's contribution to the GFI has increased reaching 2.2 million dollars in 2011.

**Figure 61**  
**QUANTITY PRODUCED AND PRICE FOR CILANTRO, 1990-2011**  
**(fiscal years)**



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

**Figure 62**  
**FARM VALUE OF SALES AND PRICE FOR CILANTRO, 1990-2011**  
**(thousands of dollars, fiscal years)**

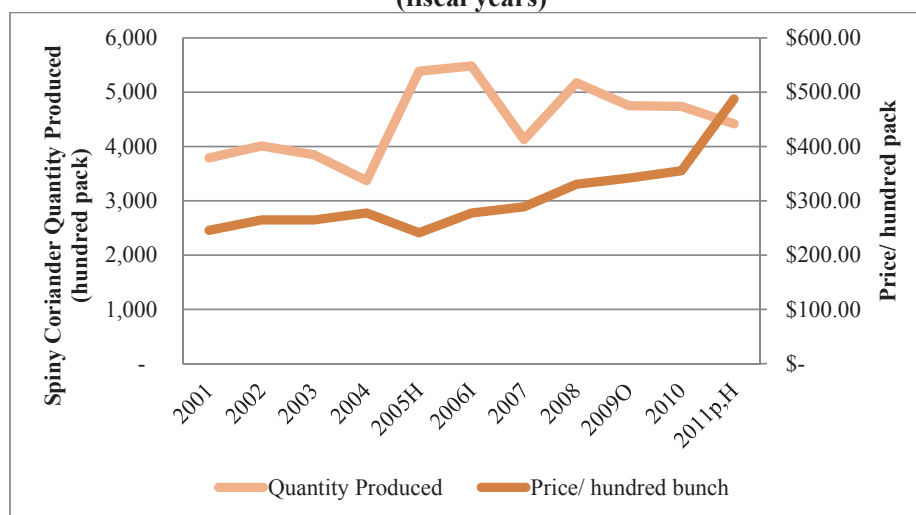


Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

## **NATIONAL INDUSTRIES FOR GREEN HOUSE, NURSERY AND FLORICULTURE PRODUCTION (NAICS 111419) AND ALL OTHER MISCELLANEOUS CROP FARMING (NAICS 111998): SPINY CORIANDER**

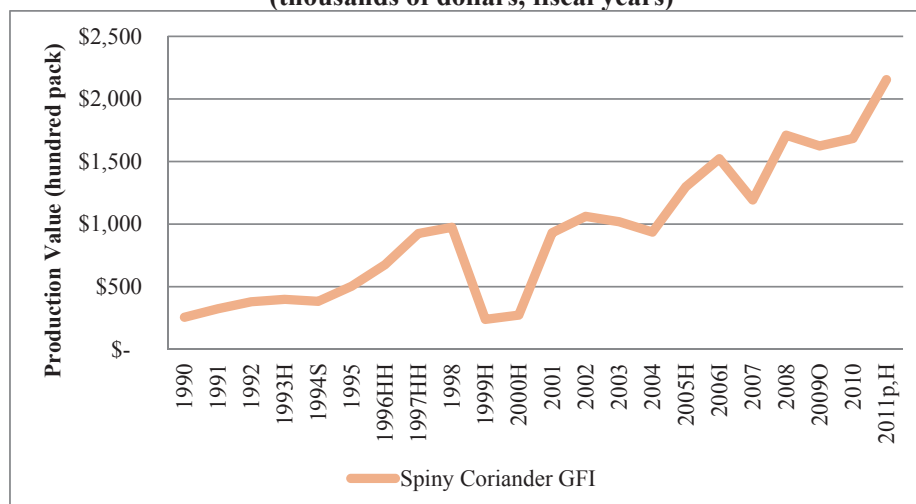
In Puerto Rico the ASO of the DAPR started publishing data of spiny coriander in 1983 and between 1987 to 2000 they published only farm value of sales. Between 2004 and 2006 production of spiny coriander shows an increasing trend and a decreasing trend between 2008 and 2011, Figure 63. Farm prices for spiny coriander shows an increasing trend, reaching the historic maximum price in 2011 of \$487.50 per hundred bunch. Figure 64 shows the value of sales of spiny coriander between 1990 and 2011. Farm value of sales shows an increasing trend, with the exception of 1999 and 2004. In 2011 spiny coriander contributed 2.2 million dollars to the GFI, an increase of 1.9 million dollars compared to 1990.

**Figure 63**  
**QUANTITY PRODUCED AND PRICE FOR SPINY CORIANDER, 1990-2011**  
 (fiscal years)



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
 p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

**Figure 64**  
**FARM VALUE OF SALES AND PRICE FOR SPINY CORIANDER**  
 (thousands of dollars, fiscal years)

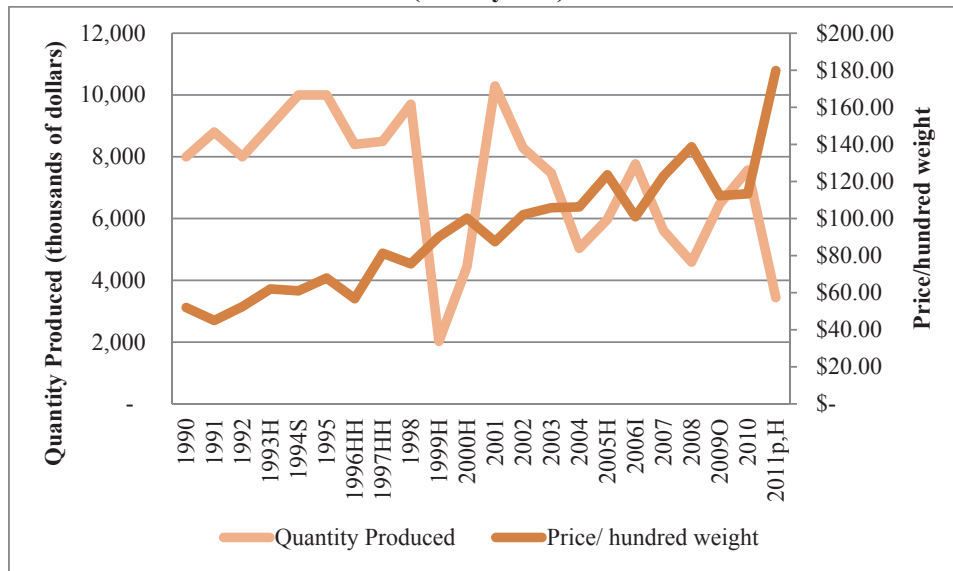


Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
 p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

### **NATIONAL INDUSTRIES GREEN HOUSE, NURSERY AND FLORICULTURE PRODUCTION (NAICS 111419) AND OTHER VEGETABLE (EXCEPT POTATO) AND MELON FARMING (NAICS 111219): SWEET PEPPERS**

