

A Basebook for Agricultural Adjustment in Iowa

PART II—PROSPECTS FOR THE YEARS AHEAD



- Cooperative Extension Service in
Agriculture and Home Economics,
- Agricultural and Home Economics
Experiment Station,
- Center for Agricultural Adjustment,
cooperating

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FOREWORD

Many people were puzzled when farm incomes began to drop in 1953. Agriculture had been in trouble before, but, usually, it was not alone with its problems; other parts of the economy were suffering also. In 1953, however, the general national economy was growing, and it has continued to progress since. Agriculture has remained in trouble. Why? Some of the reasons have been reasonably clear. Others have been more complex, and things have occurred which have tended to obscure what was happening as well as its causes.

The first generally recognized symptoms that something was wrong in agriculture became apparent in 1948-49 following World War II. Some of the clues were there even 20 years before—though almost immediately obscured in a general depression—and again about 10 years later. In this last instance, the entire economy was emerging from a depression. World War II served to overcome the economic problems then—both for agriculture and the nation as a whole. Agriculture's slogan was, "Food will win the war and write the peace," and agriculture's contribution was unprecedented. Patriotic urge plus higher farm prices because of increased demands for food spurred farm production to heights never before achieved.

Demand for American farm products continued unusually high following World War II as the war-torn nations sought to regain their feet. Export demand slumped temporarily in 1947-48—with a larger slump in "food" exports in 1950. American agriculture—geared to the higher production needs—couldn't dampen itself overnight, and the "surplus problem" once again reared its head. Continuation of price supports at or above wartime levels encouraged a continuation of wartime production—"the dollar was there to get" on supported items.

The Korean conflict, like World War II, provided a temporary "solution" and again obscured the over-all agricultural picture. But by 1953, "the farm problem" began to take shape again—surpluses, lower farm prices, lower farm incomes, higher farm costs.

Since then, by pieces and parts, the over-all picture has become more clear—not completely so, there are still gaps where more information is needed. But increasing evidence indicated that agriculture was out of adjustment with the rest of the national economy; resources elsewhere in the economy were earning increasing returns while returns to resources in agriculture were decreasing. Though the national economy as a whole was growing, agriculture was not sharing fully in the fruits of a progressive economy.

The "shocker" came in 1955. Net farm incomes dropped sharply. Hog prices in the Corn Belt, for example, fell to 10 cents a pound in December of 1955.

The farm economy was sagging during a period of a relatively prosperous and growing national economy.

By the fall of 1956, it was apparent that neither the government farm programs which had been operating, the drouth nor other factors in operation were sufficient to counteract, to stabilize or this time even to obscure what was happening in agriculture. The trouble was obvious; all of its causes and complex relationships were not; there was no one factor to be singled out as the culprit, past or present. It was obvious also that agriculture needed help. But what kind of help—not only for the immediate present but also for the future?

Members of the entire Iowa Extension Service staff met in Ames late in 1956 to focus attention on and to discuss the prospects and problems facing agriculture in the years ahead. During the winter and spring of 1957, the Division of Agriculture at Iowa State College conducted a series of seminars on the situation. Staff members of the various departments of the Division presented and discussed the evidence and data available and developed tentative recommendations and conclusions.

Following the series of seminars, the information that had been presented and discussed was considered as a whole by a basebook committee. Those who had presented material at the seminars were asked to revise, to shorten and to update their material in the light of all

information presented at the seminars and of any new information available.

The Basebook for Agricultural Adjustment in Iowa thus represents both a synthesis and a summary of the relevant information we now have available as well as the tentative conclusions and recommendations based thereon. Just as this brief foreword cannot give a complete picture of the situation, neither can all three parts of the basebook furnish a complete view; information in some areas is far from complete.

Largely because of this and partly as an outgrowth of the series of seminars, a Center for Agricultural Adjustment has been established within the Division of Agriculture at Iowa State College to seek and coordinate and to apply and extend both basic and practical information in the areas where present knowledge is inadequate.

Meanwhile, the primary purpose of this basebook is to provide as brief but complete a picture as is now possible of: (1) the current situation and its background; (2) the prospects for agriculture in the immediate decades ahead; and (3) alternative possibilities and means for working toward solutions of the problems and for facilitating those adjustments in agriculture that appear to be necessary to assure a healthy agriculture in the years ahead.

Originally this basebook was envisaged primarily as a "handbook" of background information for the Divisional staff in research, resident teaching and extension. It is being made available now, however, to others interested in understanding the problems of and needs for agricultural adjustment. Less technical and detailed presentations will also be made available for wider use.

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PREFACE TO PART II

This bulletin is the second in a series of three summarizing the information presented and discussed during the Agricultural Adjustment Seminar at Iowa State College. Part I considered the current situation and its background and attempted to explain the basic causes. Part II outlines the prospects for agriculture in the years immediately ahead—demand and supply for farm products, possible means of expanding demand and some of the types of adjustments needed if long-run solutions of the basic farm problems are to be made.

Essentially, Part II is an attempt to "face facts" as they exist. Only by facing and appraising these facts can we determine or guide the adjustments needed in agriculture to provide a sound and stable industry in the future—one which will give returns to resources in agriculture comparable to those of other occupations and businesses.

The types of adjustments indicated cannot be made overnight or entirely painlessly. But they are the types that appear to be necessary if farming is to be more profitable in the long run and if farm families are to have incomes and living standards on a par with other sectors of the economy.

American and Iowa agriculture has experienced a remarkable revolution during the past half century; methods and techniques have changed and so, among other things, have farm family levels of living. These changes have affected and are affecting not only agriculture itself but also rural communities, businesses, institutions, organizations and the very patterns of rural living.

Just as the changes are not all new, the adjustments under way are not necessarily new. Many of the adjustments are now going on and have been for some time. Substantial adjustments have taken place over the past 30 years, but the evidence shows that they haven't taken place rapidly enough. Some forces have operated to promote these adjustments. Other forces have operated to impede the same adjustments.

Part III will analyze some of these forces and will present some of the opportunities and means for facilitating and achieving the needed types of adjustments outlined in this bulletin.

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The Need for Agricultural Adjustment

BY CARL C. MALONE

AMERICAN FARM output in the mid-50's exceeds the demand for the products being produced by about 5 percent. In relative terms, this is not a great amount per year. As explained elsewhere in this series, however, and when coupled with other factors, the result is an income level unfavorable to farm families as compared with others. This becomes more apparent as we take a broad look at agriculture as an integral part of our economy.

Parity prices are sometimes used as evidence. Parity prices start with a 1910-14 base as 100—a period of high employment and active foreign demand for farm products—and represent the relationship between prices received by farmers and those paid by farmers. The last half of the 20's was another period of high employment, but exports were lagging, the parity ratio averaged 91 percent of 1910-14. In 1955-56 employment levels were high, farm exports (omitting exports of government stocks) were moderate, and the parity ratio stood at 84. Farm output was above demand in the market.

Some people prefer to compare labor income rather than prices. And when the labor income on farms is compared with that in industry (allowing for capital earnings separate from labor earnings in agriculture), farm earnings still come out second best. On a 1947-49 purchasing power basis, wages in manufacturing, wholesale trade and building construction averaged \$1.27 per hour during 1937-41 and \$1.87 in 1954-56—a gain of 60 cents or 47 percent. Labor earnings on all American farms are estimated at 44 cents and 61 cents in each of the same periods—an increase of only 17 cents or 39 percent.¹

Another comparison is in net income per person. Again on a 1947-49 purchasing power basis, nonfarm per capita income rose from \$1,107 in the 1937-41 period to \$1,672 in 1954-56—an increase of \$565 or 51 percent. For farm people, income from all sources (not just farming alone) during the same period rose from \$547 per capita to \$793—a gain of \$246 or 45 percent.² While this may understate farm income to some extent, it is clearly evident that farm families have been gaining slower than others.

Regardless of the data chosen, the results tell substantially the same story. There are deep and continuing income problems in American agriculture.

Other articles in this series have described the basic situation: Each of the 3.3 million commercial farmers

(and about 1.4 million noncommercial farmers) uses his land, capital and labor as he sees fit, and the output from all farms is oversupplying the market at prices that seem reasonable to farmers—considering either income comparisons or those between price relationships.

TYPES OF ADJUSTMENT

The past 30 years illustrate the major changes that have been going on in agriculture as farm people adjust to economic growth and progress. For the most part, these changes have gone on voluntarily as people responded to changing economic conditions. The adjustments going on today are largely a continuation of the same longer period adjustments. The main difference is that the pressure for adjustment is greater today than at any other time in the 30-year period; it differs in degree more than in kind. Adjustment in American agriculture has followed the same general trend since about 1920—some families and workers have moved out of agriculture, machinery and improved methods have come in, and farms have grown in size.

During the 30's farmers added some 600,000 tractors, 190,000 cornpickers and combines and otherwise improved their farming. Farm output increased. Less workers were needed; hired workers declined in numbers by 500,000 and family workers by 1 million during the decade—despite lack of growth in the general economy which was reflected in a low parity ratio.

World War II made labor scarce and expensive on the farm as elsewhere, while farm prices and income were unusually good. Farm operators responded, adding machines as rapidly as they were available. Of six major field machines, numbers increased from about 1,860,000 in 1940 to 4,840,000 in 1950. And many of these machines were larger and swifter moving than previous ones. Hired farm workers also dropped another 600,000 and family workers another million between 1940 and 1950. But output still rose rapidly. Table 1 shows the

TABLE 1. FARM EMPLOYMENT, PARITY RATIO AND FARM OUTPUT CHANGE.

	Farm employment (000)		Parity ratio*	Farm output change†
	Family	Hired		
1920 level	10,040	3,390	99	—
Change 1920 to 1930	—730	—200	90	+13%
Change 1930 to 1940	—1,010	—500	78	+11%
Change 1940 to 1950	—1,050	—600	105	+21%
Change 1950 to 1956	—1,080	—230	94	+12%
1956 level	6,170	1,860	83	—

* Annual or average for period, whichever applies.

† Trend for period.

¹ Derived from: U. S. Congress, Senate, Possible methods of improving the parity formula. Senate Doc. 18. U. S. Govt. Print. Off., Washington, D. C. Feb. 1957. Tables 8 and 10.

² Derived from: U. S. Dept. Agr., Agricultural Marketing Service. The Farm Income Situation. July 1957.

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rate at which farm employment has declined decade by decade and the parity price ratio and farm output change during these periods.

With some exceptions, however, it is not correct to say that farm people were being crowded off farms. Many moved because they saw, or thought they saw, a better future for themselves in towns and cities. As a result, also, the families remaining in agriculture were able to receive increased income and to raise their standard of living.

In the past few years, the pressure on farm prices has been downward because farm output has outpaced the demand for it. Labor earnings of those who do the farm work, allowing for capital earnings separately, have been declining. From 1947-49 to 1954-56, farm labor earnings on a purchasing power basis have fallen from 89 cents to 61 cents per hour, a decline of 31 percent; wages in manufacturing, wholesale trade and building construction have risen from \$1.50 to \$1.87 on the same basis—a gain of 25 percent.

This widening gap in favor of urban jobs is a powerful attraction to many farm people, especially younger people. Many are leaving the farm permanently. Others have found part-time or full-time off-farm employment, have stayed in the country and have adjusted accordingly. From 1950 to 1956 the number of hired farm workers dropped still another 200,000, family workers by yet another million. Meanwhile, remaining farmers added some 2 million more major machines to speed up farm work and to increase output per worker.

ARE BIG FARMS COMING?

Many people are concerned with the possibility that these shifts, if long and continued, will mean that big ("corporation") farms will dominate the American scene. But the record to date does not support this potential trend to "big farming." Rather, family farming is where the changes are greatest. The modern family farm—with its fast-moving tractor and other machines—is quite a different farm than that of horse-farming days.

The family is much the same. It is the size of its farm, the number and type of machines, and output per worker that are different. In the Corn Belt, for example, a gang plow and horses were good for about 4 or 5 acres per day; now 12 to 15 acres can readily be plowed per day with a modern 3-plow tractor. Even so, the family farm of today is only moderately larger in acreage than a generation ago—not three or four times as large.

Large-scale farms may be considered those with sales of \$25,000 or more at 1954 prices, adjusted in earlier years for changes in labor productivity. Defined in this way, their number is declining, not rising. In a USDA

study (see table 2) where this was taken into account, large-scale farms made up 4.3 percent of all commercial farms in both 1930 and 1954. Rather than the big farm, it is the up-to-date family farm that is increasing in numbers. Now, more than ever before, this type of farm dominates the American farming scene. Except for certain highly specialized kinds of farming, the modern family farm has not yet been successfully challenged.

Though not separated in table 2, the higher income family farms are increasing in number. Medium-income family farms are decreasing in number as low-income farms are doing.

TOWARD MORE PRODUCTIVITY

Americans are moving away from hand labor in the production of items for everyday living wherever this is possible. There seems to be no more reason for raising cotton, tobacco, potatoes, sugar beets or corn by hand than there is to make shoes, nails or automobiles largely by hand if better means are known. Mechanical and electrical power are cheaper and less wearisome to use than human or animal power. This is the main reason farm people are striving to have farms of more adequate size or to seek work elsewhere.

In the 24 years from 1930 to 1954 (see table 2), the number of medium to higher income farms declined by 860,000 as mechanization took place; low-income family farms, still using large amounts of hand labor, declined by 688,000. Since most available farmland was occupied in 1930, the shift in acres per farm came mostly by adding land released from the smaller farms to others.

In some areas (Iowa, for example), the increase in acreage per farm has been modest. Since horse-farming days (1920), the number of Iowa farms of 30 or more acres have declined in numbers by 11 percent. The average acreage of harvested crops increased from 103 acres in 1920 to 127 acres in 1954, an increase of only 24 acres. In shifting from the power furnished by 5 horses then to an average of 1 $\frac{2}{3}$ tractors on such farms today, the addition of 24 acres of harvested cropland per farm is not impressive, even after allowing for the smaller labor force per farm.

OBJECTIVES OF AGRICULTURAL ADJUSTMENT

The main economic objective of agricultural adjustment is part and parcel of the general economic objectives of American society—a society should be productive, Americans believe, not as their one and only goal but as an important part of the total goal. This is another way of saying that people want to have a high material level of well being. And only by being produc-

TABLE 2. CHANGE IN NUMBER OF FARMS BY SCALE OF OPERATION.*

	Large-scale (000)	Commercial family farms		All commercial†	Non- commercial†
		Medium to higher income (000)	Low income (000)		
Number in 1930	205	2,828	1,690	4,723	1,480
Change 1930 to 1940	-10	-428	-20	-458	+205
Change 1940 to 1950	-40	-140	-620	-800	+232
Change 1950 to 1954	-21	-292	-52	-365	-235
Number in 1954	134	1,968	998	3,100	1,682

* McElveen, Jackson V. Family farms in a changing economy. U. S. Dept. Agr., Agr. Inf. Bul. 171. 1957. Tables 4 and 24.

† Based on revised definition from the usual census definition.

tive is this possible. Wherever people are less productive than they might be, changes that help them to be more productive are regarded as good by our society.

Thus, the economic objective of agricultural adjustment is aimed at helping farm people individually increase their productivity. For some, this will be through efficient use of a more adequate set of farming resources—managerial ability, land, capital and labor. For others, it means shifting to another occupation on a full-time or part-time basis where this shift results in making them more productive people. Two results can be expected from such an adjustment: (1) their income should improve because of higher individual productivity and (2) each worker will be able to make a larger contribution to the total society by producing his share of the output at a lower cost. Society favors the productive worker over the ineffective one. Another way of putting this is that, if an identical item which can be produced at a cost of \$10 in one case and can also be produced at a cost of \$8 in another, society prefers that the latter be used.

The principle involved is that of organizing resources and using methods that minimize the cost of producing any one thing. Two illustrative examples: If a living room wall may be painted in 2 hours with a brush or in 1 hour with a roller, assuming equal quality, most people would prefer the latter method; this represents an increase in productivity through an "improved" practice. Or, it may be possible to use a power lawnmower to mow in 1 hour the same lawn that took 1½ hours to mow with a hand lawnmower—a better organization of resources. While the paintbrush and roller cost about the same amount, the power mower calls for a greater investment than a hand mower; in this case, the increase in productivity is in the form of a substitution of capital for labor.

Society is in general agreement on many broad social goals. Equality of opportunity is one of these goals that has general support. With other more detailed goals, there is more controversy and disagreement. For example, some people hold that stability in rural areas is a high-ranking goal—the "family farm" should be kept about as it has been for the past generation. To be more productive, however, the family farm must use more capital and land to go with the family labor supply—meaning an increase in average farm size and a decrease in the number of farms. This is why the labor force in agriculture is growing smaller but more productive while the average size of the family farm is growing larger.

If emphasis is on the economic goal, the exodus from farms will continue until the commercial farm family has enough land and capital to make its labor productive by modern standards. Good economic opportunity cannot exist for farm families unless they have access to adequate farming resources.

An alternative supported by some is to choose the social goal of stability in the number and size of family farms and make up the income deficiency from the family's lower productivity by price supports or other types of income aid. Here, the social goal is uppermost; the goal of individual productivity is less important.

On the whole, farm people themselves seem to be giving little support to the goal of stability in the number of small family farms. It is from these farms that the exodus to towns and cities has been most rapid. From 1930 to 1954, the number of very small commercial farms

declined by 41 percent. The economic goal quite clearly has had the strongest appeal.

The essential conditions for economic and social adjustment in agriculture seem to be about four in number:

1. The family must be free to make its own choices and decisions;
2. Alternative occupational choices must be available;
3. Knowledge and understanding of the alternatives are necessary; and
4. Innovators—those willing to change first—must be present in the community.

HOW MUCH ADJUSTMENT IS NEEDED?

In considering the amount of agricultural adjustment that is consistent with the economic objectives of society, two questions are of special importance. One has to do with the proper size of the farming industry as a whole. How many resources of farm people, land and capital are needed to bring forth the supply of farm products that the market needs—the supply that will allow those resources to earn comparable returns with those employed elsewhere in the economy?

The second question has to do with the way farms should be organized so that the cost per unit of farm output will be the lowest that modern knowledge and farming methods make possible. The system of farming that does this is also the one that provides the largest net income for the individual farm under free market conditions, provided that the industry as a whole is of optimum size and in balance with the national economy as a whole.

Based on present knowledge, specific answers to these two questions are not possible. We have already noted that, even with a shrink in agricultural workers of about 3 million since 1940 (many work part time), the total output from American farms continues to run too high. The addition of 10 billion dollars worth of machinery and equipment since 1940 (1955 price levels), more fertilizer, antibiotics, better methods and more knowledge and skill on the part of farm people has more than offset the decline in manpower.

WILL FEWER SMALL FARMS HOLD FARM OUTPUT BACK?

Smaller farms are rapidly disappearing from the scene. Will this bring farm output back into line with the demand for farm products? Not necessarily. When two farms are combined into one, the operator may be able to farm the combined unit more extensively—reducing output *per acre* below that of the two previous units even though the output *per worker* or *per family* would be greater. That is, through farming more extensively rather than intensively, the output from the combined unit would be greater than the output from *either* of the two previous units but perhaps *less* than the *combined* output of *both* previous units. On the other hand, this effect might be offset by the combined larger unit being in the hands of a more capable operator with more adequate capital and up-to-date knowledge.

Few facts are available on the output effects of farm consolidation; little is known of how this affects either change in output per acre or total farm output. Such information as can be gleaned from the census data is

TABLE 3. SALE OF FARM PRODUCTS PER UNIT OF REAL ESTATE BY ECONOMIC SIZE OF FARM—SIX AREAS.*

Type and location	Cash sales per acre			Sales per \$1,000 farm value:		
	Larger	Medium	Smaller	Larger	Medium	Smaller
Fruit-nut, central Calif.	\$223	\$212	\$153	\$335	\$242	\$161
Tobacco, central N. C.	102	107	91	517	477	445
Cotton, Mississippi Delta	54	68	78	362	505	615
Dairy, eastern Wis.	64	50	34	384	344	267
Cash Grain, central Ill.	58	43	33	167	137	121
Wheat, central Kan.	25	21	17	198	167	149

* Derived from Census of Agriculture. Vol. III, Part 8. 1954.

not very promising as to the short-run effects. Table 3 shows output per acre and output per \$1,000 of land and improvements investment for larger, medium and smaller sizes of farms (Class I and II, Class III and Class IV farms) in six areas.

Except for the cotton farms and the medium-size tobacco farms, the larger the farm, the larger is the output per acre and per \$1,000 of farm value. Presumably, this is because the larger farms are better supplied with management ability, knowledge and capital and can make better use of modern farming methods. Hand methods with cotton get more output per acre than does mechanized production, though much less output per man, and the larger cotton farm units often crop less intensively.

Some bias is inherent in this data; it favors the larger farms. The census economic classification of farms is by total cash sales. Thus, any farm which falls short on sales because of temporary conditions may be classed lower than where it actually belongs, though some might be classed higher because of unusually favorable conditions. On the whole, the net effect is to pull down the average for the smaller economic units. Also, relatively more of the farm output is consumed by the family on the smaller farms—less is sold.

There is some evidence, however, which suggests the opposite from that suggested by the census data. Midwest farm record summaries, for example, tend to support the idea that the larger units are farmed more extensively—producing less output per acre though more per person or family—than smaller units.

Whether farm consolidation will tend to increase or decrease farm output in total needs more study before the facts can be known. This, however, is not the reason for the gradual increase in farm size that has been taking place over the years. Nor is it likely to be the most important reason for *individual* farm families to strive to increase the size of their farms in the future. The gain to be made through farm enlargement as it accrues to the individual farm family is largely that of increasing their efficiency in the use of their resources (particularly labor), in spreading their investment over a larger unit and in realizing the income from a larger unit that was formerly shared by two families. This is the real force behind the current efforts of farm families in seeking to enlarge their operations. And, in turn, the bidding for land to enlarge farm size is maintaining a strong market for farmland, despite relatively unfavorable farm incomes of the past few years.

The apparent slowness in holding back output while farms are getting larger is a strong argument in favor of reasonable income help for farm people while longer-run adjustments are in process. Society may not want to ask farm families to carry the full burden of lower income due to excess output while the adjustments are being made; society is not asking this at present. By and

large, however, the present government farm programs are poorly related to the needs of both farmers and society during the adjustment period.

The increase in part-time farming should have some effect on slowing down the growth in farm output. In 1939 only 15 percent of the nation's farm operators worked 100 days or more off the farm. By 1954 the figure was 28 percent. When more of the family income comes from off-farm jobs, operation of the farm is likely to be less intensive.

ARE MORE EFFICIENT UNITS EARNING SATISFACTORY RETURNS?

The second problem mentioned above was that of more efficient organization of resources on individual farms. If this is to be done on a broad scale, farm families must have an adequate education and ability to operate a business unit. Modern farming requires a considerable amount of management ability as well as technical knowledge. Also, farm resources must remain reasonably fluid so that farm operators may combine their own ability with land, capital and hired labor in a way that will make the entire combination an effective one. And the marketing systems that serve farmers must be efficient.

Whatever the level of farm prices, efficient farms earn at a higher rate than less efficient ones. But, by the same token, workers on farms of higher efficiency are more productive and are entitled to higher earnings. The question is whether resources in farming, when efficiently used, can earn returns on a comparable basis with those used elsewhere in the economy. If not, this indicates that alternative opportunities are better from an income standpoint.

It may be that larger farms are efficient enough at present to earn reasonable returns on labor and other resources with farm prices around 84 percent of parity. Just as with the previous question, factual evidence on this is fragmentary, though somewhat more complete than that on the consolidation question.

