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AGRICULTURE ECONOMICS

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Proceedings of  
**THE NATIONAL AGRICULTURAL MARKETING CONFERENCE**

Denver, Colorado

April 27-29, 1971

**Sponsored by:**

- Consumer and Marketing Service, USDA**
- USDA and State Extension Services**
- Experiment Station Committee on Organization and Policy**
- Foreign Agricultural Service, USDA**
- National Association of Marketing Officials**
- National Association of State Departments of Agriculture**
- USDA and Cooperative USDA-State Research Service**

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FOREWARD

The sponsoring agencies and the Program Committee express their appreciation to the speakers; the individuals who served as Steering Committee--Discussion Leaders for the various work groups; the Secretary-Consultants; and to those individuals who served as Chairmen of the various sessions. The smooth functioning of the Conference was due to work of many groups and individuals but particularly to the Colorado Department of Agriculture, the Colorado Extension Service, and the Colorado Experiment Station.

Copies of these proceedings may be obtained from the Matching Fund Program Staff, Consumer and Marketing Service, USDA, Washington, D. C. 20250.

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INNOVATIONS IN AGRICULTURAL PRODUCTION AND HARVESTING  
WITH IMPLICATIONS TO MARKETS AND MARKETING

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People represent markets. Never before in the history of any country has so great an effort been made to satisfy consumer needs and desires. It is important that we recognize as research workers that most innovations don't occur by chance but do, in fact, occur in response to a new or changing market situation. It is important that we recognize that the forces for change usually move from the market place back to the manufacturer or producer rather than the reverse.

Henry Ford II stated this point of view very clearly as follows: "The successful companies of the future will be those that anticipate what their customers, their dealers, their employees and their many other publics will want in the future.. instead of giving them what they wanted in the past." In other words, recognition and response to trends in consumer demand can spell the difference between success and failure whether it be a company, a group of companies or a group of farmers producing a certain commodity for which there are substitutes.

It has often been said that "Necessity is the Mother of Invention", and it doubtless was true in pioneer days, but today in a free enterprise economy, I believe "Opportunity is the mother of invention or innovation". What are the opportunities?

They are:

To improve profit potential.  
To improve or to expand the market.  
To provide for the needs of man.

No farm business or company can survive in a competitive environment unless it responds to changing market demands. Those who change--

Early, tend to respond to opportunity;  
Late, respond out of necessity;  
Never, eventually go out of business.

Innovations in agricultural production and harvesting have been among the most striking of any industry in our society. In the past 70 years, farming in the U.S. has changed from a man and animal powered operation to a fully mechanized, tractor-

powered industry. This is portrayed graphically by the slides that follow.

The tools that likely were to be seen in a farmer's tool shed prior to 1831 were quite similar to what one might have seen 2,000 years earlier in ancient Egypt. However, with the development of the reaper in 1831, which really marked the beginning of International Harvester Company, an entirely new system of farming began to emerge. I have categorized three significant era's of agriculture as follows:

The pre-McCormick reaper era (prior to 1831);  
The horse power era (1831 to 1900);  
The tractor powered era (1900 to date).

The technological improvements that have occurred in farm production and harvesting processes have enabled farmers to reduce significantly or minimize the unit costs of production. The changes have enabled farmers to operate considerably more acreage with much less labor than would have been possible even a decade ago.

A recent study at the University of Illinois suggests an important reason why farms are continuing to expand in size. This study attempted to measure costs and returns associated with small, medium and large farms operated with essentially the same number of man-months of labor. These were all essentially one-man farms. The soil productivity rating was actually higher on the small farms than on the large. In spite of this, however, production costs per acre were 20% lower and gross returns per acre were slightly higher on the large farms than on the small farms.

The most significant finding of the study was in the returns for labor and management. The large one-man farms had net labor and management returns more than double that of the average of the small farms. All the farms in the study were grain farms located in northern Illinois. They were similar in nearly all respects except in the level of management and the degree of mechanization which enabled those in the large group to handle an average of 638 tillable acres compared with the small farm group who operated an average of 212 tillable acres.



