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Changing Produce Marketing Barriers: A Comparison Among Three Southern States

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Produce growers in Kentucky, North Carolina, and Tennessee were surveyed in 2002 to gather information about their decision making in the areas of planting, postharvest handling, marketing, and expected changes. North Carolina has proportionately more respondents with large operations, and Kentucky and Tennessee were more similar and concentrated in smaller farms. Tennessee and Kentucky respondents were less likely to have engaged in activities that were associated with the commercial distribution system. Greater reliance on the commercial distribution system on the part of North Carolina growers is consistent with more produce export activity.

Key Words: cooling, direct markets, postharvest handling, produce marketing, traceback

JEL Classifications: D30, D40, Q12, Q13, Q16, Q17

Market development is a complex process, dependent to a significant degree on the simultaneity between buyers and sellers. This interaction is inherently dynamic because of changing food consumption patterns that favor fresh produce, structural changes in the marketing system, improvements in packing and processing methods to transfer products from fields to consumers, and the creation of global markets. Although increased consumption has been favorable for the produce industry, not all stakeholders in the distribution system have benefited. Access favors growers with larger operations who have the ability to deliver

packaged and labeled products at specific grades, sizes, and sufficient volume for enough time to permit the creation of an appropriate market infrastructure to serve large-scale buyers (Kaufman et al.).

Produce production can be instrumental in arresting the decline in the number of farms in some rural areas, as well as in providing an alternative to tobacco production. Successful transition depends largely on market development, which entails overcoming the simultaneity of generating enough production and having reliable outlets. Various states have pursued different types of produce market development and have achieved different degrees of success. Two fundamental questions follow directly: Are these relationships crucial (1) to creating market alternatives for growers and (2) for job opportunities within the produce industry?

A study funded by the Initiative for Future Agriculture and Food Systems (IFAFS) is underway. It entails comparisons of four states, of which two have been successful (Georgia

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Table 1. Selected Farm Characteristics: 1997 Census of Agriculture

| | Kentucky | North Carolina | Tennessee |
|-----------------------------------|----------|----------------|-----------|
| Total Farmland (million acres) | 13.3 | 9.1 | 26.4 |
| Cropland (million acres) | 8.5 | 5.6 | 11.1 |
| Average Farm Size (acres) | 151 | 185 | 145 |
| Distribution of Farms by Size (%) | | | |
| 1–99 acres | 55.4 | 61.0 | 61.9 |
| 100–999 acres | 38.6 | 30.7 | 33.1 |
| 1,000 or more acres | 6.0 | 8.3 | 5.0 |
| Farms with Sales <\$50,000 (%) | 87.3 | 73.9 | 92.1 |

and North Carolina) and two less successful (Kentucky and Tennessee) with respect to market development. The goal is to address the simultaneity problems vegetable producers with smaller operations encounter in securing outlets for their production. Five stakeholder groups were surveyed in each state: produce growers, Extension agents, state departments of agriculture marketing staff, marketing agents (e.g., brokers, wholesalers), and public market managers. This paper focuses on the results of the grower surveys in three of the four states (Kentucky, North Carolina, and Tennessee).¹ These survey data provide an opportunity to examine the marketing behaviors of produce growers with respect to decision making about what to plant, postharvest handling practices, current marketing activities, and anticipated changes in the produce industry. Results are then related to recent produce export activity in the states.

Table 1 provides some background information about farms in each of the three states based on the 1997 Census of Agriculture (U.S. Department of Agriculture). Tennessee had the largest total acreage of farm land and cropland, and North Carolina had the least. However, with respect to average farm size, Tennessee and Kentucky farms were comparable and smaller than North Carolina farms. The distribution of farms by size indicates that Tennessee had the highest concentration of operations under 99 acres, closely followed by North Carolina. Kentucky had the largest

share of farms between 100 and 999 acres, and North Carolina had the highest proportion of large farms.

The Grower Survey

A 34-question grower survey was developed to obtain information about the behaviors of produce operations in the states. Questions focused on decisions about what to plant, postharvest handling, current marketing activity, and anticipated changes in the produce industry. To enhance response rates, farmers who received surveys were provided with postage paid return envelopes. Surveys were distributed in the spring and summer of 2002 and referred to the 2001 growing season.

The Kentucky sample was obtained from grower lists of the vegetable co-ops in the state, county Extension offices, Kentucky Department of Agriculture fruit and vegetable producers, and Kentucky Farm Bureau certified roadside markets. A total of 940 surveys were mailed, and reminder cards were sent two weeks later. Out of the surveys sent, 62 proved to be operations that did not involve fruit or vegetable production in 2001. Altogether, 385 usable questionnaires were returned representing a 44% response rate.