A rough approximation derived from 1954 census and other data for the various economic sizes of farms shows considerable variation in labor earnings. The larger farms (those with sales of \$10,000 or more) appeared to have average labor earnings of something like \$1.50-\$1.75 per hour in 1954 after allowing separately for earnings of real estate and farm operating capital. Medium-size farms (\$5,000 to \$10,000 cash sales), on the average, apparently earned something near 70-80 cents an hour for the labor used. Workers on smaller farms appear to have earned considerably less.

When the caliber of men needed to run the medium to larger farms is taken into account, earnings of the level indicated appear low compared with general labor income standards of the mid-50's. It suggests that labor earnings

TABLE 4. LABOR INCOME AND SCALE OF OPERATION—TYPICAL FAMILY-OPERATED FARMS AND RANCHES, 1954-56 AVERAGE (PRELIMINARY) ROUNDED DATA.

Type and location	Capital used*	Sales	Earnings per hour†
1. Cotton, Piedmont	\$ 15,700	\$ 3,700	\$0.35‡
2. Tobacco, Kentucky	23,600	5,100	0.70‡
3. Dairy, New York	27,000	8,700	0.71‡
4. Dairy, E. Wis.	33,000	6,700	0.36‡
5. Hog-beef raising, Corn Belt ..	35,000	6,100	0.42
6. Hog-dairy, Corn Belt	43,000	10,000	0.80‡
7. Wheat, North Dakota	43,000	9,300	1.08‡
8. Hog-beef feeding, Corn Belt..	60,000	12,400§	1.05
9. Cattle ranch, intermountain ..	63,000	9,200	0.44
10. Wheat, Kansas	74,000	9,600	0.76‡
11. Sheep, Northern Plains	82,000	16,600	0.08
12. Cotton, irrigated western Texas	87,000	25,000	2.80‡
13. Cash-grain, Illinois	90,000	13,600	1.33‡
14. Wheat-pea, Idaho, Wash.	147,000	20,300	2.78‡

* Value of farm plus all farm operating capital, Jan. 1 basis.

† Earned per hour of operator and family labor after charge for all farming expenses and capital used.

‡ Important products sold had price support for all 3 years.

§ Feeder cattle purchased are deducted.

Derived from: U. S. Dept. Agr., Agr. Inf. Bul. 158; and U. S. Dept. Agr. Farm Cost Situation, May 1957.

will be modest in agriculture on the whole, even on reasonably efficient units, until the problem of getting output back into line with demand is solved. Some additional evidence on this point is available from USDA studies (see table 4) of typical family-operated farms in a number of areas. Here, labor earnings are calculated only for operator and family labor, while hired labor is charged as a cost. Table 4 shows this for the 1954-56 period as well as the size (capital and sales) of the farm business.

Except to observe what well-informed people do in practice, we cannot determine the rate of labor earnings in farming that is comparable to those in other occupations. From table 4 it appears, however, that few of the 14 farming types shown are earning enough to encourage capable young men to enter farming when they compare these returns with those of other good occupations.

John D. Black sums up the situation in this way: "By 1975, it now seems reasonable to expect that half of the remaining small, low-income farms will have disappeared as separate farms, and that the Census for that year will report not more than 3.8 to 4 million farms, counting in the part-time and residential farms the same as now. . . . A farm labor force of 5 millions is definitely acceptable

as most reasonable to expect . . . and between 1.25 and 1.3 workers per farm.

"In balance, it would seem that the lowering of price levels now under way . . . plus strengthening of efforts to shift land out of surplus lines . . . plus strengthening effort to expand domestic consumption . . . plus the lowering of costs, are going to bring farm prices and receipts from marketings into better balance year by year from 1956 on . . . and this trend will strengthen a little from 1960 on."³

IN PERSPECTIVE . . .

American agriculture is in a period of rapid adjustment. Labor is becoming more productive as individual farmers adjust so that their work can be more adequately related to the proper supply of land and capital. As this proceeds, labor earnings of those who do the farm work should soon begin to rise.

If total farm output could be brought more closely into line with demand for farm products, labor earnings would soon rise substantially. But the process of adjustment would not then be ended; there will always be adjustments to be made in agriculture as long as the nation grows in population and in over-all productivity per worker.

For farm people to share fully in the fruits of this rising productivity, farming will also need to adjust. This means continued adjustments in the acreage of land to go with a family as well as in capital, in the organization of farming resources and in the number of farms.

The rapidity with which adjustments in agriculture are under way carries with it a feeling of hope that agriculture can soon better itself if the nation continues to prosper. Farm families may well need the assistance of government programs for a number of years to come. These programs would serve more effectively if they were better geared to the basic needs of a sound agriculture—one where the fundamental economic and social objectives of the American society were more clearly in the forefront.

³ Black, John D. Agriculture in the nation's economy. Amer. Econ. Rev. 46: 1-43. March 1956.

Demand Prospects for American Agriculture

BY KARL A. FOX

PROSPECTS FOR bringing farm incomes into line with those of nonfarm people depend upon the relative strengths of factors that increase demand for farm products and factors that increase supply. The most important factors affecting demand over the next 2 decades will be population growth and rising incomes per person in our own country. In addition, changes in worldwide supply and demand situations will influence our farm product exports.

In recent years, about 90 percent of the total United States output of farm products has been consumed domestically, and 10 percent has been exported. We will first consider some of the factors affecting domestic demand.

THE NATURE OF DOMESTIC DEMAND FOR FARM PRODUCTS

Most of us appreciate in a general way the effects of population growth and rising consumer incomes upon the demand for farm products. It is clear that, other things being equal, the demand for food will increase in direct proportion to population. We are pretty sure that an increase in consumer income per person means increased demand for at least some foods. But most of us are uncertain as to which foods will increase how much and what the over-all effects will be upon requirements for farm output. Similarly, we know that consumers will buy more of at least some foods if their retail prices fall, but few of us have any basis for judging which foods will respond by how much to a 10-percent drop in price or what the aggregate effect of price changes will be upon the consumption of farm products. Most of us will accept the proposition that some foods, such as beef and pork, compete with one another for a place in the menu, but few of us have had access to factual information on this point. Finally, we know that the demand for different foods may drift upward or downward over time because of a large number of factors, many of which are only vaguely understood. This area is the most difficult of all in which to prove cause and effect relationships.

FACTORS THAT CAUSE CHANGES IN CONSUMER DEMAND

The basic unit for studying consumer demand is the individual household or family. Each family has certain characteristics that are actually or potentially important

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in determining its consumption of foods. These may be grouped into (1) the basic food habits of its members and (2) measurable characteristics such as income, financial commitments and initial pattern of expenditures; number of members employed and their occupations; total number of persons in the family, their ages and sex.

During any given period, changes may occur in the family because of deaths or births, or grown sons and daughters may leave home to establish new families. Economic characteristics may also change. The income of each working member of the family from his original job may change owing to changes in wage rates, hours worked per week, or weeks worked per year. A member may change his occupation in a way that will influence his consumption of food. Or he may retire, which will mean changes in income and way of life that may influence his own consumption of food and that of the family to which he belongs. A family may take on new financial obligations or liquidate old ones. New obligations may decrease current expenditures for food, and retirement of obligations permits food expenditures to increase.

Changes in the quantity of any food purchased by a particular family depend chiefly upon these factors: (1) price of the given food; (2) prices of a few closely competing foods; (3) prices of other consumer goods and services; (4) family income; (5) liquid assets held; (6) fixed commitments and (7) various other characteristics of the family such as number, age and sex of each person, and occupations of working members.

Most studies of the demand for food products *as affected by price* have been based on annual averages over a period of years during which prices and incomes varied widely enough so that their separate effects upon food consumption could be estimated by statistical means. Fairly good data on consumer income and on prices and consumption of most major food products are available from about 1920 on. Data on liquid assets and fixed commitments of consumers are lacking for years before 1939. Other characteristics, such as the percentages of total population in different age groups, change slowly and appear to have only moderate effects on the average demand for food.

The relationship of food consumption to *family income* has generally been estimated from sample studies of the food purchases of hundreds or thousands of consumers, each study relating to a particular point in time—often just a week or two during a given year. Good studies exist for 1955, 1948, 1941 and 1935-36. But family purchase studies of this sort give no information on the response of food consumption to changes in price.

During the past few years, a new approach to measuring consumer demand has been made by at least one marketing research corporation and at least one university research group through the use of "consumer panels." These "panels" consist of from several hundred to several thousand families whose food purchases and the prices paid for them are carefully recorded each week over a considerable period. If such a panel is properly designed, it is possible to measure the responses of consumption of particular foods to changes in *both prices and family incomes*. So far, relatively few analyses have been made of such data, and the rate of publication of such analyses has been very slow.

Some implications of price and income changes for food consumption will be presented later. Further discussions of consumer demand, along with "demand curves" for some major farm and food products, are given in the following reference.¹

THE MARKETING SYSTEM

Consumer demand must be analyzed in terms of retail prices. If we wish to know the implications for farm prices of a given demand situation at the consumer level, we must take explicit account of factors affecting the marketing margin between farmers and consumers. There is a great deal of confusion about the way in which marketing margins behave and the reasons for their behavior. Since marketing charges on different farm products (including processing and transportation charges as well as trade margins) absorb from 30 to 85 percent of the retail dollar, their analysis deserves careful attention.

Part of the problem in understanding marketing margins lies in reconciling the motives and activities of individual processors or distributors with the observed behavior of marketing margins in terms of national averages.

Some economists have reported that farm and retail prices of most foods behave as though they were related to each other by (1) certain fixed charges (costs of processing, transportation and containers) and (2) certain percentage markups, particularly in wholesale and retail distribution.

An alternative diagnosis is that, on an annual average basis, most marketing margins change directly with changes in marketing costs. If farm prices rose sharply relative to costs of marketing, fixed percentage markups would result in large windfall profits to retailers. But as a result of competition among retailers for consumer trade, percentage markups would be reduced until the actual dollar margins were little if any larger than before.

For most farm products, I think this latter diagnosis is reasonably close to the truth, despite the local disturbances and exercises of bargaining power that suggest something less than perfect competition. Arbitrary gouging of farmers by marketing agencies is, I believe, relatively limited in time and place as a result of competition among marketing firms.

If extensive gouging, based on monopoly power, were prevalent in the food marketing system, one might expect marketing margins to show sharp changes from year to year. The marketing margin series I have examined do

not show this on an annual basis; pronounced trends may appear over a series of years, but changes from one year to the next are usually small.

It should be noted that, although evidences of gouging or arbitrary use of monopoly power are limited, marketing margins may be unduly wide over a period of years as a result of inefficiencies in the marketing system. Inefficiencies may be reduced by competition between different technologies and forms of organization, as between self-service supermarkets and small "corner groceries" or between vertically integrated retail food chains and independent wholesale grocers, food brokers and small processors. The efficiency approach used in farm management to reduce production costs can be just as logically applied to food marketing firms to reduce marketing costs. A reduction of food marketing margins would mean that, for any given level of farm prices, the retail price would be lower and consumption of the product somewhat larger.

This observation applies certainly to those standard commodities which continue to reach the consumer in substantially unchanged form—such as eggs, butter, milk and fresh meats. Sometimes increases in efficiency in this sense are overlooked because other products are undergoing dramatic changes in their degree of preparation before final sale. These changes involve a transfer of functions from the housewife to the food processor, and the accompanying increases in marketing charges do not imply inefficiency or gouging on the part of marketing agencies.

DEMAND AT THE LOCAL MARKET OR FARM PRICE LEVEL

The preceding section implies that consumer demand for many food products is transmitted through the marketing system in a very simple way. In the economist's language, demand at the farm level is "derived" from consumer demand by subtracting marketing costs. If a commodity has many different uses, the farm price is determined by the combination of "derived demands" from each of these end uses. Demand for a storable commodity at the farm level also involves speculative elements or anticipations. At any particular time, farmers themselves may be withholding storable crops from the market in hope of price increases. During the marketing season as a whole, these speculative aspects may "wash out" fairly well; average marketing margins may still approximately equal marketing costs. Some farm families also vary their home consumption of perishables and the amount of waste or unharvested production as the prices of the products vary.

THE NATURE OF EXPORT DEMAND

Under free trade conditions, the demand for exports of farm products from the United States is the net result of supply and demand relationships in every country in the world. At present, of course, many countries are using import quotas, export subsidies, tariffs, exchange controls and other devices that cause marked departures from a free trading pattern. Nevertheless, from year to year the demand for our exports increases sharply when there are drouths or freezes in other countries and de-

¹Karl A. Fox. The analysis of demand for farm products. U. S. Dept. Agr. Tech. Bul. 1,081. 1953.

creases when other countries have bumper crops. Over a period of years, our own policies with respect to price supports and export subsidies can have a substantial effect on our export volume; so can similar policies in other countries. Consequently we do not have very solid bases for making long-range estimates of export demand.

POPULATION GROWTH, NATIONAL INCOME AND DOMESTIC DEMAND FOR FARM PRODUCTS, 1953 TO 1975

Rex F. Daly, of the Agricultural Marketing Service, has recently published an elaborate set of projections of domestic and export demands for farm products as of the years 1960 and 1975.² He has examined a wide range of demand analyses of the sorts previously mentioned. With two exceptions, he has neutralized the available information on responses of consumption to price by assuming that prices of each farm product remain constant at their 1953 levels. The exceptions are for cattle and hogs. Consumption of beef in 1953 was relatively large and prices were low, while consumption of pork was small and prices were relatively high. As a basis for projection, cattle prices were assumed about 12 percent higher and hog prices nearly a fifth lower than in 1953. Consumption levels in the base period and price adjustments largely account for the smaller rise in total requirements for beef than for pork from 1953 to 1960-75. Responses of food consumption to rising incomes play a significant role in Daly's projections.

The basic economic framework assumed by Daly is shown in table 1. This and other tables in Daly's article contain projections for 1960 as well as for 1975. However, the text concentrates on the 1975 projections first and then makes some comments upon those for 1960. For convenience, we will follow Daly's presentation closely.

The nation's population is expected to grow by 30 to 36 percent between 1953 and 1975. These projections compare with a population increase of 30 percent from 1929 to 1953. Other things being equal, domestic consumption of food should increase in direct proportion to population growth.

Considering such factors as the growth in labor force and in output per man-hour, the nation's economy by 1975 may be nearly twice as large as in 1953. The increases in productivity and total economic growth are in line with trends during the past 3 or more decades and

² Rex F. Daly. The long-run demand for farm products. Agr. Econ. Res. 8: 1-19. 1956.

would generally be accepted as reasonable by other economists. Per capita real income would increase around 60 percent between 1953 and 1975. This would have a favorable effect upon the demand for practically all goods and services including farm products. However, per capita consumption of food as reflected at the farm level would increase only about 10 percent between the two periods. As consumption is somewhat higher in 1956 than it was in 1953, the increase from 1956 to 1975 would presumably be something like 7 or 8 percent per capita if retail prices remained at 1953 levels. Thus, the effect of increased per capita income upon domestic demand for farm products would be only a third or a fourth as large as the effect of population growth.

Daly's projections of per capita consumption of individual farm products are shown in tables 2, 3 and 4. Per capita consumption of most livestock products is expected to increase from 1955 to 1975. Consumption of fruits and vegetables (other than potatoes) is expected to increase considerably, while consumption of potatoes, grain products and sugar is expected to decrease moderately. Per capita consumption of food fats and oils is projected as about the same in 1975 as in 1955. Industrial uses of fats and oils per person are projected at about the same total for 1975 as in 1955, despite decreases in the per capita use of fats and oils in soap and drying oils. These declines are expected (perhaps optimistically) to be offset by an expansion in other industrial uses. Per capita consumption of cotton, wool and tobacco in 1975 is also projected at higher levels than in 1955. These projections are probably more tenuous than the projections for major groups of food products.

PROSPECTS FOR EXPORT DEMAND

We have already commented on the difficulty of estimating export demand a decade or more ahead. Daly does not cite any definite analytical basis for his own estimates of farm product exports. He states that "world population is expected to increase around 40 to 45 percent from 1950 to 1975. . . . Estimates based on income growth for major world areas and rough measures of income elasticity of demand for food were compared with estimates based on Food and Agriculture Organization targets for improved diets. These data suggest a world demand in 1975 some 50 to 65 percent above 1950. . . . It appears probable that with existing technology and readily accessible new lands, foreign agricultural production could be increased rapidly enough to meet a large

TABLE 1. INCOME, OUTPUT, EMPLOYMENT AND PRICE LEVEL—1929, 1953, AND PROJECTIONS FOR 1960 AND 1975.

Item	Unit	1929	1953	Projection		
				1960*	1975	1975†
Gross national product	Bil. dol.	104.4	364.5	430	705	740
Personal disposable income	Bil. dol.	83.1	250.4	308	513	540
Per capita	Dol.	673	1,547	1,725	2,449	2,449
Consumer price index	1947-49 = 100	73.3	114.4	114.4	114.4	114.4
Population‡	Mil.	123.5	161.9	178.6	209.5	220.0
Labor force§	Mil.	49.4	67.4	72	91	95.5
Employment, including military	Mil.	47.9	65.7	68.5	86.5	91.0
Unemployment	Mil.	1.6	1.6	3.5	4.5	4.5
Prices received by farmers	1910-14 = 100	148	258	258	258	258
Prices paid, interest, taxes and wage rates	1910-14 = 100	160	279	279	279	279
Parity ratio	1910-14 = 100	92	92	92	92	92

* The higher population of about 180 million in 1960 would raise the gross national product by around 5 billion dollars.

† Assuming population of 220 million for 1975.

‡ Total population of continental United States as of July 1, including Armed Forces overseas, adjusted for underenumeration.

§ Includes Armed Forces. Figures may not add to total, because of rounding.

Source: Rex F. Daly. The long-run demand for farm products. Agr. Econ. Res. 8: 73-91. 1956.

TABLE 2. PER CAPITA CONSUMPTION OF MAJOR LIVESTOCK PRODUCTS, SELECTED PERIODS 1925 TO 1955 AND PROJECTIONS FOR 1960 AND 1975.

Commodity	1925-29	1953	1955	Projections	
				1960	1975
Meat (carcass weight):	(pounds)	(pounds)	(pounds)	(pounds)	(pounds)
Beef	53.8	76.7	81.2	74.0	85.0
Veal	7.3	9.5	9.4	9.5	9.0
Lamb and mutton	5.3	4.6	4.6	4.5	4.0
Pork (excluding lard)	66.9	62.9	66.0	68.0	75.0
Total	133.3	153.7	161.2	156.0	173.0
Poultry and eggs:					
Chicken (eviscerated wt.)	14.3	22.6	20.9	24.0	27.0
Turkey (eviscerated wt.)	n.a.	4.5	5.0	4.5	5.2
Eggs (number)	330	374	366	380	403
Dairy products:					
Total milk (fat solids)	798	682	700	698	720
Fluid milk, cream, condensed and evaporated milk, milk equivalent	364	385	387	395	415
Cheese	4.5	7.3	7.7	7.5	8.0
Ice cream (net milk used)	24.1	47.6	48.4	45.0	40.0
Fats and oils: food (fat content)	n.a.	43.5	45.0	44.7	45.5

Source: Same as table 1 (Daly).

TABLE 3. PER CAPITA CONSUMPTION OF MAJOR FOOD CROPS, SELECTED PERIODS 1925 TO 1955 AND PROJECTIONS FOR 1960 AND 1975.

Commodity	1925-29	1953	1955	Projections	
				1960	1975
Fruits (farm weight equivalent)	180.3	198.5	199.1	215.0	237.0
Vegetables (farm weight equivalent)*	149.6	207.3	207.1	214.0	240.0
Potatoes and sweetpotatoes	165.1	110.0	110.0	107.0	94.0
Grain products (grain equivalent):					
Wheat	254.0	179.0	172.0	175.0	160.0
Corn	n.a.	48.2	47.3	47.0	45.0
Oats	n.a.	6.9	6.8	6.5	6.5
Other grains	n.a.	8.9	8.8	8.8	8.8
Sugar, cane and beet	101.0	96.5	96.3	95.0	93.0

* Excluding potatoes and sweetpotatoes.

Source: Same as table 1 (Daly).

TABLE 4. PER CAPITA NONFOOD USE OF MAJOR FARM PRODUCTS, SELECTED PERIODS 1925 TO 1955 AND PROJECTIONS FOR 1960 AND 1975.

Commodity	1925-29	1953	1955	Projections	
				1960	1975
Nonfood fats and oils	n.a.	21.2	20.1	21.0	20.5
Cotton	27.7	27.9	26.5	30.0	32.0
Wool, apparel	2.1	2.2	1.7	1.8	1.8
Tobacco*	9.0	12.9	12.2	13.8	15.4

* Unstemmed processing weight, per person 15 years and over including Armed Forces overseas.

Source: Same as table 1 (Daly).

part of projected needs in most areas of the world. Further, the trend toward self-sufficiency in the production of food and fibre will continue in most foreign countries, or groups of related countries, for reasons of politics and security.

"World markets are expected to take relatively large quantities of our cotton, grain, tobacco and fats and oils. The volume of agricultural exports projected for 1975 is about a sixth above the relatively small exports in 1952-53 and somewhat below the large volume exported during the 1955-56 fiscal year, when large export programs were in effect. The projected increase for fats and oils from 1952-53 to 1975 looks large, but the big exports of fats

and oils in the 1954-55 marketing year are close to levels projected for 1975.

"Agricultural exports in 1952-53 approximated less than a tenth of total output. Foreign takings are expected to continue to be a relatively small proportion of the total demand for farm products."

Daly's export projections are summarized in table 5. In general, these estimates look reasonable and possibly a little optimistic. Since the early 1920's some agricultural leaders and many laymen have assumed that our farm surpluses could be removed easily and inexpensively by two-price systems, small export subsidies or intensified merchandising efforts. More careful analyses disclose

TABLE 5. EXPORTS AND SHIPMENTS OF MAJOR AGRICULTURAL PRODUCTS, AVERAGE 1947-49, 1952-53 AND PROJECTION FOR 1960 AND 1975.

Commodity	Crop year beginning	Unit	1947-49	1952-53	Projection	
					1960	1975
Wheat, including flour and products	July 1	Mil. bu.	433.6	321.6	250	275
Corn	Oct. 1	Mil. bu.	74.8	139.6	125	150
Cotton	Aug. 1	Mil. bales	4.2	3.0	4.0*	4.5*
Nonfood fats and oils	Oct. 1	Mil. lb.	308†	1,169	1,265	1,620
Food fats and oils	Oct. 1	Mil. lb.	945†	1,078	1,369	2,587
Tobacco	July-Oct.‡	Mil. lb.	540	570	620	670
Total volume of exports	†	1947-49 = 100	100	86	85	101
Total volume of imports	‡, §	1947-49 = 100	100	112	117	140

* Assumes United States export prices will be substantially competitive with foreign prices.

† Computed from supply and disposition index made for this study.

‡ July for flue-cured and cigar wrapper. October for all other types. Tobacco exports include leaf equivalent of manufactured tobacco products exported.

§ Volume of imports would be approximately comparable to the index of volume of supplementary or similar competing agricultural products grown in the United States.

Source: Same as table 1 (Daly).

that competition from other exporting countries is keen and that efforts to dump our surpluses in deficit areas usually meet with strong protests from producer interests in the deficit countries. For example, many countries maintain high support prices or compensatory payments for their domestic producers of wheat.

