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Farm management adjustment to wartime price and demand 1939 to 1942

Wallace Elmer Ogg
Iowa State College

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FARM MANAGEMENT ADJUSTMENT TO
WARTIME PRICE AND DEMAND 1939 TO 1942

by

Wallace E. Ogg

A Thesis Submitted to the Graduate Faculty
for the Degree of
MASTER OF SCIENCE

Major Subject: Agricultural Economics

Iowa State College
1944

Signatures have been redacted for privacy
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INTRODUCTION

War has always caused tremendous increases in the demand for food. Naturally some food needs increase faster than others, and during a war demands shift. If farmers are to make their fullest contribution to a nation's war effort and if they are to take advantage of the demands for highest profits, it means rapid adjustments. Also, if the readjustment to peacetime demands is not made, financial disaster may result.

Farmers in the Iowa Farm business associations have thus far been making very rapid adjustments. Principally because of an abundant feed reserve in the area this is especially true of the Northwest Iowa Farm Business Association. As an illustration, in 1941 when farmers of Iowa increased the number of pigs raised 11 per cent and the farmers in the five Iowa farm business associations increased the pigs raised about 25 per cent, farmers in the northwest association increased the pigs raised 38 per cent. For this reason and because of the author's intimate knowledge of the northwest association, it was chosen for a study of wartime adjustments.

1 The Northwest Iowa Farm Business Association includes the ten northwest Iowa counties of Lyon, Osceola, Sioux, O'Brien, Plymouth, Cherokee, Buena Vista, Sac, Ida and Woodbury. Almost all this area is in the Western Meat Production type-of-farming area on the Missouri loess soils.
In the years since the war started in 1939 the farm management staff in Iowa has been attempting to help all farmers in Iowa to adjust their production to meet the nation's needs and at the same time to take advantage for high profits of the strong demands for food. The farmers in the farm business associations have been accustomed to use outlook. They have developed confidence in it and have the managerial ability to make adjustments indicated by the outlook. The time span required for agricultural production requires an early shift if changed demand is to be met. The association farmers as a group adjusted early.

Good outlook information reduces economic uncertainty. It makes possible more accurate anticipations of future prices. The farm management staff has attempted to help farmers, first, with good outlook, and second, by helping them to adjust to meet the increased demand, shift as it shifted, and to readjust as and if demand declines following the war.

A study of what has actually happened in this association may shed some light on what shifts in resources and what changes in techniques are involved. It may give some indication of what is involved in shifting and readjusting to meet the changing demands of the war and the possible declines of the peace.

A short review of the suggestions and outlook of the farm management staff and a statement of this anticipation for the future will provide a setting for this study.
Late in the summer of 1940 it became apparent that a tremendous increase in the demand for all food and especially for livestock products was developing. The farm management staff advised that plans be made to expand immediately and drastically hog production on all farms, first, by holding hogs already produced into 1941 to sell at heavier weights, and then to make provision to expand farrowing rapidly. Increased processing of feed through beef cattle and lambs was encouraged, especially where the feed supply and experience of the operator seemed to justify expansion.¹

Through 1941 and 1942 feed was plentiful and the price moderate. A huge reserve of corn was stored by the Commodity Credit Corporation in this area and the farmers in this association had built up tremendous individual reserves of sealed corn. As a result of their records, they also knew a good deal more than the average farmer about what kind of meat animal output to expect from their inputs of feed. Therefore, the continuation of livestock expansion was encouraged, especially in hogs, and where a supply of family labor was available and facilities could be provided or improvised in poultry and egg production. Those years cover the period of the study.

¹The Iowa Farm Business Association Outlook Letter for September 14, 1940. "On the basis of these indicated changes in supplies and in demand conditions, the average Iowa farm price of hogs for 1940-41 marketing year would average between $7 and $8 per hundred weight, compared with $5.50 in 1939-40."

