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THE APPLE ORCHARD
COMPANY

by

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-Preface-

Managers and owners are generally quite concerned with how best to maximize their opportunities. The case study approach represents one way of allowing a group to explore management alternatives and to examine the concepts involved.

In using this case study of one Ohio orchard, the sessions alternated between presentations and small work groups. The presentations included employee motivation and performance measures, use of financial tools, development of goals and standards, and measurement of results through adequate records. In small work groups participants analyzed the strengths and weaknesses of the operation. Each group then presented and defended their recommendation before the entire group.

This combination of information-providing sessions and group participation enabled the group to draw on the experiences of everyone involved.

The case contains financial information, value statements of those involved in management, and descriptions of production and marketing activities. Appended to the case is a summary of the state of the industry with some additional production and marketing information for those who may not be familiar with the fruit industry.

THE APPLE ORCHARD COMPANY*

The Apple Orchard Company is a corporation originated in 1906 by a group interested in fruit growing as an investment. The original farm was one of 140 acres. There are now 350 acres in the farm which has a market value of about \$400 per acre.

The original plantings were quite diversified. In addition to apples and peaches, cherries, plums, pears, gooseberries and currants were grown. Many of the early sales were retail at the farm. There were no dividends paid for the first two decades.

In 1922 a new manager was hired and the orchard prospered under his direction until the early 1960's. He retired in 1968. From 1930 to about 1960, sales were 25-30 percent retail at the farm and 65-70 percent wholesale. These years were generally profitable. In 1960 the sales emphasis started to change. Today, about 60 percent of sales are retail and 40 percent wholesale. The orchard has not been reasonably profitable for the last four years.

A summary of production and costs for recent years appears in Table 1.

Fruit acreage has varied from 100 to 125 acres. At the present time there is about 100 acres, mostly apples. There are 25 tart cherry trees, 50 standard prune plums. Until the last couple of years, about ten acres of peaches were raised. The planting was destroyed by infestation of stem

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Table 1. Production and Costs 1954-1970 Per Crate of Harvested Apples

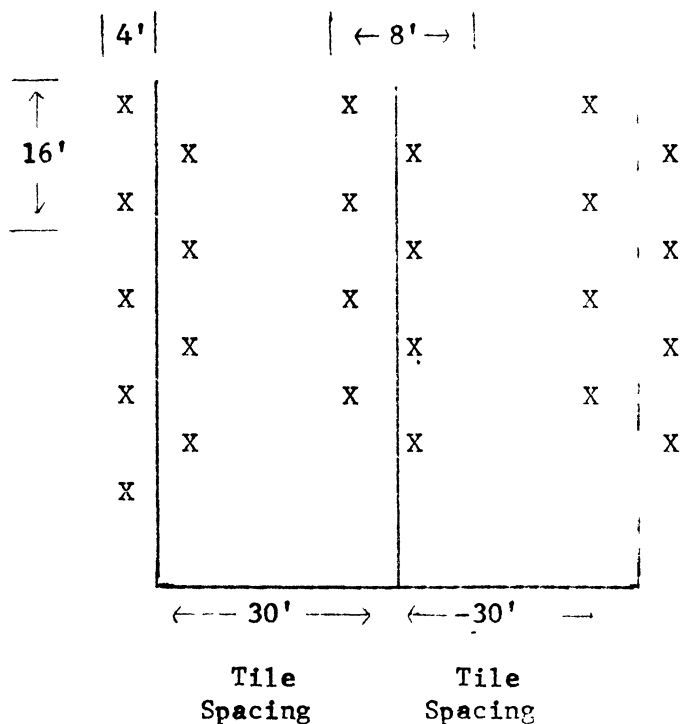
Year	Annual Production	Overhead Costs		Production Costs		Harvesting Costs		Marketing Costs			Total Cos Per Bu.
		\$	Per Bu.	\$	Per Bu.	\$	Per Bu.	Bushels*	\$	Per Bu.	
1954	19,000	\$16,098	\$.94	\$12,709	\$.74	\$ 6,136	\$.36	23,500	\$15,221	\$.65	\$ 2.69
1955	47,000	17,485	.41	18,225	.43	11,898	.28	39,000	21,295	.55	1.67
1956	44,000	22,003	.56	16,180	.41	10,795	.27	40,000	22,591	.56	1.80
1957	44,000	21,891	.55	18,639	.47	11,571	.29	48,400	27,650	.57	1.88
1958	39,000	21,399	.61	18,594	.53	9,327	.27	40,400	25,857	.64	2.05
1959	30,000	21,093	.78	14,751	.55	7,823	.29	34,270	23,090	.67	2.29
1960	42,000	24,005	.64	14,726	.39	11,840	.31	34,630	27,770	.80	2.14
1961	32,000	23,027	.80	16,710	.53	8,436	.29	32,500	27,493	.85	2.52
1962	39,000	23,842	.68	15,285	.44	11,657	.33	40,400	29,892	.74	2.19
1963	38,000	25,778	.75	15,199	.44	11,698	.34	38,600	29,028	.75	2.28
1964	43,000	30,164	.70	15,243	.39	13,888	.36	40,000	30,495	.76	2.29
1965	37,000	31,273	.94	17,266	.52	13,146	.39	45,000	30,689	.68	2.53
1966	16,800	27,642	1.83	16,251	1.07	6,326	.42	22,100	22,206	1.00	4.32
1968	45,000	42,300	.94	14,850	.33	19,350	.43			.79	2.49
1969	42,000	45,360	1.08	15,960	.38	18,480	.44			.78	2.68
1970	45,000	42,300	.94	14,830	.33	20,250	.45			.89	2.61

* The difference in bushels marketed compared with annual production is fruit purchased for resale.

pitting. Twelve to thirteen hundred peaches will be planted in 1972. Peach varieties in the new planting will include Red Haven, Loring, Crest Haven, Glow Haven, and Red Skin with a few early varieties.

New plantings will be in double hedge row for both apples and peaches. About 1600 apple trees in a new planting are on Malling VII, 106 and 111* rootstock.

The new plantings are spaced as illustrated.



These planting spacings are not considered ideal by management but existing tile lines and the heavy soil characteristics combined to give this planting pattern. This results in 175 trees per acre.

* These rootstocks produce varying degrees of dwarfness and trees which reach maturity faster. Dwarf trees enable orchardists to concentrate plantings for more production per acre and to enable a new planting to reach full production much quicker.

Summer varieties account for about 5 percent of sales--Lodi, Wealthy and Williams Red. Wealthy is being cut back. Other minor varieties are Turley and Cortland. The total number of varieties have been cut back. Nineteen peach varieties formerly grown will be reduced to 8-9 in the new planting. Other fruit being planted include a few pear trees and about 35 nectarines.

Apple varieties for the future include Lodi, Williams Red, Melba, Beacon, and Paula Red, for the early varieties. Paula Red will replace Wealthy. Other varieties that will continue to be produced at least in some volume in the future will be McIntosh, Grimes, Jonathan, Red and Golden Delicious, Stayman, Ida Red, Melrose and Rome.

Strawberries, raspberries, and vegetables are also considered as having production possibilities. Sweet cherries are not considered practical in the heavy soil.

Management feels that net returns can be increased with the resumption of production of about ten acres of peaches and the growing of selected vegetable crops to meet present and future market needs.

At the present time, only one older block of apple trees (40 years) is still in production. A part of this block is being pushed out at the present time. Jonathan has been one of the predominant varieties for this orchard. Jonathan produced about 14,000 crates in 1970. Production was down to less than 7,000 crates in 1971 and probably will be down more in the future.