With the various pressures operative upon foreign governments, there is no sure, easy and inexpensive way to secure a big expansion in our exports. Ever since 1948 we have been paying export subsidies of as much as 75 cents a bushel on wheat to meet price competition from Canada, Australia and Argentina. In 1956-57 we were subsidizing cotton to the extent of 20 percent or more of its domestic price-support level. Our domestic price-support level for butter has been at least 30 percent above prices obtainable in the commercial export market. In 1956 some 40 percent of our total agricultural exports were financed by government, mainly in the form of sales for foreign currencies. Without these major government programs (and assuming the continuance of domestic price supports at current levels), our exports of farm products would be sharply lower. Abandonment of price supports on wheat and cotton, if coupled with the abandonment of special export programs, would probably still be associated with some reduction in exports below the current level.

PROJECTED TOTAL REQUIREMENTS FOR FARM PRODUCTS

Population growth and domestic use per person, together with foreign takings, will determine total requirements for farm products. Allowing for increases in per capita consumption along with increasing income, Daly concludes that requirements for United States farm products would increase by around 40 percent from 1953 to 1975. Requirements for livestock products would increase about 45 percent and requirements for crops by around 36 percent. It should be noted that these figures represent increases in *consumption* rather than in required *production*, and that we were piling up surpluses during 1953.

Again, in terms of consumption rather than production for 1953, requirements for feed concentrates and hay might increase about 40 percent by 1975. This expansion might call for an increase of 40 to 45 percent for the major feed grains—corn, oats, barley and sorghum grains. It should be pointed out in this connection that these feed requirements assume feeding rates per livestock production unit around 1951-53 levels. If there are extensive new efficiencies in feeding, concentrates fed per livestock production unit may decline and thus moderate the projected rise in feed requirements.

A higher population assumption of about 220 million people by 1975 would add about 5 percent to the projected utilization of major farm products.

Daly states further that "projected total requirements for domestic use and export would not require corresponding increases in output. Production rates in recent years have exceeded use; they resulted in substantial accumulations in stocks of wheat, rice, cotton and feed grains. Total net stock build-up in 1953 was equal to about 6 percent of net farm output; the build-up of crop inventories was equal to about 8 percent of crop output.

Although the rate of inventory accumulation was slower in 1954 and 1955 than in 1953, production continued to exceed utilization.

"With production running in excess of utilization, the projected increase of around 40 percent in requirements . . . may require a rise of less than a third in total output of farm products. For livestock products, the increase would exceed 40 percent whereas a gain of about 25 percent is indicated for crop output."³

The over-all implication of these projections is that requirements for farm output might increase by an average of 1.2 or 1.3 percent a year from 1953 to 1975. Since farm output in 1956 was about 5 percent higher than in 1953, the average rate of increase in farm output during the next 2 decades could be slightly less than 1.2 percent, substantially lower than the rate of increase prevailing during 1946-56. However, if farm output *as of 1960* could be brought into balance with requirements, the permissible rate of increase in output between 1960 and 1975 would be about the same as that of the past decade. Granted the assumption of an initial balance in 1960, this suggests that agriculture would have reasonable prospects for successful adjustment during the 1960-75 period.

However, this picture throws into bold relief the problem of agricultural adjustment between now and 1960 or 1965. With continued growth in population and a further increase in consumer income, projected requirements for farm products by 1960 may total around 12 percent above *requirements* in the base year 1953, but only about 6 percent above 1953 *production*. As current production rates are above those of 1953 and carry-over stocks of some products are very large, little or no further increase in *output* would be needed to meet projected requirements for 1960 (table 6). This implies an unprecedented lull in the historical rate of expansion of farm output. If, in addition, we tried to eliminate our surplus stocks over and above reasonable reserves by 1960, farm output during 1957, 1958 and 1959 would have to be reduced by at least 5 percent below the 1956 output level and as much as 8 percent below the trend of unrestricted farm output.

It should be noted that Daly's estimates of requirements as of 1960 assume that farm prices will average

³ A more complete discussion of the nature of the production job implied here is contained in a companion report: Glen T. Barton and Robert O. Rogers. Farm output: past changes and projected needs. U. S. Dept. Agr., Agr. Inf. Bul. 162. 1956.

TABLE 6. PRODUCTION OF MAJOR FARM PRODUCTS 1955 AND REQUIRED OUTPUT FOR 1960, ASSUMING PROJECTED CONSUMPTION RATES.

Commodity	Unit	1955*	Projected 1960
Livestock products:			
Cattle and calves on farms			
Jan. 1	Million	96.6	98.5
Pig crop	Million	95.3	103
Eggs produced	Mil. doz.	5,403	5,960
Milk produced	Bil. lbs.	123.5	127.5
Crops:			
Wheat	Mil. bu.	938	962
Major feed grains†	Mil. ton	130	129
Corn	Mil. bu.	3,185	3,340
Soybeans	Mil. bu.	371	341
Potatoes	Mil. bu.	382	377
Cotton	Million running bales	14.5	14.5

* Note that livestock output in 1956 was 2 percent larger than in 1955, while 1956 crop output totaled the same as in 1955. The 1956 crop of corn was 3,451 million bushels; wheat, 997 million bushels; soybeans, 456 million bushels; and cotton, 13.3 million bales.

† Corn, oats, barley and grain sorghums.

Source: Same as table 1 (Daly).

about 92 percent of parity, as they did in 1953. But farm prices averaged only 83 percent of parity in 1956, and the assumed recovery in the parity ratio, other things equal, would reduce per capita consumption of livestock products 3 or 4 percent below the 1956 level. In other words, rising farm prices would operate as a partial offset to the effects of population and income growth upon food consumption.

In summary, if farm output could be reduced some 5 percent below the 1956 level for 3 years, if potential yields per acre and per breeding unit could remain for

3 years at the levels of 1956, and if current special export programs were continued or even expanded during that period, our present surpluses could be largely worked off and the trans-1960 future for agricultural adjustment would be considerably improved. To the extent that government programs are less successful than this in curtailing farm output and moving existing stocks between now and 1960, and to the extent that production efficiency continues to increase, pressures for artificial restraint of production and for special surplus disposal programs will continue into the 1960's.

Supply Outlook for American Agriculture

BY ROSS V. BAUMANN AND E. R. DUNCAN

INCREASED MARKET demands for farm products have been more than met with increased farm production. The development and rapid adoption of new farm technology has been largely responsible. The population of the United States increased from 95 million people in 1910 to 165 million in 1955 (see fig. 1), yet farm production has been ample. A further growth in population, perhaps to 207 million people by 1975, and increased consumer incomes will create a demand for further increases in production. Will farm production be adequate to meet this need? The past record indicates that the needs can be met relatively easily. Farm production capacity is such that, with only the use of techniques now known, the projected need can be met.

FARM OUTPUT 1910-1955

Estimates of farm output show that production nearly doubled in the last 40 years (see fig. 1). Livestock production did double, and crop production increased by about half. Most of the rapid strides in production came during World War II. The increase in livestock production was mainly in meat animals and poultry. Phenomenal increases in egg production and broilers have occurred. Milk production also increased, but the remarkable increase in milk production per cow only a little more than made up for the decrease in cow numbers.

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Though the increases in crop production have been less spectacular, much the same supply situation is found as with livestock production. Feed grains account for the largest proportion of crop production, and they increased quite significantly. The increases in oil crops were marked. Increases in the total production of food grains were not large; production could have been greater. The remarkable change that took place in crop production, in general, was in the large increases in efficiency of production. Rapid gains were made in output per man-hour of farm labor (see fig. 2). This has been much more evident in crop production than in livestock production. Certainly this does not detract from the records made in production; the present production is carried on with fewer workers but more machines, and the possibility of increasing production by putting back some of these resources is always available.

A number of studies have been made of possible future farm output. Two studies will be reviewed here. Both indicate that the likelihood of surmounting present surplus problems in agricultural output is rather remote.

One study of farm output by Barton and Rogers¹ assumes no further adoption of presently known techniques in production nor any possible use of techniques that are likely to be discovered and used between now and 1975. The other study by Black and Bonnen² calculated the

¹ Barton, Glen T. and Rogers, Robert O. Farm output, past changes and projected needs. U. S. Dept. Agr., Agr. Inf. Bul. 162. Aug. 1956.

² Black, J. D. and Bonnen, James T. A balanced United States agriculture in 1965. National Planning Association. Special Report No. 42. Washington, D. C.

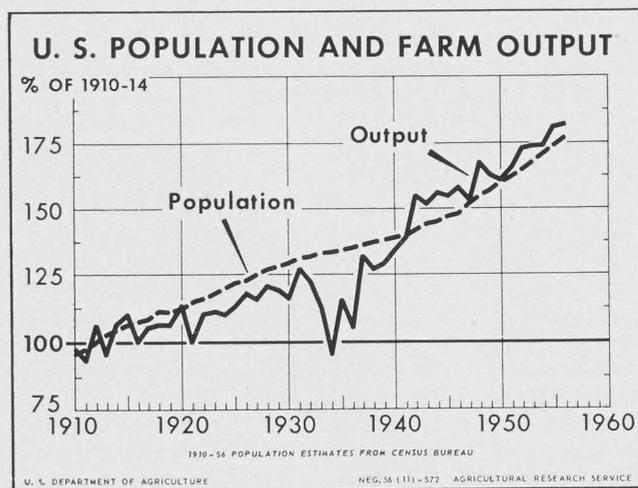


FIGURE 1

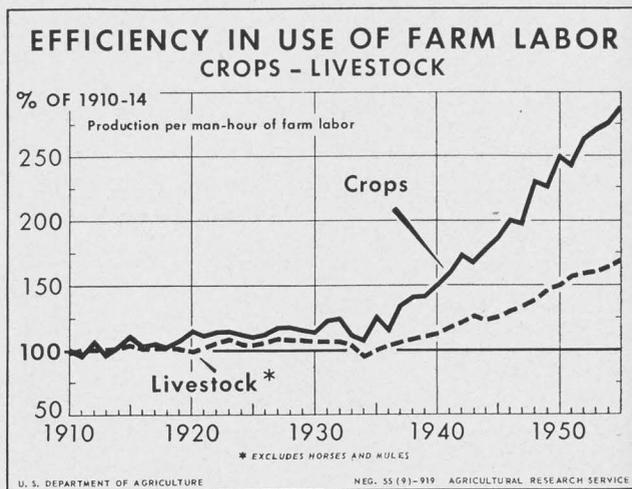


FIGURE 2

trends in farm production and projected these trends into an index of farm output for 1965. Though the projection is for a somewhat shorter period, this computation would include the assumption that new techniques of production would be adopted about as fast in the future as they have been adopted in the recent past. Both of these studies utilize about the same assumptions with respect to population. Barton and Rogers really only transform projected demands into farm output and make comparisons with past increases in production. The latter leave little doubt actually about America's capacity to produce.

PROJECTED NEEDS

An increase in production is expected in future years. A rather rapid growth has taken place in the recent past. In addition family incomes have increased, and an increased demand for many foods has been evident. Projected requirements for farm products of the larger population with its increased per capita demands were formulated by Daly as of 1975.³ These projections of demand for farm products were converted into farm output needed in 1975.⁴ The assumptions used in these studies of demand and farm output are as follows:

(1) The population of the United States in 1975 is assumed to reach a level one-third greater than in 1951-53.⁵

(2) The growth in the economy and the rise in productivity might result in almost two-thirds greater real consumer income per capita in 1975 than in 1951-53.

(3) The level of prices and price relationships that existed in 1953 are generally assumed in 1975. Further, it is assumed that there will be no major wars or economic depressions between now and 1975.

(4) No major changes in the level of exports or imports are projected.

(5) The cost-price relationships that existed in 1951-53 are assumed to be constant as well as techniques of producing crops and livestock.

³ Daly, Rex F. The long-run demand for farm products. Agr. Econ. Res. 8:86-90. July 1956.

⁴ Barton and Rogers, op. cit.

⁵ This is based on the Series "C" projection of the Bureau of Census reported in: Current Population Reports. Series P-25, No. 78, Aug. 21, 1953.

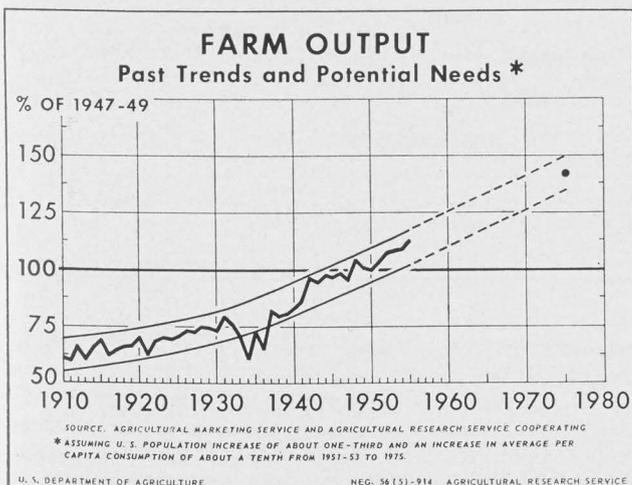


FIGURE 3

TABLE 1. AVERAGE ANNUAL RATE OF CHANGE IN LIVESTOCK PRODUCTION, UNITED STATES, SPECIFIED PERIODS AND 1975 PROJECTIONS.*

Period	All live-stock and livestock products† (percent)	Meat animals (percent)	Poultry and eggs (percent)	Milk (percent)
World War II 1938-40 to 1944-46 ...	3.57	3.56	7.04	1.62
Post-World War II 1944-46 to 1951-53 ...	1.20	1.36	2.31	-0.14‡
Projected potential needs 1951-53 to 1975.....	1.59	1.63	1.86	1.20

* Barton, Glen T. and Rogers, Robert O. Farm output, past changes and projected needs. U. S. Dept. Agr., Agr. Inf. Bul. 162. Aug. 1956.

† Excludes horses and mules.

‡ Production of milk decreased during this period.

The latter assumptions, which include the efficiency of feed use by livestock, increase the magnitude of the production needs projected. Even fuller use of presently known techniques would swell production considerably.

THE PROJECTED NEEDS FOR FARM OUTPUT IN 1975

The projected needs from the study of Barton and Rogers⁶ for farm output by 1975 are shown in fig. 3 by the large dot in the upper right corner—a third greater than in 1951-53 (see fig. 2). In terms of livestock and livestock products, the production would have to rise to a level approximately 45 percent above the 1951-53 average to meet consumer needs in 1975 (see fig. 4). Crop production might need to increase by a fourth (see fig. 5). What do these projections mean in terms of individual livestock and crop enterprises?

PROJECTIONS IN LIVESTOCK FOR 1975

The increase in cattle and calves would need to be 50 percent above the 1951-53 average. However, this is only 36 percent above the production in 1954. For hogs, production would need to be increased 41 percent by 1975, and milk production by 32 percent—again only 25 percent above 1954 production. This production should be relatively easy to obtain; milk cow numbers were lower in 1955 than in 1940, but 124 million pounds of milk were produced compared with 109 million pounds in 1940. Egg production in 1975 would need to be 49 percent above the 1951-53 average production and broiler production, 60 percent. In total, as indicated previously, all livestock and livestock products would need to be increased by about 45 percent (see fig. 4).

How much of a job will this be? How much annual increase in production will this involve compared with past years?

Our greatest annual increases in the production of livestock came in the war years. The annual rate of increase during World War II (1938-40 to 1944-46) was 3.5 percent. Specifically, in meat animals it was 3.5 percent; for poultry and eggs, 7 percent; and for milk production, 1.6 percent. How does this annual rate of increase compare with the annual rate of increase needed? Roughly half the annual increase during World War II. For all livestock and livestock products, we need an annual increase of 1.59 percent per year between 1951-53 and 1975. For meat animals, the rate of annual increase needed is 1.63 percent; for poultry and eggs, 1.86 percent; and for milk, 1.2 percent. These percentages are

⁶ Barton and Rogers, op. cit.

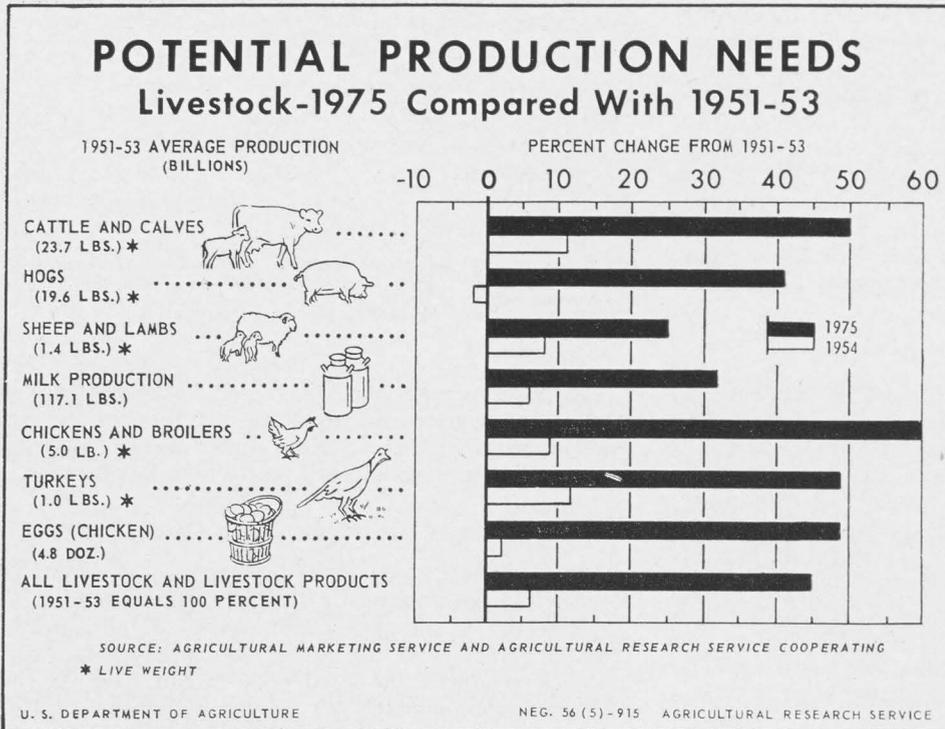


FIGURE 4

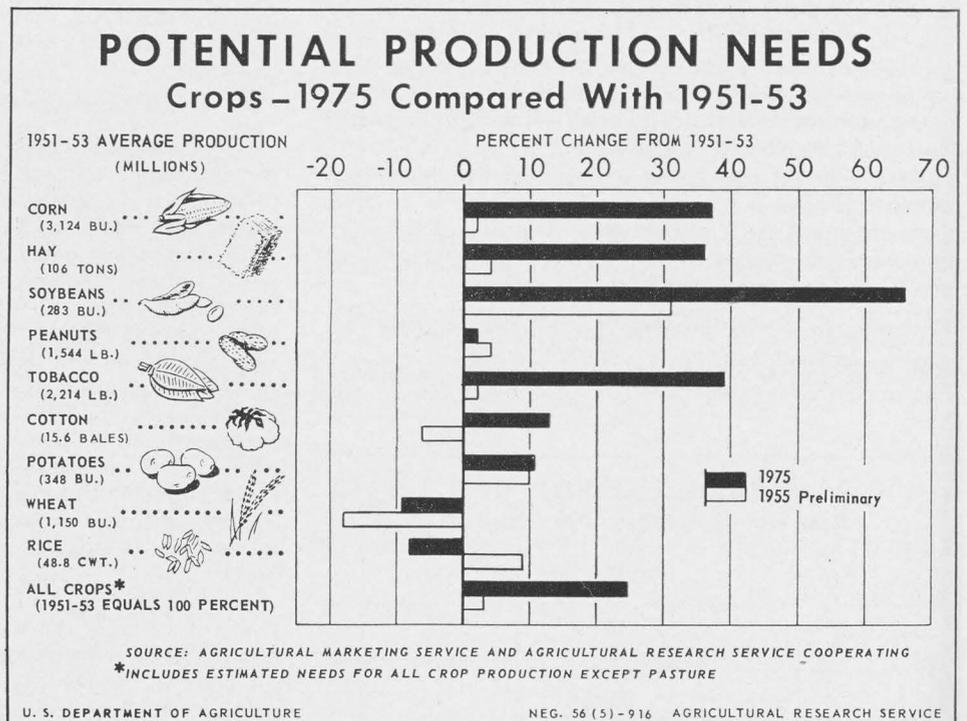


FIGURE 5

only a little larger than the rates experienced in the period since the war ended to 1953.

PROJECTIONS OF CROP PRODUCTION FOR 1975

The increase in crop production required to meet the needs for 1975 would be somewhat less than for livestock

production. Over-all crop production needed would be roughly 25 percent greater than the 1951-53 average (see fig. 5). Production of some crops is already considerably above needs, and increases in the production of these crops would be small. This includes peanuts, cotton, wheat, rice and potatoes. By 1975, however, an increase of 37 percent above 1951-53 would be needed in corn

TABLE 2. AVERAGE ANNUAL RATE OF CHANGE IN CROP PRODUCTION BY CROP GROUPS, UNITED STATES, SPECIFIED PERIODS AND 1975 PROJECTIONS.*

Period	Feed grains (percent)	Hay and forage (percent)	Oil crops (percent)	Fruit and nuts (percent)	Food grains (percent)	Tobacco (percent)	Cotton (percent)
World War II							
1938-40 to 1944-46	3.07	1.57	12.94	1.56	4.60	4.62	-3.19
Post-World War II							
1944-46 to 1951-53	-0.09	-0.14	2.92	0.28	0.83	0.95	6.53
Projected potential needs							
1951-53 to 1975	1.41	1.32	1.65	1.44	-0.39	1.45	0.56

* Barton, Glen T. and Rogers, Robert O. Farm output, past changes and projected needs. U. S. Dept. Agr., Agr. Inf. Bul. 162. Aug. 1956.

production, 36 percent in hay and 66 percent in soybeans. Changes needed above the 1955 production would be smaller, so the job of achieving the needed production is already partly accomplished. Increases needed above 1955 production would be: corn, 34 percent; hay, 31 percent; soybeans, 26 percent; and tobacco, 37 percent.

What magnitude of increases in crop production would need to be achieved annually to get the production needed by 1975? How do these compare with increases achieved in the recent past?

In feed grains, the projected needs for 1975 would require about half of the annual rate of increase accomplished during World War II. Feed grains have been plentiful since the war, and no concerted efforts have been made to increase these crops. Forage crops would need an annual rate of increase nearly as large as that during the war. However, the production of oil crops has increased annually since the war at a rate almost double that necessary to achieve the needs by 1975. No increase in production is needed. Some resources could well be transferred out of production in the coming years. The increases in production needed for tobacco and cotton are small compared with recent past performances.

In total, the crop production needed by 1975 does not appear to present an insurmountable goal, as indicated in table 2. The annual percentage rates of increases in crop production needed are only about a third of the annual percentage increases which occurred during World War II. The increases needed are only a little larger than those which occurred after the war period when no great incentives were extended to get additional production. The annual rate of change was 3.34 percent during World War II, while the needed annual rate would be 1 percent (see table 3).

Most of the production needed by 1975 must come from improved yields per acre. A small net addition to our cropland base could be made available through irrigation, drainage and clearing. The land that could be added to present cropland is estimated at 25 million

TABLE 3. AVERAGE ANNUAL RATE OF CHANGE IN CROP PRODUCTION AND RELATED DATA, UNITED STATES, SPECIFIED PERIODS AND 1975 PROJECTIONS.*

Period	Crop production (percent)	Crop production per acre† (percent)	Cropland used‡ (percent)
World War II			
1938-40 to 1944-46	3.34	2.08	0.27
Post-World War II			
1944-46 to 1951-53	0.87	0.58	0.10
Projected potential needs			
1951-53 to 1975	1.00	0.75§	0.17

* Barton, Glen T. and Rogers, Robert O. Farm output, past changes and projected needs. U. S. Dept. Agr., Agr. Inf. Bul. 162. Aug. 1956.

