Chapter 9

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Economic Potentials of Agricultural Production

FACTORS AFFECTING physical potentials of crop production were indicated by Dr. Nelson and others. These physical potentials have related both to land now used for crops and to additional land that could be brought into use if needed. For crops, this chapter is confined to the question of economic potentials associated with improvements in technology on land now in use. On the value of product side, the same potentials per-unit area of land may well apply to much of the new land that could be brought into production. On the cost side there would, of course, be an annual charge on the capital investment needed to bring new land into production through drainage, clearing, land forming or other necessary operations. Some factors influencing livestock potentials are included also.

CHANGING TECHNOLOGY AND ECONOMIC POTENTIALS

Apparently, economic potentials of land now used for some crops will be adequate to meet projected needs from approximately 1960 to 1990. The magnitude of some of our surpluses would seem to indicate that this is true. For other crops, it may not be true. Some crops respond more than others to changes in technology. For example, our technical experts expect less gain in yields per acre of soybeans than has occurred for many crops, as a result of adoption of current or envisioned technology. In contrast, we have seen what has happened to the size of the corn crop, mainly through plant-breeding efforts and application of fertilizers. The big breakthrough associated with the shift from animal to mechanical power and the substantial continuing improvement in mechanization have made major contributions to increased output of all crops. Mechanization has made it possible for more of the specific technological opportunities to be realized by a higher proportion of commercial farm operators on more acres.

Perhaps we will see even greater gains from application of new technology to forage production than has been the case for corn. These gains will be in realized yields per acre, whether harvested or pastured, and in still further improvements in methods of handling forages to increase vastly the quantity that the labor of one man can transform into edible product. The tremendous yields of coastal bermuda grass in the Southeast and the high protein content of the crop attained through use of nitrogen fertilizer suggest possibilities in filling the gap between current production and projected needs for forage in areas where it is adapted. Harvesting and utilization of the phenomenal yields attainable, however, present some problems.

If we have some crops that do not respond to technological improvements, substitutes are likely to take their place. Plant forms that cannot respond to new technological opportunities are likely to give way to alternatives. Some of these alternatives will be of natural origin, that is, other crops. Others may be synthetic.

OTHER FACTORS AFFECTING ECONOMIC POTENTIALS

Economic potentials in crop production are in large measure a function of technological change. They are also functions of managerial competence, available capital, adequate supplies of needed inputs and, of course, factor product price relationships. We could, of course, go further and say that these potentials are a function of the demand for farm relative to nonfarm products. In the long run, at least, mobility of human resources permits an adjustment to changes in this relationship, and this affects the quantity of output that is economically feasible to obtain from farm sources. In this book we are dealing partly, at least, in long-time terms. I mention the possibility of this substitution of nonfarm for farm products because it is difficult for our projectors of future needs to make quantitative allowance for significant shifts that might occur in this direction. As with our potentials estimators, our needs projectors may sometime become uncomfortable in the presence of their thought progenies. The remedy for this is to have frequent reappraisals as new factors appear and to improve projection techniques through better understanding of physical-economic relationships. So I do not rule out the possibility that relative change in demand for farm and nonfarm products, which might come about partly through synthetic substitutes for some items currently farm-produced, may render obsolete any list of quantities of items that we might now say describe our economic potentials. The matter of estimating the rate of population growth far into the future may be even more hazardous than that of estimating future crop yields.

NORMATIVE AND PREDICTIVE ECONOMIC POTENTIALS

Economic potentials have different time dimensions. We can estimate them in terms of the present, and some projected future technological setting. We choose a factor-product price level and relationship that we think appropriate, and set up the assumption that there will be adequate supplies of inputs and of available capital. Then, if our appraisal of economic potential is to be predictive in aggregative terms, we must take into account the item of managerial competence.

This means that we must not only find the economic potential per acre at different points on a surface that has been widened to include envisioned technology; we must predict the rate of adoption, which will be conditioned in part by the number of farmers operating at different managerial levels at specified points in time. I use the term "managerial level" rather than "managerial competence" because there will always be some farmers who for one reason or another choose to operate at both a level and a scale that is below their competence. We have all heard of the farmer who resisted a new idea suggested by the county agent by saying: "I don't farm now as well as I know how."