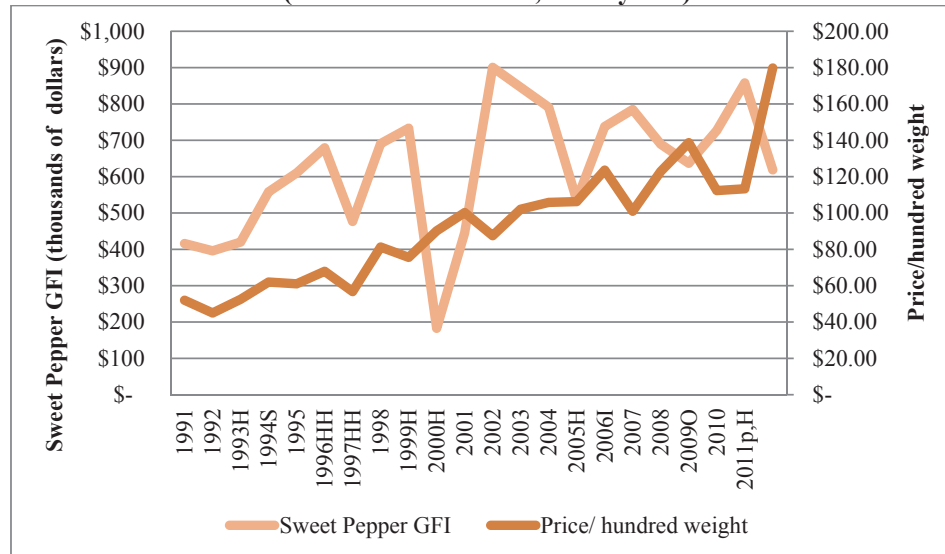
Sweet pepper production levels in 1990 and 1999 ranged between 3,000 and 2,028 hundred weight with an average of 8,270 hundred weight for that period, Figure 65. Since 2000 and 2011 production ranged between 10,291 and 3,442, with an average of 6,413. Farm prices for sweet peppers showed an increasing trend for the entire period. Figure 66 shows farm prices and farm value of sales of sweet peppers between 1990 and 2011. Farm value of sales ranged between 183 thousand and 733 thousand dollars and an average of 519 between 1990 and 2000, while in 2000 and 2011 they ranged between 901 and 535 thousand dollars and an average of 739 thousand dollars.

**Figure 65**  
**QUANTITY PRODUCED AND PRICE FOR SWEET PEPPERS, 1990-2011**  
**(fiscal years)**



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

**Figure 66**  
**FARM VALUE OF SALES AND PRICE FOR SWEET PEPPERS, 1990-2011**  
**(thousands of dollars, fiscal years)**



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

### INDUSTRY GROUP FOR VEGETABLE AND MELON FARMING (NAICS 1112); GREEN HOUSE, NURSERY AND FLORICULTURE PRODUCTION (NAICS 1114); AND OTHER CROP FARMING (NAICS 1119)

Table 29 and Table 30 presents the total quantities produced, in pounds or bunches as appropriate, of selected vegetable commodities in 1990 and 2011. Production of tomato and onions in Puerto Rico have increased by 35.9 and 1.2 million pounds respectively, while squash and cubanelle pepper have decreased by 5.1 and 36.8 million pounds respectively and a net loss of 4.9 million pounds. In addition, Puerto Rico's production of cilantro and spiny coriander increased by 17.3 and 81.9 thousand bunches respectively, a net gain of 99.2 thousand bunches.

**Table 29**  
**Tomato, cubanelle pepper, squash, onion, and sweet peppers**  
**production in pounds, 1990 and 2011**  
**(fiscal years)**

COMMODITY	1990	2011	DIFFERENCE
Tomato	34,500,000	67,368,500	<b>32,868,500</b>
Cubanelle Pepper	10,500,000	3,393,200	<b>-7,106,800</b>
Squash	45,000,000	11,642,400	<b>-33,357,600</b>
Onion	3,240,000	2,400,000	<b>-840,000</b>
Sweet Peppers	800,000	344,200	<b>-455,800</b>
<b>TOTAL POUNDS</b>	<b>94,040,000</b>	<b>85,148,300</b>	<b>-8,891,700</b>

Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years

**Table 30**  
**Cilantro and spiny coriander production in bunch, 1990 and 2011**  
**(fiscal years)**

COMMODITY	1991/1991	2010/2011	DIFFERENCE
Cilantro	n/a	24,208	-
Spiny Coriander	320,000	4,419	<b>-315,581</b>
<b>TOTAL BUNCH</b>			

Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years

## TRADITIONAL CROPS

### NATIONAL INDUSTRIES FOR OTHER NONCITRUS FRUIT FARMING: COFFEE (NAICS 111339)

Coffee is the only traditional crop left in Puerto Rico. The number of farms and land dedicated to grow coffee have been decreasing during the last two decades, Table 31. Coffee's GFI for 2011 was 25.6 million dollars an increase of 16.1% compared to the previous year, Table 32. Coffee production in Puerto Rico between 1993 and 1999 shows a decreasing trend, which can be partially attributed to the atmospheric phenomena and extreme weather conditions that occurred during that time, Figure 67. The only years that coffee production increased was between 2000 and 2002 and in 2011. The reduction in production for 2007 can be attributed to the coffee berry borer (*Hypothenemus hampei*) an African pest which has been devastating coffee production around the world. Coffee price is controlled by the Department of Consumer Affairs in Puerto Rico, although the average farm price will vary because of quality and variety of coffee that the farmer sells. In 2011 Puerto Rico produced 120,000 hundred weight of coffee, a reduction of 11.7 million pounds compared to 1990. In 2006 farm price increased and decreased the following year due to adjustments in the price due to berry borer pest. Figure 68 shows the farm value of sales and farm prices of coffee between 1990 and 2011. In 1994 farm value of sales presents a decreasing trend until 1999 and an increasing trend between 2000 and 2006.



**Table 31**  
**NUMBER OF FARMS, LAND IN FARMS AND QUANTITY HARVESTED OF COFFEE, SELECTED YEARS**

COFFEE	YEAR				
	1992	1998	2002	2007	2012
NUMBER OF FARMS IN COFFEE	6,143	5,243	5,542	5,885	4,671
LAND IN FARMS (CUERDAS)	42,234	43,401	33,924	38,535	33,213
QUANTITY HARVESTED (lbs.)	200,572	191,660	151,274	180,594	126,996

Source: 2012, 2002, and 1992 Agricultural Census, USDA, NASS, selected years

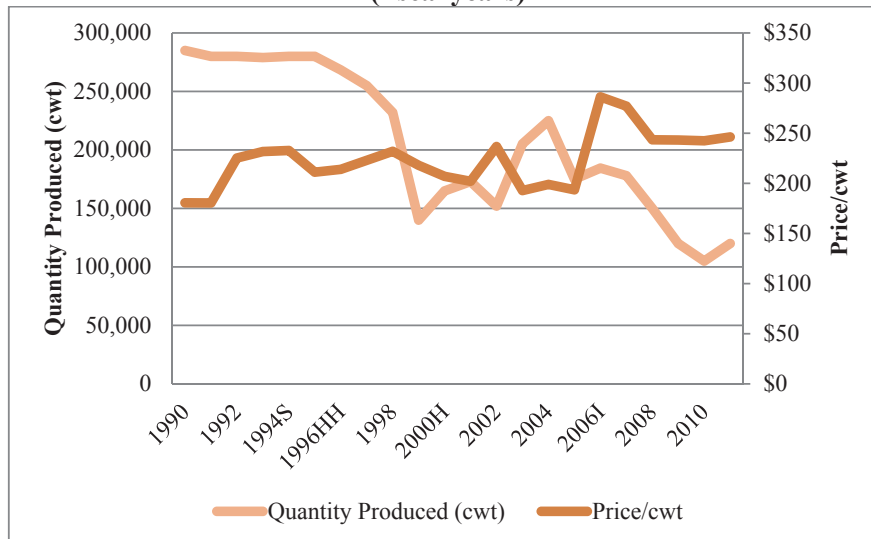
**Table 32**  
**Coffee GFI and percent change in Puerto Rico, 1990-2011**  
**(thousands of dollars, fiscal years)**

	1990	1995	2000	2005	2010	2011
<b>COFFEE</b>	\$51,474	\$59,130	\$34,150	\$33,882	\$25,459	\$29,558
<b>PERCENT CHANGE</b>	-11.77	-9.28	11.89	-24.32	-12.77	16.1

Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years

p: Preliminary data

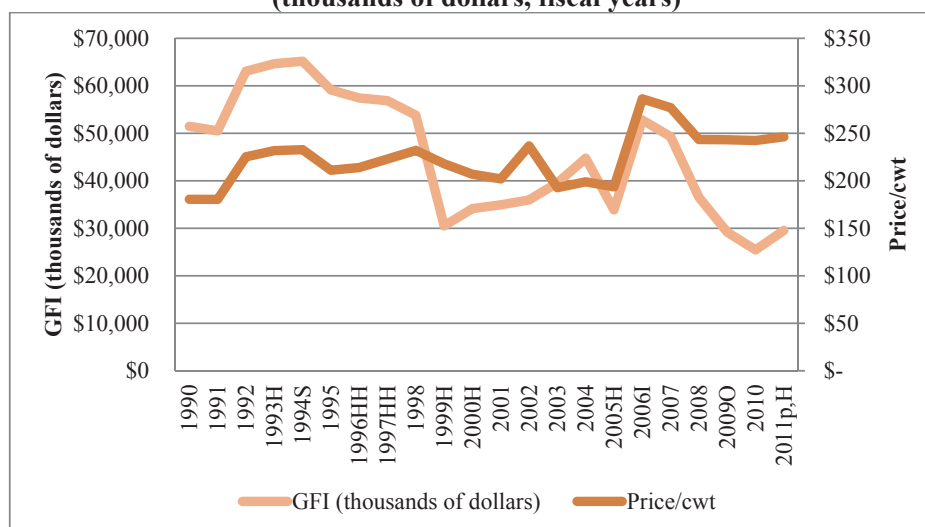
**Figure 67**  
**QUANTITY PRODUCED AND PRICE FOR COFFEE, 1990-2011**  
**(fiscal years)**



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years

p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

**Figure 68**  
**FARM VALUE OF SALES AND PRICE FOR COFFEE, 1990-2011**  
 (thousands of dollars, fiscal years)



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
 p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

## SUMMARY COFFEE

Table 33 present the quantities produced of coffee in 1991 and 2011. In the last two decades Puerto Rico's production of coffee decreased by 11.7 million pounds.

**Table 33**  
**COFFEE PRODUCTION IN POUNDS, 1990 AND 2011**  
 (fiscal years)

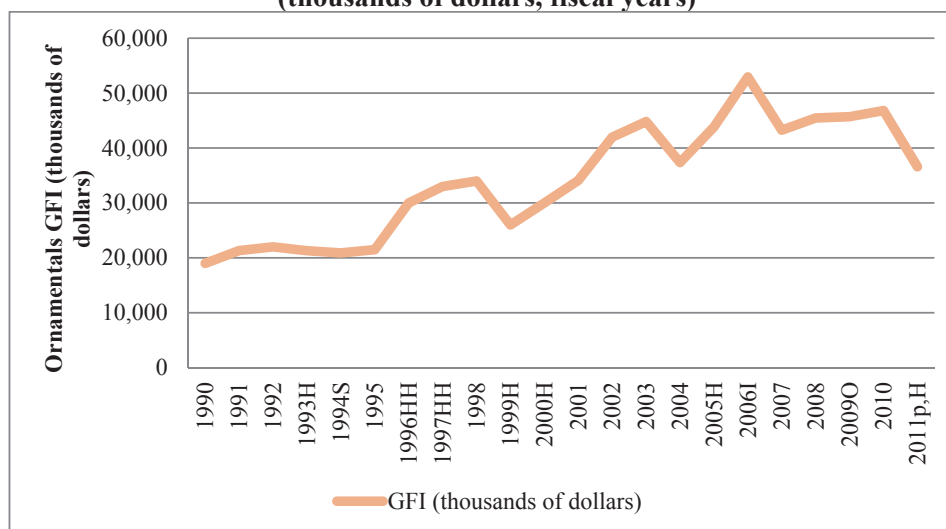
COMMODITY	1990	2011	DIFFERENCE
Coffee	285,000	12,000,000	11,715,000
<b>TOTAL POUNDS</b>	<b>285,000</b>	<b>12,000,000</b>	<b>11,715,000</b>

Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years

## NATIONAL INDUSTRIES FOR NURSERY AND TREE PRODUCTION (NAICS 111422) AND FLORICULTURE PRODUCTION (NAICS 111421)

Farm value of sales for ornamental plants includes the following: potted flowering plants, cut flowers, orchids, foliage plants, lawn, grass and turfs, trees, bulbs and roots, palm trees among others. Due to the diversity in the ornamental group which are sold in different forms, sizes, units of measure, and prices the ASO only presents the aggregate income for the whole group making an analysis based on comparison of production and prices difficult. In Puerto Rico the ornamental industry shows an increasing trend, with the exception of 1999, 2004, 2007 and 2011, Figure 69.

**Figure 69**  
**FARM VALUE OF SALES FOR HORTICULTURAL SPECIALTIES, 1990-2011**  
 (thousands of dollars, fiscal years)



Source: Puerto Rico Department of Agriculture, Agricultural Statistics Office, Gross Farm Income, fiscal years  
 p: Preliminary data, H: Hurricane, HH: Two Hurricanes, S: Drought, I: Flooding, O: Tropical Depression

## RELEVANCE OF THE AGRICULTURAL SECTOR IN THE ECONOMIC ACTIVITY

Agriculture is a primary economic activity which consists mainly of transforming natural capital; land (as space), soils (as substratum with nutrients), water, wind, solar radiation, insects, animal and plant seeds; and other resources into products which constitute raw material for other economic sectors. It is relevant as an economic activity due to its economic (direct) and other (indirect) benefits. The economic or direct impacts can be summarized as: production of economic goods, source of income to producers and workers, generates employment and is a source of foreign currency. The other or indirect benefits include the backward and forward linkages of agriculture to other economic sectors, its contribution to the quality of life, the enhancement to the community,

This sector is the source of products classified by some as the six F's. One of the Fs is food referring to products destined to human consumption, being the source of material for the food and beverage industry, as well as medicines, probiotics, nutraceuticals and other. Feeds are other products of farming, used for feeding animals including farm and domestic (pets and company) animals. The third is Fiber which refers to material used for human, home and animal clothes and includes those of plant origin (cotton) and animal origin (feathers, leathers, silk). The fourth is Fuels since agriculture is a source of renewable energy resources such as biomass from crops, oilseeds, gas such as ethanol which is a byproduct or waste of animal farming, among other. Flowers refer to production of plants, flowers, lawns and the main source of the green industry as well as the raw material for cosmetics. The sixth Fun includes activities such as sports (horses, dogs, cocks) and agrotourism.

The other benefits that the agricultural sector brings to the economic system are identified although not readily quantified and expressed in monetary value since they are either social or environmental in nature and therefore a price or value is not expressed or reflected directly in the market. The most relevant indirect impacts include the strong backward and forward linkages that the agricultural sector holds with the other economic sectors in Puerto Rico due to the fact that agriculture is mainly an endogenous economic activity. The backward linkages include the payment for resources bought or rented from other sectors which stay in the community and Puerto Rico, with few leakages to external markets, driving other economic activities. In the case of land, mainly owned by the producers or rented from

local owners; salaries paid to human resources either for professional services or as labor which are employed from the immediate or nearby community; physical inputs are locally bought even though most are imported; a huge proportion of farmers and ranchers are either locals or personas with established residency in Puerto Rico, keeping normal and economic profit within the local economy. Forward linkages consisting of supplying inputs or raw material to other sectors such as the food industry, pharmaceuticals, cosmetics, textiles, energy and other.