† An index of crop production per acre was derived by dividing the index of crop production by an index of cropland used for crops.

‡ An estimated acreage from which one or more crops were harvested plus acreage of crop failure and summer fallow. Cropland pasture not included.

§ Based on cropland projections by Wooten, Hugh H. and Anderson, James R. Agricultural land resources in the United States. U. S. Dept. Agr., Agr. Inf. Bul. 140. June 1955.

acres.⁷ This would account for about a sixth of the needed increases in production. Therefore, five-sixths of the expansion in crop and pasture production would need to be obtained by getting increased yields per acre or through other advances in technology. The projected net addition to our cropland base was about a million acres a year for the period 1951-53 to 1975. It is equal to the rate of increase since World War II. If it materializes, the average yearly increase needed in crop production per acre would be less than half that recorded during World War II—0.75 percent as compared with 2.08 percent.

PROJECTIONS TO 1965 BY BLACK AND BONNEN⁸

The projections by Black and Bonnen are made only to 1965 rather than to 1975. A somewhat different approach is used also. First, estimates were made as to the total of domestic consumption and export of farm products in 1965 together with estimates of potential output for 1965. These two were matched to see what surplus, if any, would result. These national totals aggregate the figures for individual products.

Second, a balance was computed for each of the groups of farm products that would reconcile consumption and production in a national aggregate balance.

THE ASSUMPTIONS

The specific assumptions made in this study were as follows:

(1) A continued high level of economic activity—no depressions, also no "all-out" wars but the maintenance of a significant defense program without a major change in tax structure, rationing or government allocation of materials.

(2) Average weather.

(3) A population rise from 165 million in 1955 to 190 million, or a rise of 15.2 percent by 1965.

(4) A projected civilian labor force of 75.6 million as compared with 65.5 million in 1955, with output per worker increasing at the rate of 2.5 percent per year. Hours worked per week were expected to decline from 39 to 37.

(5) Gross National Product was assumed to increase, in terms of 1953 dollars, from 385 billion dollars in 1955 to 531 billion dollars in 1965, or 38 percent.

PROJECTIONS OF CONSUMPTION AND PRODUCTION OF AGRICULTURAL PRODUCTS

Projections for food consumption were considered, with the nonfood commodities—cotton, tobacco, wool and flaxseed—eliminated. A 19.9-percent expansion in the total

⁷ Wooten, Hugh H. and Anderson, James R. Agricultural land resources in the United States. U. S. Dept. Agr., Agr. Inf. Bul. 140. June 1955.

⁸ Black and Bonnen, op. cit.

consumption of food was indicated. This assumed that per capita food consumption will increase by 4 percent. A similar expansion of the nonfood agricultural products shows a 3-percent increase in consumption by 1965. Combining the food and nonfood items gives a 16.9-percent increase in consumption for all agricultural products. The analysis of exports and imports did not change the over-all consumption increase.

PROJECTED PRODUCTION FOR 1965

The conclusion reached by Black and Bonnen was "that production will expand well beyond the 16.9-percent increase in consumption projected, if controls are not imposed effectively."⁹ The probable yield increase in crops and livestock is projected at 28.3 percent above 1955.

For certain individual crops, the projections are as follows: The recent trends for feed grains showed a projected increase of 19 percent, but an increase of only 3.5 percent would be needed by 1965. This would mean a need to shift 20 million acres of feed grains to other uses. Rice output can be expected to increase by 36 percent by 1965, with no more restrictions on output than *now* and *with* present price supports.

Given the level of cotton prices that has been maintained in the last few years and no production controls, cotton production would more than double by 1965.

POTENTIAL FARM OUTPUT BY 1965

The potential increase in farm output obtained by summing the analyses for individual products is 53 percent. So far as the available land and technology projected in 1965 are concerned, feed grain production could be increased by 45 percent by 1965.

THE EQUILIBRIUM PRODUCTION AND CONSUMPTION

The projected production equilibrium to match the projected consumption for 1965 would be a 12.5-percent increase over production in 1955, as against a consumption equilibrium of a 16.9-percent increase over 1955.

⁹ Black and Bonnen, op. cit.

Surplus stocks on hand plus those likely in the years between now and 1965 would make up the difference. Yields per acre of crops in terms of feed units were projected to increase 21.3 percent. This means that the number of acres in crops plus the number of livestock will need to be reduced by 7 percent to attain a balance in 1965. For food grains, the acreage will need to be reduced by 5 percent; for feed grains, 13 percent.

For comparison purposes, the over-all output for agriculture in 1955 is estimated to be 4 percent above consumption. Thus, to bring about a balance in consumption and production at present price relationships, production will need to be cut somewhat more over the next few years than would have been necessary to achieve the necessary balance in 1955.

THE IMPLICATIONS OF BOTH PROJECTIONS

Both of these studies indicate that the surplus problems are likely to be with us for some time to come. Some of the acceleration in the increases in the use of new technology that occurred during World War II may have been due partly to a type of stockpiling. But the annual rate of increase needed is not much greater than occurred after the war. During the war, many resources such as machinery were short. After the war, they were not. The production resulting from improved technologies probably could have been greater in the latter period if there had been more incentive to use the improved technologies.

Black and Bonnen leave no doubt that they consider agricultural surpluses in 1965 as a very probable situation. Further, retrenchment of production will be painful for many farmers—and particularly for those who raise hard wheat in the Great Plains. Though many resources will be shifted out of agriculture, the use of new techniques will more than fill the gap.

Even with the increase in population, there is not much likelihood that consumption will overtake production unless a sustained severe drouth covers a major part of our agricultural plant. In case of war, the surpluses would be used quickly, and the full productive capacity of agriculture again would be needed to meet requirements. But these needs would be much greater than those of a peacetime economy.

Crop Supply Prospects

BY I. J. JOHNSON

ONE OF THE dominant features of crop production in the past 15-20 years has been the almost phenomenal increase in units of production per acre. This has been due in a large measure to advances in technology gained from research. The pressure for increased production of food, feed and fiber crops to meet wartime demands set patterns for high efficiency in use of current knowledge that have continued, at even an accelerated rate to the present date. A comparison of yields per acre in table 1 of selected crops for the United States in the period 1910-19 with their yields in 1951-53 shows the magnitude of these changes.

Research and its application by farmers not only has increased yields but also has given greater stability to production by reducing hazards from insects, diseases and climatic adversities; it has produced and expanded the uses for new crops and crop products; and it has increased efficiency in crop production.

Although the past two decades have demonstrated the power of advances in technology to increase production, it is perhaps of more concern to estimate future potentials and trends in crop yields. In 1951, a joint land-grant college-USDA committee conducted a study on a nationwide basis to determine the future potentials for agricultural production to permit more effective advance planning. The study in Iowa, reported in February 1952, represented the joint efforts of staff members from many college departments and from the USDA. Two benchmarks were established—one for 1955 and the other a "maximum attainable" based on the assumption of superior management, average weather, favorable cost-price relationships and the adoption of all practices that were profitable and practical.

For the major crop plants grown in Iowa, the estimates by this committee, as shown in table 2, indicated that future potentials could far exceed the present levels of crop yields.

These estimates for future potential in crop yields for Iowa may not differ greatly from those in other Corn Belt

states. Although these estimates may be subject to the customary errors of estimates, the yield levels suggested are below the yield levels that have been attained by better farm managers under average weather conditions. In the state corn and soybean yield contests, maximum measured yields of corn have exceeded 175 bushels per acre and of soybeans, over 50 bushels per acre. A few farmers have produced oat yields of over 100 bushels per acre. These data may either be viewed with alarm, as in the present period of overproduction, or with optimism in adequately providing for future needs if population trends attain predicted levels.

Perhaps specific examples of future potentials in crop production will serve to illustrate changes that may be expected to occur in the major crops grown in Iowa. Although these are local illustrations, the future direction of progress in other Corn Belt states would not be greatly different.

FUTURE POTENTIALS FROM IMPROVED SOIL MANAGEMENT

Results from continued research, as well as the application by farmers of what we now know, will result in better planning for optimum combinations of soil management practices. Improvements in soil-testing techniques have made more accurate recommendations possible on needs in terms of expectations of returns from fertilizer applications under specific soil and crop management conditions. Farmers will be more convinced of the importance of using improved soil fertility and soil management practices. Fertilizer use likely will be greatly expanded. Based on current costs, fertilizer prices have increased only 6 percent in the past 5 years. Nitrogen fertilizer prices may actually decrease. Thus, its greater use could have a very marked effect on crop production—and even on our cropping pattern.

Considerable progress can be made in more effective water conservation and more efficient water use by crop plants. New knowledge of subsoil water reserves will

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TABLE 1. YIELDS PER ACRE OF SELECTED CROPS GROWN IN THE UNITED STATES FOR THE PERIODS 1910-19 AND 1951-53.

Crop	Unit	Yields per acre		Percent increase
		1910-19	1951-53	
Corn	bu.	26.0	38.6	48.5
Soybeans	bu.	12.6	20.0	58.7
Cotton	lbs.	192.8	291.4	51.1
Rice	lbs.	1,678.5	2,414.0	43.8
Tobacco	lbs.	809.2	1,276.9	57.8
Hay	tons	1.30	1.55	19.2

TABLE 2. YIELDS PER ACRE OF SELECTED CROPS IN IOWA FOR THE BASE PERIOD 1941-50 AND THEIR ESTIMATED MAXIMUM POTENTIAL.

Crop	Unit	Yields per acre		Unit increase	Percent increase
		Base period*	Potential		
Corn	bu.	50.0	85.2	35.2	70.4
Soybeans	bu.	22.0	29.5	7.5	34.1
Oats	bu.	38.0	64.9	26.9	70.8
Wheat	bu.	20.0	28.8	8.8	44.0
Hay	ton	1.60	3.10	1.50	93.7
Pasture†	AUM‡	3.33	6.46	3.13	94.0

* Adjusted in 1950 for periods either 1941-50 or 1946-50.

† Rotation pastures only.

‡ Animal unit month—pasture one mature cow per month.

become useful guides in relation to soil and crop management practices.

FUTURE POTENTIALS FROM CROP IMPROVEMENT

Advances due to the development of improved crop varieties are of particular significance because the time lag between release of a superior variety and widespread use by farmers is very short—often only sufficient to permit production of adequate seed.

Advances in corn. Major emphasis in corn improvement is now directed toward basic research designed to obtain a better understanding of the genetic mechanisms of heterosis. Continued progress also is being made in the practical use of hybrid vigor. New corn hybrids recently in commercial production are about 10 percent higher in yield than those widely grown less than 10 years ago. In addition, present new hybrids are markedly superior in agronomic characters which reduce cost of production. Intensive research in progress shows promise of producing hybrids with greater resistance to corn borers and other pests and to diseases. These are important factors in stabilizing corn yields when disease and insect pests are destructive.

Advances in soybeans. Rapid strides have been made to develop soybean varieties that are better adapted to the major areas of cultivation in the Corn Belt states, better adapted to mechanical harvest and higher in oil content. Continued progress will be made to increase yield and quality, with the greatest gains in yield in the present "fringe areas" of adaptation in the northern states. As a result of these improvements, soybean acreage is likely to expand even above the high acreage of 1956. Future progress also will be made in improving oil quality with respect to increasing the shelf-life of soybean oil food products, toward increasing protein percentage of the meal and for improvement in nutritional quality of proteins. Although soybean diseases are not currently epidemic in destructiveness, progress is promising for development of varieties resistant to diseases that may become serious in the future.

Advances in oats. Progress in oat breeding largely has been directed toward the development of varieties resistant to new races of rusts and to other oat diseases. From extensive studies on races of pathogens, on sources of resistance and on genetics of resistance, it is now possible to develop resistant varieties *before* the pathogen has become destructive to the crop. In addition to improvement in yielding ability, present research is directed toward attaining greater lodging resistance and improved feeding value.

Advances in grain sorghum. One of the most striking new advances in crop breeding has been the development of controlled hybrids in combine-type grain sorghums. Although grain sorghum production largely has been confined to the semi-arid Great Plains states, preliminary data from tests of sorghum hybrids strongly suggest that their yields may be competitive with corn, even in the Corn Belt area. Further gains from sorghum breeding and research on production methods may make possible even higher future yields. During the past three low-rainfall seasons, the acreage planted to sorghum has markedly increased in the western edge of the Corn Belt.

TABLE 3. CHANGES IN ALFALFA, RED CLOVER AND TOTAL MEADOW ACREAGE IN MAJOR RED CLOVER AREA.*

State	All hay†		Alfalfa†		Red clover†	
	1945-54	1956	1945-54	1956	1945-54	1956
Wisconsin	4,052	3,918	1,569	2,457	2,220	1,307
Minnesota	3,939	3,848	1,391	2,350	1,052	699
Iowa	3,521	3,650	1,118	2,152	2,189	1,195
Missouri	3,511	2,710	328	536	1,211	428
New York	3,491	3,130	570	919	2,360	1,859
Illinois	2,650	2,493	825	1,424	1,319	875
Ohio	2,503	2,285	644	1,072	1,725	1,124
Michigan	2,464	2,232	1,223	1,454	1,090	737
Pennsylvania	2,288	2,249	413	730	1,741	1,349
Indiana	1,776	1,551	530	820	942	549
Totals	30,195	28,066	8,571	13,914	15,849	10,122
Change		-2,129		+5,343		-5,727

* U. S. Dept. Agr., Agricultural Marketing Service, Crop Reporting Board. Dec. 17, 1956.
† In thousands of acres.

Some agronomists have estimated that sorghums may increase in acreage in Iowa to as much as 1 million acres. This acreage would in part replace present acreage planted to corn as an insurance against low feed supplies in the low-rainfall counties and partly replace acreage planted to oats.

Advances in forage crops. Three separate factors may contribute to future increased production in hay and pasture yields.

First, programs of plant breeding in progress indicate that gain can be expected in yield and quality of forage varieties. Many of the improvement programs are just beginning to reach the "pay-off" stages in their progress.

Second, as shown in table 3, there has been a marked trend toward a greater acreage planted to alfalfa and a corresponding decrease planted to red clover for hay in the major red clover producing states. In Iowa, as a typical example, the alfalfa acreage has increased by about 1 million acres, and the red clover acreage has decreased by an equal amount. Since alfalfa, even in short rotations, outyields red clover by nearly 25 percent, the net result of this change will be a considerable increase in hay production.

Third, data from research on permanent pasture improvement show that production can be approximately doubled by renovation, including liming, fertilizing and reseeded to an adapted perennial legume. The rate of adoption of these practices, however, has been comparatively slow.

ALL CROPS

In summary, available evidence strongly suggests that future yields in all crops will be higher than at the present time partly because of greater adoption by farmers of existing knowledge and partly because of future advances from research currently in progress.

Research adjustments in the biological sciences cannot be easily made to modify emphasis on a short-run basis. For example, the development of new crop varieties to meet anticipated needs normally requires 10-12 years from the inception of the program to its final completion to seed increase and distribution. At any one time, a breeding program will have material in all stages of development. Prior research investment almost necessitates completion of work in progress. If future population growth reaches numbers which result in increased demand for food, feed and fiber, the research programs which will enable us to fulfill these needs should be carried on now—rather than to wait until needs become pressing.

Livestock Supply Prospects

BY E. H. HAYNES, N. L. JACOBSON AND L. Z. EGGLETON

TREMENDOUS GAINS have been made in the overall efficiency of livestock production in the last 25-30 years. Since 1935-39, output per breeding unit has increased about one-third. For example, we are getting 40 percent more beef per cow, 20 percent more pork per sow and 30 percent more milk per dairy cow.

These gains are primarily due to animals with greater production capacity, more and better feeds, better control of diseases and insect pests, and improved management practices all along the line.

The production of livestock and livestock products depends upon a number of conditions. However, if these conditions do not vary extremely from the "normal," we can meet demand of the population increase by applying the technical knowledge we have today. Application of new advances sure to come will make the job easier. Actual total livestock production will depend more on the supply of grains and forage available from year to year than on any other single factor.

Because of this and the considerable variation in prediction of production from the various species, a discussion of each species will perhaps serve best to illustrate the *production potentials*.

SWINE POTENTIAL

Progress in improving nutrition, breeding and management has been made in the swine industry in the past 20 years.

Total hog numbers vary from year to year in the United States, but Iowa has increased total hog numbers in the past 17 years and on Jan. 1, 1957 had a greater percentage of the nation's total hog supply than at any other time during the past 17 years (table 1).

TABLE 1. ALL HOGS AND PIGS ON FARMS JAN. 1.

Year	U. S.	Iowa	Percent of U. S. total
1940	61,165,000	10,400,000	17.0
1947	56,810,000	10,689,000	18.8
1957	52,207,000	10,790,000	20.6

The same number of pigs can be produced today as was produced in 1930 with 14 percent fewer sows. There were 2,657,000 sows on Iowa farms in 1956, and we saved one more pig per sow as compared with 26 years ago. Master

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swine producers saved three more pigs per sow as compared with the average farmer in 1954 (table 2).

TABLE 2. IOWA ANNUAL PIGS PER LITTER WEANED.

	1930	1947	1950	1951	1953	1954
All farmers	5.9	6.36	6.56	6.62	6.89	6.97
Master swine producers	—	8.58	9.42	9.40	9.60	10.00

This indicates considerable increased production potential just through improving management practices on farms. Use of more prolific breeds in breeding programs and application of advances in housing, nutrition and management make this accomplishment possible.

Assuming a national need for 40 percent more pork by 1975, Iowa will need to and can farrow 3,400,000 sows annually in order to maintain her present percentage production status.

BEEF CATTLE POTENTIAL

The demand for beef has increased in the past 10 years. Increases in consumer income and population and a shift in tastes from cereal to meat products have been factors that have contributed to this increase in demand. This trend is likely to continue.

Meeting consumer demand for beef in 1975 offers no problem to the beef industry. The application of present day technical knowledge in nutrition, management and breeding will increase beef production sufficiently to satisfy the predicted demand. Overproduction resulting in low returns to the producer is a greater threat than under-supply.

Given sufficient demand, more calves could be marketed as baby beefs (800-1,000 pounds) with fewer cattle carried to yearlings and 2-year-old feeders. An extensive adoption of this practice would release grazing acres to feed increased cow numbers. Even more cow numbers could be carried through greater utilization of low-quality roughages.

The consumer is demanding meat produced from less highly finished animals. This trend is likely to continue. As fewer cattle are carried to a high-choice and prime grade, grain will be released to feed additional numbers. A real potential for increasing beef supply would be to harvest more acres of corn or sorghum as silage. Properly supplemented, feed of this type could be used effectively in producing good and low-choice grade beef.

The major supplement required to balance beef cattle rations is protein. Beef cattle can utilize nonprotein nitro-

gen as a source of protein—urea is an example. Known and possible new gain stimulators have and will increase rate of gain and feed efficiency. Stilbestrol presently increases rate of gain 16 percent and feed efficiency 12 percent on the average.

More emphasis will be placed on the selection of cattle on the basis of their performance. Present day research has demonstrated that cattle vary in individual performance; i.e., some individuals will produce 1 pound of gain on 7.5 pounds of feed, whereas others require 11 pounds of feed for each 1 pound of gain.

TABLE 3. BEEF COWS 2 YEARS AND OVER, PLUS HEIFERS 1-2 YEARS.

Year	U. S.	Iowa	Percent of U. S. total
1940	14,033,000	665,000	4.7
1950	21,497,000	898,000	3.9
1954	31,415,000	1,338,000	4.2

Historical evidence, coupled with present day knowledge, indicates that Iowa will maintain her status as a cattle-feeding state. Iowa has a comparative advantage for cattle feeding in that she is located between the feeder areas. This, plus the fact that Iowa is a natural grain-producing state, indicates that large numbers of cattle will continue to be fed in Iowa.

TABLE 4. CATTLE ON FEED JANUARY 1.

Year	U. S.	Iowa	Percent of U. S. total
1930-34	3,000,000	605,000	20
1940-44	3,950,000	912,000	23
1950-54	5,070,000	1,060,000	21
1955-57	5,900,000	1,220,000	20.6

SHEEP POTENTIAL

Decreases in stock sheep numbers have been general throughout the United States since the peak of World War II years. The more pronounced declines occurred in the western states.

Since 1949 there has been a gradual increase in numbers of sheep on midwestern farms. Iowa has experienced some increase, and it is reasonable to assume that this increase will continue because of the place for sheep as a complementary enterprise on many Iowa farms.

Stock sheep numbers in Iowa have increased 35 percent since 1950 (table 5). All indications lead one to believe that this rate of increase will at least be maintained and possibly increased by 1975. If the present rate of increase is maintained, we can expect to have at least 1,250,000 stock sheep on Iowa farms by 1975.

TABLE 5. STOCK SHEEP ON UNITED STATES AND IOWA FARMS.

Year	U. S.	Iowa	Percent of U. S. total
1940	46,226,000	1,253,000	2.7
1950	26,182,000	668,000	2.6
1957	26,370,000	920,000	3.5

The number of lambs imported into the state and fed to market weights has remained about constant for the last 10 years. As stock sheep numbers decrease in the feeder lamb producing states, it is reasonable to assume that feedlot operations in Iowa will also decrease.

The sheep industry has produced approximately 4 pounds of meat per capita per year for the past 2 to

3 decades. Production for the next decade will probably remain about the same.

DAIRY POTENTIAL

During the past 20 years there has been a downward trend in the total number of milk cows on farms in the United States. This trend was interrupted temporarily during World War II. During this same 20-year period, however, the total milk production increased markedly because of sharp increases in milk production per cow. These changes are shown in table 6.

TABLE 6. MILK COW NUMBERS AND PRODUCTION.

Year	Milk cows on farms, U. S. (millions)	Milk production per cow (pounds)	Total U. S. milk production (billion pounds)
1935	24.2	4,184	101.2
1945	25.0	4,787	119.8
1955	21.2	5,815	123.1
1956	20.9	6,006	125.7

The total milk production for 1957 is estimated at 129-130 billion pounds, and similar increases in subsequent years are probable unless drastic changes in present production and economic trends should occur.

Other significant changes have occurred in the dairy business. From 1949 to 1954 the number of farms producing milk for sale dropped 15 percent. In addition, the average size of all dairy herds increased from 5.8 in 1950 to 6.9 in 1954. It is evident, therefore, that the over-all trend is toward fewer, larger and better herds.

It has been suggested that, at current consumption rates, the expected population of 190 million persons in 1965 will require an annual milk production of 135 to 140 billion pounds as compared with 123.5 billion pounds produced in 1955. Further, it is proposed that by projecting the same increase in production per cow from 1955 to 1965 (as occurred during the past decade) average production per cow will increase from the 5,815-pound level of 1955 to 6,800 pounds by 1965. If cow numbers remain at the 1955 level of 21.2 million, total milk production in 1965 should amount to 144 billion pounds (which is at least 4 billion pounds more than the estimated total consumption).

These predictions are those which appear most likely and are based on continuation of present conditions. Obviously, any drastic, widespread changes due to technological developments, weather, etc., might radically alter the proposed trends. Potential production under highly favorable conditions (economic and otherwise) is far in excess of the above estimates.

Total milk production in the United States is influenced by both the total number of cows and by production per cow. Increased milk production per cow can be obtained by culling low producers and through improved breeding, feeding and management. Each can be anticipated to make a major contribution. The greatest increase on a short-term basis probably could be made by the use of more and better feeds. Potentially this could be an immediate increase of 10 percent or more in total production.