At any particular time, present or future, there is a wide range between output per acre and total output among different sizes and economic classes of farms. So we need to estimate future trends in importance of different components of the farm plant, each of which has its own physical and economic potential. This type of forward estimating is as important as projecting future yields per acre, if we are to predict economic potentials. With reference to physical yield potentials as they influence economic potentials, we seem to be in a flowtide of improving technology, so that 20 years hence (by 1980), operations may be cast on a plane as much higher than the present as the present is above the level of the early forties. This process of technological change is not reversible. Barring some major catastrophe that would destroy modern civilization, and assuming the kind of price-cost relationships usually used in making long-range projections, there is no ebb tide.

Past trends reveal a major increase in size of farm. This has been accompanied by unprecedented technological developments. Although extrapolation of past trends could not be expected to describe the degree of future development, there is little doubt that there will be further substantial increases in size of farm. The apparent potential for further advances in technology offers a solid basis for such a conclusion.

I have taken a quick look at trends in cropland harvested from farms of different sizes — those having less than 100 acres of cropland, those with 100 to 259 acres, those with 260 to 999 acres, and those having 1,000 acres. For the smaller of these groups, the declining trend since 1935 has been drastic. Slightly less than 78 million acres of cropland were harvested on these farms in 1935. By 1955, this had declined to about 40 million acres, a reduction of 38 million acres. In the group harvesting from 100 to 259 acres of cropland, the decline amounted to about 16 million acres. These two groups combined represent a total decline by 1955 of about 54 million acres from the 1935 level of about 199 million acres harvested from these farms.

In contrast, the gain in total cropland harvested during this period, from farms of 260 to 999 acres, was about 52 million, and the gain for farms having 1,000 acres or more of cropland was 39 million acres. Thus, the total gain in cropland harvested from farms of the two larger size groups was 91 million acres. This compares with a total decline of 54 million acres for the smaller farms. Thus, the net gain was 37 million acres, which brought the total to about 333 million acres of cropland harvested in 1955.

A simple extrapolation of trends in cropland harvested for the farms in the two larger size groups (260 to 999 and 1,000 acres or more) would indicate about 237 million acres by 1980. The rest of the cropland acreage to be harvested would then be from farms with less than 260 acres. The 1955 census shows a total of 333 million acres. If this were taken as the base, the extrapolated acreage for the two larger size groups of farms would account for about 70 percent of the cropland harvested. In 1935 these two groups accounted for approximately a third of the acreage harvested then.

The trend in numbers of commercial farms by economic class has been documented.[1] I have arranged them into three major income groups with value of sales at 1954 prices of (1) $250 to $2,499, (2) $2,500 to $9,999 and (3) $10,000 and over. The number of farms in the lowest income groups declined from about 2.4 million to less than 1 million from 1939 to 1954, a drop of

[1] Jackson V. McElveen, "Family farms in a changing economy," USDA, Agr. Info. Bul. 171, March, 1957.

57 percent. Numbers in the second group declined by 82,000 farms, or about 5 percent. But the number of farms having value of sales of $10,000 or more rose from 312,000 to 583,000, an increase of about 87 percent.

In looking to the future, Bachman projects that by 1975 the average volume of sales per farm, in 1954 dollars, could be expected to rise to nearly $17,000 per farm. This would be an increase of about 124 percent over 1954 sales per commercial farm as reported by the census.[2]

In constant dollars, and assuming continuation of current trends in numbers of farms, average investment per farm in land, buildings, livestock and machinery is projected to rise from $34,000 in 1954 to $68,000 by 1975. The number of commercial farms is projected to 2 million by 1975.