Also Iowa Farm Business Association Outlook Letter for September 21, 1940. "...it may pay to delay hogs that would normally be marketed in late December or January until late February or March."
Early in 1942 it became apparent that livestock feed rather than labor or equipment would be the limiting factor to expansion of food production through livestock. This suggested, first, rising feed costs by 1943; second, the advisability of emphasizing production of only the most efficient kinds of livestock from the standpoint of feed conversion, and third, adjustment of production out of livestock or at least a reduction to avoid disease hazards by some of the more inefficient producers.

In the period just ahead for the duration of the full war it looks as if the only way food needs can be met is by further adjustments in the direction of less food from livestock with more dependence on direct consumption of crops. Certainly this is the only way the production of high protein and fat content foods in Iowa can be increased. If this is the direction demand is to take, then it probably will be most profitable for the individual to adjust in this direction. It would mean still more intensive cropping of the land, more corn and soybeans and still less hay, pasture and oats. This in turn suggests a reduction from present high levels of livestock production and especially in roughage-consuming livestock. In this area of the state it would mean reducing breeding cattle numbers and less cattle and lamb feeding. The pressure to liquidate high value resources while they are high is another reason for liquidating cattle.

If farmers make these adjustments it means that with normal crops they will come into the post-war periods with hog and poultry production
at levels somewhere between the 1940 levels and those of 1943. It means they will not be feeding as many cattle and lambs at the close of the war and that the numbers of breeding cattle will be reduced from the present high.

Looking on into the immediate post-war period several things seem probable. Demand for food probably will decline as unemployment develops and the world relief needs are met. This drop in demand will mean a decline in unsupported prices but only after the food situation is such that we can move away from price controls.

The soil will not stand the intensive production of the war period very long before yields will suffer. A shift back to hay and pasture crops will be needed in this area, much of which is subject to erosion.

It is possible that good land use will permit hog and poultry production to be maintained at about the level reached by the close of the war and that land shifted from soybeans to grass may permit a return to roughage-consuming livestock enterprises.

The price declines mentioned above will, of course, mean serious declines in income. Few farmers, however, expect their incomes to be maintained at near the present war levels. They are not worried about a moderate decline in income if it stops there. They are seriously concerned about losses that may occur, losses serious enough to cause the kind of financial disaster many farmers suffered after the last war.

It is hoped this study may shed some light on how these farmers and others who have made the same kinds of shifts may fare.
There are two sources of loss that may develop from price declines. One is the immediate loss occasioned by the drop in value of the inventories on hand. This is especially disastrous if the inventories are large and are made up of credit purchases. Feeding cattle and lambs and all kinds of cattle breeding stock require a heavy investment in proportion to the production achieved. Thus the risk from this kind of loss is greater in these production enterprises. Hogs do not require a very heavy initial investment in proportion to the value of the production so the risk with hogs from this kind of loss is not so serious. Cash crops, unless held to speculate for higher prices, do not involve very serious risks of this kind.

The other source of loss from a price decline is the loss occasioned by prices dropping so low that all the production costs are not covered. Danger from losses of this kind is especially serious if the previous adjustments have raised production costs which in the short run are fixed. If, for instance, the adjustment was achieved only by the purchase of land, or by entering a long-term cash rent lease, or if to achieve the production adjustment costly permanent improvements had to be added, then production costs might have been raised to a point where, for the short run after a price decline, no adjustments would be possible which would permit the operator to operate at a profit.

As mentioned above, it is possible that this study may not only indicate what shift in resources and techniques took place but may also point the way that these farmers and others like them may make needed re-adjustments. It may indicate how they have protected themselves against economic uncertainty.
REVIEW OF THE LITERATURE

The first three publications reviewed are empirical studies of adjustments in agriculture. The remaining six publications are theoretical discussions of the firm. They are reviewed in the sequence into which they seem naturally to fall.


This is a study of farmers' adjustment to costs in a period of declining demand and price. The data are taken from farm records in Wisconsin for the years 1931 and 1932.

The author points out that since so large a proportion of farm production costs are fixed in the relatively short run, it does very little good to reduce production. Therefore, the costs which tend to be reduced are those costs which will still permit a relatively high level of production. Apparently these farms were so pressed for cash that their time preference rate was very high. Most of the costs reduced would soon begin to reduce net income.