POULTRY PRODUCTION POTENTIAL

In the recent past, much has been said of interregional as well as alternative opportunities in speaking of Iowa's

contribution to present and future egg production. With all of the much publicized competition, the Iowa egg production as a percentage of total eggs sold in the United States has shown a slight increase. Total egg production in Iowa has varied from year to year, but the Iowa "share" of the total has climbed rather steadily from 7.7 percent in 1945 to about 8.5 percent in 1955 and 1956.

It appears that we can compete for this amount by continued progress in adopting improved practices and in increasing production efficiency. If we assume we will retain this "share" of the total eggs produced nationally, the increased needs for 1960, 1965 and 1975 will be made up first from increased production per hen and second from increased numbers of hens.

Hen numbers have remained fairly constant in Iowa since the late 1930's, varying only with the war effort and yearly cycles. The increase in total eggs has come mostly from increased egg production per bird. We have now reached a level of 208 eggs per hen, gaining about 50 eggs per hen in the 10-year period, 1945-55. The rate of gain has slowed somewhat in the last 5 years, but it appears that we should reach a level of about 217 eggs per hen by 1960. This production would require 28,500,000 birds to produce our "share" of the 6,070,000 dozen projected need.

A similar calculation, based on a 15-egg-per-hen increase to 232 eggs per hen by 1965, would indicate the need for 28,700,000 birds in Iowa. In the following 10-year period, adjusting production at one-half the previous rate to 247 eggs per hen would indicate a need for 31,500,000 birds in Iowa to maintain 8.5 percent of the total U. S. production. A poultry population of this size has been recorded in Iowa in some peak years since 1945. It seems that with further specialization and consolidation of flocks, these numbers may be reached even though it is assumed that poultry will be kept on fewer farms.

Turkey production in Iowa has become a specialized enterprise. The pounds sold from Iowa farms since 1950

TABLE 7. EGG PRODUCTION, IOWA AND U. S.

Year	Eggs per layer Iowa	Eggs sold Iowa (millions)	Eggs sold U. S. (millions)	Iowa eggs as percent of total sold	Number of Iowa layers (thousands)
1945	156	4,350	56,221	7.7	27,713
1950	183	4,662	58,734	8.1	25,240
1951	188	4,740	59,356	8.0	25,134
1952	191	4,692	61,016	7.7	24,561
1953	198	4,673	55,645	8.3	28,221
1954	201	4,464	53,482	8.6	23,727
1955	207	4,547	53,887	8.5	23,426
1956	208	4,699	55,453	8.5	24,049
1960*	217	6,192	6,070+	8.5	28,500
			Mil. dozen		
1965*	232	6,672	6,536+	8.5	28,700
			Mil. dozen		
1975*	247	7,776	7,625+	8.5	31,500
			Mil. dozen		

* Calculated from Daly's prediction (+) and assuming an 8.5-percent share of total eggs sold (U.S.).

show a fairly consistent increase in the percentage of total turkey meat sold nationally. In the production year of 1956, we exceeded on a national basis the level predicted by Daly¹ for 1960 (see table 7). Iowa's contribution to the total was a little over 8 percent, or 101,412,000 pounds. Based on Daly's 1975 prediction and assuming we retain 8 percent of the total, we would need to add only about 633,000 turkeys. It is believed the total figure will also be reached somewhat earlier than has been predicted.

TOTAL POTENTIAL

Thus, available evidence strongly suggests that the livestock industry will be able to meet the demands placed upon it by population increases without any difficulty. As demands increase, application will be made of the technological advances now known and those yet to be developed. Quality and quantity of product can be improved using many feeds and practices now known but not as yet applied.

¹ Daly, Rex F. The long-run demand for farm products. Agr. Econ. Res. 8:73-91. 1956.

Adjustments in the Cropping Pattern of Iowa Agriculture

BY W. D. SHRADER AND F. F. RIECKEN

IOWA HAS BEEN an important producer of agricultural wealth, primarily because of the high natural fertility of its soils. Many of its more fertile soils, and its climate in most years, have been particularly suited to the production of corn—the one crop on which to a large extent Iowa's farm income is based. The time of settlement of Iowa lands, starting about 100 years ago, came at the time of development of steel moldboard plows, of wire fences, of railroads and of a generally rising demand for the products the land was so well suited to produce.

Drainage was needed on some 4 million acres of Iowa soils before they could be fully utilized, but when the techniques of drainage were known, many of the soils could be drained satisfactorily. At the present time most of this land has been drained, but some of it would be benefited by improved drainage. Soil conditions were such, in many areas, that relatively high yields of corn could be obtained year after year with little or no soil treatment. Under cultivation, the high organic matter content of the prairies and former swampy areas was gradually depleted, but for a long span of years there was little apparent need for any soil amendments. It was during this period that Iowa became established as one of the leading corn producing regions of the world.

Throughout our history as a state, Iowa has been in a favorable situation relative to other parts of the United States in corn production. A given input of labor and capital could produce more corn here than in almost any other part of the world.

The high fertility status of many of our soils, coupled with a favorable climate, was one of the reasons for this. Fertilizers and lime were expensive, hard to procure and apply, and in many cases their importance was not clearly understood. Areas with infertile soils were at a disadvantage regardless of the other attributes of the area. Now, however, many areas that formerly were very low producers are actively competing for a larger share of the market.

TECHNOLOGICAL ADVANCES

We are now in a period of rapid technological advances. These advances in technology tend to increase total production and have markedly increased production per man. Not all soils, however, may benefit equally from these changes.

Soils that have a unique advantage under one set of

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conditions lose that advantage to other areas with the introduction of some new factor or technological development. These shifts in the relative advantage of one area over another are taking place constantly within the state and between regions in the United States. They must be considered in any analysis of our current soil resources.

Some of the important technological advances that have taken place in the past generation that are affecting our farm problem today are (1) introduction of new crops and improvement of existing crops, (2) advances in the production and use of fertilizers, (3) increased mechanization, (4) improved erosion control, (5) greatly increased use of supplemental irrigation, especially in the humid regions, and (6) improvements in drainage and flood control. Numerous other improvements, such as those in the development of herbicides and insecticides, are also important.

The area of the introduction of new crops—better varieties, and the development of new uses for agricultural products—is covered in detail in other presentations in this basebook. In general, it appears that recent advances in these fields have tended primarily to increase total production. But so far as one crop such as corn is concerned, all corn producing areas have benefited more or less uniformly. In general also, improvements in grain crops have progressed more rapidly than in forage crops, at least those adapted to this region. So the net effect has been to increase the advantage of land used for grain production over that used for forage.

SOIL NUTRIENTS AND FERTILIZERS

During the past decade, as shown in table 1, there has been an enormous increase in fertilizer use in Iowa. From 1946 to 1955 nitrogen use has increased from 2,708 tons to 64,618 tons, or a 24-fold increase. In the same period

TABLE 1. FERTILIZER CONSUMPTION AND CONTENT OF PRIMARY NUTRIENTS AS CALCULATED FROM IOWA RECORDS COMPARED WITH THE ESTIMATED AMOUNT NEEDED FOR MAXIMUM PRODUCTION.

Year	Total fertilizer sold (tons)	N (tons)	P ₂ O ₅ (tons)	K ₂ O (tons)
1946*	182,010	2,708	23,993	7,858
1950*	306,595	13,200	51,557	14,253
1955*	575,676	64,618	101,639	47,315
Amount needed for estimated maximum production†	—	82,858	268,610	90,242

* Computed by J. A. Stritzel, Department of Agronomy, from tonnage reported for tax purposes by the fertilizer industry to Iowa Department of Agriculture, Fertilizer Control Office.

† From: An appraisal of agricultural productive capacity in Iowa. Mimeograph release of Iowa State College No. AN153. Feb. 1952.

the use of phosphorus (P_2O_5) has increased from 23,993 tons to 101,639 tons, or a 4-fold increase. Potassium (K_2O) use has increased from 7,858 tons in 1946 to 47,315 tons in 1955, or a 6-fold increase. This increased use has resulted from knowledge of the greater yields that can result from proper use of fertilizer, coupled with a favorable relationship between the cost of the soil amendments and the price the farmer has received for his product. Also, in many areas of Iowa, the original organic matter has been depleted through cropping, and on sloping land through erosion, to the point where yields are declining unless additional plant nutrients are supplied.

It is no longer possible to depend solely on the stored "natural fertility" of the soil for the nutrients needed for high yielding crops. A considerable portion of these nutrients are now being furnished in fertilizer form. If Iowa is to remain a leading grain-producing state, even more reliance will have to be put on fertilizers as sources of plant nutrients in years to come.

There are a number of alternative methods by which the nitrogen supply of a soil can be maintained. It can be supplied to the soil by legumes in rotations, by legume green-manure catch crops, by adding barnyard manure, or by adding nitrogen in various fertilizer forms. There are fewer alternative methods available for adding phosphorus, potassium or lime to the soil. Aside from the amount that can be furnished in barnyard manure, any additions of these nutrients must be in fertilizer form.

As is shown in table 1, the amount of nitrogen used in 1955 approached the figure estimated in the 1952 "Appraisal of Agricultural Productive Capacity in Iowa"¹ as needed for "maximum" production. This production estimate, which was the production believed to be obtainable by 1955, was made for cropping systems that contained more meadow crops and thus would have furnished more nitrogen than did those actually used in 1955. The levels of phosphorus and potassium needed for maximum production are much less affected by changes in cropping systems than are the quantities of nitrogen. As is shown in table 1, the amounts of phosphorus and potassium now being used are far below those estimated as needed.

Within the state there are great differences in the amounts of available nutrients present in different soils and in the increases in yields that can be expected from their addition. On Ida silt loam in western Iowa, a calcareous soil very low in available phosphate and in nitrogen, average corn yields can be increased from 20 to about 60 bushels per acre by the addition of these two nutrients. On Marshall silt loam, also in western Iowa, the addition of phosphate fertilizers, in many cases, has given no increase in yield, and where corn is grown in a rotation with meadow, quite frequently little increase in corn yield is obtained with any fertilization program. In general the loess-derived soils of western Iowa have sufficient available potassium for high crop yields, whereas on the Carrington-Clyde group of soils of northeastern Iowa, additional potassium is usually needed for satisfactory crop growth.

Within our present framework of knowledge, various soils in the state differ greatly in yielding capacity and also in the number of times that corn can be grown in the rotation on a sustained yield basis.

EROSION CONTROL

Erosion is taking place at a rapid rate on many sloping soil areas in Iowa. A 1952 study in Shelby County indicated that erosion losses were above 5 tons per acre on about 50 percent of the upland soil area.

A more widespread use of erosion-control practices such as terraces, contour listing and strip-cropping can increase the intensity with which many sloping areas can be cropped on a sustained yield basis. Although precise information on this subject is limited, it appears likely that, by making full use of mechanical means of erosion control, much of the sloping lands of Iowa could be shifted from exploitative to sustained production with only a moderate reduction in the acreage of row crops.

Technology in mechanical means of erosion control apparently will be of use primarily in making a shift from a depleting to a sustained production of corn.

Developments in mechanization in many phases of agricultural production have been outstanding. But not all crops or all soil areas in the state have benefited equally from these advances. When farm production was mostly dependent on hand equipment with some aid from one or two horses, there was no great premium on field size and shape. Now, with 4-row equipment large, regularly shaped, gently sloping fields seem to have a distinct advantage over small or irregularly shaped fields with steep and irregular slopes. The net effect, therefore, of technological advances in crop breeding, in fertilization, in drainage and in farm mechanization appears to have favored the large areas of level to gently sloping, fertile, drained or drainable soils. On these areas there are no natural barriers to relatively large fields, and large-scale equipment can be used for intensive grain production. The areas with small or irregularly shaped fields, or with steep slopes, appear to be at an increasing disadvantage in terms of output per unit of input.

Although advances in mechanical means of erosion control may make it possible to retain much of the sloping land in sustained crop production, the cost of these practices, plus the added problem of using large and expensive machinery on the steeper slopes, will probably tend to place the sloping land at an increasing disadvantage, as compared with the areas with more gentle slopes. As erosion control can be obtained, in most cases, either by increased use of mechanical practices or by increased use of forage crops, it may be that there will be a tendency to shift more of the sloping land to meadow or pasture. Opposing this shift, at present, is the lower value of output that is generally considered to be obtained from pasture as compared with crops.

IRRIGATION

As yet irrigation is a minor factor in Iowa agriculture. Its future development apparently will be limited by the supply of available water. Iowa is relatively poor in known ground water resources. For this reason the future large-scale expansion of irrigation will probably be confined to the floodplains along the major rivers. In 1956 a survey by the Extension Service indicated that there were some 26,000 acres under irrigation in Iowa. Most of this acreage has come under irrigation in the past few years, and a large portion is in the Missouri River floodplain in the area that is assumed to have greatly increased

¹An appraisal of agricultural productive capacity in Iowa. Mimeograph release of Iowa State College No. AN153. Feb. 1952.

flood protection as a result of the dams recently constructed on the upper Missouri River. Corn is the principal crop grown.

No accurate figures are available, but there are apparently at least 200,000 acres, and perhaps as many as 400,000 acres, with available water and with soils that are suitable for irrigation in Iowa.

Development in irrigation probably will be most profitable on level, well-drained, uniform soil areas, such as those that occur on the medium-textured bottoms along the major rivers. While the acreage of grain crops produced under irrigation will probably never be more than 5 percent of the total, the uniformly high yields that can be obtained under irrigation on suitable soils make it a potential factor in Iowa agriculture that cannot be ignored.

SOILS AND YIELD DIFFERENCES

Soils differ greatly in yielding capacity for corn as well as in the intensity of cropping that can be tolerated. Some of these differences are shown in table 2 and in fig. 1.

PRESENT YIELD DIFFERENCES

In fig. 1 and table 2, average corn yields per acre for the period 1940 to 1954 are compared on the Taintor-Mahaska soils of Canaan Township in Henry County with the dominantly Weller-Seymour and Lindley soils of Union Township in Davis County. Average corn yields per acre for this period are also given for the productive Webster-Clarion soils of Butler Township, Calhoun County, and the less productive Grundy-Shelby soils of Union Township, Ringgold County. The seasonal effect on yields appears to have been somewhat similar in each instance, as the peaks and lows on the two lines occurred in the same years.

The spread between the two lines in fig. 1 gives a measure of the difference in yield that currently is being obtained on the two groups of soils. As is shown in table 2, yields have averaged 39.5 bushels per acre in Union Township, Davis County, and 63.4 bushels per acre in Canaan Township, Henry County. Intensity of use for corn is also lower. A corn-soybean-corn-oats-meadow rotation is entirely feasible on the Canaan Township soils, whereas a rotation with not more than one corn crop in 4 years might be a maximum intensity rotation on most soils in Union Township, Davis County, for sustained production.

Corn production per farm differs greatly for various areas in the state as is shown in table 2. In Union Township, Davis County, corn production per farm has averaged 803 bushels during the 1940 to 1954 period. It was

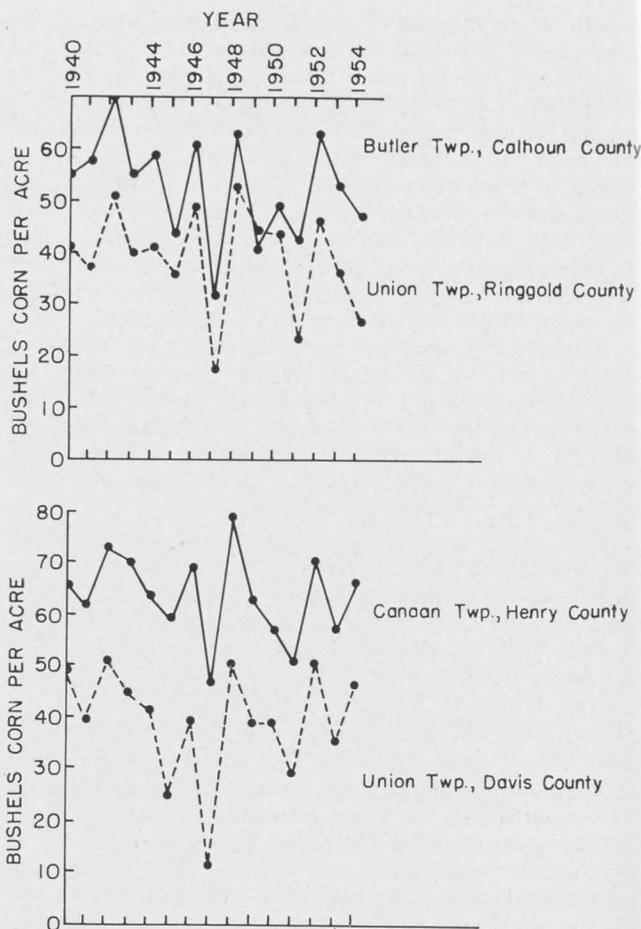


Fig. 1. Corn yields 1940 to 1954 in four Iowa townships with different soil conditions.

3,959 bushels per farm in Canaan Township, Henry County. In Butler Township, Calhoun County, with predominantly Webster-Nicollet-Clarion soils, it averaged 3,470 bushels of corn per farm. In Union Township, Ringgold County, where the Grundy and Shelby soils are dominant, the average was 1,224 bushels per farm. Farm sizes in the areas compared are about the same. Thus, the average farm on the good soil has produced about five times as much corn as has been produced on the poorer soil.

On the Weller-Seymour-Lindley soils in the Davis County township, during the 15-year period under consideration, corn production per farm has varied from a high of 1,283 bushels to a low of only 149 bushels. On the Taintor-Mahaska soils of Canaan Township average

TABLE 2. FOR SELECTED TOWNSHIPS, FOR THE 1940-54 PERIOD, AVERAGE CORN YIELDS, ACRES CORN, SIZE AND NUMBER OF FARMS.*

County	Township	Farms		Total acres in farms	Acres corn	Corn yields (bu./A)	Total corn produced (bu./twp.)	Average corn production per year per farm	Principal soils (uplands)
		Number	Size (acres)						
Davis	Union	125	180	22,656	2,483	39.5	100,760	803	Weller Seymour Lindley Grundy Shelby Webster Clarion Taintor Mahaska
Ringgold	Union	113	198	22,354	3,487	39.2	137,921	1,224	
Calhoun	Butler	122	178	21,750	8,118	52.7	423,383	3,470	
Henry	Canaan	137	167	22,840	8,557	63.4	542,468	3,959	

* Compiled by G. Simonson. Source of data: County Assessor's Annual Census Data, on microfilm, Iowa State College Library.

TABLE 3. ESTIMATED CORN PRODUCTION POTENTIALS OF WOODBURY, APPANOOSE AND HAMILTON COUNTIES, WITH NECESSARY CONSERVATION PRACTICES AND TREATMENTS FOR ERODIBLE SOILS.

County	Major soils*	Present (1940-54)†		Corn production 1940-54 (bu.)	With most N supplied by legumes‡	With commercial N if needed§	No. farms 1951	Corn potential per farm (bu.)
		Acres in corn 1940-54 average	Yield					
Woodbury	MIH, B	196,250	45.0	9,333,313	11,089,600	12,438,600	2,879	4,320
Appanoose	SSE, WL	37,581	37.7	1,427,069	2,914,000	3,155,800	1,903	1,658
Hamilton	CW	143,244	53.3	7,598,348	10,529,100	13,074,600	2,061	6,344

* MIH: Monona, Ida and Hamburg. B: Soils of bottomlands. SSE: Shelby, Seymour and Edina. WL: Weller and Lindley. CW: Clarion and Webster.

† From Iowa Census Data, compiled by G. H. Simonsen.

‡ For this estimate of corn production potential, maximum corn in rotation for any soil is 50 percent.

§ For this estimate of corn production potential, on the level, nonerodible soils a maximum corn in rotation was 70 percent, and nitrogen fertilizer added as needed.

production per farm during this period has varied from 5,663 bushels to a low of 3,118 bushels. Thus, even in the poorest year on the Taintor-Mahaska soils, some 2½ times as much corn was produced per farm as in the best year in the Seymour-Lindley soil area.

In table 2 the total corn produced per township also is given. Canaan Township, Henry County, produced an average of about 540,000 bushels of corn per year in the 1940-54 period. This corn was produced on about 8,500 acres. In Union Township, Davis County, for the same period, about 100,700 bushels of corn were produced annually on about 2,400 acres.

POTENTIAL YIELD DIFFERENCES

In table 3, the comparisons of potential corn production are made for three counties. First, an explanation of the data: The data in the column entitled "Present (1940-54)" were taken from annual assessor's census data on microfilm in the Iowa State College Library. The data in the columns headed "Estimated corn production potentials" were calculated in the following steps: (1) An estimate of the soil types, including slope and erosion phases, was available for these counties.² (2) For each soil condition, now used for "cropland," a rotation maximizing corn, with supplementary erosion control applied to sloping land, was established. (3) Assuming a high fertility level, an estimate of corn production was made for each soil condition. (4) From these estimates the total corn production potential was estimated. (5) For level or nearly level land the maximum corn potential was calculated for two conditions: (a) 50-percent use of the level land for corn and (b) 70-percent use of the level land for corn. Though the calculations are based on estimates and must be considered as tentative, the data probably reflect the proper order of magnitude of the sustained potential.

In Hamilton County the Webster and Clarion soils are dominant, as they are in Butler Township, Calhoun County. They are mostly level or nearly level and moderately to highly productive for the common crops. Erosion control is not a major problem. According to census data, corn production for the county has averaged about 7,600,000 bushels per year in the 1940-54 period. With more intensive use of the soils for corn, and with fertilizers, it seems that about 13 million bushels of corn could be produced without injury or serious deterioration of the soils.

In Woodbury County, which has a rather large acreage of sloping erosive soils, if mechanical erosion control practices are fully utilized, we estimate that corn production

can be increased to about 12 million bushels per year from its present (1940-54 average) 9,300,000 bushels.³

In Appanoose County, which has a considerable acreage of sloping, erosive soils, and with all soils only moderately productive, we estimate that corn production can be increased to about 3 million bushels from its present (1940-54) 1,400,000 bushels.

Interpreting the estimates in another way, the corn production potential per farm in Hamilton County is about 6,300 bushels, in Appanoose County 1,600 bushels, and in Woodbury County 4,300 bushels, assuming the number of farms remains as given in table 3.

THE IMPLICATIONS

All of these examples illustrate the dual nature of the problem confronting the farmer on the less productive soils. Not only are corn yields lower on these soils, but the intensity with which the soils can be used for corn on a sustained yield basis is much less. This factor is emphasized in table 4 where the "yield rank class" of two widely different soils is compared. The yield rank class is obtained by multiplying the estimated yield times the percentage of the time that the land can be used for corn. On a farm in northern Iowa that might be dominantly on Webster silty clay loam, the yield rank class is shown to be 50 to 60. On a Shelby soil in southern Iowa, the yield rank class might well range from 5 to 19.

If the farmer on the Webster soil wishes to add to his farm, there is almost certain to be large areas of similar soils in his neighborhood, and an addition of 40 to 80 acres to his operating unit would materially increase his farm volume. The farmer in the Shelby soil area has a much more limited opportunity to obtain high producing corn land to add to his unit; to add 40 or 80 acres more of Shelby soils to his present unit would have a very minor effect on increasing his individual corn production.

Recent technological developments have, in the aggregate, favored grain production on the nearly level to sloping areas with deep, medium-textured fertile soils which occur over large sections in Iowa. Despite the increasing dependence on fertilizers rather than on original soil fertility for plant nutrients, these areas remain in a favorable position relative to other sections of the state or nation as major corn producing areas.