Cost & Return Comparisons for Small, Medium  
and Large One-Man Farms, Northern, Ill. 1968-69\*

	<u>62 Small Farms</u>	<u>126 Medium Farms</u>	<u>12 Large Farms</u>
Size Range (Total Acres)	180-259	340-499	650 & Over
Tillable Acres Per Farm	212	382	638
Man-Months Labor Per Year	12	13.0	13.3
Soil Productivity Rating	87	80	73
Per Acre Costs:			
Machinery & Equipment	\$ 25.87	\$ 21.68	\$ 20.28
Labor	21.23	12.79	8.14
All Other Costs	71.86	68.25	67.59
Total	<u>\$118.96</u>	<u>\$102.72</u>	<u>\$ 96.01</u>
Per Acre Returns:			
Gross	107.83	107.62	109.30
Net for Management	\$-11.13	\$ 4.90	\$ 13.29
Net for Labor & Management	\$ 10.11	\$ 17.69	\$ 21.44

Innovations in farm production and harvesting methods have had a profound influence on the efficiency of the agricultural industry. Consider the changes that have occurred since 1950:

- 55% reduction in hours of farm labor;
- 54% increase in crop yields per acre;
- 210% increase in farm production per hour of labor;
- 192% increase in the number of persons supported per farm worker;
- 83% increase in the number of acres harvested per farm worker.

Production of a commodity is only one link in a chain of activities that are required to create and move a product to its ultimate destination, the consumer. While there obviously must be coordination in the farm production and harvesting system, the most skillful farm managers are looking at even broader aspects of the problem. Ernest Fuchs, Manager of HLH Farms, Centreville, Maryland, states: "Family enterprises that hope to compete in an industrial agriculture will need to adopt a new management outlook". The HLH Farms are one of the major production sources behind the H. L. Hunt food label. The tendency in the past, and for many farmers still is, to think mainly in terms of greater total output without regard to the end markets.

\*Source: U. of Ill. AE 2837-9/70

When the emphasis shifts to producing, harvesting and processing a finished product, the aim is to control costs and produce the quantity that will maximize profits.

Food processors and canneries are subject to the same intensive competitive forces that prevail in the farm production phase. To be successful and profitable, they must be assured of uniform quality, carefully scheduled production and many other intricacies of their operation that will help to reduce overhead costs and minimize unit costs of processing. Again quoting Mr. Fuchs he adds: "We have to think in terms of keeping a processing plant running. If we could keep cases coming out the end of the processing plant, we are lowering overhead and fixed cost on every case of product that comes off the line." He observes further that a farmer's greatest potential for added income for the products he sells lies in the area of assembling, grading, sizing, packing, hauling and storing--all of those areas associated with middle-man operations. By working with processors, farmers can share in the rewards of greater marketing efficiency. As Fuchs notes, "We are in this together for the simple reason that there is not enough profit in the whole picture for the middle-man to get a piece of the action."

Economic pressures will motivate food processors to employ every technique available that will enable them to provide high-quality food products on the grocer's shelf at the lowest possible price. Contract production to specification as to quality and timing will become a more common practice in the future.

More and more managers with vision are realizing that agriculture is marked not by a scarcity of goods but by a scarcity of markets. We have tended to ignore the need and the opportunity to expand markets. As processing and production become more closely integrated, the objectives will shift in the direction of providing in the most efficient manner what customers will buy at the lowest cost.

In the future, more producers will enter into joint arrangements with marketing corporations. Under such arrangements, a group of producers would agree to furnish the entire supply of one or more agricultural products to the processing firm according to specifications based on customer needs. Processors will not want to spend time and money in a continual search for sources of supply. If sources of dependable supplies are not forthcoming, processors will be forced to integrate backwards into the farming operation.

Mechanization of fruit and vegetable production has been among the most notable changes in recent years. There have been many who have said, "It never can be done. They are too fragile and too perishable to harvest mechanically." This has

proven to be false.

TOMATOES - In 1964, only about 5% of the California tomato crop was harvested mechanically. In a period of about 6 years, nearly all of the crop used for processing was mechanically harvested. This change involved the cooperative research efforts of plant breeders, engineers, farmers and processors.

POTATOES - My experiences on a potato farm in Idaho made a lasting impression, particularly on my back. Those of you who have picked potatoes by hand know what I mean. Now, nearly all the potatoes are harvested mechanically. They are handled in bulk containers, resulting in a higher quality product at a lower unit production cost.