The North Carolina sample was generated from several lists. Approximately 700 surveys were distributed. Of these, 400 were distributed by County Agents, and 100 each were sent to growers who attended the North Carolina Produce Expo, were members of the North Carolina Vegetable Growers Association, and were members of North Carolina

¹ To date, there are too few Georgia grower surveys to permit their incorporation into the analysis.

Table 2. Sample Characteristics of Produce Farms (% Distribution)

| | Kentucky | North Carolina | Tennessee | Chi-Square |
|---|----------|-------------------|-----------|------------|
| Age Distribution of Operators | | | | |
| Under 30 | 6.7 | 2.3 | 2.7 | |
| 31-40 | 16.5 | 13.8 | 9.1 | |
| 41-50 | 30.5 | 32.2 | 31.0 | |
| 51-60 | 23.2 | 33.3 | 25.6 | |
| Over 60 | 22.9 | 18.4 | 31.6 | 18.06* |
| Years of Experience of Operators | | | | |
| Under 10 | 62.5 | 36.8 | 38.0 | |
| 10 or more | 37.5 | 63.2 | 62.0 | 44.39* |
| Other Enterprises (respondents could check more than one) | | | | |
| Livestock | 39.1 | 16.1 | 42.6 | 18.66* |
| Row Crops | 32.2 | 25.3 | 29.3 | 23.26* |
| Tobacco | 43.9 | 50.6 | 24.5 | 13.14* |
| Produce Acreage | | | | |
| Less than 5 acres | 59.7 | 24.7 | 36.4 | |
| 5-14.9 acres | 23.8 | 21.0 | 27.2 | |
| 15 or more acres | 16.5 | 54.3 | 36.4 | 49.96* |
| Sales from Farming | | | | |
| Under \$50,000 | 68.7 | 39.0 | 62.6 | |
| \$50,000 or more | 31.3 | 61.0 | 37.4 | 63.91* |
| Produce Sales | | | | |
| Under \$50,000 | 91.6 | 54.8 | 74.5 | |
| \$50,000 or more | 8.4 | 45.2 | 25.5 | 24.10* |

Note: * Significant at the 0.05 level.

commodity associations. No reminder cards were sent. There were 87 returned surveys, for a response rate of 12%.

The Tennessee survey was conducted two ways. One was through personal interviews. County Extension agents, in addition to providing lists of growers, were also asked to suggest growers to be interviewed. This led to 22 personal interviews, plus nine additional interviews at county grower meetings. The remaining producers on the county lists received the questionnaire in the mail and were asked to complete and return the forms in the postage paid envelopes provided. Altogether, 198 questionnaires were returned for a response rate of roughly 12% or nearly 11% among those who received the mail-out. No reminder cards were sent.

Table 2 presents summary information re-

garding some farm characteristics in Kentucky, North Carolina, and Tennessee. The results suggest the samples are consistent with the 1997 Census of Agriculture. Results of chi-square tests of independence are also shown. In all cases, the null hypothesis of independence of the responses by state is rejected at the 5% level. With respect to the age of the operators, Tennessee had the lowest proportion in the 31-40 age group and the largest in the over 60 category, whereas North Carolina had the smallest proportion in the oldest group. Kentucky had proportionately fewer operators with at least 10 years experience. North Carolina had the lowest involvement with livestock, and Tennessee had the lowest in terms of tobacco production. The distributions of produce acreage indicates North Carolina had proportionately more operators in

Table 3. Production Decision Making Questions: Interstate Comparisons

| Question | Response Categories |
|---|--|
| In 2001, did you contract the sale of any of your produce for the fresh market? | Yes/No. |
| How do you decide what to grow? | Experience, production expertise,* market access,* labor timing/availability,* risk,* price,* profit potential,* equipment needs. |
| When considering a new crop, how important is each of the following? | Contracting,* broker/packer fees,* market location,* grading,* cooling,* volume requirements,* buyer-seller relationship,* transportation,* meeting buyer standards,* insurance. |
| If you were to start the production of a new crop, what sources of information for growing the commodity would you use? | Farm Bureau,* another grower,* Extension, input supplier-buyer,* Internet, grower organization,* state department of agriculture, farm service agency, no one. |
| Do you expect any changes in your operation in the next year related to the following? | Use of irrigation,* change crops,* organic production, participation in a cooperative.* |
| Do you . . . ? | Attend trade shows,* participate in grower organizations,* try new varieties, receive market news publications, attend field days,* practice IPM.* |

Note: * Significant chi-square at the 0.05 level for the states versus response categories.

larger operations, and Kentucky was more concentrated in small-acreage produce production. Consistent with the acreage, North Carolina farmers were more likely to have had sales in excess of \$50,000 for produce and for all farm sales.