Summarizing the adjustments, they were largely adjustments of costs as follows:

1. Investment costs could be reduced scarcely any.
2. Equipment costs could be reduced only a small amount.
3. Livestock costs were reduced by decisions like dropping out of herd improvement associations and failing to call a veterinarian.
4. Crop costs were reduced materially by some adjustment to more feed crops from cash crops for which there was little or no market and for which seed costs were high.

5. Some savings were made in feed though the level of livestock production was maintained.

6. The largest real saving came in the form of lower returns to labor, especially that of the operator and his family in terms of a lower standard of living.

The implication this bulletin has for this study is in considering the adjustment that may be necessary in the post-war period.

_Farm Adjustments and Income on Typical Corn Belt Farms_, by Wylie H. Goodsell. United States Department of Agriculture Circular No. 883, November 1943.

The circular is a study of the adjustments that have taken place on the typical Corn Belt farms since 1910. The adjustments may be summed up as an upward adjustment both in size of farm in acres and also in volume of business handled.

In summarizing the study several things stand out:

1. The increase in size of the farm in the Corn Belt can be attributed to improved techniques of production.

2. While the size has increased, there has been no tendency to move away from the family unit. In fact, less labor is being used on a typical farm now.

3. The income has gone up with the operator's increased ability to handle more resources.

4. Both the farm families and society have gained from the improved techniques which have enabled Corn Belt farmers to use more resources, the farm family by more income and society by lowered food costs.

In the present study the change shown in this circular will be magnified both because the time chosen and the group of farms involved. It
is a time of rapid adjustment and these farm business association farms are aggressive about making adjustments.

_Trial and Error in Farm Management_, by Albert Mighell. _Iowa Agricultural Experiment Station, Mimesographed Series No. 3703_, April 1939.

This paper is a series of case studies from farm records which are used to illustrate principles of meeting uncertainty with flexibility. The author calls attention to the high degree of uncertainty in agriculture due both to physical and economic forces. He suggests that economic uncertainty may be reduced by good outlook and that technical uncertainty may be reduced by farm records. Farm records are his means of recording trials and errors both on the economic and technical sides.

The author by his case illustrations shows how flexibility involves sacrificing some degree of efficiency. The means suggested for attaining flexibility to meet economic uncertainty is to maintain a cash reserve and the means suggested for technical uncertainty is excess physical capacity.


The sections of this book that deal with the theory of the firm are related to the study at hand. The book is an analytical study of the structure of the firm and of industry. It deals with the forces which tend to determine size in the firm. These forces are technical forces, managerial forces, financial forces and marketing and uncertainty. Problems and costs of growth are considered. The book deals with the
theory of adjustment by the individual firm in the chapters on management, on growth, and in the chapter on risk and fluctuation.

The ideas presented here of the forces at work which determine size in the firm and the conception of the coordinating function of management are basic to a study of adjustments.


The fundamental idea the author presents in this article on the theory of the firm is that it is the need for adjustment which makes the entrepreneur necessary to production. Quoting:

For the function which lends uniqueness and determinateness to the firm—the ability to adjust, to coordinate—is an essentially dynamic function; it is required so long as adjustments are required; and the extent to which it is required....depends on the frequency and the magnitude of the adjustment to be undertaken.

He defines a firm as a "productive combination possessing a given unit of coordinating ability." The "given unit of coordinating ability" is the entrepreneur. The ability of the entrepreneur to adjust to changes in economic and technical data is the "fixed factor" in production even in the long run.
11.


This is a study of the "equilibrium of the firm." According to the author, the notion of anticipations, anticipations of future prices and anticipations of rates of inputs and outputs is fundamental to theory of the firm.

The "optimum business plan" is defined as "that which offers the maximum present discounted net value of anticipated net receipts." He discusses the "business plan" under the assumption that uncertainty is lacking and then as economic uncertainty is introduced he introduces the idea of flexibility with its accompanying costs to meet economic uncertainty. (He does not deal with technical uncertainty). He suggests as means of attaining flexibility, storage, diversification and liquidity.