The agricultural sector provides other benefits such as enhancing the surrounding community by making communities more attractive to tourists and business by contributing to the preservation of the cultural heritage and history, providing rural pleasantries and helping to keep feasibility for other activities; and providing recreational activities. Farming and ranching also provide environmental services some of which are: conservation of valuable soil resources, protection to the watersheds, production and liberation of O<sub>2</sub> as a byproduct of photosynthesis, capture and sequestration of CO<sub>2</sub> which is incorporated into biomass, through photosynthesis, pleasant aromas or scents, landscape and scenery, phytoremediation of soils water resources by extraction, volatilization or degradation of chemical or biological pollutants, filter for noise and objectionable odors, buffer zone for floods, recharge zone for underground water sources, lowers temperature, serves as habitat for plant and animal wildlife, among other benefits.

Other social benefits include, but are not limited to contributing to the quality of life. Farms preserve open spaces, beautify the scenery and landscape, help maintain rural qualities and character, provide food which is fresh, high quality and superior in nutritional value, contribute to maintain a middle class and healthy civil society due to distributive aspects, keeps options to future generations open by preserving the option value of land resources. Benefits such as providing food security, food sovereignty, national security provided when food is considered a strategic good are some of the others. Local farming activities help manage climate change by reducing distance for distribution between production and consumption centers.

The agricultural sector, by its own nature, is sustainable and a value ought to be placed in that fact and its significance for economic development. Most natural capital used in the production process are either renewable or can be wisely managed to preserve them for future generations. Therefore an agricultural sector, which is responsible for providing the most important economic food for humankind: food is a sustainable activity therefore can contribute perpetually to the general economy. As such Food and Fiber System, it is the most relevant economic sector. If the value of all the goods and services, including the social and environmental benefits resulting from the agricultural sector are quantified and a dollar value placed in them, then the contribution of the sector can be fairly compared to others.

A concept which may start quantifying some of the secondary economic impacts of the agricultural sector consists in a new paradigm or a less traditional view of agriculture, not limited to the concept as agriculture as synonymous to farm but a more inclusive one that views agriculture as a system or chain in which farms or agricultural firms are linked to agribusiness firms that buy, store, process and transform unprocessed agricultural products into final consumer goods such as food, medicines, cosmetics, and other. Some names that have been used for the concept at different countries and historic realities are: Food and Fiber System (US), and Agri-food System (Canada). A name suggested for Puerto Rico is Agri-food System "Sector Agroalimentario"). The system has three major groups of industries: the input-supply industries that provide inputs used by the farms; the agricultural sector per se- farms; and the output distribution-processing-marketing-retail sales industries that buy, store, process, transform and distribute the product (to domestic consumers and for export). This conceptualization allows a measurement of the real contribution of agriculture to the national economy. The income and employment generated by the Agri-food System is the income and employment generated by all the firms that make up the System. It is not limited to farm income and employment.

## RISK IN THE AGRICULTURAL SECTOR

Risk and uncertainty are inherent to farming, making it the most risky business. Farming has many sources of risk and uncertainty. Risky events in agriculture are those in which sources and probability of outcomes are known, while uncertain events are those events for which a probability of occurrence is completely unknown. The uncertainties of extreme weather conditions and atmospheric phenomena, yields, input and output prices, government policies, and global market prices and production can have negative effects in net farm income, specifically on profits. The main sources of risk in the farm business: production, price or market, financial, technological obsolescence, legal, and human. Risk in agriculture cannot be completely eliminated but it can be managed with tools consisting of formal and informal insurance.

Production risk derives from the uncertain natural growth process of crops and livestock, ERS 2014 such as pests, illnesses, seed quality, erosion, use of certain agricultural practices that are not recommended, salinization, atmospheric phenomena, extreme weather conditions and atmospheric phenomena, among others (González, 2010). Price or market risk refers to the prices farmers and ranchers receive for their commodities or the prices they pay for the inputs (ERS, 2014; and González, 2010). Farmers are price takers since they do not have complete control of the production process, especially in the short run. Financial risk derives from the debt ratio, interest rates, liquidity, other financial ratios, imports and exports, change in the value of money, which affects the farm business when money is borrowed. Technological obsolescence refers to the technologies being use in the farm business. Some examples are: equipment, machinery, biotechnology, precision agriculture, new varieties that produce higher yields or new breeds produce more milk or meat, for example. Legal risks derive from the laws, regulations, or public policies that farmers need to comply. Some examples are: environmental responsibilities, contracts, legal organizations, successions and wills, food safety, tax reforms, chemical regulations, rules for animal waste, among others. Human risk refers to factors such as problems related to human health, personal relationships, problems with human resources, accidents, death, and other factors that can affect negatively the farm business.

Farm businesses in Puerto Rico are not exempt from these risk factors. The more predominant risks in the farm business are production, price and legal risks. Specifically since Puerto Rico is located in the Caribbean the most common threat to farm production are hurricanes and extreme weather conditions and atmospheric phenomena such as wind, flooding and droughts. These events may have had some effect in Puerto Rico's agriculture and may partially explain fluctuations in output, prices, and Gross Farm Income.

## PUBLIC POLICY

Public policy includes all courses of action, such as laws, programs, funding priorities and other which are taken by the state regarding an issue. In the Agricultural Sector, public policy can be designed to shift (either increase or decrease) the demand or supply of agricultural products. Policy makers have been making efforts at least for the past eight decades to stimulate the development and economic growth of the Agricultural Sector in Puerto Rico. The Department of Agriculture in Puerto Rico (DAPR) has kept in force programs and services established by different administrations with different economic and political philosophies in an effort to incentivize economic growth in the sector. This section will present some of the most important programs and services that have been established since the 1990 until present.

In the early 1990s tax credits were designed to benefit processing agribusiness firms in an effort to promote production. This tax credit did not have any significant impact to the agricultural sector and had to be adjusted since it did not result in the substitution of imported agricultural raw material and inputs by locally produced inputs. During the same decade the DAPR established a program to improve infrastructure in farm operations and a special status of bona fide farmer was created to provide tax exemptions to farmers and ranchers. Another policy was the protection of agricultural lands by the establishment of Agricultural Land Reserves to decrease the rapid loss of agricultural land due to irreversible uses. Since 2001 a program to plan production, distribution, adding value and processing of agricultural

products, with similarities to the marketing orders in the U.S.A. was established by an act of state legislation, the Núcleos de Producción. Additionally a generic brand for eligible agricultural products was established, Del País, under management by the DAPR. The main objectives of the generic brand was to offer farmers and ranchers a commercial brand which projected positive attributes such as fresh and locally produced food and the development of generic advertising campaigns promoting locally grown products. In 2010 and for the first time in the history of Puerto Rico's agriculture, the DAPR developed a program to shift the demand curve for locally grown food. Consumers' tastes and preferences for locally grown food were considered as the most important part the agricultural chain. Farmers' markets were introduced in urban areas, especially in areas with high per capita income levels. The first Farmers Market was located at the largest mall in Puerto Rico, Plaza Las Americas and named Placita de Plaza. The second named Mercado de la Ventana al Mar at El Condado in San Juan, was conveniently located in a highly frequented area by tourists and consumers with high discretionary income. At that time, the generic brand name, Del País, was changed to Crianza y Cosecha del País. The name change for the generic brand sent mixed signals misleading consumers since only an advertising campaign promoting the new generic brand took place in local TV channels and movie theaters, but this was not followed by an advertising campaign announcing the name change. During that period, early 2000s, most incentives were directed to the farmers selected for participation in the program named Unidades de Calidad y Alto Rendimiento (UCAR). They were required to take non formal education in best management practices, entrepreneurship and good agricultural practice. The public policy to designate agricultural lands as reserves became less aggressive although the scenario of ,the financial bubble, economic recession and slow growth in construction the risk of changing the use of these lands to alternate uses was reduced. In the beginning of 2013 the generic brand administered by the DAPR was changed again to Del País, once again sending mixed signals and confusing consumers. A lot of attention has been given recently to both Family Markets bringing fresh and locally grown food and targeting participants from the SNAP program since they represent a larger number of consumers, and to Institutional Markets providing nutritious food specially to K-12 students. Additionally, public policy is seeking to incentive activities that will increase production of agricultural goods that are included in the recommended food basket in Puerto Rico. The food basket was established in the early 2000s as an initiative of the College of Agricultural Sciences of the University of Puerto Rico's Mayagüez Campus with collaboration from other campuses, the PR Department of Health, the PR Department of Labor and Human Resources, the PR Department of Education's Lunch Program and professional organizations.