Production Decision Making

Six questions focused on production decision making (see Table 3). One asked whether the respondent had contracted for the sale of produce for the fresh market. Kentucky had the highest percentage of growers who had done so (29.2%), followed by Tennessee (20.1%) then North Carolina (13.8%). The use of produce cooperative membership lists could have contributed to Kentucky's higher percentage.

Another question asked respondents to indicate which of eight factors they used in deciding what to grow. No significant differences by state were found for "experience" and "equipment needs." For five of the remaining six factors, North Carolina growers were significantly more likely to have used those factors. The exception was "market access"

which Kentucky growers were more likely to consider.

A third question asked to rate the importance of selected factors when considering a new crop on a scale of 1 (not important) to 5 (very important). The orderings of the average ratings by states were similar. However, there were differences in the percentages giving extreme ratings. Chi-square tests of independence led to inferences that the response patterns varied by state in 9 of the 10 instances. Lower proportions of Kentucky and North Carolina respondents checked "not important" for every factor. Kentucky's "very important" percentages were always greater than Tennessee's, which were greater than North Carolina's (with the exception of "fees," where North Carolina was greater than Tennessee). An interpretation is that North Carolina growers' greater use of the commercial distribution system resulted in their indicating these factors were less important.

A related question pertained to information sources about growing a new crop. The ordering of the percentages of respondents was similar across the states, with "Extension"

Table 4. Postharvest Practices: Interstate Comparisons

| Question | Response Categories |
|---|--|
| If you considered the production of a new crop, who would you ask about marketing the commodity? | Farm Bureau, another grower, Extension, input supplier, buyer (broker/wholesaler), grower organization, state department of agriculture, co-op,* no one. |
| Are you a grower–shipper? | Yes/No. |
| If you do not use a broker or wholesaler to sell any of your produce, which two of the following are the most important factors in your not using them? | Volume requirements, fees, packing, grading, precooling, payment practices, broker availability. |
| Do you pack your produce yourself? | Yes/No. |
| Do you pay someone else to . . . ? | Grade,* pack,* cool.* |
| If you only direct market, what do you feel are barriers to shifting completely to wholesaling? | Lower prices,* access to wholesalers,* volume too small,* grading and packing requirements,* time delay in payment.* |
| Please circle any of the following you use on the farm. | Sorting tables, boxes,* sizers,* precoolers, quick-cooling, branding,* on-farm processing, washing equipment, PLU labels,* retail packing, holding coolers.* |
| Do you expect any changes in your operation in the next year related to each of the following? | Direct marketing,* on-farm cooling,* wholesale/broker marketing,* value-added processing,* branding,* traceback.* |
| Have you implemented any of the following? | Product liability insurance,* PLU coding,* organic labeling, IPM.* |

Note: * Significant at the 0.05 level for the states versus response categories.

and “another grower” being the dominant sources of information. In four out of nine instances there were significant interstate dependencies. Tennessee growers were more likely to ask the Farm Bureau. Kentucky respondents were more likely to ask, and Tennessee less likely to ask, “another grower,” “buyers,” and “grower organizations.” Thus, the differences were between the two lagging states, not between them and North Carolina.

Respondents were asked to indicate whether they expected any changes in various aspects of their operations next year. Larger proportions of the North Carolina sample expected changes than either Kentucky or Tennessee for “irrigation,” “crops,” and “co-ops.” Of the four production changes listed, only “organic production” responses were independent of the states.

The sixth question related to production and asked about activities that could generate production information. North Carolina always had larger percentages of respondents in-

dicating they engaged in the respective activity, and four of the six tests of independence led to inferences that North Carolina growers were more likely to have engaged in these activities.

Postharvest Practices

Several questions were directed toward postharvest activities (see Table 4). The states had similar proportions of respondents indicating the organizations or people they would ask about marketing a new crop. Most would ask “other growers,” followed by “Extension.” The only exception was the “co-op,” which Kentucky and North Carolina growers were more likely than Tennessee growers to use as a market information source. There was no significant difference among the shares of respondents who were grower-shippers.