The distribution of production by varieties follows:

Jonathan -- 20% of production -- will continue to be de-emphasized
Red Delicious -- 20% of production -- for wholesale and retail

McIntosh -- 12% of production -- cutting back -- for retail
Stayman -- 15% of production -- good farm retail variety
Rome (wholesale) 15% of production -- not a retail apple for this farm
market

Golden Delicious -- 7% of production -- farm retail
Ida Red -- new, increasing, good storage and retail (639 trees) (Jonathan
replacement)
Melrose -- not as many as Ida Red, well accepted at farm market

Disease and insect control is generally good. The manager states he
just does not have any scab or worm damage. Red mite control in some
years is a problem.

The manager indicates that perhaps an additional 125 acres of the
farm may be sites for fruit growing. At the present time, the farm not
used to grow fruit is farmed on shares by a nearby farmer.

For additional detail, a breakdown in costs for 1968, 1969, and 1970
on the basis of cost per orchard run crate is shown in Table II on the
following page. The figures were obtained by dividing yield into expenses
for each year.

Most of the equipment is fully depreciated. The largest exception
is a 20,000 bushel refrigerated storage addition completed in 1964. Pre-
vious to this time apples were graded when put into storage. Now, because
of adequate refrigerated storage, orchard run apples are stored and graded
as sold. The number of crates put into storage are automatically decreased
by 10 percent, to provide a built-in shrink factor.

Major equipment includes:

- 2 pickups
- 2 flatbed trucks
- 1 van truck
- 1 supply truck
- 4 tractors
- Cycle bar and rotary mowers
- Fork lifts
(one industrial high lift is leased seasonally)
- Irrigation equipment (aluminum laterals from creek water supply)
- 2 bean sprayers (1956 and 1963) 3X concentrate used

Table II

Costs to Produce, Harvest and Market Apples

	1968	1969	1970
Production - Harv.			
Fertilizer	.0047	.0126	.0056
Spray Material	.1706	.2360	.2031
Production Exp.	.0072	.6050	.0070
Harvesting Exp.	none	none	.0033
Production Labor	.1441	.1240	.1077
Harvesting Labor	<u>.4340</u>	<u>.4420</u>	<u>.4438</u>
Totals	.7606	.8196	.7755
Marketing			
Advertising	.0318	.0280	.0465
Cider Expense	.0259	.0350	.0406
Packages	.1783	.1640	.1834
Refrigeration	.0422	.0440	.0504
Truck Expense	.0108	.0045	.0075
Marketing Exp.	.0015	.0037	.0266
Trucking Apples	.0551	none	.0030
Equipment Rental	.0064	.0024	.0216
Labor	<u>.4359</u>	<u>.4970</u>	<u>.5101</u>
Totals	.7879	.7786	.8897
Overhead			
Salaries			
Mgr.	.2797	.1785	.1777
Officers	.0253	.0604	.0564
Clerical	.0170	.0267	.0202
General Labor	.0066	.0117	.0056
Fuel & Electric	.0203	.0250	.0232
Gas & Oil	.0324	.0295	.0247
Trans. & Comm.	.0130	.0217	.0187
Repairs			
Bldg.	.0025	.0739	.0361
Equip.	.0967	.1227	.1165
Depreciation	.1634	.1991	.1777
Legal & Audit	.0077	.0089	.0111
Insurance	.0844	.0815	.0838
Hospitalization	.0066	.0093	.0132
Taxes			
Real Est.	.0310	.0323	.0328
Per. Prop.	.0153	.0155	.0144
F.I.C.A.	.0597	.0679	.0608
St. Fran.	.0132	.0144	.0133
Tree Removal	.0001	.0084	.0109
Misc.	<u>.0674</u>	<u>.0912</u>	<u>.0441</u>
Totals	.9423	1.0786	.9412

Summary	1968	1969	1970
Prod. & Harv.	.7606	.8196	.7755
Marketing	.7879	.7786	.8897
Overhead	<u>.9423</u>	<u>1.0786</u>	<u>.9412</u>
	2.4908	2.6768	2.6064
	45,000 bu. Fair to Good Whole- sale Year	42,000 bu. Poor Whole- sale Year	45,000 bu. Severe Fail Damage

Table III

Assets of Apple Orchard, Inc. Dec., 1971
(That portion devoted to the orchard and retail business)

Cash & Securities	\$27,600
Land	40,700
Buildings & Improvements	30,463
Machinery	7,484
Inventory	25,200
Trees	<u>57,073</u>
Total Assets	\$188,320

Full time employees include the manager and one other man. The full time man is responsible for equipment operation and maintenance. In 1971 he was also given the responsibility for overseeing the pickers. About 35 part-time employees include 14 pickers. Women are used in the retail sales room and in grading and packing. Most of these part-timers are local, with a few being of high school and college age.

The manager reports that the board is cooperative. He is responsible for operations; the board for policy decisions. The manager is on a salary plus bonus arrangement and may buy stock in the company.

Although the last four years have not been profitable ones, the board is open to suggestions on how they may make additional investments in the business to improve operations. Funds are available to make changes, but the board is determined not to go into debt. The business is now debt free.

When asked about the packout rate (percent of picked apples sold as first grade fruit) the manager responded that more effort will be put on pruning to get trees opened up--and lower.* This may mean more part-time pruning help. He estimated packout averaging about 65 percent. Examples of wholesale packout spot checks were presented.

Cost analysis of 12/3# Jonathan

10/19/69 Packing Slip # A 8621

To pack US Fancy 57-60# of orchard run apples were used to pack 33 pounds. Packout percentage 65% or approximately 1 1/3 field crates.

* Trees which are more open will tend to produce a higher percentage of well colored fruit. Color is a major factor in determining acceptability by buyers and consumers. Better spray coverage and easier picking on lower trees may also influence packout.

Returns

Packed apples	\$3.000
15# Utility grade @ \$.0466 per lb.	.699
4# Cider grade @ \$.04 per lb.	<u>.160</u>
	\$3.359

Costs

1 1/3 field crates of apples @ \$2.6763 =	<u>\$3.570</u>	(See Table 1)
Net	÷	\$.289

Four and two-thirds cents per pound on utility grade computed by averaging returns of approximately 6 3/4 cents per pound retail and 2 1/2 cents per pound to truckers. Four cents per pound on cider grade computed by averaging returns of approximately 7 1/2 cents per pound in the cider operation and 1 1/2 cents per pound net back to orchard if sent to juice plant.

Details on direct marketing costs associated with this sale are:

A. Packing labor \$20.80 per hour divided by average production per hour of 80.	\$.2600
B. Package costs (box .247, bags .1164, staples .0049)	.3683
C. Loading costs--4 men to load trailer of 300--2 hrs. @ 8.00	.0200
D. Trucking costs, orchard to Dayton	.2000
E. Commission Fruit Growers Marketing Association-- 7% + .01 per bushel advertising fund	<u>.2200</u>
Direct Marketing Costs	\$1.0683

Cost analysis of 8/6# Jonathan

10/27/69 Packing Slip # A 8629

To pack US Fancy approximately 75# of orchard run apples were used to pack 50#. Packout percentage of 65-67 percent or equivalent of 2 field crates to pack one box. Packing a minimum of 75 percent color.

The previous three examples are indicative of why Apple Orchards, Inc. is interested in taking a hard look at alternatives in marketing their crop. Apple production may be reduced to allow a larger portion of the crop to be sold through the farm market. The manager feels that they will not be able to sell all their apple crop through the farm retail market at any time in the near future.