These projections are not intended as predictions, but they are undoubtedly in the direction of what will occur. As such, they have a bearing on the economic potential in crop production. As the number of farms and the harvested cropland in farms, large in both acreage and income, will no doubt rise substantially, while the smaller farm component is likely to decline, we can expect a more rapid rate of adoption of improved technology in the future than in the past. Improved management and more capital associated with larger farms should increase this rate, and as a result a higher proportion of the total farm output will probably utilize improved technology in the future. On this basis, future yields per acre will be higher than would be projected if no change in the relative importance of different components of the farm plant were assumed. In areas in which more technology can substitute profitably for land, operators with sufficient capital and managerial ability would tend to use their capital to adopt yield-increasing technologies, as well as to enlarge units, in an effort to achieve the optimum balance for maximum total returns.

From work now being undertaken, it is hoped to develop in a few areas some estimates of the acreage of each major crop to which different projected yield levels could be assumed to apply. This is in conjunction with development of an estimated technological yield surface, from which appropriate yield estimates can be drawn. As the "package" making up each point selected will be known, corresponding return-cost ratios can be established. Also, a "normative" solution can be developed for the characteristics of a farm for each of specified income levels

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[2] Kenneth L. Bachman, "Prospective changes in structure of farming," presented at the 36th Annual National Outlook Conference, Nov. 18, 1958, Washington 25, D. C.

based on technical coefficients reflecting return-cost ratios for enterprises adapted to the area. This will involve use of coefficients appropriate to the production situations applicable to different scales of operation. The "predictive" part then becomes a matter of estimating expectancy as to number of farms and number of acres to be operated at different technological levels. This type of approach by relevant areas needs looking into in any thoroughgoing forward-looking appraisal of economic potentials in agricultural production. It should contribute to increased consideration of the economics of changing technology, its impacts where adopted and some predictions of its rate of adoption, so that an appreciable amount of quantifying that will reflect this aspect of the problem can be done.

SOME QUANTITATIVE ESTIMATES OF ECONOMIC POTENTIALS

I assume that in using the term "economic potential," all of us think of what would be economic to individual firms, considering the problems of risk, uncertainty, capital position and managerial level. This, of course, is a lower potential than might be economic to society as a whole in case of a national emergency. In an emergency situation, the public need might dictate use of general powers to effect allocation of more resources to certain lines of agricultural production than would be allocated by unaided individual firms. But the estimates of economic potentials presented here reflect decisions that would be profitable to farmers under other than emergency situations.

Economic potentials are largely determined by opportunities for increase in yield per acre. Different estimates of yield potentials have been developed. None of us who are associated with any of them is particularly satisfied with them. As researchers approach the job area by area and utilize the best local information available they should be able to improve them substantially.

An estimate of economic potential has greater meaning if measured against economic need. Here again, there are different levels. The one used here relates to the medium level population projection of 244 million by 1980, as indicated in a recent committee report.[3] The projected requirements assuming this population level, divided by the yields in Table 9.1, would suggest the acreage needed. The projected yields indicated in Table 9.1

[3] USDA, "Land and water potentials and future requirements." A report to the Senate Select Committee on National Water Resources, Washington, D. C., Dec., 1959.

Table 9.1. Projected U.S. Average Crop Yields With Acreage Requirements for Medium-Level Needs for 1980, With 1957-59 Average Yields and Acreage

Crop	Unit	1957-59 average yields	Projected yields per harvested acre[a]	Acreage: Needed at projected yields	Acreage: 1957-59 average
				(1,000 acres)	
Corn	Bushel	50.2	57	81,456	76,843
Cotton	Lbs. lint	440	539	19,812	13,522
Tobacco	Pound	1,552	1,453	1,882	1,118
Sugarcane	Ton	23.5	---	300	289
Soybeans	Bushel	23.8	27	19,704	22,382
Dry beans	Pound	1,187	1,377	1,637	1,489
Peanuts	Pound	1,092	1,451	1,688	1,488
Potatoes and sweetpotatoes	Bushel	264	369	1,394	1,688
Vegetables	Ton	4.8	6.1[b]	2,932	3,624
Fruit	Ton	2.5	3.1[b]	8,696	4,210[c]
Grain sorghum	Bushel	33.9	37	10,297	17,244
Wheat	Bushel	23.6	25	51,480	50,073
Oats	Bushel	39.9	44	38,250	31,656
Barley	Bushel	29.6	37	20,784	14,994
Rye	Bushel	16.6	20	1,500	1,624
Rice	Pound	3,235	4,300	1,535	1,447
Hay	Ton	1.65	1.90	78,421	71,939
Total crops		---	---	342,585	316,162
Pasture		---	---	111,835[c]	111,835[d]
Total		---	---	453,603	427,105

