U-Pic or fresh market berry; suitable for machine harvesting.
'Powderblue': Moderate to high vigor; late berry; fruit quality better than 'Tifblue'; U-Pic or fresh market berry; suitable for machine harvesting.
80-20: Early bloom period; not recommended.
80-11: Early bloom period; large berry size; not recommended.
80-150: Not recommended.
'Beckyblue': High vigor; U-Pic or fresh market shipments; early bloom period; suitable for machine harvesting; best adapted to north central Florida; susceptible to leaf diseases.
'Chaucer': High vigor; Rabbiteye cultivar best adapted to north central Florida; early bloom; U-Pic berry; ships poorly; prolonged ripening period.
'Climax': Moderate vigor; low to moderate yields; U-Pic or fresh market berry; early bloom period; suitable for machine harvesting.
'Tifblue': High vigor; high yields; late season berry; good for U-Pic or shipping; berries tend to split badly if rain occurs just prior to or during harvest; recommended for north Florida only.
'Brightwell': High vigor; high yields; 'Woodard' *season* but berries ship well; suitable for machine harvesting.

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METHODOLOGY FOR COUNTY LEVEL ECONOMIC IMPACT ANALYSIS: THE CASE OF AGRICULTURE AND AGRIBUSINESS IN DADE COUNTY, FLORIDA

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Abstract. **In 1989, six Dade County organizations funded an economic impact analysis of agriculture and agribusiness in Dade County. This paper discusses the research methodology and is intended as a general guide for conducting similar studies in other geographic areas.**

Data for analyses were based on published and unpublished data and interviews with growers, shippers, extension personnel, and others familiar with Dade County agriculture. Methodology included (a) secondary data collection conducted in Gainesville at the University and in Homestead at Dade County Cooperative Extension, (b) primary data collection in Homestead for agricultural commodities with no published data, and (c) descriptive information obtained from various Dade County organizational meetings and informal interviews. Input-output analysis for Dade County indicated that sales of agricultural products contributed $910 million to Dade County output and almost $300 million to the county's income, and generated over 23,000 full-time equivalent jobs. This type of economic analysis is useful to policy makers and industry officials as they consider a broad range of policies affecting the interests of agricultural producers, agribusiness firms, and citizens of the county. Similar analyses can be conducted in other Florida counties to reflect the contribution of the agricultural sector of the economy.

Purpose

The purpose of this paper is to outline the research methodology used in conducting an economic impact analysis of Dade County, Florida. The basic methodology discussed in this case study of Dade County can help agricultural and community leaders in other counties or multi-county regions have a better understanding of the data requirements and ultimate benefits of such studies. Economic impact analysis helps planners, analysts, and interested individuals estimate the total economic effect that a particular sector or industry has upon a region's output (gross sales), earnings (income), and employment.

Results obtained from studies of this kind are used by policy makers and industry officials to consider a broad range of policies affecting agricultural producers, agribusiness firms, and citizens of the county. Funding for studies of this type generally comes from industry participants, special interest organizations, and government agencies.

Objectives of the Dade County Study

The Dade County study was undertaken to provide a more complete understanding of agriculture and agribusiness and their contribution to the county's total economy. This study represented more of a challenge for an economic impact study than most because of the extremely diverse agriculture found in the county. Thus, the Dade County study was complex but the specific objectives were rather straightforward and would apply to other studies as well. The specific objectives were to: (1) identify the major elements of agricultural production and agribusiness, (2) assemble published and unpublished data for the major agricultural and agribusiness elements, (3) identify sources of primary economic data to supplement secondary data as necessary, (4) determine the aggregate economic impact of the agricultural sector and estimate economic interrelationships with other sectors of the county's economy, and (5) prepare descriptive profiles and specific estimates of economic impacts for individual sectors. Descriptive profiles are not essential to an economic impact study, but they help educate decision makers and the general public about facets of agriculture they may know little about. Such descriptions can help bring life to stale statistics.

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Procedures

The elements of the agricultural and agribusiness industry were identified through review of secondary data and personal interviews of individuals familiar with Dade County agriculture. Field work conducted in Dade County in cooperation with the Dade County extension staff required seven months. The major focus was on row crops (including traditional and tropical vegetables), tree crops (tropical fruit), and ornamental horticulture. Interviews were conducted with members of the agricultural community and officials of the Cooperative Extension Service, the Florida Department of Agriculture and Consumer Services, Federal agricultural agencies, trade associations, and other local business and government sources. Interviews provided leads for obtaining published and unpublished data, which were assembled for all major agricultural commodities. Personal interviews also identified potential sources of primary economic data used to supplement secondary data.