Apples wholesaled are sold 100 percent through the Ohio Fruit Growers Marketing Association. Not much thought has been given to developing a second farm market at the edge of the metropolitan area or to the possibility of developing a retail store route. Relocation of the farm retail market to another location on or off the farm has been talked about but not explored intensively.

Table IV

Cost Comparison of Different Wholesale Packs*

<u>PACKAGE</u>	PACKAGE COST	PACKING COST			SELLING CHARGE		TOTAL COST
Tray Pack Complete	.65	.50	=	1.15	+	.30	= 1.45
OW Complete	.75	.75	=	1.50	+	.28	= 1.78
12 x 4# Complete	.50	.60	=	1.10	+	.33	= 1.43
10 x 4# Complete	.50	.50	=	1.00	+	.30	= 1.30
12 x 3# Complete	.50	.50	=	1.00	+	.28	= 1.28
9 x 5# Complete	.50	.60	=	1.10	+	.32	= 1.42
½ Bushel Complete	.35	.30	=	.65	+	.16	= .81
OW 18 Pack-Flat	.90	.90	=	1.80	+	.33	= 2.13
Bushel Container	.35	.35	=	.70	+	.20	= .85

* Average costs of one multi-plant packing operation in midwest

Ohio Orchards has packed most of their apples that are wholesaled into poly bags, 3#, 4# and 8#. This pack has been considered a "low price" pack by both buyers and sellers. The manager of Ohio Orchards is considering upgrading the type of pack and concentrating his sales in overwrap consumer sized packages and in tray packs where the apples are placed in cupped trays in master cartons.

The information in Table V provides data on differences in wholesale prices of various packs. The price differences illustrated are rather typical of those observed over time.

Table V

January, 1972
Wholesale

SELLING PRICE COMPARISON OF DIFFERENT PACKS*

<u>Average Packing Costs</u>	(\$1.00)* 12-3# poly bags	(\$1.00) 10-4# poly bags	(\$1.20 EST) 6 & 8# poly bags	(\$1.50) OW 32# overwrap	(\$1.15) Trays
<u>RED DELICIOUS</u>					
75-100% color	3.00	3.25	3.75	4.50	5.25
50-75% color	2.50	2.75			4.50
<u>JONATHAN</u>					
75-100% color	2.60	2.95	3.25	3.80	4.00
50-75% color	2.20	2.40	2.75		3.25
<u>STAYMAN</u>					
75-100% color	2.60	2.95	3.25	3.80	4.00
50-75% color	2.20	2.40	2.75		3.25
<u>ROME</u>					
75-100% color	2.75	2.95	3.25	3.80	4.00+
50-75% color	2.20	2.40	2.75		3.25

* Information from one midwest multi-plant packing and selling organization

The manager and the board are somewhat doubtful if they wish to expand their farm retail market by expanding into products which they do not produce. About 95% of today's sales are produced on their land. There is interest in expanding the size of the present market facility. The present location is good from the standpoint of all operations being centralized in one building. The rather extreme slope of the parking area presents some difficulties in expanding the parking area and in unloading pallets of apples from the orchard to the packing room.

The corporation has more desirable sites to the south of the present building about one-fourth mile away. Also, to the north, a one acre lot at the intersection of the county road and a state highway is owned by the corporation, and might provide a new store location. A new store might also be located near the present storage where more level terrain would provide more adequate working space.

The market is now located within the storage building as shown on the following diagram.

OHIO ORCHARDS FARM RETAIL MARKET

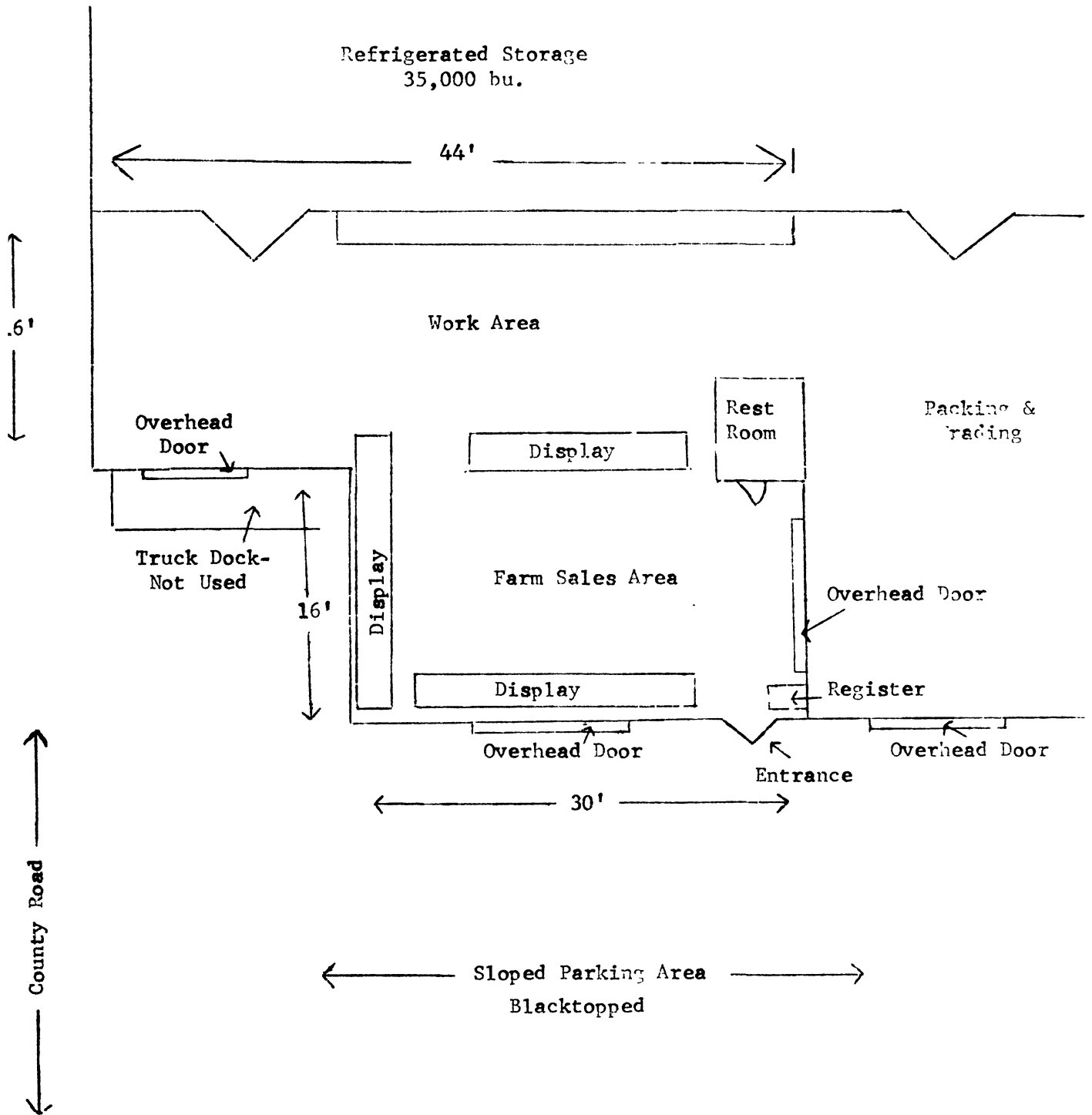


Table VI

Apple prices in the farm market in January, 1972

	One-half Peck	Peck	One-half Bushel	Bushel
Rome	\$.65	1.15	\$ 2.20	\$ 4.25
Medium Red Delicious	.85	1.30	2.55	5.00
Med. Golden Delicious	.65	1.15	2.20	4.50
Jonathan		.90	1.65	3.25
Ida Red	.65	1.15	2.20	4.25
Stayman	.65	1.15	2.20	4.25
McIntosh	.60	1.00	1.90	3.75
Golden Delicious Drops	.65	1.15	2.20	4.25
Utility (seconds)		.75	1.25	2.25
Cider---gallon, \$1.00 ----your jug, \$.25				
1/2 gallon, \$.55 ----your jug, \$.45				

The manager estimates the primary trading area for the farm store extends about ten miles and the secondary area an additional ten miles. The total population of the trading area is estimated at a little less than 20,000 people. This includes the county seat of about 5,750 people. The local village nearby has a population of about 750 people. There are three other small villages in the trading area. A city of 580,000 is located in the next county about 30 miles away. The total population of the local county is about 24,000. The total population of the metropolitan county nearby is 340,000.