[a] Projected yields, 1980 — USDA, "Land and water potentials and future requirements." A report to the Senate Select Committee. Washington, D.C., 1959.
[b] Average of estimated yields of selected vegetables and fruits.
[c] Average requirements same as 1954 average based on yield projections for 1980.
[d] 1954 pasture acreage includes cropland pasture in all regions and permanent open pasture in humid regions.

were prepared in collaboration with a committee of scientists in the Agricultural Research Service. They indicate yields considered probable by 1980, with continued adoption of presently known technology under a set of assumed economic conditions.

However, in discussing economic potentials, considerations previously indicated, plus some others I shall present, suggest a basis for somewhat higher yields than those mentioned. For some crops, my estimates of economic potential yields based on certain assumptions as to changes in extent and intensity of improved technology, are similar to the published projected yields.

But there are some differences, most important of which are concerned with three crops — corn, wheat and hay — which account for rather large acreages.

I offer four reasons for yield estimates which in the main are somewhat higher than those heretofore projected: (1) The trend to larger farms will mean a higher rate of adoption of new technology in the future; (2) generalized estimates of yield response to fertilizer, with some improvement in other technology, would seem to justify somewhat higher yield estimates; (3) the probability of new developments now unknown or in the earliest experimental stages that would provide some addition to estimates based on the first two reasons; and (4) anticipated further geographic shifts in production of some crops. For example, some further shift of acreage of grain sorghums to the Corn Belt fringe might be expected.

Part of the basis for estimating somewhat higher-level yields may be found in previously published material relating to the economics of fertilizer use.[4] So far as fertilizer use is concerned, an estimate of the economic potential by 1980 requires an assumption as to the proportion of the acreage to be fertilized. In 1954, 30 percent of the acreage of all crops including permanent pasture in the humid areas was fertilized. In my estimates of the economic potential yield level for crops generally, the corresponding figure projected to 1980 is 52 percent. Greatest increases projected compared with 1954 are from 60 to 90 percent for corn, from approximately 30 percent to 40 to 50 percent for small grains, and from 10 to 40 percent for hay. These projected changes account for most of the difference in proportion of the acreage fertilized assumed, compared with 1954.

Corn is the dominant crop as to both acreage and fertilizer use. A yield of about 25.5 bushels without fertilizer was estimated. With 90 percent of the crop fertilized, generalized estimates of response indicate about 64.5 bushels per acre harvested. This would mean a yield of 68.8 bushels per acre fertilized. Using the generalized average yield function for corn based on a level of other technology that is probably lower than that now followed by the more progressive farmers, this yield would be associated with a marginal return to fertilizer of about $2. This estimate is based on a price level somewhat lower than that used in calculating volume of production per acre in the report to the Select Committee. At the rate of application associated with this yield, a ton of plant nutrients would substitute for about 5.1 acres.

[4] D. B. Ibach and R. C. Lindberg, "The economic position of fertilizer use in the U.S.," USDA Agr. Info. Bul. 202, Washington, D. C., Nov., 1958.

The cost of a ton of plant nutrients was calculated at about $240. Thus, the variable cost per acre at which the marginal return to fertilizer would equal average return on all costs would be $47.06 ($240/5.1). But $20 of this would be cost of fertilizer, leaving $27 for other costs. United States average variable costs per acre other than those for fertilizer are currently estimated at $23. Some items of other costs may be expected to rise during the 1960's and 1970's; of course, the effect of larger scale operations may reduce costs of land preparation, tillage and harvesting. But new technology that would include some of the items mentioned in other chapters will bring about added costs. Other things being equal, a rise in total discrete variable costs would require more fertilizer and higher yields to maximize average returns.