Published data were evaluated for accuracy and refined to meet the requirements of input-output analysis. For example, published estimates of farm values of various crops had to be adjusted to reflect values at the shipping point. Data for making such adjustments were obtained from trade associations or shippers.

The aggregate economic impact of the agricultural sector was determined through the use of input-output analysis, a macroeconomic analytical technique. This technique also allowed economic interrelationships existing between agriculture and other sectors of the economy to be estimated. Analysis employed an input-output model of the Dade County economy developed by the U.S. Department of Commerce. In addition to the economic impact analysis, the final report included a descriptive overview of agriculture, including a physical description of the county with emphasis on the agricultural sector, a brief historical overview of agriculture, and descriptions of selected commodities produced in the county.

Data Sources and Limitations

Published data were obtained from the *Census of Agriculture*, the Florida Statistical Abstract, the Federal-State Market News Service, the Florida Agricultural Statistics Service, the Florida Department of Agriculture and Consumer Services, Dade County Cooperative Extension, the Florida Lime and Avocado Administrative Committees, and the Florida Tomato Committee. Information was also provided by local trade associations including the Dade County chapter of the Florida Foliage Association, the Florida Nurserymen and Growers Association, the Mango Forum, and the Tropical Fruit Growers Association, and from local industry including J. R. Brooks & Son Inc., Fairchild Tropical Garden, and other private corporations. Other sources of primary data included the county planning department, water management districts, state extension specialists, and a mail survey of nursery operators. In the Dade County study, the mail survey was rendered more effective with the support of industry trade groups and associations.

Limitations encountered from published data sources included confidentiality restrictions, inconsistency of categorical delineations over time, multi-county and regional summary data, and insufficient time series data. The *Census of Agriculture* reports county level data in five year increments; Census category definitions have changed over time and confidentiality restrictions frequently limit the information reported due to the small number of reporting units.

Confidentiality restrictions are also encountered with the Florida Agricultural Statistics Service (FASS). Additionally, FASS frequently aggregates data by multi-county producing areas, limiting the availability of county level information. It is difficult to obtain county level commodity data unless the commodity is a major enterprise such as tomatoes, limes, or avocados which are regulated by federal marketing orders. This regulation results in detailed time series data which are very consistent and reliable. In the case of commodities that are not regulated by marketing orders or that are viewed as "minor" by state and federal statistical collection services, there simply are no data available. In many Florida counties, there are significant numbers of these "minor" crops which make relatively small contributions to the agricultural sector on an individual basis, but are of considerable importance when taken in the aggregate. Thus, in addition to the data provided by the large local trade associations, representatives of smaller commodity groups, individual producers, packers, and shippers, and Cooperative extension agents provided sources of unpublished data. In effect, a list of "Who's Who in Agriculture" was compiled and on-site interviews were conducted. These interviews generated descriptive information and estimates of acreage, production, and prices for all commercial crops, including those viewed as minor. This type of data collection is time consuming and costly, but necessary in counties with extremely diversified agriculture.

Overview of Input-Output Analysis

The agricultural sector of Dade County's economy "exports" commodities to locations *outside* of the *county*. These "exports," in turn, affect the county's economy by stimulating additional local economic activity, as dollars generated from sources outside Dade are used for purchases within the county.

When Dade's agricultural commodities are sold outside the county, the agricultural industry directly affects the region's economic activity by bringing new dollars into the county. These *direct* effects then produce *indirect* impacts or effects on the regional economy as dollars generated by external sales are used for local purchases. For example, farmers spend money for wage payments in all phases of agricultural production from land preparation, planting and harvesting to transporting produce to warehouse facilities for storage and subsequent packaging and processing for export out of the county. Indirect impacts, in the form of goods and services provided by local businesses and individuals to the agricultural sector, can include activities such as (1) business services like accounting, banking activities, or any services that are provided to the agricultural industry, (2) sale of inputs used by the agricultural sector such as fertilizers, machinery and equipment, office supplies, packing materials, and the like, (3) sale of parts and repair services, and (4) other similar kinds of activities. These indirect effects represent additional economic activity and result in additional jobs and income for local resi-

dents, generated from external sales by the agricultural industry.