In 1971 the dollar volume of the farm store declined. The sales decline amounted to \$4,000 less for Sundays in October. The market sales at the present time accounts for about 24,000 crates of apples including cider. All cider is sold at the farm at retail. The orchard has its own cider mill. The manager and the board of directors feel they do not have an explanation for the retail dollar decline.

The present store could be expanded by squaring off the building where the old truck dock, now unused, is located. One person pointed out that he felt that the present store space was not well utilized, and the present retail market is too plain in appearance and atmosphere.

Table VII

Retail Farm Market Sales Distribution

Month	70-71 Sales *	% by Months
July	\$ 1,998	2.3%
August	3,700	4.3
September	9,000	10.3
October	25,000	29.2
November	15,500	17.7
December	11,500	13.1
January	8,000	9.2
February	7,200	8.2
March	<u>4,900</u>	<u>5.6</u>
Total	\$87,500	100.0%

* Retail sales are higher than production year might indicate (Mail Damage) because of fruit purchased for resale.

The market is open from mid-July through most of the month of March.

This past year, a vegetable grower was hired at \$4.00 per hour to grow an assortment of fresh vegetables on Apple Orchard Corp. land for the retail market. This resulted in \$4,000 worth of additional sales for the retail farm market, and contributed about \$1,000 to gross profits.

This coming year the grower will rent the land, raise vegetables and sell them to the corporation at wholesale. The farm market also sells honey and apple butter. Questions which the board and manager now are considering relate to a possible relocation of the farm market and possible expansion of products stocked in the farm market which are not raised on the farm.

Vegetables sold in the farm market in 1971 included sweet corn, 5 1/2 acres (too many for a start, 3 acres would have been enough); tomatoes, 600 plants; cantaloupe, 600 hills; some pumpkins, squash, and turnips.

A few years ago, when wrestling with decisions related to how to market apples, the manager and the board estimated that it would require an investment of about \$100,000 to modernize their picking, grading and packing operation with up to date mechanization if they were to remain wholesaling their crop. They were unable to justify this kind of investment on the basis of probable returns.

The company at the present time is open to suggestions both from the standpoint of production and marketing.

QUESTIONS:

When considering the present cost structure and trends, what opportunities exist for reducing costs?

What are the possibilities of holding down or reducing labor costs? Labor wages and management salaries now account for between 50 and 60 percent of all costs.

What suggestions do you have for increasing productivity of the orchard?

To what extent may price be adjusted to provide additional income?

What major changes would you recommend in the marketing of fruit?

Should the present market be expanded, or a new site developed, or both?

What additional information is needed for better management?

Develop a plan which will maximize returns for this operation. For an immediate goal, determine how net return can be increased to \$20,000.

THE CHANGING U. S. APPLE INDUSTRY 1/

Apple production is widely dispersed. Commercial apple production is reported in 34 States 2/, but production is concentrated heavily in a relatively few. Six principal States (California, Michigan, New York, Pennsylvania, Virginia, and Washington) account for slightly more than two-thirds of total production.

Over the last 2 decades, apple production was generally in an upward trend. In 1969 it was the largest since the late 1930's. Comparing the 1950-53 average with the 1967-70 average, U.S. apple output has increased approximately 30 percent. 3/ Although Washington is the leading apple producing State, its apple output has increased less than any other principal State except Virginia. Virginia's apple production has been relatively stable. Pennsylvania had the largest percentage increase, up 80 percent.

The general upward trend in the production of apples is shared by all three regions (Eastern, Central and Western) but the regional composition of apple production has shifted somewhat during the last 2 decades. Only the Eastern region had a slightly larger increase in apple production than the U.S. average; its share of U.S. production also increased somewhat. The Central and Western regions showed slight declines in shares. Currently the East produces 46 percent of the U.S. apple crop (table A).

Although the change in apple production by regions has been relatively small, dramatic shifts have occurred in varietal composition (table B).

1/ From Fruit Situation, USDA, November, 1971.

2/ In orchards of 100 more bearing age trees.

3/ Production data were reported in bushels prior to 1959, but were converted to pounds by multiplying by 45.1.

Old plantings are being replaced with dwarf and semi-dwarf trees which have greater per acre yield potentials than standard types. Principal varieties mainly for fresh use, such as Red Delicious, Jonathan, and Winesap, have shown mixed production patterns. The big expansion occurred in Delicious. From 1950-53 to 1967-70, Delicious output increased 70 percent, while its share of total apple crop increased from 20 to 23 percent. All 6 principal States shared in the increase in Delicious production, ranging from 40 percent for Washington to 230 percent for California.

Jonathan dropped in rank from the fourth to the fifth most important apple variety, but its production increased approximately one-fourth and its proportion has remained relatively stable at 6.5 percent of the U.S. apple crop. Jonathan production has dominated in Michigan, and has become relatively more important there in recent years, but production from the other major producing areas has shown a mixed pattern. California and Missouri more than doubled output while Washington showed a substantial decline for this variety.

Winesap was usually the third most important apple variety in 1950's. But because of the sharp decrease in production--down approximately one-half between 1950-53 and 1967-70--it is now ranked behind Stayman as the eighth most important apple variety. Its share of U.S. apple crop has dropped from 10 to 4 percent. Washington normally produces about three-quarters of all the Winesap crop. Virginia, the second-ranking State, produces approximately 15 percent. The two leaders both have had a substantial drop, down 52 percent for Washington and 43 percent for Virginia.

The York Imperial is a principal variety used mainly for processing. It is grown mostly in the Eastern region and production has increased in

both absolute and relative terms during the last 2 decades. York reached a record production of 360 million pounds in 1970 and accounted for 5.3 percent of the apple crop compared with 4.3 percent in the early 1950's. Pennsylvania, Virginia, and West Virginia account for approximately 90 percent of the York production, but each State has shown a different pattern. Pennsylvania has shown increases in both absolute and relative terms with production more than doubling. Its share of the total York crop moved up from 20 to 30 percent. York production in Virginia remained relatively stable but its proportional share declined. West Virginia's output increased approximately one-fourth, with a slight decline in its share.

Principal varieties used for both fresh and processing include Golden Delicious, McIntosh, Stayman, and Rome Beauty. The increasing amount of apples for processing has come mostly from these varieties. Production of each of these has increased during the last 2 decades, led by Golden Delicious. From 1950-53 to 1967-70, production of Golden Delicious has increased four-fold with the proportion of U.S. apple crop up from 3 to 12 percent. It surpassed and replaced McIntosh in 1969 as second among the apple varieties. The sharp increase in Golden Delicious production has occurred largely in Washington and Pennsylvania. These States currently contribute approximately half of the Golden Delicious crop.