The author centers attention on the need for flexibility to meet adjustments caused by fluctuations and economic uncertainty. He gives consideration to divisibility and adaptability. He shows that flexibility may be built into a plant by (1) building small fixed units such that they are divisible and thus reduce the variable costs for less than optimum levels of output, or (2) by reducing fixed plant relative to variable costs. This second method of building flexibility into a plant is a matter of substituting resources that are used up in the process of production for resources that are long-lived and must be depreciated.
The author points out that flexibility is not a "free good". One
has to choose, for instance, between a higher level of operating costs
as against depreciation and interest charges plus the risk of fluctua-
tions which may cause writing off as a loss part of the fixed investment.

Theory of the Firm and Farm Management Research, by T.W. Schultz.

This paper directs attention to criticisms which have been leveled
against farm management research. Farm management research has been
criticized, he says, for (1) "not providing a basis for guiding entre-
preneurial decisions when economic change confronts the farmer" and
(2) for not affording a basis for "relating the actions taken within the
farm to that of the economy as a whole." This paper is an attempt to
present a theoretical background for farm management research. The
author takes the theory of the firm as presented by Kaldor, Hicks,
Knight and Hart and orientates it to agriculture.

A good deal of emphasis is placed on the "production plan". This
plan is based on expected prices and expected technical rates of output
for input. The author points out that the divergence between expectations
and realizations represents waste and should be a logical area for research.

Capital Rationing, Uncertainty, and Farm Tenancy Reform, by

This article is of interest to this study chiefly in the contribution
it makes to economic theory where uncertainty and capital rationing are
involved. In this connection the author points out that capital ration-
ing stems from uncertainty. (Hart in the article reviewed above fails to
point this out). He differentiates uncertainty from risk, calling it uncertainty when the range of accuracy of expectations is too great to call risk and put a risk-bearing premium on it.

The losses which may result from capital rationing are a matter for concern in connection with other resources as well as with land. The same principles set forth here for considering capital rationing in acquiring land for production apply, for instance, in making a decision about the purchase of expensive equipment. The difference is in the amount of capital involved and in the time span.
SOURCE OF DATA

As has been indicated above, the data from the tables which follow and upon which this study will depend for basic information were taken from the records kept by the farmers in the Northwest Iowa Farm Business Association for the years 1939, 1940, 1941 and 1942. There are 116 identical farms with complete records for the four-year period.

These farms are not average farms for the area. They are larger in acres and they do a larger volume of business than the average farm of the area does. The land operated is in a better state of cultivation but in other respects is typical of the area; the livestock enterprises are typical of the area, only larger; and the people involved are among the more progressive in the area.

The proportion of renters to owners is quite typical of the area as is the proportion of young and old farmers. They can considerably more capital than the average farmer in the area, and while the proportion of borrowed to owned capital is about typical, they are not limited by capital rationing nearly as much as the average operator. Probably this is at least partly due to their past record of adjustment to technical and economic change.

Adjustments to meet war demands the average farmer made were made sooner by this group, and the extent of the adjustment was greater. Thus they magnify what was happening on the average farm and may be expected to point the way for other farmers using the resources of this area.
CLASSIFICATION OF THE DATA

The war caused few adjustments in Corn Belt agricultural production during 1939 and 1940. These were years of moderate and steady demand and prices. Incomes were good enough so that some retooling was done to offset the heavy depreciation of the depression and drought years. Since few production adjustments took place during 1939 and 1940, these years were taken as the base years.

By the end of 1942 most of the production adjustment was in livestock expansion and the maximum expansion consistent with the operator's judgment had been made on many farms. The adjustment by 1942 was therefore used as the extent of the adjustment.

Since it is not possible to combine all farm production into one total, since meat animal production was adjusted most, and because these are essentially meat production farms, the pounds of meat produced was used as the dependent variable to study the production adjustment. All the farms were divided into five groups based on the percentage that the 1942 meat production was of the 1939-40 average.