In addition to direct and indirect effects, there are also *induced* effects or impacts associated with the production of agricultural commodities. Induced effects represent the spending activities of employees who earn income in jobs provided by the businesses involved, either directly or indirectly, in the production of agricultural exports. This induced effect is income that is spent by consumers on purchases of services including such things as retail sales, local bank accounts, dry cleaning services, car repairs, and the like.

Thus, the economic impact that agriculture has upon Dade County's economy is the combined direct, indirect, and induced effects. For example, if for some reason agricultural "export" sales increase and local production expands, then the increase in sales represents new direct economic activity and increased local expenditures for labor and other agricultural inputs. This increased activity results in increased local spending by service and input supply industries as they increase their output and local purchases in order to supply increased demands of the agricultural sector. This expansion, in turn, leads to increased output and local purchases by firms supplying the input and service businesses. For example, a local tire business might experience increased sales (indirect effect) because it supplies the local transport company that provides freight services for agricultural producers. At the same time, tire sales personnel spend income for a variety of local goods and services; one example could be purchases of health services (induced effect). Thus, each dollar in additional sales, when spent locally, triggers a chain reaction of additional indirect and induced spending activities.

Total economic repercussions associated with an additional dollar of external sales from a region is referred to as the *multiplier* effect. The multiplier for a particular export industry is a measure of the total economic activity (direct, indirect, and induced) associated with an additional dollar of external sales by the industry in question. While multipliers are usually considered in positive terms, the converse is also true. A decrease in agricultural export sales will decrease economic activity. The multiplier therefore can measure the impact of either an increase or a decrease in export sales.

Additional economic activity, however, is not infinite in its ripple effect through the economy. Some dollars earned in the direct activity are not spent locally. A part of direct sales dollars are used for such things as taxes and fees paid to state and federal agencies, payments to landowners who reside outside the county, and as payment for goods and services imported into Dade County such as seed purchased from mid-west companies, externally located computer consultants servicing equipment, etc. The size of the multiplier associated with increased/decreased regional export sales varies with the size of the region and with the industry in question. In general, the larger and more diverse the economy of the region and the more complex the industry in terms of its linkages to other local industries, the larger the multiplier effect.

The economic impact of agriculture on the county is estimated by use of multipliers based on regional input-output (I-O) models. The foundation of the I-O model is a transactions table structured like a mileage chart on a road map. Each industry (or sector) in the region is listed as a selling industry in a row and as a purchasing industry in a column of the table. Entries in the table indicate the distribution of sales and the pattern of purchases for each sector of the regional economy. In effect, the transaction table provides a picture of interactions between local sectors and allows the flow of dollars to be traced through the economy. Multipliers are calculated based on the information generated from the transactions table.

Because they are dollar multiples of the initial dollar spent for the output (sales) of the industry, total changes in output are referred to as *output multipliers*. *Earnings multipliers* show the total earnings (direct, indirect, and induced) to households employed in county industries in order for the agricultural sector to deliver a dollar of sales outside the county. The *employment multiplier* shows the number of full-time equivalent jobs that all county industries provide, directly, indirectly, and induced, in order for the agricultural sector to deliver $1 million of "export" sales.

The combined total output impacts from vegetables ($511.4 million), fruits ($127.5 million), and nursery ($271.2 million) production indicate that the agricultural sector of Dade County had a total output impact of $910.1 million during the 1988-89 production season. The total impact of the agricultural sector on Dade County earnings during 1988-89 was $297.2 million, of which nurseries generated $76.4 million, vegetables $181.2 million, and fruits $39.6 million. Agricultural export sales during 1988-89 generated 23,069 full time equivalent jobs across all Dade County industries, of which 14,117 jobs were generated by the vegetable industry, 5,891 by nursery production, and 3,060 jobs by fruit production (Table 1).

Table 1. Subsector contribution and economic impacts of agriculture on Dade County, 1989.

	Agricultural Subsectors			Total Ag Sector
	Fruits	Vegetables	Nurseries	
Total gross (FOB) export sales (million $)	64.9	280.7	120.9	466.4
Output				
Multiplier	1.8261	1.7771	1.8255	
Output impact (million $)	118.4	498.8	220.6	837.8
Sales within Dade County	9.1	12.6	50.6	72.3
Total output impact[b] (million $)	127.5	511.4	271.2	910.1
Earnings				
Multiplier	0.6106	0.6457	0.6323	
Earnings impact[a] (million $)	39.6	181.2	76.4	297.2
Employment				
Multiplier	47.1729	50.2991	48.7482	
Employment impact[a] (full-time job equivalents)	3,060	14,117	5,891	23,069

[a]Impacts do not include employment and earnings associated with agricultural production for local sales.
[b]Total output impact is the output impact from export sales plus sales within Dade County.