McIntosh is now the third ranking variety in the country. Its share of the total apple crop has been stable at approximately 11 percent, in the last 2 decades. New York has maintained about 45 percent of McIntosh production. During 1950-53 to 1967-70, U.S. and New York McIntosh production increased 22 and 21 percent respectively. Michigan, the second major McIntosh producing State, had even a larger production increase, more than 50 percent.

Stayman is produced mostly in the East with Pennsylvania and Virginia together accounting for two-fifths of this variety's total production. Pennsylvania's production had increased 50 percent from the early 1950's while Virginia's output fluctuated. North Carolina produces a relatively small quantity of Stayman (approximately 10 percent of this variety in recent years), but its production has doubled.

Rome Beauty, another Eastern apple, has shown increases in both absolute and relative terms due primarily to the introduction of the newer red strains. Rome output increased 52 percent with its share of the total apple crop up from 6.7 to 8.1 percent due mainly to sharp increases in production in New York, Pennsylvania, and North Carolina. These States accounted for 40 percent of its total production in 1967-70 compared with 27 percent in 1950-53.

As crops of these 8 principal varieties except Winesap have trended upward, their total production has increased about 50 percent and their proportion of the U.S. apple crop has risen from 67 percent to 80 percent. In contrast, apple production from the remaining varieties has decreased in both absolute and relative terms, with production dropping by one-fifth.

Shifts in the Market for Apples

There has been a striking shift in the apple market over the last 20 years. Although total apple sales for fresh market went up approximately 10 percent, a steadily decreasing percentage of total apples sold went to fresh market. The proportion of apple sales for fresh use declined from 70 percent in 1950-53 to 57 percent in 1967-70.

Total apple sales for processing use have trended upward. The proportion has increased from 30 to 43 percent. There have been shifts in

the relative importance of canning, freezing, drying, and other types of processing (mostly crushed for vinegar, cider, and juice). These 4 classes of use have shown mixed trends. Uses for canning and freezing have increased in both absolute and relative terms. Since the early 1950's, the proportion of processed sales of all apples for canning has increased from 45 to 47 percent and for freezing from 5 to 9 percent while drying has declined from 13 to 7 percent. The share of other apple processing has remained relatively steady, 37 percent in 1950-53 compared with 36 percent in 1967-70 (table C).

Changes in apple processing may be observed from the standpoint of output of various apple products as well as from the volume of raw apples going into the several processing uses. Over the last 2 decades, the packs of canned applesauce and apple juice quadrupled; the latter had a particularly rapid growth rate. The frequent sharp changes in size of the packs was usually caused by the size of apple crop. However, the output of canned apples showed an erratic trend ending with a moderate decline. The pack of frozen apple slices grew rapidly. This output increased from 43 million pounds in 1950 to a record of 122 million pounds in 1969, then declined slightly to 120 million pounds in 1970, reflecting the smaller apple crop. The sharp increase in the pack of frozen apples is mainly caused by the increased use of frozen apples in pies and related bakery goods. Production of dried apples has fluctuated, but overall it has remained rather steady. Comparable figures on output of other apple products are not available.

Trends in Per Capita Consumption

Annual per capita consumption of apples, fresh and processed combined on a fresh weight equivalent basis, showed a generally erratic trend during

the last 2 decades. Consumption reached a high of 31.5 pounds in 1951 and then declined to a low of 23.9 pounds in 1966. As a result of record production in 1969 and relatively high production in 1970, consumption bounced back to 29.2 pounds in 1970.

The decrease over the years has been in fresh consumption--from 22.7 pounds in 1950-53 to 16.3 pounds in 1967-70, falling from approximately 80 to 62 percent of total per capita apple consumption on a fresh equivalent basis (table D). In contrast, consumption of processed apples has increased sharply--from 6 pounds (fresh equivalent basis) in 1950-53 to 10 pounds in 1967-70.

There have been shifts among forms in which the processed products are used--canned apples and applesauce, canned juice, frozen and dried apples. Decreased consumption of canned apple slices and dried apples has been offset by sharply increased use of canned applesauce and apple juice and frozen apples and applesauce. Per capita use of canned apple juice has increased almost three-fold and frozen apple and applesauce and canned applesauce about doubled.

Changes in composition of per capita apple consumption during the last 2 decades can be traced to several factors. The substitution of processed for fresh apples is closely associated with changes in consumer tastes and preferences and living habits. Consumers are constantly seeking foods that are convenient and time-saving. Processed fruits are essentially such foods. As employment of women is increasing, more families are eating away from home. This further stimulates the markets for processed apple products.

The shift to processed use for apples also reflects lower prices for processed fruit than for fresh fruit. Retail price of fresh fruits and

vegetables increased 51 percent since the early 1950's, with an increase of only 28 percent for processed products. (Retail price indexes for fruits alone are not available, but indications are that the increase in prices for fresh was much larger than for processed.) Furthermore, canned applesauce is inexpensive relative to other processed fruits.

Development of new or modified product forms as well as quality improvement in processed products have also contributed greatly to the increase in consumption of processed fruits. The use of frozen apples in pies and other bakery goods and of apple juice in mixed fruit juices are examples.

Producer Prices

Apple prices for all sales (fresh market and processing) rose 23 percent between 1950-53 and 1967-70. Prices of apples sold for fresh market rose more than those utilized for processing--38 percent versus 29 percent. Year-to-year price movements for both fresh and processing use were more moderate in the early 1960's than in any other such period over the last 2 decades.

Apple prices can be further examined by regions. Prices have been generally erratic in all 3 regions (Eastern, Central, and Western). Average apple prices for grower sales were generally lower in the East than in either of the other regions from 1950 through 1970. This was due mainly to the East's larger percentage of apples sold for processing use. But the East also had the highest average price for fresh apple sales, while the West had the lowest. But Western apple prices for all and fresh sales have each increased about 30 percent, more than either Central or Eastern

regions. A possible explanation is that the West has marketed a relatively larger percentage of Delicious and Golden Delicious apples in the fresh market in recent years. A large percentage of Western apples are stored in controlled atmosphere storage for several months.

Economic theory suggests that apple prices are influenced by several factors such as the total apple crop, population, disposable personal income, prices or supply of competing fruits, the carryover of processed apple products, and consumer tastes and preferences.

The interpretation of one equation can be summarized as follows:

1. An increase in estimated per capita apple production of 1 pound can be expected to result in a decrease in price of apples for fresh market of approximately 0.34 cent per pound.

2. An increase in per capita disposable personal income of \$100 can be expected to result in an increase in price of apples for fresh market of approximately 0.1 cent per pound.

