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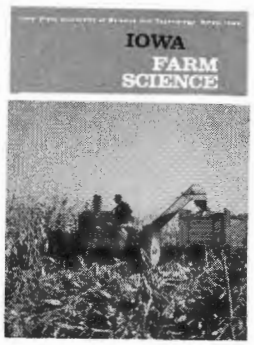
Current prospects point to a smaller feed-grain output this year than a year ago. But Francis Kutish points out that, because of the cutback in hog production, there'll be fewer livestock to feed. At the time this was prepared, it was still too early to size up the extent of the late corn crop problem.




## in this issue



**October Iowa Farm Science Reprints**
(available about mid-month)

FS-884 Why and How Do We Produce So Much?

FS-885 What Governs Farm Land Prices?

FS-886 A "Pattern" for Regional Adjustment

# chat with the editors

"If overproduction is such a big part of the farm problem," your urban neighbor may ask, "why do farmers produce so much? If it depresses farm prices and incomes, why doesn't each farm trim its output?"

The article on the opposite page attempts to answer some of the questions like these. Overproduction isn't all of the problem, but it's hard for some folks to understand -- given the fact that farm production in total is in surplus -- why each farm tends to produce as much as it can. Why can't each farm control its production more like other industrial firms to maintain more favorable prices for its products?

When asked point blank (and also to omit such very real factors as millions of individual farm firms, fixed costs, margins, problems of laying off family and operator labor, etc.), Associate Editor Carol Greiner put it this way: "Because the individual farmer must support himself and his family day by day, week by week and year by year. If he cuts his own output, he simply has less to sell at whatever market prices there are. He can't afford to stop producing or to slow down while waiting for other farmers and the nation to adjust. He must provide an income for family living and attempts to provide as much income as possible under the circumstances that exist."

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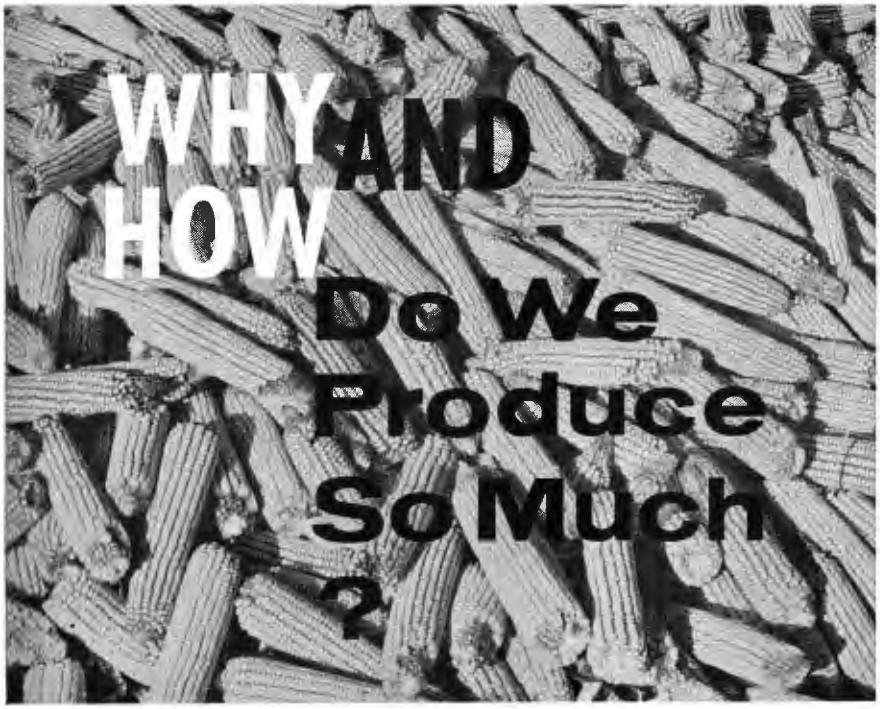


**If our surplus output depresses both farm product prices and farm family incomes, why and how—even in the face of the national forces outlined last month—do farmers and agriculture in total produce so much?**

***by Earl O. Heady and John F. Heer***

OUR FARM production has increased 50 percent since 1940—by 25 percent in the last 10 years. Our grain stocks are almost large enough for 2 years of normal domestic and export needs. How has farm output grown so rapidly? Why?

Last month we looked mainly at the forces operating "outside of" agriculture and their impact on farming (see "What Agriculture Is Up Against" in the September issue or reprint FS-881). We indicated that agriculture's predicament isn't exclusively a problem of agriculture's own making—that it stems partly from the economic growth and development of the nation as a whole. We pointed out that the forces stemming from the changes in our national economy are the ones which tend to dictate agriculture's place and role as a part of the national economy.

We reviewed those forces first since they're less well recognized than a related part of agriculture's predicament — the very apparent surpluses from agriculture's excess production capacity. The fact that farm output is in surplus adds to the impact on agriculture of the forces outlined last month. This month, let's look at the supply or surplus production problem *within* agriculture.

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## Why So Much?

How has agriculture reached its surplus position? With about the same amount of total acres and with a decreasing farm population, the answer, at first glance, looks simple — improved technology. But there's much more than this behind the increase in output and the growth of agriculture's actual and potential productivity.

Before new technology can be put to use, it must be developed, and people who might use it must know about it. And some of the uncertainty about the use of the new technology must be overcome before people are willing to take chances in using it. Other conditions related to knowledge and customs also must be favorable to adoption.

But even then, new technology isn't adopted just for technology's sake—at least not in an economy such as ours. The new technology is adopted by farm operators *if*, and only if, it's *profitable* to use it.

The application of new technology often calls for more or different resources to go along with it. Chemicals used for weed and insect control, for example, tend to increase output. But these chemicals aren't just new technology as such. They're resources or inputs that have to be purchased. And to be adopted, they must control weeds or insects more cheaply, effectively or easily than older methods. Fertilizer, likewise, isn't just a new practice that can be freely adopted or not. It's a material resource, requiring a cash outlay. The same is true of the seed of a new crop variety, a new feed ingredient or mixture, or a new piece of machinery—any of which may help increase yield or replace labor.

There are few important developments in farm practices or technology that, in this day and age, are costless. Adoption, therefore, depends not only on awareness, custom, status, etc., but especially on profitability.

**Must Be Profitable:** To be adopted, a new technique must give or promise a profit. Whether it increases output, does a better job than other methods or substitutes for other resources, the return from adopting a new technique must still be enough to make it worthwhile. The resources used in applying the new technology must be priced favorably in relation to the prices of the products they produce.

Three things are important with regard to the possible profitability of a new technique or practice: (1) the amount it adds to production, (2) the cost of the resources necessary to use it in relation to the price of the output it produces or (3) the cost of the resource in relation to the cost of the other resources for which it may substitute.