## **PART V. REGIONAL TRENDS**

### **LOCATION QUOTIENT FOR PUERTO RICO OF WAGES, EMPLOYMENT, ENTERPRISES**

The number of establishments classified in the agricultural sector (NAICS 11) in years 2006 and 2011 data by the Census Bureau, County Business Patterns and the location coefficients for 2011 as well as the maps showing location of the establishments is presented in Figures 70 to 75. Due to the extremely limited number of establishments that are reported, data is extremely incomplete and no analysis is possible.

Figure 70

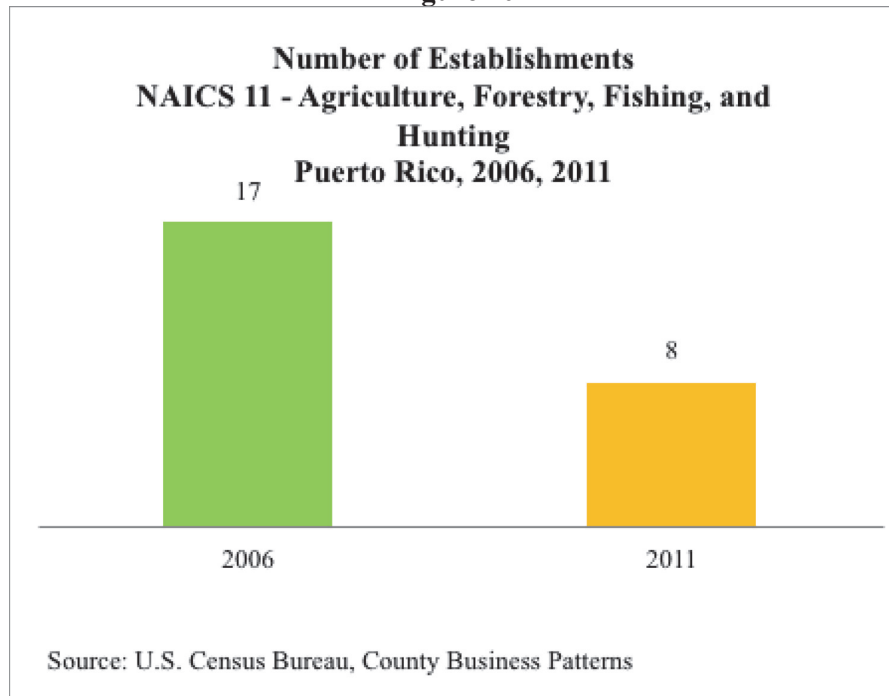
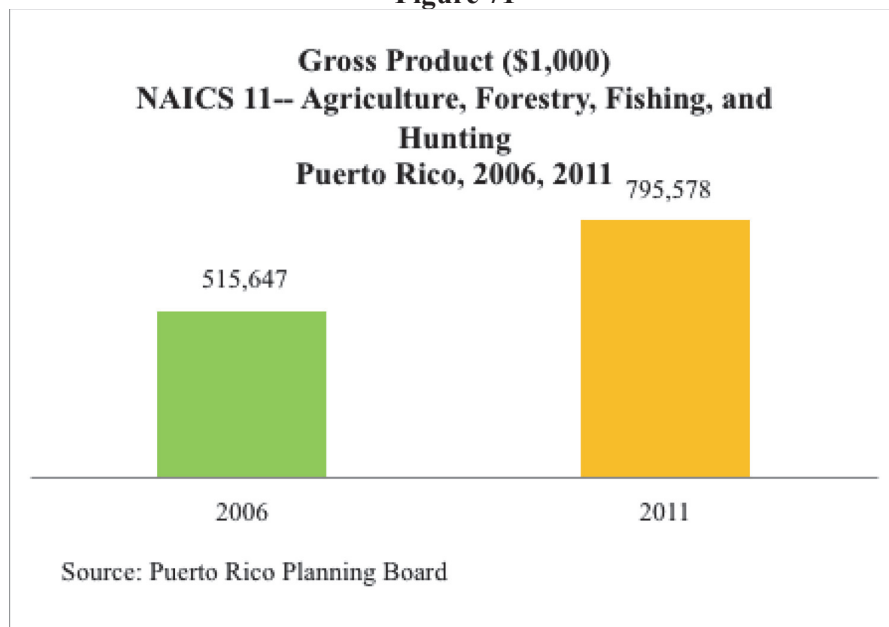


Figure 71





**Figure 72**

**Location Quotient of Number of Establishments  
NAICS 11 - Agriculture, Forestry, Fishing, and Hunting  
P.R. and U.S. 2011**

11 - Agriculture, forestry,  
fishing and hunting

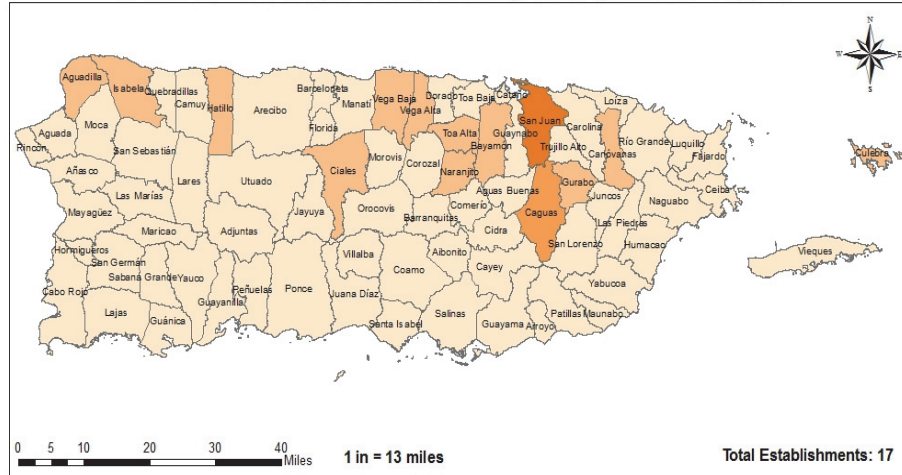


0.063

Calculated by PR Planning Board with data from U.S. Census Bureau,  
County Business Patterns

**Figure 73**

**Number of Establishments in Puerto Rico, 2006  
NAICS 11 - Forestry, Fishing, Hunting, and Agriculture Support**



U.S. Department of Commerce, Census Bureau  
County Business Patterns  
Puerto Rico Planning Board  
Economic and Social Planning Program