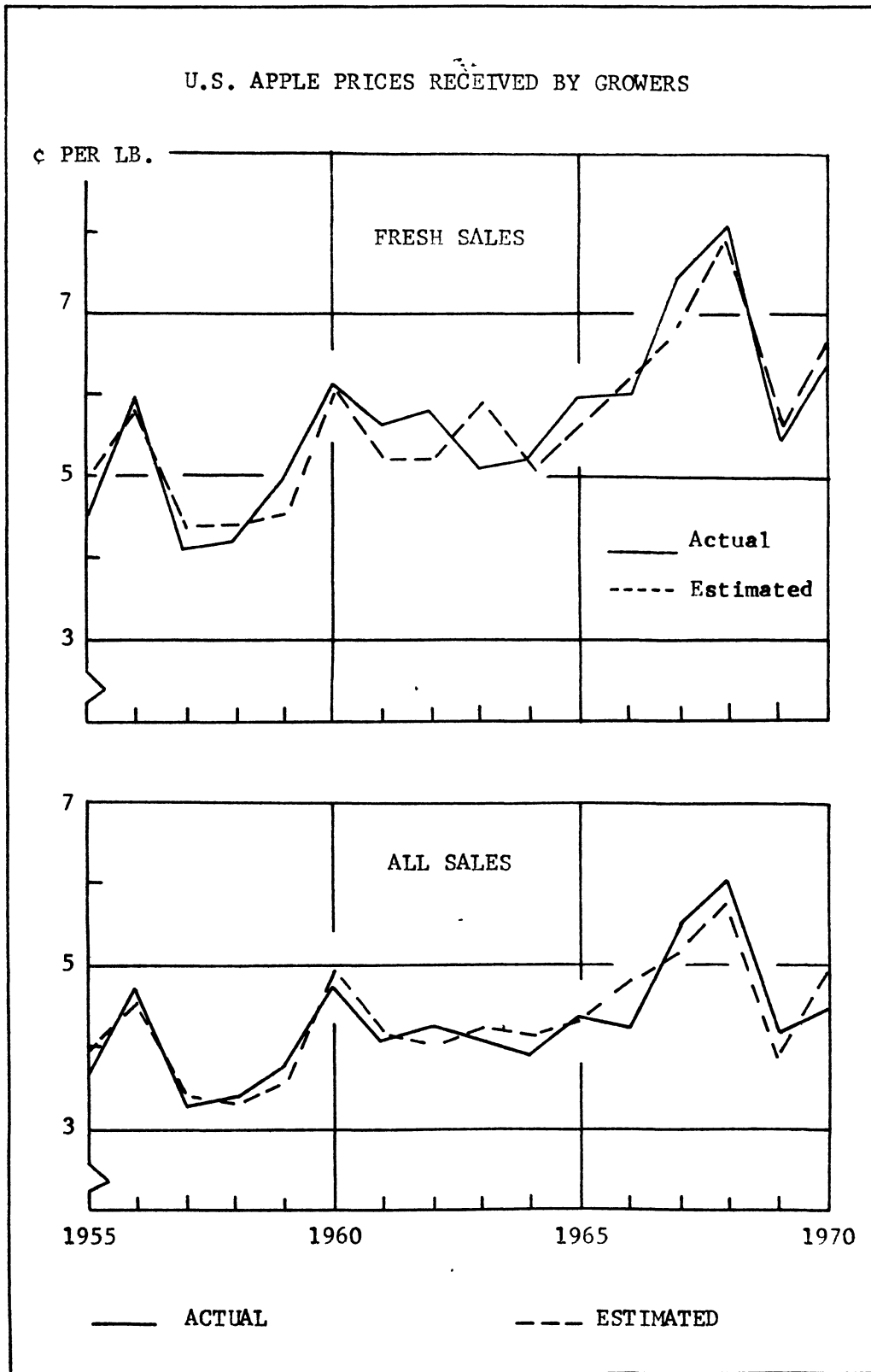
3. An increase in price of oranges for fresh market of \$1 a box can be expected to result in an increase in price of apples for fresh market of approximately 0.39 cent per pound.

The estimated price equation for apples for all sales is (figure 1).

Changes in Marketing and Industry Structure

Apples as well as other fruits have undergone many changes in marketing and industry structure. As a result of such developments as the growth of supermarkets, the emphasis on mass merchandising of uniform quality products at low cost, the increased geographic concentration of fruit production, larger farm units and improved transportation, direct marketing of apples at shipping points has increased. The old marketing system from

FIGURE 1



grower through country buyer to terminal market, wholesaler, and retailer no longer prevails. Most apple growers deliver their crop to nearby shipping points. Then apples are graded, packed, and sold by shippers to large corporate chains and some voluntary and cooperative wholesalers as well as small chain operations.

With the increased volume of sales at shipping points, each individual apple grower is often in a weak bargaining position when he deals with only a few typically large shippers in his area. So cooperative apple marketing associations play a large role in handling the growers' apples. Latest available data indicate cooperatives marketed approximately 21 percent of the apples. 4/ But in the Pacific Northwest, the major apple producing area, cooperatives handled 47 percent of the apple crop. 5/ Although the number of cooperative apple marketing associations only increased from 48 in 1952 to 51 in 1964, average dollar volume per cooperative increased sharply, up 62 percent during this period. 6/

The development of controlled atmosphere cold storage has also brought changes in the marketings of fresh apples. Apples now can be stored in good condition throughout the season and marketed for an extended period. Consequently, more apples are now shipped later in the season and the processing season for apples is also extended. Thus, the ensuing more orderly marketing increases the opportunities for apple marketers to maximize their returns from the fruits.

4/ Food from Farmer to Consumer, Report of the National Commission on Food Marketing, June 1966, p. 51.

5/ Charles H. Meyer, "Cooperatives in the Fruit and Vegetable Industry," Service Report 93, January 1968, Farmer Coop. Serv., U.S. Dept. Agr., p. 16.

6/ Ibid, pp. 3 and 41.

Because of these advantages, the capacity of controlled atmosphere cold storage has been continuously expanding. The latest CA survey made by USDA's Statistical Reporting Service in 1969 indicated that CA capacity was equivalent to 21.6 million bushels, almost double that of 1963. 7/

As the marketing system changes and increasing proportions of apples are marketed for processing use, growers want to be reasonably assured of markets and prices of their products. Apple growers have found that group action is needed to adapt to changing market conditions. They have formed cooperative bargaining associations as a means for gaining bargaining power. According to a Farmer Cooperative Service survey, there were no apple bargaining cooperatives in 1954, but in 1964 there were 7. 8/

Increased demand for processed apples is also bringing about many changes in the processing industry. The quantity of canned apples and applesauce processed has increased substantially in recent years. According to Census of Manufactures data, the value of production in 1967 was \$124.4 million, compared with only \$57.5 million in 1954. The total processed quantity of frozen apples, although comparatively small, has also increased substantially in recent years. Many processing firms have built new plants or have modernized and enlarged existing facilities. New equipment and sufficient volume to realize economies of scale in processing operations have contributed to lower unit labor costs. With increases in volume of processing fruit and improvement in plant and equipment, the value added by manufacture has continued to increase.

7/ Capacity of Refrigerated Warehouses in the United States, Oct. 1, 1969, Statistical Reporting Service, U.S. Dept. Agr., March 1970. p. 4.

8/ Ibid, p. 53.

Processing fruit cooperatives have maintained a large share of the manufactured apple product business. A survey by USDA's Farmer Cooperative Service in 1969 indicated that 47 cooperative fruit and vegetable processors packed approximately 38 percent of all dried apples, 19 percent of the applesauce and apple juice, and 7 percent of the frozen apples processed in the United States. 9/

Prospective Developments

Apple output probably will continue to trend upward, and likely at a faster rate than population growth. Better cultural practices, some new varieties, replacement of older orchards with dwarf and semi-dwarf trees, installation of more orchard heating systems, and better methods of thinning and supplemental irrigation are expected to keep yield per acre trending upward. However, increased efficiency often requires increases in use of capital and a large scale of operation which will force many small and less efficient apple growers out of business. Thus, total apple acreage is likely to fall, and apple production will be concentrated in larger commercial holdings. Relative increasing labor costs and shortages of harvest labor will accelerate the use of mechanized cultural and harvesting operations.