If allowance is made for the effect of a reasonable improvement in technology during the 1960-80 period on fertilizer-yield relationships, it is clear that the corn yield projected would be reached at a lower rate of fertilizer than would be needed to maximize average return on all variable costs. Farmers without serious capital limitations, of course, could well afford to fertilize for still higher yields.

Hay is one of the crops for which yields are expected to gain substantially from improved technology. Assuming that 40 percent of the hay will be fertilized by 1980, a yield of 2.4 tons per harvested acre seems not unlikely as an economic potential. This would mean a yield of 4 tons per fertilized acre. With other technology at present levels comparable to that for corn, the rate of fertilizer associated with a yield of 4 tons would result in a marginal return to fertilizer of about $2.25. A ton of plant nutrients would substitute for about 7.9 acres. A ton of plant nutrients used on hay was calculated to cost about $218. Thus, the variable cost per acre at which the marginal return to fertilizer would equal average return on all costs would be about $27.60 ($218/7.9). Of this amount, $16 would be for fertilizer, leaving $11.60 per acre for other variable costs. This means that even today, farmers on the average would fertilize for a 4-ton yield to maximize average return unless their variable costs other than fertilizer were $11.60 per acre or below. The estimated 1960 United States average variable cost other than fertilizer for a 4-ton yield of unirrigated alfalfa is estimated to fall within a range of $22 to $30 per acre, depending on the method of harvesting.

The average yield of vegetables per harvested acre in 1954 was 4.2 tons. But the yield of 5.9 tons on the acreage fertilized represented a marginal return of about $6 to fertilizer. To obtain a yield of 8.4 tons per harvested acre would require a yield of 9 tons per fertilized acre (80 percent of the crop fertilized) at which the marginal return to fertilizer would be about $2.65, assuming about present average management. The rate of fertilizer required for this would equalize marginal return on all costs, if other costs were about $70 per acre. No United States average data are available on variable costs per acre of vegetables generally. However, some 1957 data from the Northeast indicate that for processing tomatoes yielding 13.5 tons, variable costs per acre other than fertilizer would amount to about $225 per acre. The return per dollar of these costs would be about $2.20. The expenditure per acre for fertilizer was about $43.

These examples suggest that if we have appreciable gains in technology other than use of higher rates of fertilizer, economically potential yields may be materially higher than the projected yields included in Table 9.1. I have developed estimates of economically potential yields for each crop included in Table 9.1. In addition to the crops mentioned, I suggest that a yield of 45 bushels for grain sorghums may not seem too high as an economic potential. Probably the potential gains from existing hybrids have not yet been fully reflected in harvested yields. Also, as mentioned earlier, further shift of this crop to the Corn Belt fringe should result in an increase in average yield. Response of grain sorghums to fertilizer in the nondry areas is similar to that for corn. Additional moisture-conserving practices may be expected to result in increased yields of grain sorghums and wheat in the dry-farming areas where grown. These considerations, together with comparison of 1957-59 average yields with those projected (Table 9.1) and a look at yield trends for some crops, may lead some economists and some natural scientists to consider the latter a bit on the conservative side.

I have indicated, in the main, the crops with economically potential yields that I estimate to be appreciably higher than projected yields. Without going into further detail, acreage requirements for the medium-level output requirements for 1980, assuming such yields, would be about 392 million acres of cropland (including cropland pasture in all regions), plus permanent open pasture in the humid regions. This compares with the 454 million acres needed at projected yields and the 1957-59 average of 427 million acres shown in Table 9.1.

On the conservative side, it should be pointed out that constant war must be waged on the "protective" research front. New diseases and pests and development of immunities of present ones to some of the newer control measures present problems for plant breeders, agronomists, soil scientists and chemists. But there seems little reason to doubt that protective research can safeguard the gains made and maintain the base for further advances.