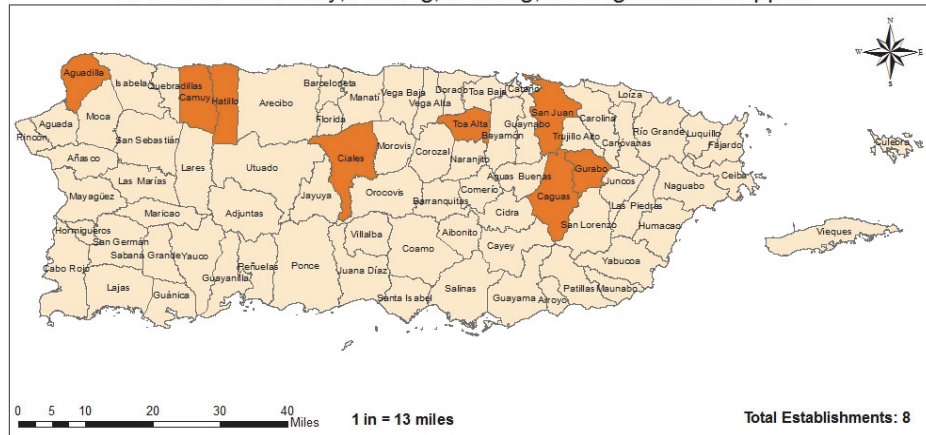
Establishments	Frequency
0	65
1	11
2	1
3	1





**Figure 74**

Number of Establishments in Puerto Rico, 2011  
NAICS 11 - Forestry, Fishing, Hunting, and Agriculture Support



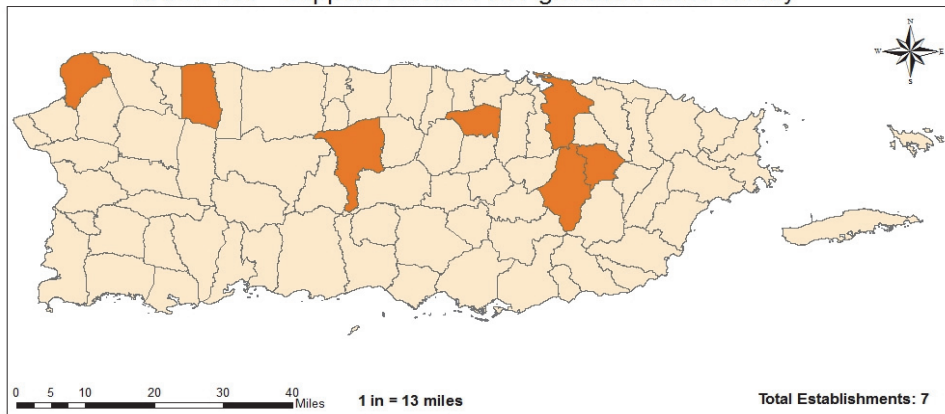
U.S. Department of Commerce, Census Bureau  
County Business Patterns  
Puerto Rico Planning Board  
Economic and Social Planning Program

Establishments	Frequency
0	70
1	8



**Figure 75**

Number of Establishments in Puerto Rico, 2011  
NAICS 115 - Support Activities for Agriculture and Forestry



U.S. Department of Commerce, Census Bureau  
County Business Patterns  
Puerto Rico Planning Board  
Economic and Social Planning Program

Establishments	Frequency
0	71
1	7



## A COMPARISON OF THE CHARACTERISTICS OF PUERTO RICO'S AGRICULTURAL SECTOR WITH SELECTED STATES: HAWAII, FLORIDA, SOUTH CAROLINA, MISSISSIPPI, CONNECTICUT

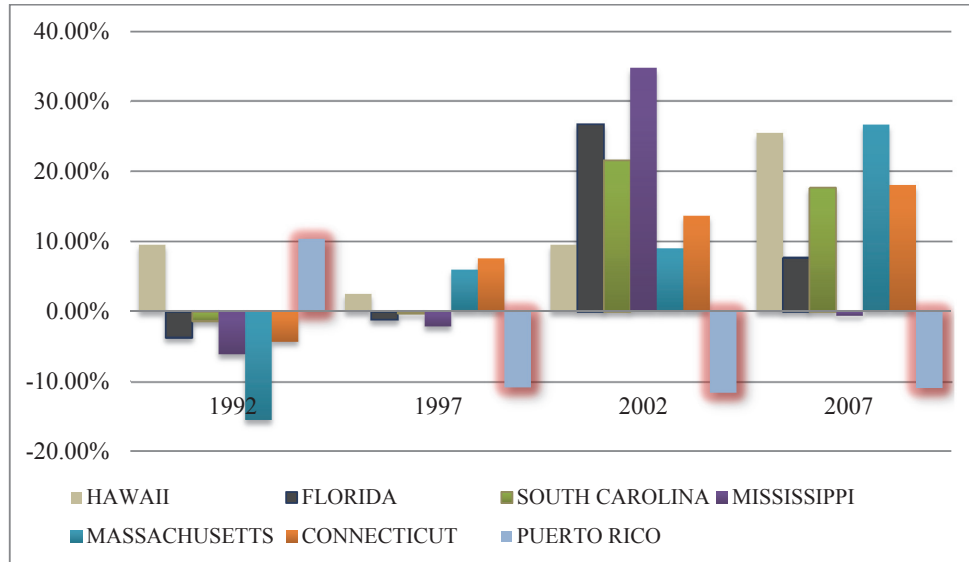
Census data from Hawaii, Florida, South Carolina, Mississippi and Connecticut were used to compare some indicators of the structure of agriculture with Puerto Rico (Table 34). In contrast to Puerto Rico's case, all selected states, except Mississippi, show an increase in number of farms from 1992 to 2007 as illustrated in Figure 76. While total cropland has been decreasing in all jurisdictions included (Figure 77), land in farms behaved in a similar fashion to Puerto Rico in Hawaii and Florida (Figure 78). Average farm size showed a trend to become smaller in all states included as well as in Puerto Rico from 1992 to 2007 but registered increases in 2012 (Figure 79).

**Table 34**  
**Indicators of the Structure of Agriculture 1992-2012**

		Year				
		1992	1997	2002	2007	2012
Number of Farms	Puerto Rico	22,350	19,951	17,659	15,745	12,630
	Hawaii	5,336	5,473	5,996	7,521	7,013
	Florida	35,204	34,799	44,081	47,463	47,740
	South Carolina	20,242	20,189	24,541	28,867	25,266
	Mississippi	31,998	31,318	42,186	41,959	38,089
	Massachusetts	5,258	5,574	6,075	7,691	7,755
	Connecticut	3,427	3,687	4,191	4,946	5,977
Land in Farms	Puerto Rico	803,078	840,552	670,795	541,473	529,000
	Hawaii	1,588,843	1,439,071	1,300,499	1,121,329	1,163,152
	Florida	10,766,077	10,454,217	10,414,877	9,231,570	9,548,342
	South Carolina	4,472,569	4,593,452	4,845,923	4,889,339	4,971,244
	Mississippi	10,188,362	10,124,822	11,097,543	11,456,241	10,933,810
	Massachusetts	526,440	518,299	518,570	517,879	523,517
	Connecticut	358,743	359,313	357,154	405,616	436,406
Average Size	Puerto Rico	37	43	39	34	42
	Hawaii	298	263	217	149	166
	Florida	306	300	236	195	200
	South Carolina	221	228	197	169	197
	Mississippi	318	323	263	273	287
	Massachusetts	100	93	85	67	68
	Connecticut	105	97	85	82	73
Total Cropland	Puerto Rico	272,596	533,081	453,433	392,728	n/a
	Hawaii	293,371	292,107	211,120	177,626	n/a
	Florida	3,841,505	3,639,850	3,715,251	2,953,340	n/a
	South Carolina	2,588,525	2,462,818	2,270,084	2,151,219	n/a
	Mississippi	6,518,288	5,947,311	5,822,786	5,530,825	n/a
	Massachusetts	235,284	223,573	207,734	187,406	n/a
	Connecticut	192,756	181,043	170,673	163,686	n/a