In Table 1 farms are placed in the five groups based on the increases of meat output in 1942 as a percentage of 1939-40. This percentage is the first item in the table. The next item is the average total pounds of meat produced per farm for each group in 1942 and for 1939-40. The meat per farm is broken down into pounds of beef, pounds of pork, and pounds of lamb and mutton. This table also contains the pounds of
Table 1. Five Groups Divided by Per cent 1942 Meat Production is of 1939-40 Average Showing Total Meat Production, Beef, Pork, Mutton, Butterfat and Dozen Eggs per Farm for 1939-40 and 1942

<table>
<thead>
<tr>
<th>Per cent 1942 is of:</th>
<th>Meat #</th>
<th>Beef #</th>
<th>Pork #</th>
<th>Mutton #</th>
<th>Butterfat #</th>
<th>Eggs - dozen</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>255</td>
<td>61,700</td>
<td>119,400</td>
<td>21,100</td>
<td>42,300</td>
<td>72,000</td>
</tr>
<tr>
<td>Second</td>
<td>175</td>
<td>56,200</td>
<td>97,000</td>
<td>21,000</td>
<td>32,500</td>
<td>61,300</td>
</tr>
<tr>
<td>Third</td>
<td>152</td>
<td>50,600</td>
<td>92,800</td>
<td>19,200</td>
<td>32,400</td>
<td>56,700</td>
</tr>
<tr>
<td>Fourth</td>
<td>127</td>
<td>48,600</td>
<td>74,800</td>
<td>23,000</td>
<td>26,400</td>
<td>43,900</td>
</tr>
<tr>
<td>Fifth</td>
<td>102</td>
<td>46,500</td>
<td>79,900</td>
<td>27,400</td>
<td>35,600</td>
<td>41,700</td>
</tr>
</tbody>
</table>
butterfat produced per farm in each group and the dozens of eggs produced per farm in each group for 1942 as compared with the average for 1939-40. This table permits a comparison of the farms that increased meat production most with the farms that increased little or none. The table shows in what kinds of meat production the increase was made, and whether the increase in meat production came at the expense of other kinds of livestock production. Preliminary investigation of Table 1 indicates that:

1. The farms with the largest increases were producing somewhat less meat to start with. In fact, they were not producing in as large a volume as any livestock enterprise. In meat production the groups that increased percentagewise had also a large actual increase in pounds of meat produced over the farms that did not increase.

2. All farms increased pork production.

3. All but the fifth group increased beef production.

4. Only the first two groups increased in beef, pork and mutton.

All of the last three groups decreased mutton production. Sheep, however, are a minor enterprise on all but a few of these farms.

5. There appeared to be no significant change in butterfat production.

6. All but the first group increased egg production materially but there seemed to be no indication that the increase was related to the increase in meat production.

7. Summarizing, there is no indication that the large increase in meat production was achieved by a corresponding decrease in other livestock production though there is some indication that the first groups
were in a position to increase production faster since they were at a lower level of production in the base years. If this is true it would be because of the indivisibility of the productive resources. Some of their resources may not have been employed to capacity.

Table 2 has the five groups of farms showing the 1942 meat production per farm as a per cent of the 1939-40 average and the total pounds of meat produced per farm in 1942 compared to the total pounds produced on the average in 1939-40, as was true in Table 1. This table then has for comparison the average acres of corn, soybeans and small grain per farm for the 1939-40 average and for 1942, in each of the five groups.