³ Some additional production is possible from some of the soils on the Missouri River bottoms through irrigation.

TABLE 4. YIELD RANK CLASS OF TYPICAL AREAS OF WEBSTER AND SHELBY SOILS.

Soil	Crop use	Estimated yield corn (bu./A)	Yield rank class
Webster silty clay loam	70% corn	75	(50-60)
Shelby loam	20% corn	35	(5-19)

² From Project 1191, Department of Agronomy, Iowa State College.

It is on these favored soil areas that a large proportion of the corn in Iowa is produced. It seems also that any marked adjustment in total corn production must also take place on these better soil areas. The possibilities for expansion in corn production in the better counties apparently far outweigh any decrease in total production that

could result from the complete elimination of corn production in the poorer counties.

The problems of adjustment of total corn production exist principally in the better soil areas. The problems of the individual farmer in obtaining an equitable income are frequently much more acute on the poorer soil areas.

Adjustments in Farm Size and Resources in Iowa Agriculture

BY H. B. HOWELL

IN AN EXPANDING economy, agriculture, as any other industry, finds continuous adjustments are needed. The kinds of adjustments needed are based on the demand for the products produced, the cost of the resources used and the management skills available. Changes in consumer demand, new techniques, the supply of and cost of resources, all affect the combination of resources in agriculture in total and in the individual farm business that will be necessary to achieve maximum income. This is often referred to as achieving a balanced agriculture. When an industry is out of balance in the economy, it means that the present combination of resources does not give an adequate return to labor and capital and management.

SITUATION IN IOWA AGRICULTURE

The combination of resources in the average Iowa farm business is not in balance. Too little capital and land is being combined with the present supply of labor and machinery on Iowa farms to use all resources efficiently.

According to the 1955 Iowa Annual Farm Census, the "average" Iowa farm is 180 acres in size. Of this 180 acres, 140 acres are in cropland and the remainder in permanent pasture, waste, lots and roads. The land use pattern consists of 55 acres of corn, 11 acres of soybeans, 31 acres of oats and the remainder in rotated hay and pasture. This "average" farm has 5 dairy cows, 5 beef cows, 12 feeder cattle, 3 ewes, 13 litters of pigs and 121 hens. The labor supply available including the operator, family and hired labor is equivalent to 1.4 workers or approximately 3,000 hours of labor annually. And the number of tractors per farm averaged 1.5 according to the 1955 farm census.

An examination of the earnings of the average farm and the efficiency in use of labor and machinery gives an indication of the kinds of adjustments that are needed in Iowa agriculture in terms of size of farm and resource ratios.

Applying 1955-56 prices and current costs to the farm previously described, the farm would have had a net income of approximately \$3,100-\$3,600 as a return for operator and family labor, capital and management. Based on the opportunity of labor earnings alone—without providing capital in other industries—this level of return indicates a maladjustment in the use of resources in Iowa agriculture.

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The labor supply on the average farm was indicated at about 3,000 hours. Using reasonable labor requirements for growing and harvesting crops and in producing livestock as have been determined by many studies, the labor required to handle the average Iowa farm today is about 2,070 hours. This comparison indicates that one of the maladjustments in Iowa agriculture is that the present labor supply on farms is underemployed. Or put another way, there is nearly 50 percent more labor available on the average farm than is needed if a reasonable level of labor efficiency were to be achieved. Resource adjustments, either by increasing the size of farm in acres of harvested crops, more livestock per farm if it can be added profitably, or less labor per farm are some of the changes that are necessary to increase labor efficiency in Iowa agriculture.

SIZE OF FARM AND MACHINERY EFFICIENCY

Mechanization of the farm business has played a major role in making farming an easier job. Since the advent of tractors, mechanization has greatly reduced the labor requirements in the farm business, especially in crop production. How much machinery is needed on an individual farm is not easy to analyze. The cost and returns of having additional machinery to meet emergency situations of wet seasons at planting and harvesting time, of seasonal peak loads and the satisfaction of doing the job easier are hard to measure.

Figure 1 shows the trends in the average total cost per acre of various machine combinations as the acreage of crops grown and harvested increases. The costs are based on current prices for new machinery and assuming 50 percent of the land in corn. The smallest machine combination studied, the one-plow combination, shows a sharp decline in average cost per acre as acreage is increased to about 160 acres. Then the cost levels off at a higher per-acre cost than any of the other combinations. The two-plow combination shows a sharp decline in average cost per acre up to about 240 acres and then levels off. With other machine combinations studied, the average cost per acre leveled off at more than 240 acres of cropland.

As previously indicated, the average Iowa farm has 140 acres of cropland and about 1½ tractors per farm. It is apparent from the study of average per-acre costs as shown in fig. 1 that the present Iowa farm is either over-mechanized or that adjustments in the average size of farms is needed to increase the efficiency of machine use

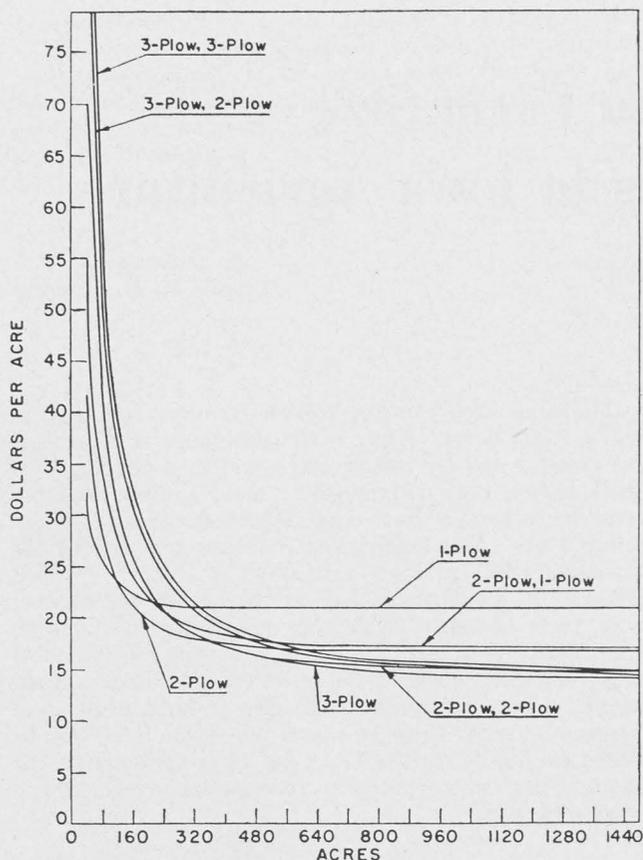


Fig. 1. Average total costs per acre for seven machinery combinations. Source: Heady, Earl O., McKee, Dean E. and Haver, C. E. Farm size adjustments in Iowa and cost economies in crop production for farms of different sizes. Iowa Agr. Exp. Sta. Res. Bul. 428. 1955.

and thus lower the per-unit cost of production. Increasing the acreage of crops from 160 to 240 acres, where a two-plow combination of machinery is used, would reduce the average total cost per acre from about \$22 per acre to about \$18 per acre.

SIZE OF FARM AND LABOR EFFICIENCY

The implications in this analysis are that, by increasing the size of the farm, costs can be reduced. Further indication of the possible effect of increasing the size of the farm on labor and machine costs in the farm business is shown in table 1. The source of data is the summaries of farm business records on 1,066 farms in Iowa in 1955 and 1956. The records are from farms that are operated with above-average management skill. Still, the records indicate some of the increased efficiencies that can be achieved by increasing farm size.

TABLE 1. EFFECTS OF INCREASING THE SIZE OF FARM ON LABOR AND MACHINE COSTS AND CAPITAL REQUIREMENTS (1955-56).

	Range in size of farm				
	139 acres and under	140 to 199 acres	200 to 259 acres	260 to 359 acres	360 acres and over
Crop acres per man	72	98	112	128	141
Total production per man	\$7,195	\$8,231	\$8,899	\$9,708	\$10,575
Power and machine cost/A.	\$ 26	\$ 21	\$ 20	\$ 18	\$ 16
Total capital per acre	\$ 371	\$ 373	\$ 350	\$ 347	\$ 321

Source: 1955 and 1956 Iowa farm record summaries, Cooperative Ext. Serv., Dept. Econ. and Soc., Iowa State College, Ames, Iowa.

Crop acres per man and total production per man (which includes the value of crops produced), income added by processing feed through livestock and miscellaneous farm income increased steadily as size of farm increased. Crop acres per man nearly doubled from the small farms to the large farms, while total production per man increased 47 percent from the small size group to the largest size group. Power and machine costs made the sharpest decline as the size of farm increased from the 139 acres and under group to the 140-199 acre group but continued to decline as size of farm increased.

The trend in machine costs per acre in table 1 is similar to the trend shown in fig. 1. The major cost reductions occurred as size of farm increased to 240 acres; then the average cost per acre tended to level off.

Another resource adjustment that occurred on the farms included in table 1 was that the total capital per acre declined as size of farm increased. Total capital per acre which includes the investment in land, buildings, machinery, feed and livestock on Jan. 1 showed practically no change as size of farm increased from the 139 acres and under group to the 140-199 acre group. It then declined as size increased. The decline amounted to \$52 per acre from the 140-199 acre group to the 360 acres and over size group. The decline in total capital per acre as size increased indicates less tendency to intensify production with increased size.

SIZE OF FARM AND PRODUCTION PER ACRE

Another phase of the effect of increasing farm size is whether the farms would be more intensively or more extensively farmed. Indications of the possible trend are shown in table 2, the data being derived from the same source as table 1.

Crop production per acre declined from \$43 per acre on the farms 139 acres and under in size to \$36 per acre on farms 360 acres and over. These data indicate that, as farms increase in acreage, there is less pressure to intensify crop production. The greater crop acreage uses the fixed resources of labor and capital more efficiently, and there is less need to intensify production per acre in an attempt to bring resources into balance.

In terms of total production of the farm including crop production and income added by livestock, the production per acre declined further than crop production alone as the size of farm increased. Total production per acre averaged \$72 per acre on the farms 139 acres and under in size, declined to \$60 per acre on the farms 140-199 acres in size and declined to \$49 per acre on the farms 360 acres and over. As the size of farm increases, giving more efficient use of the labor and capital available, there is less need for increasing the size of business by adding livestock production beyond the level of utilizing the crops produced on the farm to increase the efficiency in resource use. *These data indicate that as size of farm increases we can expect a less intensive agricultural pro-*

TABLE 2. EFFECT OF INCREASING SIZE OF FARM ON PRODUCTION PER ACRE (1955-56).

	Range in size of farm				
	139 acres and under	140 to 199 acres	200 to 259 acres	260 to 359 acres	360 acres and over
Crop production per acre	\$43	\$41	\$39	\$38	\$36
Total production per acre	\$72	\$60	\$57	\$55	\$49

duction. This would assist in bringing production closer in line with demand at a more profitable price level.

The adjustments needed in Iowa agriculture in farm size and resources can be summarized in this manner: To provide full employment for the farm operator who has a machinery combination that achieves timeliness in operations, the size of the average Iowa farm needs to be increased by about 50 percent in crop acres. In addition, to achieve a proper balance, more capital will be needed per farm unit in machinery and livestock than is found on the average farm today. This does not mean that we need to expand Iowa agriculture; the reference is to the

individual farm unit. It does mean that less labor will be needed in total if we hope to have an efficient agriculture.

By increasing the size of the farm unit, the efficiency in the use of labor and machinery can be improved. This will lower the unit cost of production. There also is the potential that, in addition to achieving more efficient use of labor and machinery in this manner, there will be less tendency to intensify production per acre on the individual farm unit. This would reduce the rate of expansion of production in agriculture and lead to an agricultural industry that can successfully compete in an expanding economy.

Programs for Expanding Domestic Demand for Farm Products

BY LEE KOLMER

DURING THE PAST several decades various programs have been suggested as means for expanding the demand for farm products. The proponents of these programs maintain that, by a rather modest increase in consumption, we could "eat our way out" of the surplus problem.

The suggested programs may be divided into three major groups: (1) advertising and promotion by commodity groups, (2) quality improvement and (3) industrial uses.

In this article we will examine some of the possibilities and limitations of such programs.

ADVERTISING AND PROMOTION

There has been considerable debate concerning the value of advertising and promotional activity as a means of increasing the consumption of farm products. Some people and organizations have made extravagant claims about the possibilities food producers have for increasing the demand for their products and thereby increasing farm income. On the other hand, many people have criticized advertising as being an ineffective and useless tool for commodity groups to use to enlarge their market.

Before we can discuss some of the pros and cons that exist in this area, we must differentiate between advertising activity and promotional activity. In the food business these two activities are carried on simultaneously in a majority of cases. Both are tools used by sellers to increase sales.

Advertising is basically an information-extending process. The seller, through the various media available, tells the buying public about his product. Through advertising he invites the public to give his product consideration (for a variety of reasons) when making purchases. After the information has been made available and the public is aware of the availability of the product, the seller uses promotional devices such as store banners, product displays, sampling and price incentives to convince the customer to buy and use the particular product being advertised and promoted. It is at this point that the seller attempts to turn the interest he has aroused into action on the part of the consumer—and to make a sale.

This differentiation can be understood very quickly if we look upon advertising as an invitation from the seller to the consumer to come into the store and look over the product. After the consumer accepts this invitation, the

seller then uses various devices designed to create a desire for the product at the retail outlet.

WHO ADVERTISES?

Many persons who advocate increased advertising activity do not realize the amount of money now being expended in advertising food products. Andrews and Cochran in the March 1956 issue of *Minnesota Farm Business Notes* state that 17 percent of the total advertising expenditures in newspapers, magazines and network radio and television was devoted to advertising food products (including confections and soft drinks). Andrews and Cochran also state that if this proportion holds true for all advertising, the annual food advertising bill was 1.4 billion dollars in 1954. This would mean that 2.2 percent of the consumers' food dollar went for advertising. This does not include the costs of promotional programs used to supplement advertising.

Table 1 shows the amount spent for advertising at different market levels. Farm groups, such as the American Dairy Association, California Citrus Producers and others, spent only a small portion of the total spent on food advertising.

WHY DO THEY ADVERTISE?

Sellers advertise¹ their products (1) to expand sales of a particular product, a commodity or a store and (2) to make the quantity purchased less responsive to price changes. In the first instance sellers want to increase sales at a given price. In the second case they want to increase revenue with rising prices.

In any program undertaken simultaneously by such diverse groups as producers, processors and retailers, there are conflicts of interest. Retailers, advertising their products within a community, are primarily interested in expanding sales of their stores. They are not especially interested in any particular product or brand.

The objectives of the grocer are not identical to the objectives of a manufacturer of a branded product. The

¹ Hereafter in this paper the term advertising will include both advertising and promotional activity.

TABLE 1. ANNUAL ADVERTISING EXPENDITURES BY MARKET LEVEL.

Group	1952		1954	
	(millions of dollars)			
Farm groups	\$	42	\$	60
Retailers		333		350
Other "middlemen"*		855		1,020
Total	\$	1,230	\$	1,430

* Other middlemen includes all processors and handlers except retailers.
Source: Andrew and Cochran. Advertising food products: facts and fiction. *Minnesota Farm Business Notes*. March 30, 1956.

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TABLE 2. APPROXIMATE CONSUMPTION OF FOOD PER CAPITA, RETAIL WEIGHT EQUIVALENT IN POUNDS BY MAJOR FOOD GROUPS, 1933-1954.

Year	Milk equiv. excluding butter	Eggs	Meat, fish and poultry	Fats & oils including butter	Beans, peas, potatoes	Citrus fruit & tomatoes	Veg. and other fruit	Flour & cereal products	Total	
									Pounds	Index
1933	201	36	136	66	161	81	309	211	1,499	96
1954	250	48	169	65	123	108	320	156	1,527	98
Percent change	+24.3%	+33.3%	+24.2%	-1.5%	-23.6%	+33.3%	+3.6%	-26.1%	+1.9%	

Source: Consumption of food in the United States, 1909-52. U. S. Dept. Agr., Agr. Handbook 62.

brand product producer is interested, first of all, in increasing the sales of his particular brand. The branded product producer attempts to entice consumers away from (1) other brands of the same food product and (2) other foods.

This is not the only goal of the branded product producer. He is also trying to build up a brand loyalty on the part of the consumer. He is attempting to convince each individual consumer that his product is far superior to any other brand of the same food. He then hopes to see consumers use the same amount of his brand even though the price has risen. In other words it is a two-pronged attack: (1) build up sales at a given price and thereby increase revenue and (2) increase revenue by raising price without reduction in volume sold.

Much of the brand advertising is competitive. Almost every brand of food has a reasonably close substitute. This means that when one advertises and builds up brand loyalty, competing firms must also advertise to maintain their share of the market.

The objectives of farm groups and commodity associations engaged in advertising, again, do not necessarily coincide with the objectives of the retailer or "middleman." The commodity groups are interested in expanding sales of a particular commodity or group of commodities.

ADVERTISING AND TOTAL FOOD CONSUMPTION

Each advertiser selects the type and method of advertising that he believes will do the best job for him. Indi-

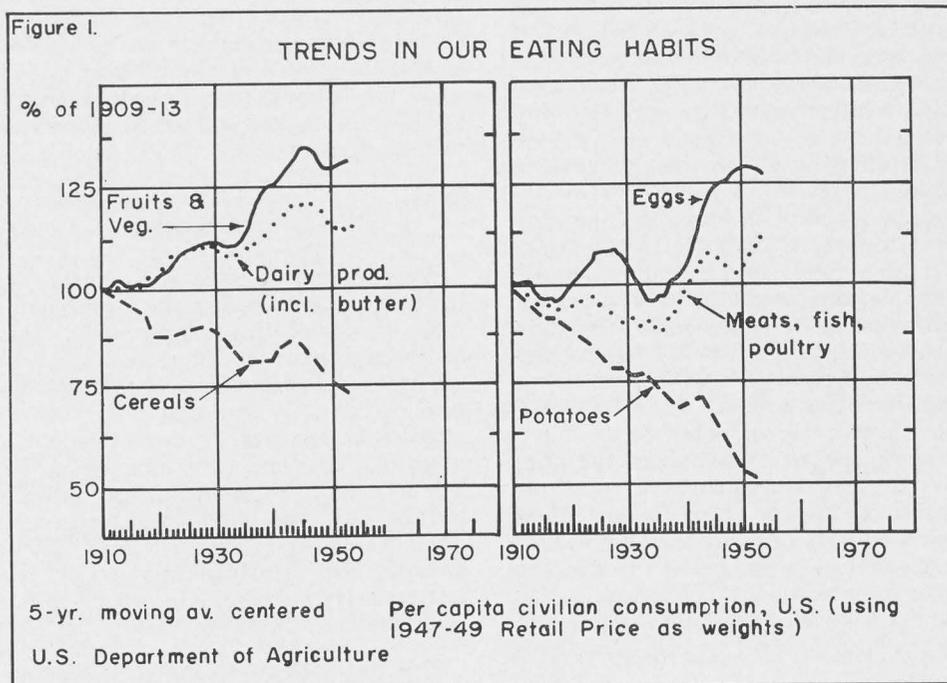
vidual retailers, branded product producers and commodity groups have shown large increases in sales and revenues after initiating an aggressive advertising program. This is especially true in cases where new products such as margarine have been introduced. This does not, however, mean that an expanded advertising program for all food products would follow the same successful pattern as it has for some individual products.

Regardless of the income situation, individual consumers have eaten (on the average) about 1,550 pounds of food per year for the past 40 years. During that period we have had extreme swings in real income. This stability of total food intake indicates that the possibilities of increasing total food intake are rather limited. Therefore advertising programs with this objective are not likely to be successful.

ADVERTISING AND CONSUMPTION OF SELECTED FOOD GROUPS

While we have not had any significant change in the total pounds of food consumed per person, we have had decided shifts in the composition of the total food intake. Table 2 shows the composition for 1933 and 1954.

We have had significant upward shifts in consumption of the animal protein products and citrus fruits. At the same time consumption of potatoes, flour and cereal products declined sharply. These consumption shifts are shown graphically as a percent of 1910 consumption in fig. 1. These shifts toward higher animal protein



product consumption suggest that this is one area that may pay off in advertising. If advertising can increase the rate of change from cereal and potato products to animal protein products, it may aid in increasing farm incomes. It takes 7 pounds of dry matter to produce 1 pound of dry matter as meat. Therefore, every consumption shift from 1 pound of flour to 1 pound of pork represents an increased use of 6 pounds of dry matter in the form of feed.

It is possible that we have not reached the limit of meat consumption. If we have not, increased advertising may be of benefit to producers. However, we cannot expect these consumption shifts to continue indefinitely. There is probably some upper limit of meat consumption. Irrespective of what incentives we offer consumers, they probably will not go beyond this limit.

Table 2 and fig. 1 have implications in any advertising program designed to increase consumption of food products. They indicate that increases in one area are accompanied by decreases in another area.

THE SUBSTITUTION EFFECT

Another complication arises here in attempting to determine the value of advertising in increasing the demand for particular food products and food groups. If one product such as pork is heavily advertised and promoted by retailers, packers and pork producers, very likely we can show an increase in consumption. However, what happens to beef, veal, poultry and fish consumption? There is very likely some substitution of pork for some of these competing products. If the increase in pork consumption comes at the expense of other meats, we will not have increased the demand for food products. We will only have expanded consumption of pork. This same question arises in all products.

Producer group advertising may also have a complementary effect. For example, an advertising program designed to increase sales of lower grade beef may also result in increased sales of vegetable products because of the suggested uses—such as stews or casserole dishes. If beef producer groups had knowledge of the influence their program had on vegetable consumption, they would have a basis for entering a joint program with vegetable producers. Without such knowledge producer groups have no sound basis for dividing costs of a joint program in accordance with benefits received.

Knowledge about the substitution effect and the complementary effect is necessary if producer groups are to channel their advertising funds into the most fruitful channels. If, for example, pork producers were to sponsor a nationwide pork lift such as we had in some Iowa communities in 1956, how much benefit would livestock producers derive from the campaign? Would it mean only a substitution of pork for other meat or fish? Would it mean some loss in consumption of other meats but a greater total meat consumption? What about the price effects on hogs in that some consumers will substitute higher-priced cuts such as ham or chops for low-priced cuts such as variety meats. If this increases the volume of pork that must be sold at prices below the live hog price, it may tend to force down live hog prices.

At present, we do not have adequate information about substitution effects that can be used to help guide producer groups.

PRODUCER GROUP ADVERTISING AND BRAND LOYALTY

Even though it may not be possible to expand total demand for food products by increased advertising, advertising may increase revenue in another fashion. As we mentioned previously, one of the objectives of the branded product producer is to develop brand loyalty. If consumers are loyal to a particular brand, the seller can raise prices and thereby increase revenue without suffering from a drop in volume sold. It may be possible to convince consumers that food is not very high priced. And that, even though the price goes up, they should continue to purchase the same foods in the same quantities. Perhaps it is possible to convince consumers that a diet containing a large proportion of animal products is important as a means of conforming to the social standard. If they are convinced of this, some would sacrifice non-food items to maintain such a diet as long as possible. But here again it seems doubtful that it would be possible to do this for all products. Regardless of the income level, consumers have spent about 25 percent of their disposable income for food. To be successful such an advertising program would have to build up the prestige value of food to the point where consumers would be willing to spend more than this 25 percent of their disposable income on food.

Any advertising program with this objective requires very careful planning. Advertising food to raise the prestige value of food may result in the prestige value being placed upon food *services* rather than food *products*. This would expand the demand for food services but would not necessarily affect farm prices or incomes. Retailers and processors would benefit, but not producers.