Here's an example. Suppose a new practice (or, more exactly, the resources it calls for) is applied as a dose of material and adds 3 bushels to yield or output. If no other costs are involved, it will be profitable if the cost of the material is no more than 3

times the price per unit of output. This is because 1 dose of the material adds 3 units to output. Use of the material would be highly profitable if the dose costs only 2 times the price per bushel of product. If the dose costs, say, $2 and the price of each unit of added yield is $1, the total return is 3 times $1, or $3—a return of $1.50 for each $1 invested.

It's this relationship of the resource or input cost to the price of the output (along with the increased productivity of the practice) that's important in the profitability and adoption of a new technique or practice. Simple arithmetic? Yes. Almost anyone could figure it out in one way or another. Millions of farm operators have. And this basic kind of reasoning goes a long way in explaining why our total farm output has increased so greatly and so rapidly.

**We've Added Resources:** The great increase in our farm output has taken place largely because agriculture has *purchased* and *added* great amounts of inputs or resources from off the farm. These have been added and used along with the land and labor resources already in farming. They've far more than offset the labor migration from farming and have added a tremendous amount of resources and potential productivity to agriculture.

The large and rapid increase in farm output wouldn't have been possible without these purchased and "imported" physical and material resources, some of which have productive power in themselves. But it is by no means just the *knowledge* of new practices that has led to the output increases over the past 20 years. More nearly, it is the putting to use of materials produced in industries outside of farming that accounts for this.

Take away fertilizer, insecticides, power machinery, feed ingredients, etc., and the knowledge of them would still exist. But farm output would drop about as rapidly as it has increased.

**Where From?** The additional agricultural resources coming from what we might call "resource furnishing industries" have made possible the rapid and large increases in farm output. Even such things as hybrid corn seed and special ingredients for feeds are coming less and less from firms producing commodities for consumers in general and more and more from firms specializing in producing resources to be used in agriculture. And these products have had a sizable role in contributing to our farm productivity.

These products aren't just produced for the fun of it any more than the practices and techniques that use them are adopted that way. The fact that they're profitable lies behind both their production and use. Their use is profitable because these products are priced favorably in relation to the farm commodities they produce or help in producing.

**How It Works:** Especially in the past 20 years, the prices of important purchased and "imported" resources have fallen in relation to the prices of the farm products they produce. Accordingly, it has become more and more profitable to use them in spite of the lower farm prices resulting from increased output.

Hybrid corn seed is one example. It was adopted quite early in Iowa. Its cost, in relation to market prices for corn, was less than proportional to the yield increase it gave. Over time, the price of hybrid corn seed has fallen even lower relative to the market prices of farm-produced corn. It was more profitable to use hybrid corn seed in the 1950's than it was in the 30's. From 1935-1939 the price of a bushel of hybrid corn seed averaged about 15 times the price of market corn; today, it's roughly only 11 times.

Fertilizer is an even more striking example. With inflation, the prices of both fertilizer and farm products have increased. But farm product prices increased more rapidly than fertilizer prices in the 20-year period, 1940-59. Even now, with farm prices receding, it takes fewer bushels of corn to buy 100 pounds of fertilizer than in 1939. In the most recent 5-year period, it took only 70 percent as much in farm products to buy 100 pounds of fertilizer as it did in 1935-39. It's more profitable to use fertilizer now than in 1939 or than in the more prosperous war years.

It's true that many more farm operators now know about fertilizer and use it, but the profit incentive and reward also is greater. Farm operators do respond to these price relationships—whether for fertilizer or the many other chemicals and materials that represent additions to our agricultural resources.

Without these additions to resources being purchased and brought into agriculture, we couldn't produce a farm output at today's levels. Farmers might produce more of their own improved seed, though not at as low a cost as they can now buy it. But farmers could hardly supply their own chemical fertilizers, insecticides and pesticides, tractors, other machinery, mechanical livestock equipment and feed additives.

*Some* of the increase in farm output has come purely within agriculture — improved rotations, more timely planting and harvesting dates, etc. But take away the resources now supplied and purchased from outside, and a major portion of our farm productivity increases over the past 20 years would be erased. These resources, however, are available—and most important—generally profitable.

**Why Profitable?** These resources that are bought and brought into agriculture have been favorably priced, and the practices involving their use have been adopted because of two things: (1) The prices of farm products have been high enough for a favorable cost-return ratio. (2) The prices of these purchased resources have been kept comparatively low by technical improvements and competition among the firms that produce and supply them—also contributing to a favorable cost-return ratio.

Technical improvements in the resource furnishing industries are perhaps more the key — through achieving favorable prices — to widespread adoption and use than

the technical improvements discovered in the agricultural research institutions. The latter, in effect, opened up knowledge of a practice and its productive response. The supplying industries helped the practice to become more and more profitable through new technology and distribution methods that kept the cost relatively low.

Added to this are the sales programs of firms selling these inputs to agriculture. They, likewise, are important in calling attention to the materials and the practices in which they're used. Is this an attempt to fix blame? No. To do this, we'd first have to decide that the development, improvement and promotion of something that is and remains profitable—both for the supplying firm and for the individual farm operator who uses it—is "bad" or a "sin." And actually only those things which have, in fact, been profitable have been widely adopted by farm operators.

Can we, then, blame this "individual farm operator?" Not unless the adoption and use of a profitable material or practice is blameworthy in the absence of deception or fraud. Bear in mind, too, that economic progress—the availability of more goods and services per person—comes from the knowledge, development and application of new technologies in *all* industries and the availability of the manpower and other resources to produce them. And there's still more to the picture.

Not all costs in agriculture have fallen or kept low relative to farm product prices. Otherwise, farming wouldn't now be the victim of a cost-price squeeze. Fixed costs in particular have gone up. The cost of labor (a resource migrating from agriculture) has gone higher and higher because of higher wages in other industries. The machines and capital substituting for this labor have sometimes been expensive—but low in cost in relation to the labor they replace.

**Substitution:** The resources purchased and brought into agriculture that we've been talking about have served largely to substitute for both *land* and *labor* in farming. We can now produce our food needs with much less of both than at any time within the past 50 years. Estimates indicate that we could withdraw at least 40-60 million acres of cropland and still easily meet our food needs. Total farm employment already has declined by half in the last 30 years; by more than a third in the past 10.

These substitutions are possible because the nonfarm capital items used in much of today's farm technology replace land and labor in producing a given output. We can produce more with fewer laborers and with fewer acres of land by using these added and substitute resources.

Bags of fertilizer, cans of insecticide, etc., as well as machines and power units substitute for farm labor, freeing it and causing it to seek employment elsewhere. They make it possible to meet our food requirements with fewer acres—or to produce a surplus if we continue the same acreage in field crop production. We've tended to follow the latter course—keeping the land mostly in production and mopping up the surplus in government storage operations. And with current domestic rates of demand and population increasing slower than the rate of our output increase, we're now faced with (1) stepping up the rate at which labor and land are withdrawn, (2) slowing down the rate at which substitute resources are injected into agriculture or (3) opening up new markets.