A related question asked respondents to select up to two reasons from a list of reasons for not using a broker or wholesaler to sell any

Table 5. Distribution of Estimated Produce Sales by Outlet by State (Share of Weighted Produce Sales)^a

| Outlet | Kentucky | North Carolina | Tennessee |
|-----------------------------------|----------|----------------|-----------|
| Direct Market | 52.4* | 11.6* | 32.8* |
| Direct to Retailer | 11.2* | 29.0* | 16.4* |
| Wholesale Market (Noncooperative) | 11.4* | 28.7* | 44.1* |
| Direct to Local Restaurant | 0.0 | 0.0 | 0.6 |
| Processor | 0.1* | 9.7* | 3.0* |
| Community Supported Agriculture | 1.4 | 0.8 | 0.4 |
| Cooperative | 20.8* | 2.7* | 2.4* |
| Shipper, Packer | 0.4* | 17.4* | 0.2* |
| Auctions | 2.3 | 0.0 | 0.0 |

^a Respondents' estimated percent distribution of sales times the cell midpoint of the produce sales categories.

Note: * Significant chi-square for the row at the 0.05 level.

of their produce. The ordering of the percentages of respondents across states was very similar. There were no significant chi-squares. An interpretation is that all the growers, regardless of the state, have similar patterns of reasons for using or not using a broker or wholesaler. Between 70 and 75% of the respondents in each state packed their products themselves. With respect to paying someone else to grade, pack, and cool, the Kentucky sample had higher proportions of respondents than North Carolina or Tennessee. This result might reflect greater participation in marketing co-ops in Kentucky. Growers who only used direct markets were asked to check any barriers to their shifting to wholesaling. "Volume too small" and "lower prices" were the two most frequently cited. "Access to wholesalers" and "grading" and "packing" requirements comprised a second tier of barriers with respect to the percentages of the samples that indicated those factors were problems. The percentage of the Kentucky sample indicating a respective factor was a barrier was always significantly less than North Carolina and Tennessee. "Payment delays" had the lowest relative frequencies for the states.

Respondents were asked to indicate whether they used any of 11 types of postharvest equipment. Similar orderings of the percentages of samples that used each were found. However, the North Carolina percentages were always greater than Tennessee's, which were greater than Kentucky's, with one exception,

for which the ordering was reversed ("on-farm processing"). There were five instances for which the patterns of responses varied significantly by state: "boxes," "sizers," "branding," "PLU labels," and "holding coolers."

A list of postharvest activities was provided, and respondents were asked to indicate whether they expected any change in them for the coming year. The chi-squares for "change"/"no change" responses for each activity by state were significant. In every instance except "wholesaling," the percentages for North Carolina respondents expecting change were always greater than Tennessee's, which were greater than those for Kentucky.

Respondents were also asked if they had implemented four specific practices. In all instances, the percentage of North Carolina growers was greater than for Kentucky and Tennessee. Only in the case of "organic labeling" was the pattern of responses independent of the states.

Growers were asked to estimate the percentages of their sales that went through different market outlets (Table 5). The weighted averages by state for each type of outlet were calculated. Both Tennessee and Kentucky had significantly higher concentrations of direct market sales than North Carolina. Tennessee's largest outlet share was "wholesalers." North Carolina was almost evenly split between "direct to retailers" and "wholesalers" and had the highest average for "direct to retail store."

Table 6. Expansion of Produce Operations

| Question | Response Categories |
|--|---|
| Are you interested in expanding your production? | Yes/No.* |
| For each factor listed below, please indicate the extent to which you feel it is a factor that limits your ability to expand your produce operation (1 = not limiting, 5 = very limiting). | Land, labor management, harvest labor availability, credit availability, equipment, insect control, price received,* market outlets,* weather, irrigation, disease control,* transportation, cooling,* labor housing. |

Note: * Significant chi-square at the 0.05 level for the states versus response categories.

Tennessee's "wholesalers" share was larger than the other two states, and Kentucky had the largest share of weighted sales going to "co-ops." Notable among the percentages is the "shipper-packer" share for North Carolina, which was 17.4% versus 0.4% for Kentucky and 0.2% for Tennessee.

Table 6 summarizes information about expansion of produce operations. The percentage of growers indicating interest in expansions were 58.0% for Kentucky, 69.0% for North Carolina, and 52.9% for Tennessee, and the chi-square test by state led to an inference that significantly more North Carolina growers were interested in expansion.