Table 2. Five Groups Divided by Per cent 1942 Meat Production is of 1939-40 Average Showing Total Meat, Corn Acres, Soybean Acres and Small Grain Acres for 1939-40 and 1942

<table>
<thead>
<tr>
<th>Per cent 1942</th>
<th>Meat #</th>
<th>Corn acres</th>
<th>Soybean acres</th>
<th>Small grain</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>255</td>
<td>51,700</td>
<td>119,400</td>
<td>85</td>
</tr>
<tr>
<td>Second</td>
<td>175</td>
<td>56,200</td>
<td>97,000</td>
<td>77</td>
</tr>
<tr>
<td>Third</td>
<td>152</td>
<td>60,200</td>
<td>93,000</td>
<td>79</td>
</tr>
<tr>
<td>Fourth</td>
<td>127</td>
<td>65,500</td>
<td>74,000</td>
<td>80</td>
</tr>
<tr>
<td>Fifth</td>
<td>102</td>
<td>75,500</td>
<td>79,000</td>
<td>84</td>
</tr>
</tbody>
</table>
This table provides an opportunity to see what happened to crop production as meat production was shifted. On preliminary investigation of Table 2:

1. Corn acreage increased fairly uniformly in all the groups.
2. Soybean acreage increased materially and uniformly in all the groups.
3. Small grain acreage was decreased uniformly and materially in all the groups.
4. The average increase in corn (six acres) and the average increase in beans (thirteen acres) was just about compensated for by a decrease (seventeen acres) in small grain acreage.
5. Summarizing: There is no indication that the increased meat production was achieved by a shifting of resources from crop production to livestock production. On the contrary, without regard to what was happening in meat production all the farms were intensifying crop production by increasing corn and soybeans at the expense of small grain.

In Table 3 the same groups of farms are again divided into the five groups by the average percentage increase in meat production. This table makes possible a comparison of the average size of the farms in each group both in 1939-40 and in 1942. This table also contains a frequency distribution of the farms by size groups in 1939-40. The table makes it possible to see if there seemed to be a difference in size between groups in the base years and also if there was any significant change in size by
1942 which accompanied the increased meat production. The frequency
distribution part of the table makes it possible to see if there seemed
to be a normal distribution of farms between the various farm size groups
in 1939-40.

Table 3. Average Size of Farms in Each of the Five Groups
and Frequency Distribution of Farms by Size Groups
in 1939-40

<table>
<thead>
<tr>
<th>Average size</th>
<th>Number of 1939-40</th>
<th>Number of 1942</th>
<th>Number of 120 A.</th>
<th>Number of 160 A.</th>
<th>Number of 240 A.</th>
<th>Number of 320 A.</th>
<th>Number of 400 A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>243</td>
<td>245</td>
<td>3</td>
<td>6</td>
<td>4</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Second</td>
<td>248</td>
<td>268</td>
<td></td>
<td>9</td>
<td>7</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Third</td>
<td>256</td>
<td>264</td>
<td>2</td>
<td>5</td>
<td>8</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Fourth</td>
<td>261</td>
<td>264</td>
<td>1</td>
<td>7</td>
<td>6</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Fifth</td>
<td>262</td>
<td>277</td>
<td>1</td>
<td>4</td>
<td>8</td>
<td>8</td>
<td>4</td>
</tr>
</tbody>
</table>

On preliminary investigation of Table 3:

1. There is a rather small but definite difference in the size of farm in
acres between the groups. The farms that increased meat production
most are smaller than the farms that increased meat production very
little.

2. The variation that occurred in the acreage operated by this identical
group of farm operators did not seem to be related to the adjustment in
meat production.
3. There is nothing to indicate that all the farms in the five meat production groups were not normally distributed between the five size groups designated as 120 A., 160 A., 240 A., 320 A., and 400 A. farms in 1939-40.

4. Summarizing, part but only a small part of the difference in increase in meat production between the groups may be accounted for by the fact that the first groups were smaller farms and were producing somewhat less livestock products in 1939-40. Most of the difference must be accounted for elsewhere.

Table 4 is a table with a frequency distribution of the number of farms in each of the five meat production groups by type of farm in the base years of 1939-40. This table provides an opportunity to see if any particular type of farm seemed to be in a more favorable position to increase meat production. On preliminary investigation of Table 4:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>3</td>
<td>6</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Second</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Third</td>
<td>3</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Fourth</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Fifth</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
1. There is no indication that the farms in all the meat production
groups were not normally distributed between the different types
in 1939-40. There is no evidence that any one type of farm was
in any better position to increase meat production than any other.