If such a program were successful, it would primarily benefit animal product producers. This is because animal protein product consumption would remain high in spite of the higher price. Normally we would expect some shifts out of meat if all food prices increased. However, under the above conditions, consumers would not substitute lower priced foods for animal protein products. Cereal and potato products would also derive some benefit in that they would receive a higher price for the quantity sold. This assumes that in one way or another, production would be held down and would not increase and force the price back down.

THE INCOME EFFECT ON CONSUMPTION

As consumer incomes rise, family food expenditures increase. Also as incomes increase, families have a wider range of food choices than formerly. This has been cited as an argument for intensive advertising by producer groups to capture a portion of this expanded food expenditure. While it is true that total dollars spent for food increase as incomes increase, this does not necessarily mean that consumers are actually consuming more food. The increase in expenditures may primarily represent an increase in the consumption of food services—eating out, using more frozen prepared foods and the like. Daly² estimates that the demand for services is about five times as responsive to changes in income as is the demand for farm products. Stated differently, for each \$6 increase in

² Daly, Rex F. The long-run demand for farm products. *Agr. Econ. Res.* 8: 73-91. 1956.

income spent on food, \$5 will be spent for services and only \$1 will be spent on food.

Under these conditions the branded product producers selling these food services would be the logical people to step up their advertising activity. The low degree of responsiveness of farm product consumption to increases in income would raise questions about producer group advertising effectiveness.

QUALITY IMPROVEMENT

In America we associate price with quality. The higher the price, the higher the quality, we think. We can cite numerous success stories where someone raised quality and price and found a profitable market—especially when the quality improvement was accompanied by an intensive advertising and promotion campaign.

These operators were successful because they marketed a product tailored to the consumer desires. In technical terms the product may not have been of high quality, but it was the quality level preferred by the consumer. What quality level is "best" is determined by consumers in their purchase patterns.

Individual preferences vary widely. An individual's nationality, religion and economic background and status all influence his preference pattern. In many instances the individual consumer's rating of quality will be different from the official guide and quality designation. For example, official standards rate 93-score butter over 92-score butter in quality. However, if an individual consumer prefers the taste and flavor of 92-score butter, it is, so far as the consumer is concerned, the superior quality. Some attributes may be considered detrimental so far as official grading is concerned, but these same attributes may be desirable to the consumer. In this paper the term quality is used to designate the degree of desirability of the product to the consumer. It is not used in the sense of a product conforming to or attaining the highest official specifications.

Some people think that raising quality and price offers at least a partial solution for the present farm income situation—that all we have to do to solve the problem is to pass legislation setting minimum product requirements at a high level with either marketing prohibitions or severe price reductions for any lot not meeting these minimum standards. While not all people would be willing to go to the legislature to accomplish this goal, many maintain that raising the quality of all farm products would result in higher per capita consumption and higher prices and incomes. To substantiate this feeling, people point to the price differential existing for Grade A over manufacturing milk and between the Grade A large and Grade B large eggs and state that, if all milk and eggs were Grade A, all producers would receive the higher price.

If we assume that we will continue to have a relatively free pricing mechanism in this country, could we expand the demand for farm products and raise farm income by marketing only top grade products? Unless we have administered prices such a program would not expand demand or increase income, as we will show later.

Quality improvement, however, is not an all or nothing proposition. Improving the quality of one product or a portion of the output of one product may be beneficial.

In this way consumers who desire the lower quality products are still satisfied while those who desire and are willing to pay for higher quality will have their wants satisfied.

Present methods of merchandising in retail stores place a high premium on appearance. An example of the importance of quality improvement and consumer acceptance can be seen in beef. Consumers have indicated a preference for choice grade beef, and beef producers have been alert to this change in preference.

There has been a significant shift away from Utility and Prime along with an increased production of Choice beef (see table 3). This is in line with consumer desires. The drop in the percentage of Prime beef sold at Chicago may seem to represent a drop in quality to some people. However, consumers are the ultimate judges of quality. If Choice beef is preferred over Prime beef, so far as the consumer is concerned, Choice beef is of higher quality.

The production of more Choice beef has benefited beef producers in that beef consumption and prices are higher than consumption and prices of the major competitor, pork. Another meat that has benefited from quality improvement is poultry. The development of the modern broiler and turkey has moved poultry out of the seasonal food group into the year-around food group. Part of the success of this program must be attributed to the improvement of quality.

Pork producers are engaged in a program to increase the percentage of lean meat in hog carcasses. They are hopeful that they too can increase their sales of pork with no price decline by raising leaner hogs. However, even though they may not be able to increase per capita consumption, quality improvement may be necessary to stop the downward consumption trend and maintain the present position relative to competing products.

If such gains are possible for individual products, why not for all products? In answering this we must first point out that the two products mentioned had certain advantages. Consumer incomes have been steadily rising for more than 15 years. Meat products are among the primary beneficiaries, in terms of consumption, of a rise in disposable income. Part of this increased consumption of beef and poultry would probably have come about even though quality had not been improved. However, since the beef and poultry products conformed more closely to consumer demand than did pork, the consumption gains occurred in beef and poultry products rather than in pork. We do not know what the present consumption pattern would be if pork quality had improved along with beef and poultry.

If producers market only the top-quality products of agriculture, the degree of success of the program would depend upon several factors:

1. In the discussion of advertising we mentioned that total food intake is very stable and that consumption in-

TABLE 3. DISTRIBUTION BY GRADES OF THE NUMBER OF BEEF STEERS FROM FEEDING AREAS SOLD AT CHICAGO, 1922, 1940 AND 1955.*

Year	Prime (percent)	Choice (percent)	Good (percent)	Commercial (percent)	Utility (percent)
1922	13.1	32.9	41.3	12.8	
1940	26.7	45.6	24.0	3.7	
1955	16.5	56.0	23.0	3.8	0.7

* Grades names now in use.
Source: Harold Breimyer. Problems and probable trends in adjusting livestock production to changes in food habits. Talk presented before the Inter-regional Livestock Production and Marketing Conference, Ithaca, New York, June 1956.

creases in one area were generally accompanied by decreases in another area. This suggests that it is unlikely that raising the quality level of all products would result in increased consumption. More likely it may cause some shifts between foods as an improvement in the quality of one product causes consumers to shift to that product and away from others. Insofar as these shifts are toward foods that require relatively large resource requirements in production, such as meat, we have an expansion of demand. However, we have no assurance that the shift will always be in that direction.

2. If a 1-percent change in price is associated with less than a 1-percent change in quantity taken (an inelastic demand), restricting the market to only top-quality products would result in a rise in farm income if a reduction in output is achieved. This, however, would be in reality a production-restriction program rather than a demand-expansion program.

3. If we assume that production levels will remain at today's level or increase slightly, an all-out drive for quality production of all agriculture products may actually result in no change in consumption but a decrease in price for some commodities. To illustrate: At present the cost of producing Grade A milk for fluid use is higher than the cost of producing manufacturing milk. To insure consumers an adequate supply of wholesome milk and to compensate Grade A producers for the additional cost, the price of Grade A milk for fluid use is higher than the price of manufacturing milk. If all milk sold met Grade A requirements, all producers would incur this additional cost. Since all milk would be of equal quality, however, there would be no incentive for the processor to pay a premium for milk sold in fluid form. The price the processor would be willing to pay would be determined by the value of the milk used in the lowest valued product. In the case of milk, this would be the value of milk used in processing butter and nonfat dry milk or cheese. The situation would be similar for eggs, fruits, vegetables and any other product that is used in several forms of different value.

The consumer and/or the processor would derive some increased satisfaction and perhaps increased income through such a program, but it is unlikely that producer incomes would be increased.

EXPANDED INDUSTRIAL USES OF FARM PRODUCTS

At the present time, approximately 12 to 14 percent of our total agricultural output is used in nonfood products. The major use of farm products in nonfood uses are the textiles, tobacco products, soaps, drying oils, linoleum, resins and other industrial products. Normally we think of industrial uses for farm products as those uses which produce raw material for other industrial processes. This would include processes such as grain for alcohol, cotton for tire and belt cord, and soybeans for industrial oils and plastics.

The major obstacle to widened industrial uses of agricultural products seems to be the economic problem. Technologists have developed many possible uses for starch and fiber products in industrial production. In most cases, however, the substitute petroleum and mineral alternatives are considerably more economical at present

than are the starch or fiber products. To compete with these alternative sources of industrial supplies, farm product prices would have to be considerably lower. This situation will continue unless technologists develop new processes that will utilize farm products more efficiently than nonfarm products.

If the price obstacle is overcome, the variable supply of farm products is a problem that may seriously hamper expanded industrial use. Once present surplus stocks are disposed of, variation in supply available for industrial uses would be quite large in some years. This would require flexibility in industrial plants so that they could shift from farm products to nonfarm products at minimum conversion cost. If this flexibility is not possible, industrial users may not be willing to use farm products because of the uncertainty of being able to compete at all times with processors using nonfarm supply sources.

This flexibility problem involves more than just the question of plant organization and equipment requirements. Product quality and standardization must also be considered. If shifting from a farm product to a nonfarm product supply source results in some change in output composition or uniformity, the industrial processor may be unable to use farm products with a variable supply because of customer requirements of quality and uniformity. Therefore, if a farm product is to be used in industrial processes it:

1. Must be priced competitively with nonfarm sources of supply;
2. Must have a supply stable enough to permit processors to compete with nonfarm product using competitors at all times; or
3. The process in which it is used must be flexible enough to permit substitution of raw materials from other sources without changes in product uniformity or characteristics.

The search to develop farm products and industrial processes to meet the above requirements has been going on for a long time. The fact that we have large surpluses of fiber and carbohydrate crops does not mean that this search has been entirely fruitless. New uses have been developed and exploited. So far, however, no one has developed an industrial use that will permit economical substitution of farm products for mineral or petroleum products on a large enough scale to provide an unlimited market for farm products.

In looking over the entire range of farm products presently used for nonfood products, the nonfood use trend seems to be going against farm products. Synthetic fibers have made serious inroads upon cotton consumption. Table 4 shows a decline of 3 pounds per person since the 1947-49 period. Cotton product consumption is influenced more by consumer incomes than are most other farm products. Therefore, this consumption decline, which occurred in a period when consumer incomes were rising rapidly, represents a substitution of more than 3 pounds of synthetic fibers for natural fibers. This same consumption and substitution pattern has prevailed in wool.

Consumption of soap products, another important nonfood use of farm products, has followed the same general pattern of cotton and wool. The introduction of synthetic household detergents since 1945 has resulted in soap consumption declining from 13.6 pounds per person to 6.7

TABLE 4. PER CAPITA NONFOOD USE OF MAJOR FARM PRODUCTS IN POUNDS, SELECTED PERIODS 1925 TO 1955 AND PROJECTIONS FOR 1960 AND 1975.*

Commodity	1925-29	1947-49	1951-53	1953	1955	Projection	
						1960	1975
Nonfood fats and oils:							
Soap	n. a.	13.6	8.8	8.1	6.7	6.5	4.0
Drying oil	n. a.	6.6	6.3	6.1	6.3	6.0	5.0
Other industrial	n. a.	4.9	6.8	7.0	7.1	8.5	11.5
Total	n. a.	25.1	21.9	21.2	20.1	21.0	20.5
Cotton	27.7	29.5	29.3	27.9	26.5	30.0	32.0
Wool, apparel	2.1	3.1	2.3	2.2	1.7	1.8	1.8
Tobacco†	9.0	12.0	12.8	12.9	12.2	13.8	15.4

* Daly, Rex F. The long-run demand for farm products. Agr. Econ. Res. 8:73-91. 1956.

† Unstemmed processing weight, per person 15 years and over including Armed Forces overseas.

pounds per person at present. This, a decline of almost 50 percent, is expected to continue in the future.

The development of synthetic paint resins and the increased use of rubber in paint has replaced a portion of the drying oils formerly obtained from farm products.

If the projections shown in table 4 are realistic, we can

expect an expansion of industrial use by about 8 percent by 1975. Unless technologists develop new processes capable of utilizing large quantities of farm products, with existing price relationships, there does not seem to be a very great possibility of a substantial expansion of industrial uses of farm products in the next few years.

Expanding Demand for Farm Products Through Improved Nutrition

BY ELISABETH WILLIS AND PEARL SWANSON

IT IS SOMETIMES suggested that the American people "eat their way out" of the problem of agricultural surpluses. How practical a suggestion is this? How much would the consumption of agricultural products be increased if all Americans were "well fed" according to the best current knowledge of nutritionists? To arrive at a useful answer to this question we need to know: (1) what an adequate diet is; (2) how many Americans now fail to eat adequate diets; (3) how much more of what kinds of food would be consumed if the inadequate diets were made adequate. We have enough information about each of these topics so that we can give a definite answer to the people who think that improving the nutrition of the American people will go a long way toward solving the problem of agricultural surpluses.

AN ADEQUATE DIET

Nutritionists measure the adequacy of an individual's diet in terms of the amounts of food energy and nutrients it supplies. The *average* amounts of food energy (calories) and nine nutrients that meet the needs of *groups* of persons of specified age, sex and degree of activity can be estimated, although the needs of individuals within any of these groups vary considerably. These average amounts needed—known as the daily dietary allowances—have been determined by the National Research Council on the basis of careful screening and evaluation of all available experimental evidence.¹ Revisions of the recommended allowances are issued from time to time as new evidence is obtained.

The recommended allowances are set high enough to provide for at least some of the variation known to exist among individual requirements, so individuals whose diets supply a little less than recommended amounts of certain nutrients may still be considered adequately nourished. In general, however, it is accepted that diets supplying less than about two-thirds of the recommended amount of a specified nutrient are inadequate in that nutrient. Because of the interdependence of the various nutrients in the maintenance of a good nutritional state, a diet short in only one nutrient is inadequate even though other nutrients are supplied in recommended amounts.

These recommended allowances are the yardstick by which we shall measure the adequacy of American diets.

¹ Food and Nutrition Board. Recommended dietary allowances, revised 1953. National Academy of Sciences, National Research Council, Publication 302. Washington, D. C. 1953.

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HOW MANY INADEQUATE DIETS?

There are two kinds of information about the nutritive value of the diets of Americans that we can compare with the recommended values:

1. Estimates of "nutrients available for civilian consumption per capita per day" computed by research workers at the Institute of Home Economics of the Agricultural Research Service and published periodically by the United States Department of Agriculture, and
2. Reports of several aspects of the food intake of groups of families and individuals, based on studies made by a variety of public and private agencies.

AVAILABLE NUTRIENTS

In computing amounts of nutrients available for civilian consumption, the Institute of Home Economics uses estimates made by the USDA of apparent per capita consumption of major food commodities. Nutritionists calculate the amounts of food energy and nutrients supplied by these estimated quantities of food.

Table 1 shows these estimates for 1955 together with average daily allowances for food energy and nutrients recommended by the National Research Council for 25-year-old men, and boys 16 to 20 years old—groups requiring considerably larger amounts of food energy and nutrients than most other segments of the population. It appears from this table that the food available for civilian consumption provided ample amounts of nutrients for the entire population. Food energy available per day equaled the amount recommended for 25-year-old men, and nutrients available were well above the level recommended for this group. Available amounts of four nutrients exceeded even the high levels recommended for 16- to 20-year-old boys.

TABLE 1. NUTRIENTS AVAILABLE FROM CIVILIAN CONSUMPTION AND DAILY DIETARY ALLOWANCES RECOMMENDED BY NATIONAL RESEARCH COUNCIL.

Nutrient	Nutrients available per capita per day in 1955*	Recommended daily allowance†	
		25-year-old men	Boys 16-20 years old
Food energy (cal.)	3,230	3,200	3,800
Protein (gm.)	97	65	100
Calcium (gm.)	1.07	0.8	1.4
Iron (mg.)	17.0	12	15
Vitamin A value (I. U.)	7,800	5,000	5,000
Thiamine (mg.)	1.88	1.6	1.9
Riboflavin (mg.)	2.40	1.6	2.5
Niacin (mg.)	19.8	16	19
Ascorbic acid (mg.)	115	75	100

* Nutritional review. The National Food Situation, Agricultural Marketing Service, U. S. Dept. Agr. Nov. 1956. Table 4, p. 6.

† Food and Nutrition Board. Recommended dietary allowances, revised 1953. National Academy of Science, National Research Council, Publication 302. Washington, D. C. 1953. p. 22.

In interpreting these data, however, we must bear in mind certain important limitations:

1. These data measure the nutritive value of foods purchased at retail. Estimates of the amounts of food available at retail are derived from information about food available at "the primary distribution level" and from estimates of losses between this level and the retail market. It is recognized that these estimates are inexact.

2. Furthermore, we know very little about how much waste occurs, in terms either of food or nutrients, between the retail market and the family kitchen.

3. Moreover, we know that the nutritive value of the food actually eaten by family members is less than the nutritive value of the food brought into the kitchen. There is some waste of food or nutrients or both between the market basket and the table because of spoilage and improper handling and preparation of foods. There is further waste in the food that goes onto plates but is not eaten. It has been estimated by the USDA that as much as 15 percent of the calories may thus be lost between retail stores and actual consumption of the food. Information about the extent of such waste and loss in terms of specific commodities and nutrients is urgently needed. It has been recommended that the Institute of Home Economics make a thorough study of this problem.² Until such study is completed, we cannot make any very useful estimate of how much this food waste amounts to in terms of a national average.

4. These per capita figures are yearly national averages and, thus, cannot reveal the differences in actual food consumption associated with seasonal and regional differences, with differences in such family characteristics as size, composition, income, occupation of head and education of head and homemaker, and with individual differences among family members and single individuals.

DIETS OF FAMILIES AND INDIVIDUALS

During the spring of 1955, a Household Food Consumption Survey was made by the United States Department of Agriculture. This was the most comprehensive such survey undertaken in this country and the first nationwide survey made since 1942. The results of this study, appearing in the early months of 1957, are the best basis yet available for estimates of the number of families in this country having inadequate diets.

The survey was based on a national probability sample of about 6,000 housekeeping households of one or more persons, from which information was obtained about quantities of all food items used at home during the 7 days preceding the interview and about meals eaten away from home by household members. The nutritive value of the amounts of food consumed by the households was calculated and compared with the allowances recommended by the National Research Council.

As a result of these calculations, it appears that in the spring of 1955:

"The average amounts of food brought into household kitchens in the United States were sufficient to provide more than recommended allowances for calories and eight nutrients studied in this survey of a week's food consumption. . . . Not all households, however, had diets that met recommended levels. When household supplies failed to meet nutrient recommendations, they were most often short in milk, especially important for calcium, and in vitamin C-rich fruits and vegetables.

"About 3 in 10 households had diets that provided less calcium than the allowances recommended by the National Research Council. About 1 in 4 had less than

recommended amounts of ascorbic acid (vitamin C) and slightly smaller proportions had less vitamin A, riboflavin, and thiamine than the allowances specify. A tenth or fewer had food furnishing less than recommended amounts of iron, protein, and niacin.

"This does not prove that all of those families were poorly fed or subject to malnutrition; the recommended allowances provide a considerable margin of safety over average needs. This margin varies for the different nutrients. About 90 percent of the households had food that provided at least two-thirds of the recommended amounts of ascorbic acid and calcium and the diets of an even higher percentage furnished at least two-thirds of the allowances for other nutrients."³

This survey makes it possible to compare the adequacy of diets of households grouped according to several characteristics:

"City-farm: Though city-farm differences in food consumption patterns have become less marked during the past several decades, considerable difference in dietary levels still exists. In general, farm diets furnish larger amounts of all nutrients except vitamins A and C. . . .

"Income: In rural nonfarm and city groups, the quality of diets and income are quite closely related. The diets of higher income families contain larger quantities of nearly all nutrients than do those of lower income groups. The differences, measured in the 1955 survey, were particularly marked between the low- and the middle-income groups. . . .

"Region: Although regional differences in food consumption may be less than they used to be, according to the 1955 survey there were still some important differences in dietary levels among the four regions of the United States. Diets of households in the North-Central region and the West were much alike in nutritive content; and diets in the Northeast were not very different except for thiamine, which was lower. In diets of the South, levels of most nutrients were lower than in the other regions."⁴

Earlier surveys indicated that, in general, family diets were poorer: the lower the family income; the larger the family; the lower the formal education of the homemaker.^{5, 6}

Such studies have also shown that even within households appearing to have adequate food supplies, individuals within a family may consume food supplying less than adequate amounts of some nutrients. Mothers and teen-age daughters have been shown to be the family members most likely to have inadequate diets.⁷

Similarly, studies of diets of groups of individuals (e.g., school children, older women, industrial workers) reveal that within groups reporting dietaries with satisfactory nutrient values, fairly large percentages of individuals had diets that were low in one or more nutrients—

³ Dietary levels of households in the United States. Household Food Consumption Survey 1955. Report No. 6. Agricultural Marketing Service and Agricultural Research Service, U. S. Dept. Agr. Washington, D. C. March 1957, p. 1.

⁴ Clark, F. and LeBovitz, C. Dietary levels of households in the United States. The National Food Situation. Agricultural Marketing Service, U. S. Dept. Agr. April 1957, pp. 20, 21.

⁵ Coons, C. M. Family food consumption studies. Public Health Reports 67: 788-796, 1952.

⁶ U. S. Department of Agriculture, Federal Extension Service. Program projection report No. 3b. Food and nutrition. April 1956.

⁷ Leverton, R. M. We could eat even better. Nebraska Experiment Station Quarterly 1: 3, 1952.

² Food and Nutrition Research Advisory Committee. Report and recommendations, Nov. 8-10, 1954. Agricultural Research Service, United States Department of Agriculture. Mimeographed report, Dec. 15, 1954. p. 3.

especially calcium, ascorbic acid and vitamin A.⁸ For instance, in a study of 24-hour dietaries of five samples of white women in five north-central states (including more than 2,000 women), it was found that in one of the samples as many as 30 percent of the 24-hour dietaries provided less than 1,400 Cal., and 20 percent, less than 40 gm. of protein. In other samples, 82 percent of the dietaries furnished less than 0.60 gm. of calcium; 52 percent, less than 50 mg. of ascorbic acid, and 54 percent, less than 2,500 I.U. of vitamin A.⁹ In each instance the percentage of the dietaries indicated furnished less than half to three-fourths of the recommended allowances for the respective nutrients.

DESIRABLE CHANGES IN FOOD CONSUMPTION

The nutrients found most likely to be deficient both in food supplies of households and in meals and snacks actually consumed by individuals are found chiefly in the following foods: (1) Calcium in milk and milk products; (2) Ascorbic acid in citrus fruits, tomatoes and members of the cabbage and turnip families; (3) Vitamin A value in butter, cream, fortified margarine, whole milk, eggs, liver, green and leafy vegetables, and yellow fruits and vegetables.

Protein, iron and the B-vitamins are inadequately supplied by the diets of a lesser but still substantial number of persons who would benefit from including more meat, fish, poultry and other protein-rich foods in their meals and snacks.

WHAT ARE THE POSSIBILITIES?

Suppose a vigorous program of nutrition education were launched, directed toward correcting the deficiencies that appear to exist in American diets. How much could we expect such a program to contribute toward easing the problem of agricultural surpluses? The USDA estimates, on the basis of the 1955 Household Food Consumption Survey, that household consumption of milk would increase by 9 percent, and consumption of fruits and vegetables, by 6 percent, if everyone in this country whose diet is short in calcium and ascorbic acid had a diet that met nutritional requirements.¹⁰ The corresponding increase in consumption of protein-rich foods probably would be smaller.