Summary and Conclusions

The total economic impact of agriculture on Dade County output was about $910 million in 1988-89, which generated over 23,000 full-time equivalent jobs and almost $300 million in income for workers in the county. Details on the contributions made by the major components of Dade County's agricultural subsectors, as well as interactions with other non-agricultural sectors, can be found in the final report, "Economic Impact of Agriculture and Agribusiness in Dade County, Florida," prepared by the Florida Agricultural Market Research Center, IFAS, at the University of Florida.

While the final results of an economic impact study may seem relatively simple and straightforward, a tremendous amount of effort is required to generate these results. The effort required is directly related to the diversity and complexity of agricultural production. In the absence of published data, it is virtually impossible to conduct an economic impact analysis where there are numerous unreported minor crops without the full cooperation of the agricultural community. The level of cooperation in Dade County was excellent, but in other areas, producers and shippers may be reluctant to provide confidential data. In conclusion, successful economic impact studies require full cooperation of the agricultural community in addition to time and resources to document agricultural economic activity.

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AN OVERVIEW OF ECONOMIC IMPACT ANALYSIS OF AGRICULTURE AND AGRIBUSINESS IN DADE COUNTY, FLORIDA

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Abstract. **An economic impact study of Dade County agriculture and agribusiness was conducted in 1989-90. This paper discusses the results of the Input-Output analysis used to determine the economic impact of the three agricultural subsectors: fruits, vegetables, and nurseries.**

Input-Output analysis showed agriculture's total output impact on Dade County was almost $1 billion in 1989. Of this output impact, vegetables contributed $511 million (56%), nurseries contributed $271 million (30%), and fruits contributed $127 million (14%). Total earnings impact of Dade agriculture in 1989 was almost $300 million. Vegetables constituted over 60% of earnings impact ($181 million); nurseries contributed over a quarter of the county agricultural income impact ($76 million); and fruits represented 13 percent, almost $40 million. Agricultural export sales (sales outside the county) generated more than 23,000 full-time equivalent jobs across all Dade County industries. Of this total, 14,117 jobs were generated from $281 million in external sales from the vegetable industry; 5,891 jobs were generated from $121 million in export sales from the nursery industry; and the fruit industry, with almost $65 million in external sales, generated 3,060 full-time equivalent jobs.

Objectives

The purpose of the study was to provide a more complete understanding of agriculture and agribusiness in Dade County and evaluate the importance of agricultural production and related activities to the county's economy. Specific objectives were to: (1) identify the major elements of agricultural production and agribusiness, (2) assemble available published and unpublished data for the major agricultural and agribusiness elements, (3) identify potential sources of primary economic data to supplement secondary data as necessary, (4) determine the aggregate economic impact of the agricultural sector and estimate economic interrelationships with other sectors of the county's economy, and (5) prepare descriptive profiles and specific estimates of economic impacts for individual sectors as resources permitted.

Data and Analysis

The elements of the agricultural and agribusiness industry were identified through personal interviews of individuals familiar with Dade County agriculture. Field work was conducted over a seven month period in Dade County in cooperation with the Dade County extension staff. The major focus was on row crops (including traditional and tropical vegetables), tree crops (tropical fruit), and ornamental horticulture.

Data for analyses were based on primary and secondary data and interviews with growers, shippers, extension personnel, and others familiar with Dade County agriculture. Data and information were collected from the *Census of Agriculture*, the Florida Agricultural Statistics Service, the Florida Department of Agriculture and Consumer Services, the Dade County chapter of the Florida Foliage Association, the Florida Lime and Avocado Administrative Committees, The Florida Tomato Committee, the Mango Forum, the Tropical Fruit Growers Association, and J. R. Brooks & Son Inc.

For the economic impact analysis, official 1989 estimates of individual commodity production values were used when available. However, due to the non-traditional nature of Dade County agriculture, there is reason to believe that estimates of the economic value of agriculture in the county are sometimes under-reported because only published data are used. Therefore, unofficial sources, including growers, shippers, and packers, were consulted to determine (a) values for those commodities for which there were no official estimates and (b) the proportion of each commodity shipped out of the county.

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