**Why,** in the face of our mounting surpluses and the national forces outlined last month, do farmers continue to buy and use these added or substituted resources? Mainly because it remains profitable for farm operators to do so in terms of the costs of the resources compared with the prices of the products produced. The cost-price relationships have been favorable—particularly for commodities that have had high price supports and also for some crops without supports.

Thus, the "HOW" of our rapidly increased agricultural productivity *is the rapid increase in the use and substitution of purchased and brought in resources.* The "WHY" *is that these resources have been priced favorably in relation to the prices of farm products produced with them* — low enough to encourage widespread adoption because of their profitable returns.

It isn't the mere knowledge of improved farm technology or its discovery that has affected the burst in farm output. More accurately, it's the addition and substitution of these purchased and brought in resources and the widespread adoption of the improved practices for which they're used. These have been profitable to the firms producing them and also to the farm operators who buy them and use them — notwithstanding surplus production.

While a surplus output depresses both farm product prices and incomes, it hasn't put much of a damper on the use of these still profitable resources and practices that add to output. This is partly because of the competitive nature of farming and its millions of farm firms. One producer himself can't influence the market. If he merely cuts back his own output, he still gets only the going market price per unit and has less income and higher costs than before. But if he boosts his output, he still gets the going market price, and his income goes up—though he'd be even better off if agriculture in total weren't overproducing.

With continued ability to draw profitable resources from "outside itself," agriculture will have a surplus producing capacity for some time into the future. The current problem, and that of the next decade, will be to figure out how to manage this surplus capacity to avoid further depressed incomes and to balance this against the consequences of different courses of action or inaction.

As we mold farm policies and programs for the future, we must consider the forces mentioned in this article, the national forces outlined last month and the economic and social costs and consequences of the proposed solutions.

# What Governs Farm Land Prices?

**Research studies by the USDA and the state agricultural experiment stations have helped to pinpoint the forces that have been operating in the land market, both as to their existence and the nature of their effects.**

***by Melvin G. Blase***

FARM LAND values generally have been rising throughout the past 20 years. The rise continued during the 1950's — even though net farm incomes were dropping in most of the 50's.

What are the factors and forces that have been influencing farm land prices? The same factors probably will continue to influence farm land prices in the future. Research studies by the USDA and the state agricultural experiment stations have helped to pin down the forces that have been operating in the land market, and the nature of their actual effects.

There have been factors with positive and ones with negative influences on farm land prices. Let's look at them classified in terms of the "plus" or "minus" influences that they've had on land values during the past 10-20 years. There's some danger in this classification, however, in attempting to apply it to the future. While the same forces are likely to continue to influence land prices, some of them that have tended to increase farm land values in the past could reverse and become negative influences in the future.

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## "Plus" Factors . . .

Let's look first at some of the general factors that have been at work to increase farm land values:

+ *Inflation psychology and expected future increases in capital value.* These are different but related. Inflation is the upward movement of the general price level without a similar increase in our national productivity. During periods of inflation investors tend to prefer stocks, farm land, and other securities whose prices go up with inflation. The idea that land is a good hedge against expected continued general inflation has given some over-all stability to the market.

During periods in the last 20 years, the value of farm land has increased more rapidly than inflation. This increase in the capital value of farm land has resulted from not only the combined effect of other factors discussed here, but also buyers' faith in the continued upward trend of the market. The effect of these two general, "plus", factors might be summarized thus: People have observed that land has been a relatively good investment in the last 20 years and apparently expect it to continue to be good.

+ *Government programs* have strengthened the land market, though it's not possible to estimate the extent of this strengthening from the data available. Use of short-term programs has given support to the idea that the surplus problem also is of a short-run nature. Many of the programs have been tied to land (or acres) and its productivity. The expectancy that this will continue in the future tends to place a premium on land. Also, there's widespread feeling that the federal government is committed "not to let things get too bad" and will help out with some kind of program—whether it's price supports, a soil bank, a rental plan or something else. This, too, undoubtedly has enhanced the value of farm real estate.

+ *National economic growth*

*and development and population growth.* Even though farm production has outstripped the demands created by these forces, it appears that both have acted to provide bases for higher land prices.

+ *Land "hunger."* This is perhaps an oversimplified term to describe several forces or ideas at work. In the absence of further frontiers, there's the idea that, at least someday, we'll be faced with a land shortage. This, plus the tangible aspects of land as an investment and the idea of the inherent goodness of land, has resulted in this loosely described "land hunger" and desire for ownership among farm people.

These are all general and underlying forces that, in one way or another, have worked either to increase or at least to provide an underlying firmness for land prices in the past 20 years. While it's difficult to estimate the extent of the influence of any of these factors, the *direction* of their influence is more certain. Some of these involve psychology as well as fact. A change in psychology could turn the direction of their influence the other way.

Now let's turn to some of the more specific forces that have had an influence on increasing farm land prices during the past 20 years:

+ *Demand for farm enlargement* is by far the chief specific force currently in the upward pressure on land prices and is related to or has a bearing on the following factors. More and more farm sales involve farms or tracts of land to be added to existing farms. The force here is mainly economic as individual farm operators attempt to achieve a more efficient "mix" of resources — spreading their management, labor, machinery, etc. over more acres.

+ *Entry into agriculture.* This is related to the first factor. As average farm size increases, there are fewer opportunities for prospective farm operators. Those seeking entry tend to bid up the price of land along with the efforts of established operators to enlarge their existing farms.

+ *Nonfarm investors.* Purchases of farm land by nonfarm investors has traditionally been regarded as an important factor in the land market. But the relative importance of this phase of demand is questionable on the basis of the evidence available. Its influence undoubtedly has been positive to some degree, but it's doubtful if a reduction in this demand would have much influence in forcing land prices downward.

+ *Financial position of older operators.* This seems to be related to the forces of farm income mentioned later. Apparently many older operators—as the result of good incomes in the late 40's and early 50's—are in a favorable position to compete in the land market for farm enlargement. Another way of looking at it: Many of those who recognize the need for farm enlargement are in a favorable position to do something about it and aren't, on the other hand, forced to sell because of weak financial position.

+ *Land for nonfarm uses.* The demand for farm land to be converted to nonfarm uses is of only slight importance in total. But it has been an important force in localized areas, particularly in areas of concentrated urban and industrial expansion.

+ *New technology and resources in agriculture* have tended to reinforce the rise in land prices in two ways. (1) They have made it possible for one family to profitably handle more acres, thus contributing to the demand for farm enlargement. (2) Because of accounting difficulties, the return from new technology and capital resources is often "credited" to land as such. Land, of course, must be credited for its capacity to absorb added inputs productively. But the added technology and resources have made the productivity possible. Fertilizer, improved machinery, improved crop varieties, etc., for example, have helped to make formerly unproductive soils suitable for many profitable farming operations.

+ *Changes in methods of land transfer* have had some positive influence on the increase in land prices. Low-equity financing, such as purchases with land contracts, as one example, has made it possible for some buyers to enter the market and add to the effective demand who couldn't have done so in the absence of low-equity arrangements.