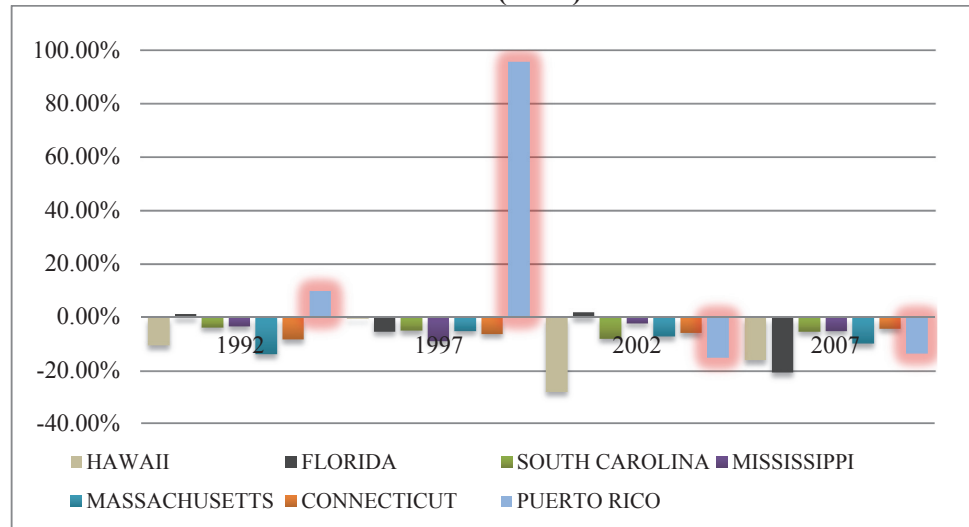
Source: USDA-NASS, Agricultural Census: 1997, 2007, 2012

**Figure 76**  
**PERCENT CHANGE IN THE NUMBER OF FARMS 1992- 2007**



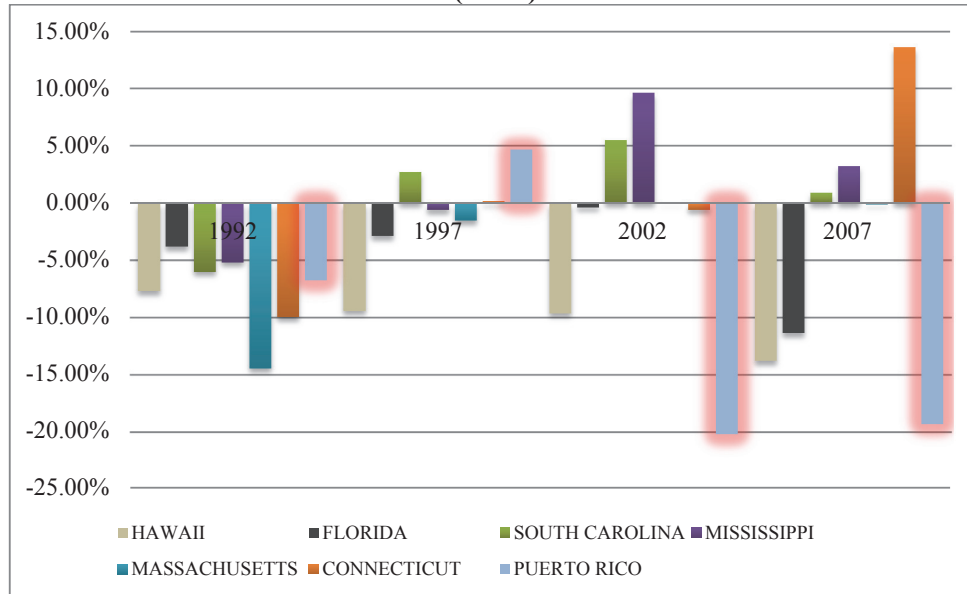
Source: USDA-NASS, Agricultural Census: 1997, 2007, 2012

**Figure 77**  
**PERCENT CHANGE IN THE TOTAL CROPLAND 1992-2007**  
**(acres)**



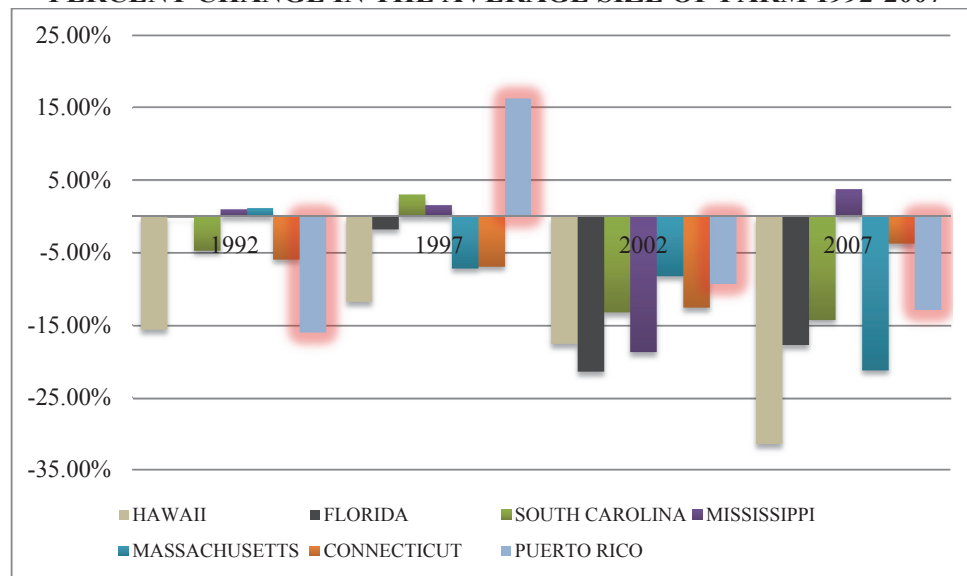
Source: USDA-NASS, Agricultural Census: 1997, 2007, 2012

**Figure 78**  
**PERCENT CHANGE IN LAND IN FARMS 1992-2012**  
(acres)



Source: USDA-NASS, Agricultural Census: 1997, 2007, 2012

**Figure 79**  
**PERCENT CHANGE IN THE AVERAGE SIZE OF FARM 1992-2007**



Source: USDA-NASS, Agricultural Census: 1997, 2007, 2012

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## **CHAPTER 2: STRENGTHS, WEAKNESSES, OPPORTUNITIES AND THREAT (SWOT) ANALYSIS OF THE AGRICULTURAL SECTOR**

### **PART I. INTRODUCTION**

#### **OBJECTIVES**

A strengths, weaknesses, opportunities and threat (SWOT) is an assessment technique developed by Albert Humphrey during the 1960s and 1970s in US that can be applied at the personal, firm, public organization and other. In the preparation of this report, it was used in the stage of generating ideas to determine objectives and suggest strategies to achieve them. The steps followed were: conduct an internal analysis of the sector and list its weaknesses (situations and resources that limit the sector and that should be overcome, avoided or eliminated) and strengths (capacities, potentials and strong points of the sector that can be put to help its growth and development and therefore should be put into use). Then an external analysis identifying and listing opportunities (positive situations in the outside environment that must be used in favor of the sector) and threats (all factors outside the sector that may contribute to limiting its development) is in order.

#### **SOURCE OF INFORMATION**

The SWOT Analysis included in this Chapter was based in the analysis of the data and discussion conducted in Chapter 1.