This increase in household consumption of milk regarded as desirable from the nutritionists' point of view would make a real contribution to the problem of surpluses: The current distribution of dairy products ac-

quired under the federal support program is equal to about 4 percent of the total per capita use of dairy products.¹¹

How do these desirable increases compare with the changes that are expected to take place in per capita consumption of food over the next 20 years without any special campaign of education in nutrition? An over-all increase of about 10 percent in per capita consumption of food as reflected at the farm level is projected for the period between 1953 and 1975 on the basis of an estimated increase of about 60 percent in real income.¹²

The consumption of different farm food products would be affected to different degrees, of course, but in general, per capita consumption of livestock products (meat, poultry, eggs and dairy products) and fruits and vegetables (other than potatoes) would be expected to increase by more rather than less than the anticipated overall 10 percent. Only the estimated increase in per capita consumption of fluid milk (from 385 to 415 pounds)—an increase of about 7 percent—is below the increase that nutritionists would regard as desirable for nutritional adequacy.

Thus, it appears that the estimated income elasticity of demand for fruits, vegetables, meat, fish and poultry and (to a somewhat lesser degree) milk, coupled with the rise in real income anticipated over the next 20 years, will bring about the increases in food consumption that nutritionists would urge in any program of nutrition education. Under these circumstances it would be unrealistic to look to nutritionists for any major contribution to the solution of the farm surplus problem.

Several considerations should be recognized, however, before this topic is dismissed:

1. The effect of increased real income on expenditures for food probably will depend somewhat on how the increase is distributed. The estimates reported above were based on the assumption that the relative income position of families would be unchanged.¹³ If more of the increase in real incomes should go to families already in the higher income brackets, per capita increases in consumption of food might be somewhat below these estimates. Moreover, these increases in total food consumption might reflect changes in diets already adequate rather than a reduction in the number of inadequate diets.

2. Even if the anticipated increase in real incomes went primarily to families now in the lower income brackets, it could not be counted on to guarantee the nutritional adequacy of food intakes of families or individuals. Education in nutrition will continue to be needed.

3. The estimates of future increases in per capita food consumption are based on current trends in food consumption patterns. The increasing recognition of obesity as a serious health hazard, and the concern over the possible relation of the kind and amount of dietary fat to cardiovascular diseases may result in further changes in the dietary pattern.

⁸ Adelson, S. F. Adult nutrition 1. The situation. Nutrition committee news, Winter 1955-56. U. S. Dept. Agr., Washington, D. C.

⁹ North Central Cooperative Project NC-5. Food intakes of 2,189 women in five North Central States. Iowa Agr. and Home Econ. Exp. Sta. Res. Bul. To be published.

¹⁰ Clark and Le Bovit, op. cit., p. 18.

¹¹ The Dairy Situation. Agricultural Marketing Service, U. S. Dept. Agr. March 29, 1957. p. 1.

¹² Fox, Karl A. Demand prospects for American agriculture. Tables 2 and 3. (In this publication.)

¹³ Daly, Rex F. The long-run demand for farm products. Agr. Econ. Res. 8:73-91. 1956. p. 79.

Adjustments in the Rural Community

BY JOE M. BOHLEN

NO SEGMENT OF any society has undergone technological changes with the rapidity that American society and particularly American rural society has in the past 50 years. The introduction of so many technological changes in such a short period of time has created some problems of social adjustment that have as yet not only been unsolved, but in many instances not recognized.

Man is an enigma within himself—on one hand, he invents material gadgets as rapidly as his intellectual capacity can devise them and, on the other hand, he stubbornly resists changes in the social structure which these devices inexorably demand. Since in our society, as in most societies, the balance of power is in the hands of the older members, this intellectual dualism creates situations with which society must cope in the on-going process.

First, more workable technical devices are created than are adopted immediately. This results in a backlog of technological knowledge and materials which can move in to fill a vacuum whenever created. Most technological developments have been in the direction of labor-saving devices and those which substitute capital and managerial ability for labor. When a labor vacuum occurs in the economy, technology is applied to fill the vacuum. The major factor causing labor shortages is war. Under war conditions the older generation governs the adoption of changes which may work to a disadvantage of the young. And the adjustments made to technological changes are frequently the adjustments which are more favorable to those who have wealth and power.

Secondly, the adjustments may be such that they limit the possibilities of further adaptation. A case in point is the rural school situation in Iowa. Here, the adjustments made have been of a nature which inhibits further change; once set up, even a small constituent district may block and prevent further reorganization. Before any discussion of the suggestions for change in community organizations can be made, the underlying factors must be analyzed. The nature of the technological changes affecting social institutions in the community needs to be recognized as well as the demands for social change which these have brought.

The technological changes having the impact on the rural community have had an effect on the urban community as well. On the rural scene there has been the impact of the row-crop tractor with 2- and 4-row equipment for tilled crops, the hay baler, the combine, the field chopper, the workable milker, hybrid seeds, antibiotics,

herbicides and the myriad of other things which have reduced hand labor and the need for a "strong back and weak mind" and supplemented this labor need with one of more managerial "know how."

On the urban side there is an increased demand for men to fill the slots on the ever-improving assembly lines where as yet there are no gadgets capable of making decisions. Also, industry is demanding men and women who can invent new devices and maintain and operate existing ones. These complementary forces are moving people from agriculture. The facts are that there are people to move. Iowa's total population is growing slowly. The nation's population has increased more rapidly. Between 1950 and 1955 the increase was 2.7 percent for Iowa. The national increase was 10.9 percent. This was not due to a lower birth rate in Iowa but to the fact that people are migrating—particularly from the rural areas. Between 1940 and 1950 the rural areas of the state had a decline in population due to out-migration of approximately 12 percent. This was compensated for by a sharp increase in urban areas over 25,000 in population.

From 1950 to 1955 the number of farm operators declined from 203,000 to 193,000 within the state. Farm size has increased rapidly through a consolidation process. Changing technology and opportunities in urban industries also have brought about a decline in the number of people living in rural areas as hired hands. Between 1950 and 1954 there was a decline of 23 percent in this group. All of these things added together mean a smaller rural population. According to the predictions of population experts, the estimated number of farm operators in 1965 will be near 170,000. Opportunities in agriculture now and in the immediate future are and will be such that many people will have to seek employment elsewhere. The evidence of the statisticians working on the census data indicates that the rural areas of Iowa will continue to decline in population in the next 15 years. These kinds of predictions, based upon valid data, indicate that the problem is becoming quite serious.

Because of the tendency for people to cling to old ways of doing things after they have become outmoded, many of the rural institutions are inadequate to meet the demands and needs of the present day. With an increasing decline in population and a change in the needs on the part of the people, these institutions are going to be even more inadequate 15 years from now than they are now. To give a preview of what may take place on the Iowa scene, it has been estimated that one of the counties which at the present time has 1,800 farms may, by 1965, have as few as 1,200 farms. This means that changes

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must take place for social institutions to survive in these areas.

There have been several forces at work to effect a need for change in the rural social institutions. Increasing farm size has meant fewer farmsteads per square mile. The declining birth rate has meant that there are fewer people living on each of these farmsteads.

An increase in transportation facilities and in reliable transportation equipment has meant that farm families are less dependent upon their local community for services which they need. It means that they can go where services are more specialized, where these services are of a nature that is most satisfactory to them. This means that a small inefficient, uneconomic business unit can no longer take advantage of monopoly of position and continue to operate. This has tremendous implications for the continued existence of certain types of businesses in the smaller communities.

To deal with these problems more systematically let us look at several of these institutions individually and discuss the background and needs for change in each.

THE RURAL SCHOOL

At the present time there is no institution on the rural scene which is more controversial than the rural school. Looking at the rural school and life in the present day, the problems can be summarized in terms of too many and too small.

Many forces including more adequate transportation, changing technology, communications, migration and costs have been at play in changing the situation of schools as they are operated in rural communities today. Because of changing technology and changing values, there are two forces which have brought about the decline in the number of people of school age per square mile. One is the increasing farm size, and the other is the declining farm birth rate. It has been pointed out earlier that there has been a decline in the number of enrollments in the rural schools to the extent that, at the present time, even in our rural high schools of which there are slightly more than 800, approximately only 10 percent have enough pupils to provide what is considered by professional educators to be a minimum level of high school training. (The usual figure used by professional educators is 250-300 pupils and 10 to 12 teachers.)

The problem goes back basically to the size of the school district. The major limitation on the size of the school is the size of the district. The best evidence of research today is that there is a need for a minimum of 1,200 students between the ages of 5 and 17 years within a given area in order to provide an adequate school for that area.

Part of the resistance to the change in this program is based on two things. One is the fact that there are people in the community who prefer to have the tax structure unaltered by a change in school district structure. A change would inevitably mean an increase in taxes for some districts.

The second is the fact that we support our schools to such a large extent out of the ad valorem property tax. Until we make some adjustment either in the changing of the support pattern for the schools—or in formulating some equation which will make it more equitable—the

property tax support of schools is going to deter reorganization of schools into units which make more educational sense.

In terms of total cost to society the small schools are the most expensive schools. In Iowa we spend a greater amount of money for education than would be necessary because we are teaching in small and relatively expensive units. Those schools which have lowest per pupil cost are those schools which range in size from 400-600 enrolled in the 4 years in high school. In Iowa today there are less than 7 percent of all the schools in the state which have a minimum number of students enrolled that would approach 400 (actually 46 of the 807).¹

Savings on per pupil costs, however, are not most important. More important is the fact that the small schools cannot offer the kind of curriculum that prepares boys and girls—particularly those who are going to leave their home communities—to live in a modern world. Going back to the research which has been done in this area, more than 50 percent of the farm boys and girls and non-farm boys and girls said that the schools which they were attending were too small to give them the kind of training to live in the world in which they were finding themselves. Over 75 percent of these high school graduates mentioned at least one or more courses that they would have liked to have had in high school but which were not offered. These data are from an Experiment Station study which was conducted in Hamilton County, Iowa, over the period 1948 through 1956.²

In the spring of 1948 all of the graduating seniors of the rural high schools in this typical Corn Belt county³ were interviewed to determine occupational plans and intentions relative to migration from their home communities. At the time of graduation, only 7 of the 39 farm boys in the study intended to stay in their home communities while 20 of them were undecided. In 1956 it was found that 16 of them had actually left their home communities. Of this group of farm boys, 27 had expressed a desire to farm; 23 of them were actually farming.

Among the 51 farm girls in this study only 5 expressed intentions of remaining in their home communities, and only 11 of them were actually there in 1956. Among the town youngsters (those living in the village centers where the high schools were located), even a smaller proportion expressed intentions of staying in their home communities; only 3 of the 62 town boys and girls intended to stay. In 1956 only 14 of these town youngsters were still in their home communities.

These facts in themselves may not be disturbing. But the production of a surplus of rural children means that many of them must leave. The data from this study which contained implications which may be most disturbing are those data which deal with the occupational choices and educational levels of the young people and the obvious implications for the future of agriculture in these data.

First is the fact that 56 of the 152 in this study were undecided about what they wanted to do at the time of

¹ Iowa Educational Directory, 1954-55.

² For further details see: Bohlen, Joe M. Personal and social factors related to migration of high school seniors, Hamilton County, Iowa, 1948. Unpublished M.S. thesis. Iowa State College Library. 1948. Also, Bohlen, Joe M. and Wakeley, Ray E. Intentions to migrate and actual migration of rural high school graduates in rural sociology. Dec. 1950.

³ Hamilton County, Iowa, was so designated by the Bureau of Agricultural Economics, USDA, as a basic unit of research.

high school graduation. As would be expected there was considerable upgrading in intentions of occupational attainments as against actual attainments. In other words, there was a larger number of people who said they intended to be professional people than actually turned out to be so. By the same token, there was a greater proportion of those in semiskilled and nonskilled groups than was anticipated in terms of their intentions.

Most important is the evidence from this study that farm people (those youngsters who go back to the farm) on the whole have less education than those who go elsewhere to take up occupational activities. Of the 24 boys and 23 girls who are now on farms from this group, none of them had completed a college education. Only two of the boys now farming had gone beyond high school. Both of these had taken 2 years of the farm operations course at Iowa State College. Of the 23 girls now on the farm 4 of them had gone beyond high school; none of them had gone more than 2 years beyond. Three of them had been rural school teachers before their marriages.

If one were to look at the young people in terms of their original place of residence (where they lived in 1948 and where they were reared) one would find that the farm reared boys and girls are receiving less advanced education. Of the 39 boys who were farm boys in 1948, only 4 of them had graduated from college whereas 10 of the 27 nonfarm boys had graduated. Only 5 of the 51 farm girls had graduated from college.

Insofar as formal education better fits young people to live in and adjust to a complex pattern of interaction in a changing world, the evidence of this study is that farm boys and farm girls are being less well equipped to live in a modern world than are other young people.

The evidence is that, with the increasing decline in farm numbers and the increase in farm size, the school situation in the smaller communities is going to continue to be about the same or poorer than it has been in the past. At the present time it is generally inadequate. The greatest needs and the greatest opportunities for young people now seem to be in the scientific and technical areas. The greatest demand for courses and desires for courses on the part of students are in the areas of mathematics, and in the basic sciences of chemistry, physics and biology which the small schools are ill equipped to teach because of the necessary laboratory equipment.

In summary, these are the problems the rural school must face: (1) small districts and subsequently small schools; (2) inadequate teaching; (3) inequitable means of finance; (4) limited curricular offerings which give farm boys and girls a disadvantage in competition in college and in competing for jobs in the industrial areas; (5) the meagerness and, in many cases, the absence of offerings in the basic sciences such as chemistry and physics and biology and mathematics; (6) the inadequate teaching of the basic communications skills.

In these areas rural people either must face up to the facts and do something about the problems or be satisfied with a second-rate education for their young people. Another factor enhancing these problems is the fact that there is a definite scarcity of teachers. Those school districts which can pay the better salaries are going to demand the better, more highly trained personnel. This will reflect on the smaller rural school systems in making

available to them what is left over after the larger school systems have made their selections for staff.

These problems are already with us. They will be enhanced by the kind of population changes which are going to take place in the next 20 years.

THE RURAL CHURCH

Another institution of major importance to rural people which has gone through some very difficult times is the rural church. Since the development of the Constitution of the United States (and in a few of the colonies before the revolution) men have been able to worship if and how they pleased. Within this framework of freedom to worship, the rural church in America has developed.

In many rural communities today, we see struggling small competing churches which do not have the facilities to meet the needs of their people. These needs again as in the school situations are dual needs. Among the members are those who are going to leave the community and those who are going to stay in it. In many instances the rural church has faced—and as yet has not completely solved—the problem of the migrating youngster. The young person who is familiar in his home community with a church which has a given denominational label and operates on a face-to-face primary group basis finds the situation is quite different from a church with the same denominational label that operates in the city on a very secondary basis.

The strangeness of the human relations pattern as it exists in the urban church of the same denominational name in many instances is a major factor causing young people to cease going to church when they move to town. One of the major problems which all denominations everywhere face is the attendance and participation patterns of their people. There seems to be a gradually increasing attendance in terms of proportion of people attending from the time a person is 4 or 5 years old, and it reaches its peak at approximately 14 or 15 years of age. Then there is a decline reaching bottom at age 18 to 25. In their late 20's and early 30's, when these same people are having their own children and feeling the need and necessity to take them to Sunday school, they again start attending church.

The church is not reaching young people during the period of their lives when they are making the two major decisions which will have the greatest influence upon them—whom they shall marry and what occupation they shall follow. This means that the church has not reached its fullest impact in terms of adjustment of young people to living in a modern society. The church with 25 or 30 members cannot solve these problems; it takes trained full-time leadership to provide such service. The facts are that, in the rural community, a large proportion of churches are being served by pastors who serve two or more churches or are being served by supply pastors from seminaries and by student pastors.⁴

This type of church leadership limits church programs to a sermon on Sunday morning and a minister who can provide services for the rites of passage (birth, marriage and death). Where such leadership is the only available, the church is not taking an active part in the ongoing life of the rural people nor is it speaking out on

⁴ See: Nelson, Lowry. Rural sociology. Third Edition. Chapters 16 and 17.

issues which are problems to the particular area in which it is found. In the ministry as well as in education there are some few dedicated people, but the problem has been one of finding competent leaders who will work for the incomes that are available.

If rural people wish to continue their churches as vital institutions in the rural areas, they must face up to the problems which are now clearly in the picture as far as churches are concerned. These problems will be accentuated by the declining population and by the fewer numbers of families per given area.

Interdenominational struggles have caused the rural churches to remain relatively weak. There are in many instances so few members in any given congregation that an excessive financial burden is placed on each member to maintain even a minimum program. The rural church also faces the problem of gearing the program to the needs of the young people who are going to stay in the rural community as well as to those who are going to leave. The need is to prepare young people to adjust to a changing society and adult life which, in many instances, is foreign to these people whether they leave their home communities or stay there. To solve these problems, rural leadership must ask itself some significant questions.

First of all, what are the possibilities of intradenominational reorganization? Also, have the possibilities of interdenominational cooperation been fully exploited? Can rural people get satisfactions out of so-called non-denominational churches? As farm people look at the rural church they must recognize the impact of technological change. There was a time when people were satisfied with coming to the rural church to hear the preaching sermon. Now church programs need to be more than a preaching sermon to satisfy the needs of those people who will come to it.

People have become more concerned for a religion which gives them some of the answers to their problems of complex living. Those urban churches which seem to be most successful at the present time in working with the youth of the community are those which are carrying on broad social programs as well as religious activities. Programs of occupational guidance, of courtship and marriage and programs which contain recreational aspects are bringing more and more young people to the urban churches. The evidence is that these programs in no way have detracted from the basic framework of the church—that of providing religious experience.

FARMER COOPERATIVES

Farmer cooperatives suffer from size in both directions. On one hand, many of the local farmer cooperatives are too small to get the advantages of the economies of scale. They are so small that they do not have the volume to make them efficient, economic units. Research at the Experiment Station has pointed out these problems in the area of creamery cooperatives, elevator cooperatives and also in livestock marketing associations. On the other hand, some of the problems arise from the fact that the local cooperatives are integrated into so many regional structures and have become so complex that the farmer has difficulty understanding them.

Robotka and Phillips have delineated the economic nature of the cooperative. Research by Beal, Bohlen and

Harp has indicated that farmers know little about this basic nature of their organizations, the cooperatives. There is a need for further education among farm people on the nature of the cooperatives and their responsibilities to them.⁵

Many of the farmer cooperatives are suffering from the same kind of problems that the churches and schools in rural communities have. At present combination and integration of units seems to be a partial solution to the changes necessarily taking place in agriculture.

FARMER ORGANIZATIONS

Farmer organizations which function as pressure groups first came on the American scene about the time of the Civil War. These organizations were primarily concerned with the four major income problems of agriculture which prevailed at that time. These were: (1) the high cost of farm commodities as against the price farmers received for farm goods, (2) the differential freight rates and the treatment of farmers in the transportation of agricultural products, (3) the inequitable treatment of the farmer in the halls of the legislatures and (4) the problems of agricultural credit.

To be effective in agricultural adjustment as well as in other areas of effort, a pressure group must have three characteristics: (1) It must have competent leadership; (2) it must have a high and stable level of membership; and (3) it must have an ample and free two-way communication between leaders and members. The soundness of a democratic pressure group is based on the assumption that people if given the facts can make better decisions for themselves than others can make for them.

Farmer organizations in the past have held to a traditional organizational structure. It may be that in the future, because of the declining numbers of farmers and because of the changing nature of agriculture and the diversified interests of rural people, they are going to have to develop new local units. These units may have to be based upon a functional organizational basis rather than upon geographic distribution.

The organizations must decide whether they wish to include a broad spectrum of membership with the widely diversified interests—including rural but nonfarm members and others—or whether they wish to limit their membership primarily to full-time farmers.

OTHER COMMUNITY ORGANIZATIONS

Other organizations and institutions which are inevitably being changed by the changing conditions in the community and agricultural economy are the independent community organizations such as the business houses.

One of the problems which small businesses in the smaller communities have faced is the fact that, with increased transportation and with changing emphasis on industrial operations, the smaller villages have declined

⁵ For greater elaborations see: Beal, George M., Fessler, Donald R. and Wakeley, Ray E. Participation in farmer cooperatives. Iowa Agr. Exp. Sta. Res. Bul. 379; Beal, George M. Roots of participation in farmer cooperatives. Part 2. Iowa State College Bookstore, 1953; Beal, George M. Are farmers satisfied with their co-ops? Iowa Farm. Sci. 9: 739-742. April 1955; Bohlen, Joe M. Changes in knowledge and opinion of business and professional people about cooperative associations. Unpublished Ph.D. thesis. Iowa State College Library, Ames. 1954; Bohlen, Joe M. Farm folk—town folk opinions of cooperatives. Iowa Farm Sci. 10: 51-52. Sept. 1955; Harp, John. Factors related to participation in cooperatives in Iowa and Manitoba. Unpublished M.S. thesis. Iowa State College Library, Ames. 1956.

in population. Also because of the increased size in farms and the lower farm birth rate, it means that there are fewer and fewer rural people living within the trade area of these communities. These fewer people have much better transportation facilities than they had in the past; they can go to a larger center where more specialization can be had in the services which they desire.

Small grocery stores, the small independent hardware stores, general stores, and men's and women's clothing stores of the typical small Iowa community now have to compete with the larger more specialized business houses of the county seat town. They no longer have the advantages which were gained from monopoly of position in the days when people were restricted pretty much to shopping in the area in which they lived.

The local merchant who has a relatively small volume of business cannot operate on the markups that are being used by his larger competitors who make their incomes on the basis of a rapid turnover of inventory. The larger grocery store markets are operating effectively on net margins as low as 0.75 percent, whereas the country grocer who has perhaps $\frac{1}{10}$ as many turnovers of inventory in a given fiscal period must take much higher margins to make a decent living. This means that he is in a poor position to compete and finds that his potential customers are going elsewhere for their goods and services.

Inability to meet price competition of the larger competitors on the part of the merchants and a desire for a wider variety and a wider range of selection on the part of the consumers has already spelled the death-knell for many small-town businesses.

In the past, when transportation facilities were limited, people associated together in a community on the basis of the fact that they lived there and were located there. At present, patterns of association seem to be more on the basis of what we would call special interest. This means that people associate with whom they wish on the

basis of likes and dislikes, and there is less tendency to form tight-knit community organizations with strong loyalties built up within and around them. This means that people have the tendency to go where the services are what they want rather than to participate in services which are offered in their community because they happen to be offered in the community.

The changes in rural communities have reflected through the years the changes that are taking place in farming. Those rural communities whose centers contained less than 1,500 population at the turn of the century have been continuously and steadily losing population since. In the days of the team and wagon, many of these small centers provided a vital service to the farm people living about them.

Many of the functions which are performed in the small communities are performed at an added cost to farm people; they appear in the form of over-competition, in the form of duplication of functions and in the form of providing inadequate products at excessive costs. These businesses are, in many instances, existing on their reserves and are gradually dying out. In a democracy, this is necessarily the pattern if entrepreneurs choose to make decisions on other than economic bases. It is neither the function nor the right of people or a government to remove the businesses and economic activities that prevail in the communities on an inefficient basis.

The rural community of tomorrow is going to be larger, it's going to offer more specialized services, it's going to have to offer the kinds of institutional programs in the way of church, school, farm organization and cooperatives which are geared to meet the needs of a different kind of competition than has prevailed in the past. Those organizations which take an active role in attempting to adjust to the changes which are inevitably coming about because of the shift in agriculture are the ones which will survive in this rapidly changing rural world.

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