Respondents were given a list of 14 factors that could limit expansion and were asked to indicate the extent to which they were limiting on a scale of 1 (not limiting) and 5 (very limiting). The rankings of the average scores were similar across states. "Harvest labor availability," "market outlets," and "prices received" were the three highest, and "equipment,"

"transportation," and "credit availability" were the lowest. North Carolina tended to indicate "prices received," "market outlets," and "cooling" as limiting, which is consistent with these growers having greater interaction with the commercial distribution system. Tennessee growers were more likely to have indicated that "disease control" was a problem.

Produce Exports

Export data are displayed in Table 7. North Carolina leads in terms of overall agricultural exports, followed closely by Kentucky. Tennessee's agricultural exports have been roughly half of those of the other two states. Much of this is due to tobacco. With respect to vegetables, Kentucky had negligible exports. North Carolina and Tennessee had similar estimated levels of vegetable exports until 2000. Part of the North Carolina increases is due to an increase in the number of crops reported by the state's agricultural statistics service and as-

Table 7. Agricultural Exports by State, 1996–2001 (millions of dollars)

| Year | Total | | | Vegetables and Preparations | | | Fruits and Preparations | | |
|------|----------|----------------|-----------|-----------------------------|-------------------|-----------|-------------------------|----------------|-----------|
| | Kentucky | North Carolina | Tennessee | Kentucky | North Carolina | Tennessee | Kentucky | North Carolina | Tennessee |
| 1996 | 1,048.4 | 1,404.4 | 562.6 | 0.0 | 2.4 | 3.0 | 0.5 | 17.5 | 0.0 |
| 1997 | 1,112.4 | 1,542.0 | 606.0 | 0.0 | 3.8 | 3.6 | 0.0 | 14.3 | 0.0 |
| 1998 | 944.7 | 1,463.7 | 539.3 | 0.0 | 4.9 | 3.9 | 0.0 | 9.6 | 0.0 |
| 1999 | 904.7 | 1,226.3 | 438.8 | 0.0 | 4.4 | 4.0 | 0.2 | 13.4 | 0.0 |
| 2000 | 827.8 | 1,181.8 | 435.8 | 0.0 | 17.3 ^a | 5.0 | 0.6 | 15.3 | 0.2 |
| 2001 | 1,010.1 | 1,389.0 | 549.0 | 0.0 | 19.7 ^a | 6.7 | 0.5 | 14.9 | 0.2 |

^a Part of the increase versus earlier years is attributed to North Carolina having increased the number of crops reported. Source: www.fas.usda.gov/ustrade.

sociated acreage and yields that occurred in the last 2 years. Both Kentucky and Tennessee were well below North Carolina for fruit and preparations exports.

The extent of North Carolina produce export activity vis-a-vis Kentucky and Tennessee is consistent with the produce-related behaviors of the typical growers in the states' samples. North Carolina growers were more likely to consider several factors that help determine what to grow. They tended to report fewer limiting factors and were more engaged in information gathering activities. Operators in North Carolina were more apt to expect changes and more likely to have implemented marketing-oriented practices. Finally, North Carolina growers typically were more interested in expansion, which is further evidence of their greater market sensitivity.

The disparity in the development of the produce industries among the states is only partially related to grower behaviors. Preliminary results of the surveys of the four other stakeholder groups indicate they have important roles in overcoming the simultaneity barriers in market development. In general, the level of activity in North Carolina greatly exceeds that found in Kentucky and Tennessee.

Differences have been identified for the breadth and variety of programs and in the number of people involved with produce marketing activities. With respect to public farmers' markets, the states differ widely in terms of the financial support and the types of facilities in operation. For example, Tennessee does not provide any operating assistance for them, whereas North Carolina does. The types of facilities also vary. The Tennessee and Kentucky markets generally provide limited ser-

vices. North Carolina accommodates brokers and wholesalers at several of its locations, which also have cooling and repacking capabilities. The number of brokers and wholesalers operating in each state varies. Both Kentucky and Tennessee have fewer of these stakeholders versus North Carolina. Extension programs with produce marketing emphases are quite different. The latter has many more programs to assist growers in marketing their crops, including activities to bring buyers and growers together. The Tennessee Department of Agriculture has one full-time produce marketing position, whereas North Carolina has nearly 30.

Taken together, the surveys point to the need for critical masses to be present in order for development to proceed. A sufficient number of large growers, who could also be shippers, is needed to attract buyers at the first-handler level. Then, smaller operations have outlets for their production beyond direct outlets, such as roadside stands and farmers' market. Extension and state departments of agriculture need to have the personnel and programs in place to assist in produce marketing decision making and in bringing buyers and growers together. Public markets with facilities to attract brokers, wholesalers, and repackers could help facilitate development.

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