EFFECT OF NEW COMBINATIONS OF TECHNOLOGY

In the examples given, it was pointed out that the economic position of fertilizer use on a crop would be strengthened as other yield-increasing improvements in technology were adopted. An illustration of the effect of such adoption may be helpful. The illustration used is drawn from one stage of a joint effort on macro-analysis of soil and crop technology, between the Farm Economics Research and Soil and Water Conservation Research Divisions of the Agricultural Research Service and the Georgia Agricultural Experiment Station. The illustration relates to the effect of supplemental irrigation on corn yield response to fertilizer in the Georgia Piedmont area. The corn is grown in a rotation with coastal bermuda grass. The effects indicated in this illustration should be considered as preliminary and subject to revision after further review of yield response estimates by technical specialists.

Table 9.2. Corn: Expenditure for Fertilizer to Equalize Returns on Variable Costs (Class II Land, Georgia-Piedmont)[a]

Unirrigated		Irrigated	
Expenditure per acre for fertilizer	Variable costs/Acre (excl. fertilizer)	Expenditure per acre for fertilizer	Variable costs/Acre (excl. fertilizer)
(Dollars)		(Dollars)	
6.92	5.11	7.47	1.64
9.98	6.61	10.51	1.71
13.07	9.33	13.60	2.45
16.22	13.71	16.74	4.03
19.42	20.26	19.92	6.66
22.45	28.57	23.13	10.60
25.91	42.57	26.37	16.17
29.19	60.21	29.67	23.72
31.78	78.35	32.92	33.84
		36.22	47.01
		39.53	63.97
		43.11	85.37

[a]Preliminary — subject to further review.

The lower curve of Figure 9.1 is based on estimates of yield response, assuming the level of technology practiced now by the more progressive farmers. Reading along the abscissa, if varible costs per acre excluding fertilizer are $20, an expenditure of a little less than $20 per acre for fertilizer would be required to

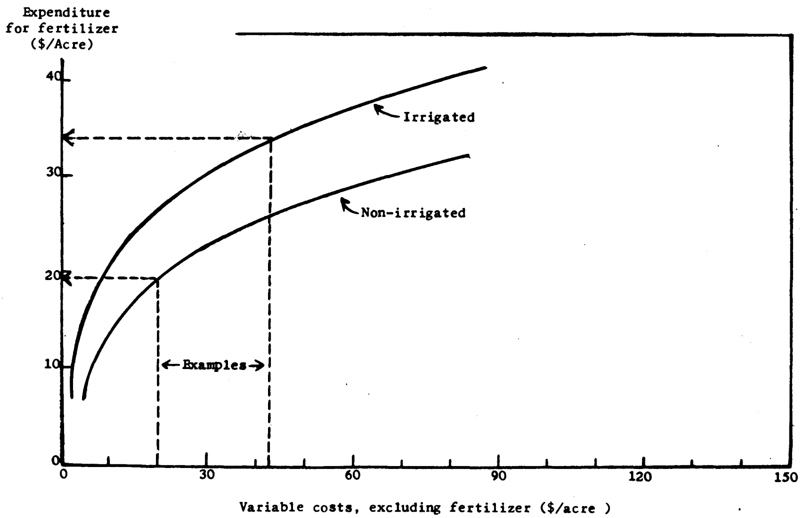

Fig. 9.1. Corn: Expenditure for fertilizer to equalize returns on variable costs (Class II land, Georgia-Piedmont).*

* Preliminary — subject to further review

maximize average return on total variable costs. Most profit will be made on a given investment for producing the crop at that expenditure per acre for fertilizer. This expenditure per acre would represent a minimum, even for farmers with limited funds. At this expenditure, the marginal return to fertilizer ($2.30) is the same as the average return on the other variable costs.

As improved technology is adopted, represented by the top curve in Figure 9.1, the minimum expenditure for fertilizer is increased for two reasons. First, there is a complementary effect from use of irrigation with fertilizer. This fact alone would increase the expenditure needed to maximize average returns. Second, there is an added cost for most practices that substantially increase yields; certainly this is true in the case of irrigation. As other variable costs rise, greater expenditure for fertilizer is needed to maximize the average return. In this illustration, other costs would be increased to about $43 per acre, and this would establish an expenditure of about $34 per acre for fertilizer for maximum profit on the investment made in producing the crop.