Apple production will continue to be concentrated in several principal producing States--probably further increasing their share of U.S. output. All three regions (Central, Eastern, and Western) will share the larger production, but the output from the West probably will increase at a relatively rapid rate, judging mainly from Washington fruit tree census

9/ Gilbert W. Biggs and J. Kenneth Samuels, "Cooperative Fruit and Vegetable Processors in the United States," Service Report 123, May 1971, Farmer Coop. Serv., U.S. Dept. Agr., pp. 7 and 8.

data and related USDA production figures for recent crops. Among varieties, Golden Delicious will continue to increase rapidly in both absolute and relative terms because plantings have been sharply increasing in all regions, with a large proportion of dwarf and semi-dwarf stocks. Red Delicious will also continue to expand as the main variety for fresh use since orchard growers have responded to the premium price for this variety by planting a larger proportion of Red Delicious in new plantings during recent years.

To increase efficiency and expand outlets for apples, the apple industry will further improve facilities, equipment, and processing methods. Some apple packing plants have adopted such improvements as pallet box handling, float-roll sorting tables, automatic box filling, and hydro-handling systems which make it possible to separate the fruit by grade and size before it goes into storage. The processing industry also has several things under development, such as dried flakes for instant apple sauce, jelled apple sauce, buffer treated fresh slices for pies, acid fume peeling, thick cake extraction of apple juice, and objective evaluation of flavor by means of gas chromatography.

Additional new methods of processing, such as dehydrofreezing and the osmo vac method of drying, are likely to stimulate further use of processed apples. Dehydrofrozen apple slices are made by dehydrating apple slices under controlled conditions to assure superior quality. These slices, reduced 50 percent in weight and volume, are then preserved by freezing. This process provides a big potential outlet for apples for use in manufacturing products such as pies and other bakery products. The osmo vac method of drying--(combination of the process of osmosis with

vacuum drying) is being developed to produce crisp and porous apples. It retains the fresh apple flavor and will keep without refrigeration or chemical preservation. Osmo vac apples are easily reconstituted for use in desserts and salads.

The total demand for apples will increase in the years ahead due mainly to population growth and continued increases in disposable personal income. Per capita fresh apple consumption will likely be stable at the recent levels at least for about 5 or 6 years, assuming no seriously short crops. But per capita consumption of processed apple products will continue to increase. A rising standard of living, increased employment of women, and the desire for more leisure time will contribute to the growing increase in consumption of processed apple products. Among processed items, prospects appear the best for canned applesauce and apple juice which have gained sharply in popularity during the last few years. Per capita use of frozen apples mainly in pies and other bakery goods, probably will increase somewhat less vigorously.

Because of the increased concentration of apple production by large growers, many growers are likely to extend their operations into packing and shipping. On the other hand, the retailers such as large supermarket chains or large institutional buyers are likely to increase their purchases directly from the grower-shipper at shipping points. However, to maintain or improve competitive or bargaining positions, growers probably will be taking more collective action or become associated with integrated marketing systems. Thus, the role of apple cooperative marketing and bargaining associations as well as trade associations will continue to grow in importance.

Another marketing system that probably will become increasingly popular with small apple growers with plantings near large centers of population is the pick-your-own operation. This type of operation has often proved profitable for many small and medium-sized growers and might provide a practical solution to a diminishing supply of harvest labor.

In anticipation of large apple production in the years ahead, the capacity of controlled atmosphere cold storage will be further expanded. Thus, the marketing of apples will be extended further into the spring and summer months providing an opportunity for more orderly and uniform marketing throughout the season and the possibility of increasing returns to apple growers.

Table A.--Apples: Production having value by regions, United States, 1950-70

Year	Eastern	Central	Western	Total
	Million pounds	Million pounds	Million pounds	Million pounds
1950-54.....	2,175.4	864.3	1,679.1	4,718.8
1955-59.....	2,399.2	1,001.3	1,768.5	5,169.0
1960-64.....	2,615.1	1,141.1	1,882.4	5,638.6
1965.....	2,844.4	1,207.9	1,941.0	5,993.3
1966.....	2,120.2	1,051.9	2,474.3	5,646.4
1967.....	2,585.9	978.3	1,830.7	5,394.9
1968.....	2,491.3	1,052.1	1,898.5	5,441.9
1969.....	2,818.9	1,273.0	2,659.9	6,751.8
1970.....	2,891.5	1,220.0	2,111.0	6,222.5

Table D.--Apples: Per capita consumption, fresh weight equivalent, United States, 1950-70

Year	Fresh ¹	Canned	Canned juice ¹	Frozen	Dried	Total
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
1950-54.....	22.2	3.6	0.9	0.5	1.0	28.2
1955-59.....	20.3	4.4	1.1	.7	.8	27.3
1960-64.....	17.3	5.0	1.7	.6	.8	25.4
1965.....	16.3	5.4	2.4	.8	.7	25.6
1966.....	16.0	4.5	1.8	.7	.9	23.9
1967.....	16.2	5.1	2.1	.9	1.0	25.3
1968.....	15.7	4.9	2.6	.8	.9	24.9
1969.....	15.1	5.0	3.7	.9	1.1	25.8
1970 ²	18.1	5.0	4.1	.8	1.2	29.2

¹ Crop year basis.

² Preliminary.

Table 12.--Apples, commercial crops¹: Production, 1969, 1970, and indicated 1971

State and area	1969	1970	1971
	Million pounds	Million pounds	Million pounds
Eastern States:			
New England.....	289.2	315.5	341.4
New York.....	855.0	945.0	1,050.0
New Jersey.....	119.7	99.0	130.0
Pennsylvania.....	525.0	510.0	540.0
Delaware.....	14.0	12.0	14.0
Maryland.....	72.0	69.0	73.0
Virginia.....	472.0	463.0	510.0
West Virginia.....	260.0	242.0	275.0
North Carolina.....	204.0	223.0	172.0
South Carolina.....	8.0	13.0	15.0
Total.....	2,818.9	2,891.5	3,120.4
Central States:			
Ohio.....	147.0	135.0	160.0
Indiana.....	90.0	83.0	90.0
Illinois.....	102.9	94.1	106.0
Michigan.....	720.0	710.0	720.0
Wisconsin.....	65.0	58.0	62.0
Minnesota.....	19.1	25.0	25.0
Iowa.....	15.0	14.0	13.6
Missouri.....	59.2	56.2	54.0
Kansas.....	14.4	11.6	15.0
Kentucky.....	20.9	16.4	18.0
Tennessee.....	10.4	9.0	9.4
Arkansas.....	9.1	7.7	8.5
Total.....	1,273.0	1,220.0	1,281.5
Western States:			
Idaho.....	134.0	60.0	90.0
Colorado.....	77.0	63.0	68.0
New Mexico.....	24.9	25.5	18.0
Utah.....	42.0	27.5	30.0
Washington.....	1,675.0	1,320.0	1,000.0
Oregon.....	167.0	115.0	125.0
California.....	540.0	500.0	420.0
Total.....	2,659.9	2,111.0	1,751.0
United States.....	6,751.8	6,222.5	6,152.9

¹ In orchards of 100 or more bearing trees.