+ *Fewer farms for sale.* This factor more or less follows as the result of increasing average farm size. The demand for farm enlargement continues as farms, meanwhile, become fewer.

## "Plus" and "Minus" . . .

+ and — *Farm income* could be expected to have a major influence on farm land prices. But, at least during the past 20 years, it has been subordinated to or "drowned out" by other factors. Favorable farm income (when present) during this period seems to have added emphasis to the upward pressure on land prices. But the land price rise continued also in years of unfavorable farm income. While erratic in effect in the short run, the influence of farm income may be "lagged" and may be much more pronounced and important in the long run—given extended periods of either favorable or unfavorable farm income.

+ and — *Weather.* The influence of good and bad weather has been something like that of favorable and unfavorable farm income —erratic. But the influence of weather on land prices during the period appears to have been both more immediate and more localized. Like farm income, an extended period of unfavorable weather could have a much more pronounced effect in the area(s) concerned.

## "Minus" Factors . . .

Now let's consider some of the specific forces that have tended to decrease or retard the rise in farm land prices during the past 20 years:

— *Higher interest rates.* There seems to be little question that higher interest rates had some

downward influence on land prices. The forces of this influence and of the following "minus" factors simply have been much more than offset by the "plus" factors during the past 2 decades.

—*"Tight money"* has had about the same kind of influence as higher interest rates in keeping some buyers off the market.

—*Uncertainty about government programs,* despite the positive force of government programs generally, shows up in some research results as one of the factors tending to retard the increase in land prices in recent years. The extent of its influence on land prices isn't known, but this uncertainty has been with us in the past and is likely to continue in the future.

## Can We Predict?

No — especially when it comes to specific tracts of land. Here, with the general land market as a base, buyer and seller "make their own deal." Taken all together, however, the weight and number of the "plus" factors indicate no immediate or serious break in farm land prices.

But remember that the "plus" factors outlined are classified by the over-all influence they've had in the past 20 years, and some could become "minus" factors with a major change in psychology. The best bet is to consider each of the factors on its own merit and in relation to the others. As to possible changes in mass psychology, your guess is as good as ours. This article merely outlines some of the factors that research has tied down as having some influence—positive, negative or erratic—on land prices during the past 20 years.

Regardless of the causes of the increase in land prices, there is one other observation to make: The rise in land prices, now coupled with decreasing farm incomes, is tending to make it increasingly difficult to pay for land from farm income. This, in turn, tends to increase the pressure to use the land in the most efficient resource combination possible.

# A "PATTERN" for Regional Adjustment

**Since a land-retirement type of program on a regional basis is among the possibilities for overcoming surplus farm output, an analysis has helped to determine an approximation of how such a program might work.**

***by Alvin C. Egbert and Earl O. Heady***

TO OVERCOME the surplus problem, it's likely that most of the adjustment will have to be in land—at least in the short run and, perhaps, even in the long run. One way or another, enough land will have to come out of crop production to curtail our rapidly increasing surplus stocks.

The other main alternative would be to expand demand rapidly enough to use all that agriculture can produce as well as to absorb surplus stocks. But it appears that little short of a miracle could cause demand to expand this much. Improving demand—while it has some merit as a much longer-run solution — just isn't likely to handle our problem within the next 10 years or more.

Many types of production control programs have been suggested: production quotas, an expanded soil bank or conservation reserve with land in all regions taken out of production, land retirement on a regional basis, land-use easements, marketing quotas and many others.

All of these proposals need careful consideration to find out which would be best for holding output in line with demand over the next few years. We need to know several things about each of them—their cost; their acceptability; the burdens placed on communities; their fairness to producers who participate in them; the extent to which, as short-run policies, they contribute to the long-run problem, etc.

Considerable research is underway at Iowa State on the various types of production and supply adjustment problems. Such studies are difficult and time consuming to provide sufficient detail for all of the different areas of the country. Progress in research methods, however, permits analyses for the country as a whole. This article reports on the results of our analysis of one of the al-

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ternatives — regional land retirement. We don't have all of the answers yet. But the results so far are useful in getting a "first picture" of one of the types of adjustments which might be made in supply and output.

Our analysis indicates that a land-retirement program based upon regions could be used to accomplish three things:

- To bring wheat and feed-grain production in line with demand;
- To reduce surplus stocks of grain; and
- To keep production and demand in balance in the future.

## Why Regional?

A regional approach to land withdrawal—as opposed to a single national "across-the-board" approach — recognizes existing differences among the various areas of the nation. Some areas are more suited to producing certain crops than others; some areas, in other words, have a greater comparative advantage for certain types of production than do others.

The idea would be to adjust production by regions so that the nation's total output would equal demand and not pile up stocks. Our research method indicates, in general, which regions would produce certain crops — if demand were met so that land in a region with the greatest comparative advantage for a crop were used in producing that crop.

We chose wheat and feed grains for this analysis. These crops are the most pressing segments of our present surpluses. Their total value makes up about 45 percent of average farm income, and, in 1957, the realized cost of farm programs dealing with these grains amounted to about 1.6 billion dollars. Production of these grains is spread throughout the United States. So they're especially useful in showing some of the kinds of possibilities involved in regional adjustment.