Table 1 and Table 2 provided the opportunity to study the farms in
the five meat production groups to see if there seemed to be any shifts
in production that compensate for the increased meat production. Tables
3 and 4 make it possible to study the farms to see if any particular size
or type of farm seemed especially adapted to rapid increase of meat
production.

Table 5 makes it possible to compare the resources used on the average
farm in each of the five groups both for 1939-40 and in 1942. The resources
compared are labor, investment in livestock equipment, investment in other
equipment, investment in buildings and improvements, and the percentage in
terms of value of the raised feed that is fed. Where increases occur in
investment in either equipment or permanent improvements, it means that
enough new was purchased to offset depreciation and increase the investment.

On preliminary investigation of Table 5:

1. There was slightly more labor being used on the farms that increased
meat production the least. It was in almost exact proportion to the
additional acres shown in Table 3.

2. The farms that increased production most increased the labor resources
used slightly and those who increased the least decreased labor
slightly. (From two months increase to two months decrease).
Table 5. Resources Used in 1939-40 and 1942

<table>
<thead>
<tr>
<th>Months of</th>
<th>Investment in:</th>
<th>Investment in:</th>
<th>Investment in:</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1939-40</td>
<td>Livestock</td>
<td>Other</td>
<td>Equipment</td>
<td>Improvements</td>
</tr>
<tr>
<td>1942</td>
<td>1939-40</td>
<td>1942</td>
<td>1939-40</td>
<td>1942</td>
</tr>
<tr>
<td>First</td>
<td>$24</td>
<td>$424</td>
<td>$644</td>
<td>$2330</td>
</tr>
<tr>
<td>Second</td>
<td>25</td>
<td>360</td>
<td>531</td>
<td>2310</td>
</tr>
<tr>
<td>Third</td>
<td>26</td>
<td>283</td>
<td>397</td>
<td>2350</td>
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<tr>
<td>Fourth</td>
<td>27</td>
<td>402</td>
<td>468</td>
<td>2600</td>
</tr>
<tr>
<td>Fifth</td>
<td>28</td>
<td>410</td>
<td>518</td>
<td>2520</td>
</tr>
</tbody>
</table>

5. The investment in livestock equipment, other equipment, and farm improvements increased in all five groups.

4. Livestock equipment increased most in the group of farms increasing meat production most.

5. The farms that increased production least had the most resources in permanent improvements to begin with, as indicated by the investment in 1939-40, and increased these resources most.

6. The feed resources used seem to be directly related to the level of meat production as indicated by the per cent of feed raised that is fed to productive livestock.

7. Undoubtedly there is some significance to the fact that these farms which increased meat production most increased the labor used slightly, while the others used slightly less labor. But labor resources must not have been a very important factor in the change since the differences
were so small. Also all the farms increased meat production over the 1939-40 average 52 per cent in 1942 and yet on the average used exactly the same number of months of man labor = 25.6 months. Very little of the tremendous increase in meat production can be accounted for by the using of more months of labor. It should be pointed out, however, that labor here is measured in months. There probably was a definite tendency for the operators and their families to work longer hours.

That kind of increase in labor resources does not show up in these data.

Tables 6 and 7 are an attempt to make it possible to study new techniques which might in part make it possible to achieve the increased meat production.

Table 6 is a table showing the frequency distribution of the farms in the five meat production groups which bought new machines and livestock equipment which were generally considered by the farm management staff to make it possible to achieve production with less labor. In other words, Table 6 makes it possible