As farmers become more aware of optimum combinations of new technology for limited as well as unlimited capital situations, we can expect rates of adoption to be stepped up and hence an acceleration in the trend toward higher yields. This trend will likely be augmented by another trend — that toward larger operating units with more capital at the disposal of their operators.

SOME OTHER POTENTIALS

I shall not discuss potentials in the livestock sector in any quantitative sense. Generally, progress in the feed-livestock input-output relationship has been less pronounced than has been the case with respect to crop yields. Improvements in rations and some improvement in selection of animals for feed conversion efficiency have been made, and there seems to be some prospect for further gains. Specialists in the Agricultural Research Service indicate that feed conversion efficiency for livestock in general may rise from 10 to 13 percent during the 1960-80 period. More widespread use of artificial insemination in livestock generally could accelerate the process of better animal selection and perhaps make present estimates of feed conversion efficiency seem conservative.

The arrangement referred to as vertical integration has been a means of facilitating combinations of capital and management to make spectacular gains in the volume of product one man can turn out. Various predictions have been made as to future developments along this line. When it can greatly increase factor returns, as it has in the case of broilers, this type of arrangement will no doubt be extended.

Perhaps the most spectacular gains by innovators (aside from vertical integration) has been in the handling of materials and products on the farm. These new methods permit great savings in labor and, in many instances, marked reductions in the capital investment in facilities needed per unit of output. In dairy production, savings in both capital investment and labor, made possible by use of new designs of building and milking facilities, represent one of the truly major gains. The loose-housing barn and the herringbone design of milking arrangement, where adopted, have reduced building and equipment cost per cow by more than 50 percent. Compared with stanchion barn systems found on farms, they have also reduced the number of man-minutes required per cow by 30 percent.[5] If these potential gains are more widely adopted, they will contribute to still further increases in the trend toward greater agricultural output per

[5]Morris M. Lindsey, "Investment costs and efficiency of one-man dairy systems," U.S. Agr. Res. Serv. Farm Cost Situation, ARS43-102, May, 1959.

worker in agriculture. Such new developments in roughage handling as wafering and pelleting are still in the experimental stage. But as they are perfected and become feasible for general adoption, they offer possibilities for further substitution of capital for labor and for increasing the farm output potential.

I have attempted to outline some of the factors by which we might project economic potentials in agriculture. For crop production, I have ventured some quantitative evaluation in relation to projected needs for 1980. By 1965, or perhaps sooner, I may want to alter the picture as presented for purposes of this discussion. American agriculture has the economic potential to meet such forseeable needs as have thus far been projected. I have attempted to sharpen this statement a bit by suggesting that through improved technology and probable changes in scale of operations by individual farmers, needs in 1980 might conceivably be reached with no increase in the acreage used for crops and pasture.

IMPLICATIONS FOR RESEARCH

If this conclusion were regarded as substantially correct, different implications might be drawn from it. One implication that to me would be unwarranted would be that we could afford to slow down on research designed to advance the technological front and allow consumption to catch up with the potential we now have in relation to current needs. There are several reasons why this course would be not only unwarranted, but dangerous. First, research results do not come off the assembly line in a steady stream. A continuous flow of resources must go in to insure progress that comes only as discrete bundles. Results cannot be forecast; usually, they come as more or less unpredictable breakthroughs which have back of them a great deal of hard, routine work. Furthermore, in the long run, only research results can insure the kind, the quantity and the quality of output needed by growing populations in modern society.

But most important for the present and in the short run, we need continued research to enable us to assess potentials and determine resource combinations to meet needs most economically in the less remote future. There is no conflict between technological research and economic research in this regard. There is, however, need for a team approach in a look to the future that will best utilize existing research results and guide future research in both subject matter and geographic areas so that it can make a more direct contribution in meeting the larger economic problems.

No one questions the place of research in long-time terms or in times of high-level need. But technological research results are needed in times of surplus, for use in finding present and potential lower cost resource combinations for levels of output that would clear the market at prices remunerative to farmers. This point has not yet received adequate attention with respect to both development and use of research results or in "selling" research as a need, irrespective of the current economic situation.