## Regional Production . . .

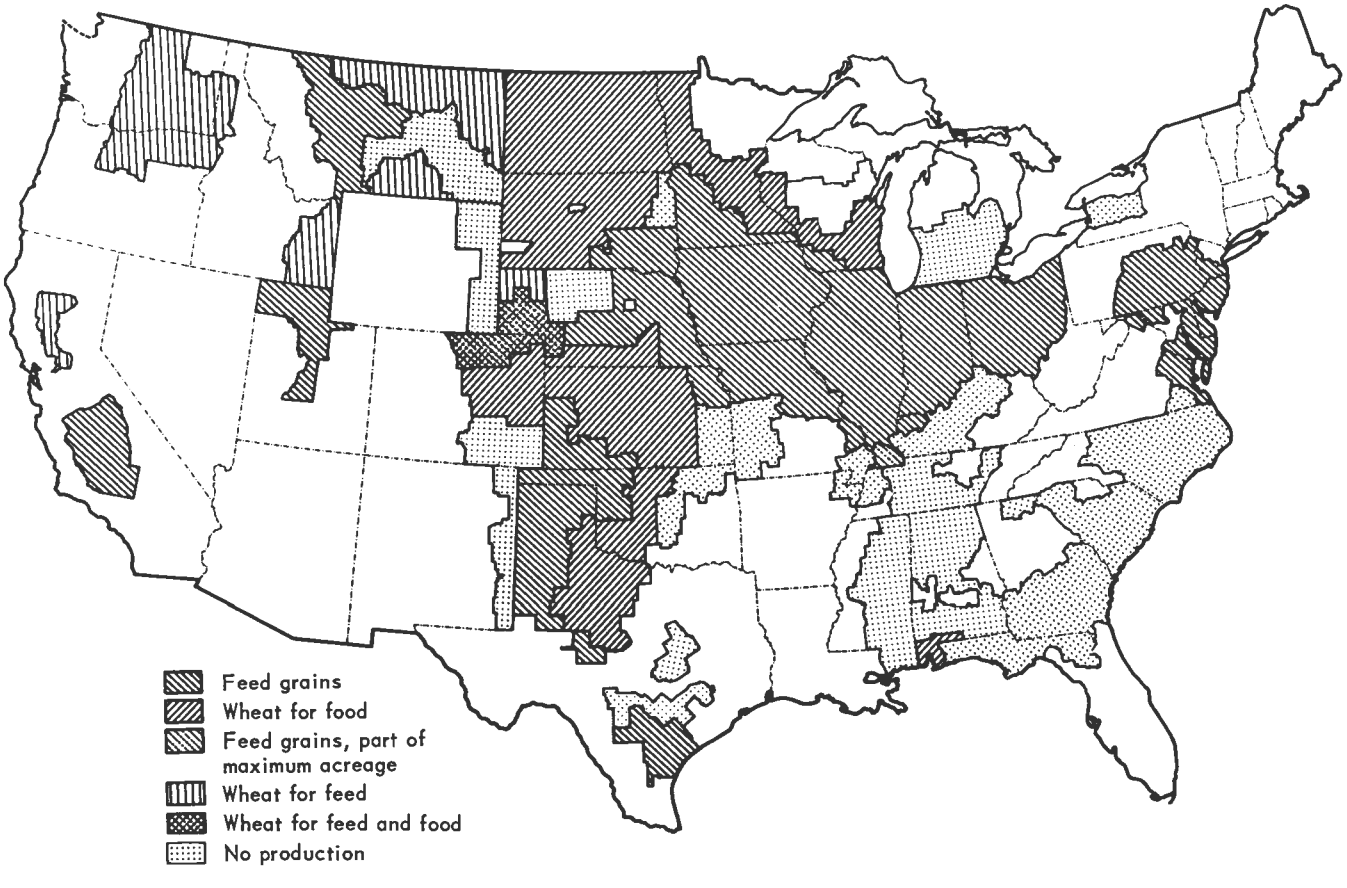
The method for specifying a regional grain-production pattern to balance production with demand uses the idea that there's a wide range of grain production costs in different parts of the country. Thus, if production is to be brought in line with demand and if agricultural resources are to be used efficiently, most of the contraction in grain production would take place in the "marginal" regions of higher production costs.

The general objective for specifying a regional production pattern for an efficiently balanced grain economy is this: to locate similar grain-producing regions that would produce normal wheat and feed-grain requirements at lowest cost.

We made several analyses to find the group of grain-producing regions that could produce annual grain needs most efficiently. First we found the set of regions that could produce the necessary grain at minimum total cost. Finally, we determined which set of regions could meet wheat and feed-grain needs with farm families as a group receiving maximum net returns.

## The Results . . .

The results of our several anal-



yses weren't greatly different. But the maximum net return pattern probably is the most realistic (see map).

The dark-shaded regions are the ones that would ideally stay in production of wheat and feed grains if production were to equal annual use and be produced most efficiently. The lighter-shaded regions are of less comparative advantage not presently needed to meet the nation's wheat and feed-grain demand. These are the most likely areas where grainland would be removed from production and used for nonsurplus production in an effective regional adjustment program. About 30 million acres normally are used for wheat and feed-grain production in the lighter-shaded areas.

About 20 million acres of land normally used for grain production were expected to be in the conservation reserve program in 1960. These 20 million acres, however, are scattered throughout the country—not concentrated in particular regions as under a regional withdrawal program. Even so, we'd expect that roughly twice that many acres would have to come out of production before wheat and feed-grain production would come into balance with annual use. This would be a sizable additional adjustment.

## Only Approximate . . .

The regional pattern shown in the map represents mainly a "first approximation" of a possible regional program to balance production with demand. Our data wasn't complete enough for a "this-is-it" plan. We weren't, for example, able to remove from our data all of the influences of past and present farm programs. For another thing, we used average production costs to represent all farms in an entire region. Certainly some farms within the higher-production-cost regions (lighter shading) are competitive and would continue in grain production.

These and a number of other aspects, such as resource reorganization on individual farms, would need further study to pinpoint production changes necessary under a long-run regional adjustment program.

## For Long Run?

Three distinct parts would have to be considered for a regional grain adjustment program for the long run. The first is the balancing of annual production and use. The others are (1) getting rid of surplus stocks and (2) the impact of additional production technology, population shifts and changing demand patterns over time. Our analyses aren't yet complete enough to show specifically how a regional approach could include the latter two points, though they do indicate one method of attack.

Grain stocks could be liquidated through a relatively simple extension of the regional adjustments for balancing supply and demand. Some decision would have to be made first on the rate at which the stocks should be worked off. Given this, the method would be to temporarily shift some of the grainland in the darker-shaded areas to other crops not in surplus. Once the stock disposal rate was decided, relatively little further analysis would be needed to pinpoint sub-areas for this purpose. As grainland in these sub-areas was withdrawn from production, excess stocks could be marketed without depressing prices.

The amount put on the market each year would vary because of annual variations in yields. But the essential point would be to achieve the goal of no surplus stocks at the end of a relatively short period. Then, producers in the sub-areas temporarily shifted to nonsurplus crops would resume grain production.

Judging from past history, it's reasonable to expect that, for some time to come, fewer and fewer acres will be needed to meet normal annual demands for wheat and feed grains. If so, there'd be a need to keep the regional pattern up to date.

Also, improved production techniques wouldn't necessarily be neutral with respect to regional production advantages and disadvantages. A new, more efficient harvesting machine, for example, might be usable in some areas but not in others. Thus, a region in a poor competitive position under present conditions might become highly competitive virtually overnight.

Population shifts, too, could improve or worsen competitive positions; the cost of shipping grain from producing to consuming centers often exceeds the cost of production.

## In Brief . . .

The results of this study suggest that a regional grain production adjustment program offers one means of bringing and keeping feed-grain production more closely in line with demand. Such a program is one of a number of alternatives of a land-retirement nature. The main disadvantage of a regional approach is that it would concentrate the burden of adjustment on particular regions.

We've also studied land-retirement approaches (1) with land withdrawn equally over the country and (2) with no more than 25 percent of the land in any one region withdrawn. Either of these two types of programs would call for higher public treasury costs, but they wouldn't place so much of the burden on particular regions.

The objective of our research and analysis along these lines is to examine, appraise and/or develop alternative approaches which might be used in both the short and long run to overcome our surplus farm output problem. For land-retirement programs in general, we found that the number of acres required and the public cost depends (1) on how the program is spread over the country and (2) the farm price level to be achieved by controlling the supply.

All of the proposals being made need to be examined, analyzed and understood as fully as possible before a choice is made. It's important to be reasonably certain that a program will do the job intended and that it isn't so short-sighted as to give only temporary relief but further complicate the situation in the future. And the social and other consequences must be considered as well as the economic ones.