Table 17.--Apple harvesting costs and storage charges, 5 major production regions, 1969/70 season

Source - Regional Costs of Harvesting, Storing & Packing Apples
USDA-EAS 496

Region	Harvesting			Storage charges	
	Picking	Hauling	Total	Regular atmosphere	Controlled atmosphere
	-----Dollars per bushel-----				
Northeast.....	0.36	0.08	0.44	0.33	0.14
Lake States.....	.37	.06	.43	.29	.57
Appalachia					
North <u>1</u> /.....	.33	.07	.40	.30	.3
South <u>2</u> /.....	.32	.10	.42	.35	---
All Appalachia.....	.33	.08	.41	.30	.63
California.....	.31	.05	.36	.23	.43
Northwest					
Wenatchee, Okanogan,					
Washington <u>3</u> /.....	.24	.04	.28	.38	.75
Yakima, Wash. <u>3</u> /.....	.23	.05	.28	.32	.5
Idaho, Oregon,					
Colorado.....	.23	.11	.34	.35	.0
All Northwest.....	.24	.05	.29	.35	.60

1/ Virginia (North of Roanoke), Maryland, Delaware, West Virginia, and Pennsylvania.

2/ Virginia (South of Roanoke), and North Carolina.

3/ And other nearby points.

Table 18.--Apple packing and selling costs and charges, 5 major production regions, 1969/70 season

Region	Costs of packing and selling							Packing and selling charges							
	Containers				Totals			Totals							
	Labor	Tray : packs	Bag : cartons	Bulk : cartons	Aver- age : 2/	Sell- ing : 3/	Over- head	Tray : packs	Bag : cartons	Bulk : cartons	Aver- age : 2/	Tray : packs	Bag : cartons	Bulk : cartons	Aver- age
-----Dollars per carton-----															
Northeast.....	0.35	0.58	0.46	0.32	0.49	0.26	0.15	1.34	1.22	1.08	1.25	1.34	1.23	1.09	1.25
Lake States.....	.32	.53	.46	.30	.48	.18	.14	1.17	1.10	.94	1.12	1.28	1.14	NA	1.18
Appalachia															
North 4/.....	.44	.60	.50	.36	.53	.18	.17	1.39	1.29	1.15	1.32	1.43	1.27	1.14	1.33
South 5/.....	.47	.53	.50	.38	.51	.16	.36	1.52	1.49	1.37	1.50	NA	NA	NA	1.78
All Appalachia.....	.44	.58	.50	.37	.53	.18	.20	1.40	1.32	1.19	1.35	1.43	1.29	1.13	1.34
California															
North of S.F. ....	.57	.64	.47	NA	.56	.16	.48	1.85	1.68	NA	1.77	NA	NA	NA	NA
South of S.F. ....	.28	NA	.48	.34	.40	.14	.18	NA	1.08	.94	1.00	NA	NA	NA	NA
All California.....	.40	.65	.48	.34	.47	.14	.31	1.50	1.33	1.19	1.32	NA	NA	NA	NA
Northwest															
Wenatchee-Okanogan															
Washington 6/.....	.48	.61	.58	.36	.61	.15	.26	1.50	1.47	1.25	1.50	1.65	1.55	1.16	1.67
Yakima, Wash. 6/.....	.44	.62	.52	.35	.60	.13	.42	1.61	1.51	1.34	1.59	1.74	1.63	1.28	1.72
Idaho, Oregon,															
Colorado.....	.47	.72	.58	.39	.65	.15	.30	1.64	1.50	1.31	1.57	1.67	1.43	1.28	1.56
All Northwest.....	.46	.63	.55	.38	.62	.15	.34	1.58	1.50	1.33	1.57	1.70	1.60	1.27	1.68

1/ Average of all bags packed 10/4's, 12/3's, etc. In particular in the Appalachian area this includes some 15/3's and 12/4's.

2/ Includes cell packs and overwraps but excludes other bulk containers and other miscellaneous containers.

3/ Selling charge.

4/ Virginia (North of Roanoke), Maryland, Delaware, West Virginia and Pennsylvania.

5/ Virginia (South of Roanoke) and North Carolina.

6/ And nearby points.

NA = Not Available.

Source - Regional Costs of Harvesting, Storing & Packing Apples, USDA-EAS 496

Table 19.--Labor costs of packing fresh apples and type of containers used, by regions and areas, 1969/70

Source - Regional Costs of Harvesting, Storing & Packing Apples
USDA-EAS 496

Region and area	Labor costs	Type of containers					Total
		Trays	Bag cartons	Bulk cartons	Other		
	Dollars per carton	Percent					
Northeast.....	.35	17	56	3	<u>1/24</u>	100	
Lake States.....	.32	14	63	7	<u>2/11</u>	100	
Appalachia							
North.....	.44	39	53	5	3	100	
South.....	.47	47	42	8	3	100	
All Appalachia.....	.44	40	51	6	3	100	
California							
North of S.F. ....	.57	55	20	25	<u>3/</u>	100
South of S.F. ....	.28	5	10	76	<u>0</u>	100
All California.....	.40	13	19	63	<u>3/</u>	100	
Northwest							
Wenatchee-Okanogan							
Washington.....	.48	70	3	4	<u>4/0</u>	100	
Yakima, Wash. ....	.44	71	13	6	<u>5/10</u>	100
Idaho, Oregon,							
Colorado.....	.47	65	9	25	1	100	
All Northwest.....	.46	75	10	7	8	100	

1/ Includes 19 percent cell packs.

2/ Includes 9 percent overwraps.

3/ Less than 0.5 percent.

4/ Includes 6 percent cell packs.

5/ Includes 4 percent cell packs.

Table 20.--Returns to apple growers by variety, three selected weeks, 1969/70 season

Variety, unit and origin	Week ended	F.o.b. : shipping: <u>Costs</u>					Return to growers
		point price ^{1/}	Harvesting	Storage	Packing and selling:	Total	
-----Dollars per carton-----							
Northeast:							
Western and central New York points, U.S. Fancy 2 1/4" and up, 12- 3 lb. film bags master container, <u>McIntosh</u>	Nov. 1, 1969	2.88	0.44	0	1.22	1.66	1.22
	Jan. 31, 1970	2.73	.44	.33	1.22	1.99	.74
	April 4, 1970	<u>3/3.30</u>	.44	.64	1.22	2.30	1.00
Lake States:							
Western Michigan points, Cartons, U.S. Fancy, 2 1/4" and up, 12- 3 lb. film bags, master container, <u>Jonathan</u>	Nov. 1, 1969	2.50	.43	0	1.10	1.53	.97
	Jan. 31, 1970	2.50	.43	.29	1.10	1.82	.68
	April 4, 1970	<u>3/3.25</u>	.43	.57	1.10	2.10	1.15
Appalachia:							
W. Va., Va., Md., Pa. Carton tray pack, combination U.S. Extra Fancy and U.S. Fancy, 125's and larger <u>Red Delicious</u>	Nov. 1, 1969	3.62	.41	0	1.40	1.81	1.81
	Jan. 31, 1970	3.55	.41	.30	1.40	2.11	1.44
	April 4, 1970	<u>3/4.72</u>	.41	.63	1.40	2.44	2.28
Northwest:							
Yakima Valley, Washington Washington State Grade, Carton tray pack, Extra Fancy, 138's and larger, mostly 125's and larger <u>Red Delicious</u>	Nov. 1, 1969	3.68	.28	0	1.61	1.89	1.79
	Jan. 31, 1970	3.72	.28	.32	1.61	2.21	1.51
	April 4, 1970	<u>3/4.88</u>	.28	.65	1.61	2.54	2.34

1/ Source: Weekly Summary of f.o.b. Prices, Market News Service, Fruit and Vegetable Division, Consumer and Marketing Service, U.S. Department of Agriculture.

2/ Derived by subtracting total costs from f.o.b. shipping point price. No allowances have been made for promotion assessments.

3/ Controlled atmosphere.

Source - Regional Costs of Harvesting, Storing & Packing Apples, USDA-EAS 496