#### **ROAD MAP**

An analysis of identified strengths, weaknesses, opportunities and threats, or SWOT Analysis is presented in the second chapter. Internal (strengths and weaknesses) and external (opportunities and threats) factors are presented and discussed in the next section. This analysis has the purpose of contributing to the assessment of the sector to help in the establishment of Vision, Mission, Goals and Objectives for the agricultural sector that will be presented in a next chapter.

#### **STRENGTHS**

1. Natural Capital endowment: Puerto Rico has 10 of 12 soil orders in the world, being the two exceptions soils that develop in glaciers and in recent volcanic activity, plenty of water resources, good climate for variety of crops, no extreme variability in temperatures year long
2. Puerto Rico has a Land Grant College in University of Puerto Rico at Mayagüez, College of Agricultural Sciences, so research and development activities in crop and animal biotechnology, food science and technology, tropical crops pest management and tropical farm animal diseases are being conducted and formal education at the undergraduate and graduate level in 11 major fields and informal education are offered based on indigenous research results.
3. The agricultural sector maintains some characteristics of perfectly competitive structure, exhibiting a small market concentration since individual producers have a small market share.
4. Crop output in Puerto Rico is made up of specialty/tropical crops within the US economy.
5. Organic fruit and vegetable production shows increases in recent years.
6. Most business is owned by locals generating secondary, spillover, benefits to local communities and Puerto Rico's economy such as residual income, economic profits, normal profits and interest, rent, salaries of local farm workers, local agribusiness from sales of inputs.
7. Compliance with federal and state safety and quality requirements facilitate the speed the process to export locally produced commodities to the US mainland and territories.
8. Existence of adequate distribution infrastructure.
9. Local production occurs close to the market due to the island's dimensions and the access to roads and transportation, shortening the distribution time so products preserve the attributes of freshness, better flavor and nutritional value.



10. Local economic demand is guaranteed by considerable proportion of population participating in Food Assistance Programs.
11. Local consumers' preference for locally produced fresh products are documented in research results, providing assurance of potential consumption.

## **WEAKNESSES**

1. Land use changes are biased in favor of other uses. The diversion of ag lands to other economic activities has resulted in decrease in quantity, fragmentation of farms into not economically feasible units, agriculture viewed as a nuisance and need for buffer zones, non-point pollution requirements of waste management plans increasing costs of production.
2. Shortage of farm labor especially in mountain range where most agricultural practices cannot be mechanized due to topography.
3. Commercial agriculture's reliance on imported industrial inputs costs and small margins between costs and returns increases vulnerability and dependence to global market.
4. Obstacles for farmers to obtain contracts from buyers and reasonable prices from input sellers are the characteristic of the farming sector: small scale, individually owned, with lack of market organization.
5. The small size and individually owned structure of the firms pose limits to: growth, obtain financial capital, capacity for R & D activities and opportunity for managerial specialization.
6. Beginning and existing farm businesses face excessive regulations (state and federal) and slow permit processes.
7. Federal environmental quality standards are set with temperate zone parameters, based on research conducted in other regions, crops and agricultural practices.
8. Little or no incentive for industrial inputs (agrochemicals) suppliers to comply with registers for local products due to small size of the market limiting their availability, especially for local commodities such as starchy roots.
9. Low priority given by the DAPR to its OEA has resulted in lack of adequate, accurate and timely data needed to evaluate impacts of policy and specific programs at the macro level and for business management including analysis on efficiency of allocation of factors of production, among other.
10. Market risk for the firm increases due to lack of timely and readily available data about demand factors, price fluctuations, and other due.
11. Existing market infrastructure is not being used for local production resulting in weak distribution channels and communications, lack of standards and grades, predominance of intermediaries, poor post harvest management and no incentives to add value to the products by vertically integrating the activities.
12. Low purvey of agricultural credit from private banking.
13. Improper maintenance to drainage systems in low laying areas due to 2002 shut down of "Corporación Azucarera" has converted farmlands into wetlands which are protected by Section 404 of the Clean Water Act, preventing their reversibility to the agricultural land base.
14. Migration and low birth rates may result in a slow growth of demand for agricultural and food products.
15. There is a general perception among consumers that prices of imported products are lower than domestic products.
16. Existence of competitive imports and unfavorable price ratio of imports to domestic products (Pm/Pd).
17. Ignorance about the fact that food comes from the farm, but urban consumers think food originates in the supermarket shelf and refrigerator.
18. Late 20th Century habits favoring imports (potatoes favored over starchy crops) - influence of fast foods and other especially among youth.

## **OPORTUNITIES**

1. Puerto Rico has potential for developing a sector dedicated to alternative agriculture such as organic farming, ecological agriculture, sustainable agriculture, low input farming due to the existence of fallow land as a result of decrease in agricultural production activities.
2. In the case of livestock, Puerto Rico must continue doing research in the Senepol breed for beef production and the Vacas Pelonas, a natural adaptation of the Holstein milk producing race to local conditions, which produce well in heat and humidity and are being bought by ranchers from the Caribbean Basin area, to develop other breeds necessary for to adaptation to the climate changing conditions.

3. There is a potential for the establishment of multi product based fruit and vegetable processing firms due to the diversity of tropical products and the availability of natural capital during the whole year.
4. Opportunities to increase activity in other economic sectors due to the existing agribusiness linkages such as the food industry and the bio-industry for local and export markets.
5. Opportunity to become a center to train professionals from other tropical regions in crop and animal biotechnologies and food science technologies.
6. The opportunity to obtain royalties from patents or intellectual property obtained for processes and technologies and new breeds and varieties of crops and livestock that can be sold to local farmers and also to other tropical producing countries.
7. Partnering with research institutions in other countries to do agrochemical tests for registration in the environmental agencies.
8. Expanding export (ethnic) markets provides wide opportunity with special reference to: specialty crops and animal products such as, but are not limited to: mangoes, pineapples, avocados, grass fed beef, vegetables, starchy products, flowers due to increase in population, income and ethnic diversity in the US, Canada and EU.
9. Domestic demand for organic, ecologically produced, natural,, Non-GMG, fair-trade products, is growing due to awareness about health benefits. There is an opportunity to establish a certificate and use it in the labels for Non-GMO products such as bananas, plantains, starchy crops and most tropical fruits which have not been modified by genetically engineered techniques.
10. Consumers' confidence on quality and safety of local products due to compliance with regulations offers an opportunity for competitive imports substitution.
11. Domestic consumers' preferences for local produce can serve as basis to develop strategies for customer retention and loyalty.
12. Opportunity to capitalize by establishing a branding strategy like denomination of origin for coffee and a few selected commodities for which attributes can be highlighted.

## THREATS

1. The urban bias of economic growth and the absence of land use plan threaten prime agricultural lands especially to install projects of renewable energy such as solar parks and windmills.
2. Potential reduction in availability of water resources, quantity and quality issues, and the absence of a water management plan pose a threat to farming.
3. Aging agricultural community: average age of farmers is 59 and the number of young farmers is rapidly decreasing. The concern is: Who will be future producers?
4. Frequency and severity of extreme events such as droughts, winds, storms and hurricanes, rainfall, high temperatures pose risks to farmers and potential increasing costs due to the need to use new technologies, including protected/enclosed environments.
5. The imperfect market structure- oligopoly- of the input suppliers and processors give them some control of prices over the farmers'.
6. Potential increase of risk due to factors such as changing climate and the greater number and spectrum of pests.
7. Salt water intrusion in the South due to depletion of fresh underground water sources leads to decrease in fresh water availability and salinization of soils that have to be set aside from production and in higher research investments to mitigate and develop tolerant crops.
8. Forecast on sea level rise in the North will decrease land base.
9. Producers and DAPR need to play the economic game of being participants of a world or global economy and try to make the most of the new economic order and the linkages to local markets.