RADISHES - The Tem-Cole Farm in Florida is estimated to grow and sell 52% of all radishes sold in the U.S. One custom-built machine harvests 14 rows at a time, roughly 1,000 lbs. of radishes per minute. This farm produces only radishes; however, they harvest 4 or 5 crops a year. The innovations in this operation extend through all phases--from planting, where they use a 28-row machine, through processing, packaging, and distribution.

Grading begins in the field where a conveyor on the harvester discharges all radishes smaller than 11/16 inch diameter. Custom built carts are filled in about 20 minutes and are emptied in a field washing machine where the radishes are washed and loaded directly into piggy-back trailers and rushed to a pre-cooler within an hour of harvesting. They are immersed in near freezing water for about an hour, then transported under refrigeration to Cincinnati, Ohio. At this location, they are packaged into 6 ounce plastic bags in a controlled atmosphere in which liquid nitrogen replaces oxygen to preserve the quality.

FRUIT HARVESTERS - Several companies have experimented with ways of mechanically harvesting fruits. Blackwelder Manufacturing Company of California has developed a machine that is capable of harvesting one of the most delicate of all processing fruits--cling peaches. Their objective was to develop a competitively priced machine that would satisfy both the grower and the processor. The machine reportedly can harvest up to 80 trees per hour with quality equal to hand-picked fruit. It consists of a two-part harvester (shaker half and fruit conveying half each with its own specially designed catching surface) and a tractor-drawn bin trailer that travels parallel to the harvester permitting side loading directly into the bins. The machine can also be used to harvest such fruits as apricots, prunes and apples.

CHERRY HARVESTERS - This machine, manufactured by Friday

Tractor Company of Hartford, Michigan, is capable of harvesting up to 40 trees per hour using two men. Cherries are conveyed into large boxes for transport to the processing plant.

ASPARAGUS HARVESTERS - Draper King Cole, Inc. of Milton, Delaware, uses specially designed machines to cut asparagus. Each machine is capable of harvesting more than 4 acres per hour or approximately 40 acres per ten-hour day. This compares with hand cutting of less than 3 acres per day. This is another example of a fully integrated operation from production through harvesting and processing.

COTTON - The cotton industry has not responded to customer needs as readily as some others. As a result, synthetic fibers have taken over a significant portion of the fiber market. When mechanical pickers were first introduced, ginners and millers were reluctant to accept machine-picked cotton on an equal basis with hand-picked cotton. Ginners had to modify their equipment to handle more trash. Defoliation techniques were not perfected resulting in some leaf spot. Most of these problems have been eliminated and nearly all cotton today is mechanically harvested.

Even though innovations have been significant in the cotton industry, production and marketing policies have not changed fast enough to maintain cotton's share of the fiber market. Innovations now are being tried in hopes of reducing the cost of producing cotton. Broadcast seeding is one technique being tested. The harvesting machines to be used will differ in many respects from the present spindle-type pickers. And while the new machines will not change the end markets or marketing procedures, they will necessitate some changes in ginning equipment to remove more trash from field-harvested cotton.

CORN - Grain combines, modified to harvest corn, have virtually replaced corn pickers as a method of harvesting the nation's most important crop. This innovation has resulted in significant changes in handling, drying and storing phases of marketing. Storage facilities had to be changed to accommodate shell corn. In most cases, corn had to be dried in order to store properly. Many farmers turned to country elevators for this service.

During early years of the transition, buyers were wary of artificially-dried corn and often purchased it at a discount. Most of the problems, however, have been resolved with the addition of farm storage and drying facilities.

These examples illustrate only a few of the many innovations that have occurred in agricultural production and harvesting. And in nearly all cases, the innovations have arisen out of a desire to meet customers' needs more effectively at a price they are willing to pay.

Serious questions are being raised at the highest levels of government and by private "people interest" groups, concerning the relevance of and the duplication of research efforts. Publicly funded research that parallels the research efforts of private industry or that works at cross purposes with other agencies of government must be examined closely and eliminated in the interest of efficiency and economy. Research or resource development programs that aid in establishing a more efficient system for providing for the real needs of man can never be justifiably questioned.

Where does your program fit?

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