# For your Interest

## farm buildings and equipment

### *Study Methods of Seeding Oat-Grass-Legume Mixtures*

THERE ARE MANY different methods that can be used to seed field crops. Which method, however, can give the highest stand and the highest yield? To try to find the answer to this question, seven different ways of planting a mixture of oats, orchard-bromegrass and alfalfa were compared by agricultural engineers at the Experiment Station. The methods were:

1. Oats drilled 1½ inches deep. Orchard-bromegrass mix dropped on the surface from fertilizer hopper. Legume on surface from legume seedbox. Followed with corrugated roller.
2. Oats drilled ¾ to 1 inch deep. Orchard-bromegrass mix in fertilizer hopper and drilled to the same depth. Legume from legume seedbox dropped on surface. Followed with corrugated roller.
3. Oats and orchard-bromegrass mix drilled ¼-½ inch deep (drill "floated"). Legume on surface. Seeds in same hoppers as above. Followed with corrugated rollers.
4. Entire mix of oats, bromegrass, orchardgrass and legume seed drilled 1 inch deep. Rolled with corrugated roller.
5. Same mix drilled ½ inch deep. Rolled with corrugated roller.
6. Same mix dropped on surface with drill. Rolled with corrugated roller.
7. Same mix dropped on surface. Not rolled.

The seeding mixture per acre was 50 pounds oats, 5 pounds bromegrass, 3 pounds orchardgrass and 8 pounds alfalfa.

Preliminary results show that stands were highest for oats and alfalfa under method 2, lowest for oats and alfalfa under method 7. Yields for oats were highest under method 4, lowest under method 7. These results are just for 1 year of trials, however, cautions D. R. Hunt who directed the study. Results may vary under different seasonal conditions.

### Will Automatic Tractor Steering Beat Fatigue?

TRACTOR ROW-CROP cultivation is one of the most tedious and demanding jobs in crop production. The resulting operator's exhaustion may cause damage to the crop and unsafe machine operation — in addition, of course, to operator discomfort.

One suggested way of cutting down operator fatigue is to use an automatic tractor steering device. Agricultural engineers at Iowa State, in cooperation with the Psychology Department, tested such a steering device to see its effects on fatigue and to learn more about ways to measure fatigue.

Two operators were used; each man operated the tractor a full day on manual control and the next day on automatic control. The men kept the tractor speed constant for all tests. The final results, reports Donnell Hunt, were exactly opposite in nature for the two operators—that is, one operator seemed more fatigued at the end of the day when using manual steering, while the other operator was more fatigued when using the automatic steering system.

This study, though preliminary, indicates that a person's attitude or emotions will affect his feelings of fatigue when he's using the automatic steering device.

### Not Much Effect On Crop Moisture From Corn Topping

THERE'S NO REAL difference in the rate of field drying of corn when the corn is topped. This conclusion is based on results of a 2-year study on corn topping conducted by agricultural engineers at the Experiment Station. In general, report the engineers, there seem to be no differences in stand, losses or lodging between topped and untopped corn. The gross yield, however, tends to be low if the corn is topped too early.

In harvesting tests with topped corn, the combine had the least harvesting losses of the machines tested; the picker had the most.

### *Test Usefulness of One-Step Threshing-Chopping Cylinder*

A CYLINDER mechanism has been developed to thresh and chop forages and small grains in one operation. This device has been tested by Donnell Hunt and coworkers at the Experiment Station. They found that it's possible to use the cylinder in a combination machine which can harvest both small grain and forages. According to Hunt, up to $370 can be saved in yearly costs if the combination machine replaces the two individual machines.

## soils

### What Has Soil Type To Do With Corn Yield?

ESTIMATES of average corn yields for different soil types are necessary for any worthwhile agricultural planning program. Agronomists at the Experiment Station are trying to develop such estimates from yield information

Basin terraces are built to protect farmland against the runoff from steeper slopes above. But it's necessary to establish vegetative cover on the areas disturbed by construction. Note rilling on the unprotected area at left. Researchers at Iowa State are trying to learn more about the fertilizer requirements for establishing and maintaining cover. Notice the unfertilized area in photo at right.

provided by farmer-cooperators in 10 Iowa counties.

Preliminary results show that yields in recent years were high in most counties. The exceptions were in Harrison and Hamilton counties in 1959 where lack of fertility limited yields in many fields and in Clay County where moisture deficiency limited yields in both 1958 and 1959.

In general, yields on soils of below-average productivity were about as high as those on soils of above-average productivity. Weather conditions generally were good, and this helped reduce yield differences among various soils. Inadequate stand levels limited yields in a high percentage of the fields, particularly in western and southern Iowa where stands generally were low.

This research is under the direction of Lloyd Dumenil of the Experiment Station.

### *Seek To Establish Vegetation on Basin Terrace Areas*

MANY BASIN terraces are being built every year in connection with watershed development projects. These terraces are constructed below areas of 20 percent or steeper slopes to keep runoff water from flowing across farmland and harming soil and crops. Vegetation must be established and kept up on areas disturbed by construction; otherwise, terrace channels can fill with silt in one season of intense storms.

Alfalfa furnishes quick cover if it is fertilized properly. If seeded during the first 10 days of April, it will usually give enough cover to protect the soil from heavy June rains. If alfalfa is seeded later than this, it's a good idea to seed oats with it. On many areas where basin terraces are built, 200 pounds of $P_2O_5$ per acre are necessary to establish a vigorous stand of alfalfa.

Since these areas will be pastured, many farmers object to using alfalfa because of the bloat problem. Thus, even though it's desirable in a grass mixture for quick cover and as a source of nitrogen during the establishment period, no special effort is made to keep alfalfa in the stand after the second or third year.

So establishing and maintaining grass become very important. It's difficult to keep a sufficient grass stand to protect steep slopes from eroding. Smooth bromegrass is always used for reseeding because the seed is readily available and inexpensive and the seedlings are vigorous and spread well. It requires high fertility, however, and becomes unproductive after the alfalfa disappears unless it is fertilized.

Experiments are being conducted by W. C. Moldenhauer and co-workers of the Experiment Station to discover the fertilizer requirements for establishing vegetative cover on areas disturbed during construction of basin terraces. The researchers also hope to find the best grass species to use—something easy to establish and maintain under heavy grazing with as little fertilization as possible.

### How Many Operations Does Tillage Take?

HOW MANY mechanical operations are involved in preparing a seedbed? This question is important since the number of operations adds to the cost of the tillage method used.

Research directed by W. G. Lovely and W. E. Larson of the Experiment Station and the USDA shows that the conventional method usually involved about eight operations; mulch takes six; plowed ridges, seven; unturned ridges, six; hard ground listing, four; and wheel-track, five.

But there are many other factors to consider besides the number of field operations — such as cost of equipment, power requirements and timeliness. This is pointed up by the fact that while the field operations for wheel-track are less than for some other tillage methods, the factor of timeliness may make some of the operations more expensive because

they must be done at busy times during the season. Nevertheless, wheel-track, mulch, listing and ridging are usually all cheaper than the conventional seedbed preparation method of plowing, disking, harrowing and surface planting.

### *What Management Practices Are Being Used on Corn?*

A RECENT TEST of corn yields on 191 sites in 10 Iowa counties gave valuable information on the management practices being followed by Iowa farm operators. To predict possible corn yields for different areas it's important to know which new methods are being followed and which aren't.

The study showed that in the various countries, 14 to 16 percent of the fields were fertilized, 7 to 48 percent were manured and 48 to 70 percent were in second-year corn or more. Few operators used two methods of fertilization — though a hill or row fertilizer plus applications of N, P or K fertilizer are strongly recommended. In most cases, the fertilizer used was either broadcast or applied with a planter attachment. Little side-dressing of nitrogen was done.

Management practices for insect and weed control were also examined. Insecticides for corn rootworm were applied on 0 to 30 percent of the fields in the various counties. Borer control was rarely used, but there were less borers than usual during the period. In most counties, 2,4-D is widely used for controlling broadleaf weeds.

The effects of soil conservation and nonconservation practices on corn yields will also be studied, reports Lloyd Dumenil of the Experiment Station.

## home and family

### What About Marriages Involving Mixed Religions?

SOME characteristics of brides and grooms who enter into cross-religious marriages, plus other factors associated with such marriages, are under study by Lee Burchinal of the Experiment Station in cooperation with the Iowa Division of Vital Statistics. Their findings so far show that about 80 percent of the Protestants in the study who claimed a church affiliation married church-affiliated Protestants; for Catholics marrying Catholics, the figure was 63 percent.

There were more cross-religious marriages among both brides 17 years old and younger and brides 30 years of age and older. The smallest number of cross-religious marriages involved brides aged 21 and 22. This was true in the case of both Catholics and church-affiliated Protestants. More cross-religious marriages involved grooms of low social status than of high status.

Also under study are the frequency of remarriages and the connection between cross-religious marriage and residence patterns, age differences between spouses and the country in which the marriage occurred.

### Consistency of Starch Products Examined

A STUDY OF the effects of freezing on foods containing starch is underway at the Experiment Station. The way the ice crystals pierce the gel and the way the gel leaks liquid when it's thawed are being examined. An attempt is being made to learn the carbohydrate composition of the liquid which leaks out of the gel.

This photo shows the surface of a frozen corn starch pudding used in an Experiment Station study of the effects of freezing foods containing starch.

E. Madge Miller is in charge of this experiment.

### *Try to Predict Teaching Success*

HOW GOOD a home economics teacher will today's college freshman make? Hester Chadderdon here at the Experiment Station hopes to be able to predict this to some extent. Such information would be helpful in counseling young people as they plan their college studies.

With the cooperation of the State Department of Public Education, a series of tests is being developed which will give a basis for forecasting a student's teaching ability.

### *Study Effects of Mother's Job on Children*

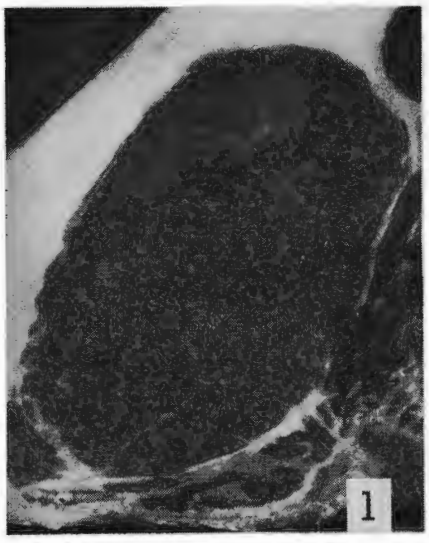
IS THERE A relationship between mothers holding outside jobs and the personality development of their children? This is the question that Lee Burchinal and Arthur Wilkie of the Experiment Station hope to answer.

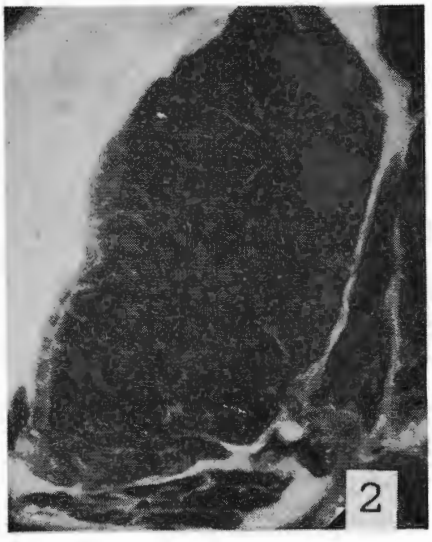
Questionnaires were given to all seventh grade and eleventh grade children in the Cedar Rapids schools to measure personal and social adjustment. Additional questionnaires were sent to the children's parents.

Though much work is still to be done, the study thus far shows only a slight relationship between employment of mothers any time during the first 6 years of the children's lives and the emotional adjustment of these children.

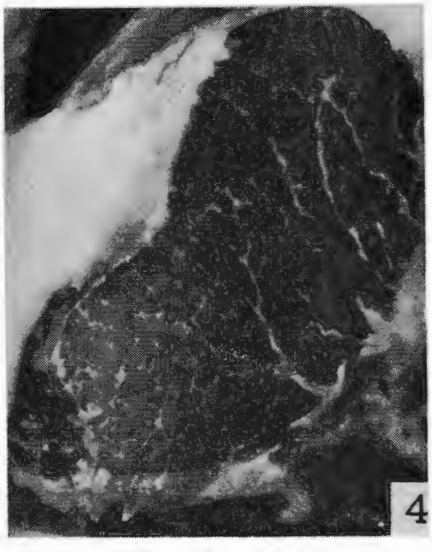
### *Expanding Role for Uncooked Turkey*

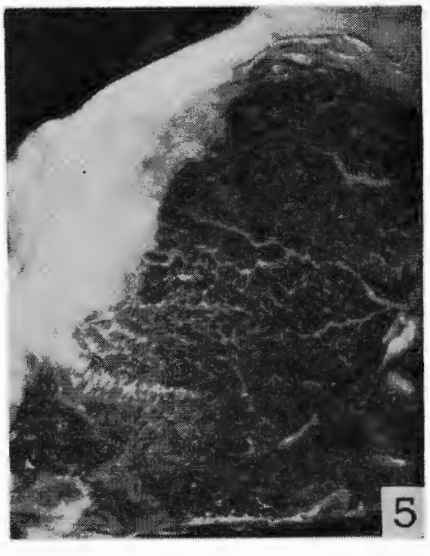
USING UNCOOKED turkey in making timbales for large quantity food service would give a greater number of timbales and also save labor and equipment. In an Experiment Station study directed by Grace Augustine and Dorothy Blemmer, a panel of six judges rated timbales prepared with uncooked, roasted and stewed turkey. They judged the light and dark meat separately for aroma, flavor, tenderness and juiciness.








**These pictures show the standards used for assigning marbling scores in studying the relationship between backfat thickness and marbling in pork chops.**

1. Slight marbling
2. Moderate-minus marbling
3. Moderate marbling
4. Moderate-plus marbling
5. Abundant marbling

Their findings indicate that the timbales made with roast turkey had a more intense aroma but were less juicy than those made with uncooked turkey. This was true of both light- and dark-meat timbales. The timbales made with stewed turkey had a more intense aroma than those made with uncooked turkey and a more intense flavor than those made with either uncooked or roasted turkey. The differences were greater for those timbales made with dark meat. Timbales made with uncooked turkey were rated highest in tenderness and in juiciness than those made with either roasted or stewed turkey.

Through these experiments and findings, it is hoped that recipes may be adjusted so that uncooked turkey will give as good results for aroma, flavor, tenderness and juiciness as does cooked turkey.

These studies were made to examine how different preparation methods affect yield, preparation time and quality. Researchers now hope to see how quality is affected when light- and dark-meat turkey rolls are roasted in aluminum foil at different oven temperatures.

### Is Marbling Related To Backfat Thickness?

FINDING THE relationship between marbling in pork, backfat thickness, chemical composition and eating quality is the object of a study by Frances Carlin and coworkers of the Experiment Station.

Pork chops, roasts and hams are being studied. So far, only the results for chops are complete. They show that:

1. Total cooking losses of ½-inch thick chops are not affected by backfat finish.
2. During braising of loin chops, losses from evaporation decrease and dripping losses increase with increasing finish.
3. Fat yields of raw or cooked rib or loin chops increase with increased carcass finish.
4. Lean yields in raw or cooked rib chops decrease with increased carcass finish.
5. Chops from higher finished carcasses usually have more marbling.
6. There are no differences in flavor, tenderness or juiciness of braised ½-inch pork chops that result from backfat thickness of pork carcasses.

It is hoped that through these studies of marbling it will be possible to tell whether marbling can be predicted from backfat thickness.

# Farm Outlook...

THE GENERAL ECONOMY has moved along a fairly high plateau this summer--with areas of both strength and weakness. But the combined gross national product has risen mainly because of consumer spending for nondurable goods and for services.

It now appears that we're heading into a period of business slow-down--the extent of which we can't evaluate today. But it's not likely to seriously depress farm demand next year.

Inventory reduction by businesses is expected to be the rule in early 1961. This is in contrast to the last 2 years when most business firms were increasing their inventories. Increasing inventories is a business-expanding force; inventory reduction is a business-contracting force. Some decline in investment by business firms in new factories and equipment also is likely in 1961.

So, unlike the past 2 years, 1961 is not likely to produce any expansion in the demand for farm products.

FEED . . .

Late summer prospects pointed toward a somewhat smaller total feed-grain output than last year. But, because of the cutback in hog production, there'll be fewer livestock to feed. Present indications point to some further accumulation of feed-grain supplies in CCC hands in the coming year. But it's not likely to be as great as in the past year.

The late corn crop may cause problems this fall. Many fields are in danger of being caught by frost. Oat prices have been high compared with corn and will probably continue this way. The steady drop in oat acreage has brought oat production below current needs, and the carryover is being cut materially.

Total supplies of protein feed are expected to continue at current levels in the coming year. Another big crush of soybean meal is in prospect. If there's a heavy sale of soybeans at harvest, a situation could result where the price of meal would be depressed. Be on the lookout for any chance to stockpile protein feed at favorable prices this fall.

SOYBEANS . . .

The soybean crop will be large again this year. Summer estimates pointed to a crop slightly larger than 1959's big crop of 539 million bushels. Carryover of old crop beans will total about 40 million bushels this fall.

Soybean exports have been going up steadily and probably will total near 140 million bushels in the coming year. Opinions differ about the possibilities of exporting soybean oil, but the odds are that exports will be down slightly from last year because of larger world stocks. Demand for soybean meal is affected by the total number of livestock produced as well as by a continuing increase in the rate of feeding. In total, demand for soybean oil will probably be a little lower than in the year just past.

Soybean oil at 8-9 cents and meal at $50-$55 wholesale at Decatur will return a soybean price of near loan level to Iowa farmers. But the price of soybeans also is determined by the attitudes of people who trade in the soybean market. So it's hard to forecast a seasonal price movement for soybeans.

Farmers held soybeans last fall, and most didn't make money on their holding. If the market is supplied with plenty of soybeans during the fall harvest season, there's a distinct possibility of a market run-up sometime during the winter or spring because of speculator

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attitudes. With soybeans at loan level, farmers can use the loan as a hedge on farm storage while awaiting the possibility of a winter price bubble in soybeans.

HOGS . . .

Summer's price peak for hogs came the first week in August--dropping sharply for the rest of the month as receipts mounted and the packers struggled to work off the large accumulation of hams, bellies and other pork products that they put into storage last winter. And the larger supply of beef on the market offered competition for the consumer's meat dollar.

Thus, hog producers have had disappointing August hog prices for 2 years in a row. In a normal hog cycle, we could expect another drop in hog production to show up in the 1961 spring crop. This could be expected if hogs were to follow their recent history of a 4-year cycle, and prices this summer probably have been disappointing enough to cause the production pattern to follow the 4-year cycle. This means that hog production in 1961 is likely to be at a level that will make hogs a more profitable market for corn than selling the grain for cash.

CATTLE . . .

Movement of cattle into feedlots this summer was slower than a year ago. It reflected a slower movement off of the range and very little early contracting by feeders. This adds up to an ample supply of feeder cattle in the next few months.

Slaughter in 1961 is likely to show another increase over 1960. We're at the stage of the cattle cycle where marketings will be increasing--with the prices, in turn, drifting lower. A further decline in the fed cattle market of $1-$3 is likely in 1961--depending on how much marketings bunch up, what happens to business and how weather is on the range.

The seasonal pattern of fed cattle prices for the last 3 years has been for the price peak to come in the first part of the year. This is different from earlier years when the yearly peaks more often came in the fall. The conditions which prevailed in the last 3 years will probably prevail again in 1961.

SHEEP AND LAMBS . . .

The number of stock sheep and lambs on farms and ranches at the beginning of 1960 was slightly over 29 million. This represented an increase of 4 percent over numbers at the beginning of 1959 and an increase of 8 percent from the low of 3 years ago. Sheep numbers apparently are increasing again this year, but the increase probably will be slight and will come mainly from farm flocks in the native states. High labor and other fixed costs are reducing the number of large sheep operators in the West.

The 1960 lamb crop is estimated at about 21½ million head--an increase of 2 percent. Most of the increase was in Texas and Wyoming. The favorable returns from lamb feeding last year may encourage feeders to put more lambs on feed this fall than a year ago. Feeding lambs for the late winter market has been the most profitable in recent years.

--Francis A. Kutish