| Table 6. Frequency Distribution of Farms Buying Certain Labor-saving Machines and Equipment by Five Groups During the Four Years |
|---------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| First                           | 5       | 3       | 2       | 4       | 19      | 15      | 14      | 17      | 4       | 2       | 2       |
| Second                          | 3       | 5       | 2       | 4       | 19      | 9       | 16      | 18      | 1       | -       | -       |
| Third                           | -       | 2       | 1       | 3       | 15      | 6       | 12      | 15      | 1       | -       | 1       |
| Fourth                          | -       | 1       | -       | 3       | 6       | 4       | 5       | 6       | -       | -       | 1       |
| Fifth                           | -       | 2       | 1       | 2       | 6       | 1       | 5       | 5       | -       | 1       | -       |
to tell something about what was purchased where the increase in investment in livestock equipment and other equipment occurred. It indicates whether or not there was a difference between the groups in what they purchased. These pieces of equipment were not only assumed to be labor-saving equipment but they were assumed to be equipment which made new techniques possible. On this preliminary investigation there appears to be an obvious relationship between the farms which purchased these particular pieces of equipment and the farms which made the most rapid expansion in meat production. Taken either cumulatively or individually the relationship seems to exist.

In Table 7 eleven practices recommended by the farm management staff as practices to make the most of available equipment and labor are arrayed for the five production groups by numbers of farms adopting the practices in each group. Again there is a very obvious relationship between the farms that adopted these practices and the farms that increased meat production. On observation without an elaborate multiple correlation test it appears that the new equipment together with the new techniques adopted contributed more to the increased production than any one of the variables studied except the increased amount of feed processed. By using a multiple correlation test with pounds of meat produced as the independent variable, and the other data, such as resources used, size of farm, and kinds of equipment in terms of value as dependent variables, it would be possible to determine what percentage of the adjustment was brought about by each of the factors. The percentage of the adjustment due to adoption of new techniques and to the increased efficiency in the use of labor and capital already at hand would, however, still be in the residual.
Table 7. Frequency Distribution of Farms Adopting Certain New Practices by Groups During the Four Years

<table>
<thead>
<tr>
<th></th>
<th>Late</th>
<th>Winter</th>
<th>Self</th>
<th>Pasture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sowing</td>
<td>Started</td>
<td>Early</td>
<td>Auto</td>
<td>Adapted</td>
</tr>
<tr>
<td>in</td>
<td>fall</td>
<td>ground planting</td>
<td>large</td>
<td>water</td>
</tr>
<tr>
<td>pasture</td>
<td>pigs</td>
<td>pig feeders</td>
<td>ing</td>
<td>for beef stock</td>
</tr>
<tr>
<td>First</td>
<td>11</td>
<td>7</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Second</td>
<td>5</td>
<td>5</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>Third</td>
<td>9</td>
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<td>7</td>
<td>1</td>
</tr>
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<td>Fourth</td>
<td>6</td>
<td>-</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>Fifth</td>
<td>3</td>
<td>-</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>
Analysis of Data

Adjustments in production can be made in about the four different ways which follow:

1. Production can be adjusted by shifting resources from one kind of production to another.

2. Production can be adjusted by using potential resources which are unemployed. This is especially true of labor, buildings or machinery.

3. Production can be adjusted adding to or subtracting from the resources actively employed in production. It does not matter, for example, in the case of an upward adjustment whether these resources come from depletion of a capital inventory such as a granary full of feed or whether they are purchased outside the business.

4. Production adjustment may be achieved by a change of techniques of production which makes for more or less efficient use of resources. These four alternatives suggest some questions which the data appear to have answered.

In the first place, were the increases in meat production accomplished by accompanying decreases in other lines of production, or are these increases a net increase to total production? The answer to this question seems to be quite obviously that the meat production increase was a net increase to total production. There was no downward adjustment of butter-fat or eggs or in crop production to compensate for the meat production.
increase. In fact, other livestock production increased as did the intensity of crop production simultaneously with the increase in meat production.

The second question which suggests itself is, were the increases in meat production associated with any size of farm in acres? This question cannot be answered quite so positively as the first. The farms that increased meat production most were producing somewhat less in 1939-40 and were slightly smaller in acres. Some small part of the increase in the first groups may be accounted for by the fact that their size and volume was such that there was some unused capacity.¹

The third question which suggested itself was, were the increases in meat production associated with any certain type-of-farming operation being carried on during 1939-40? The answer to this question seems to be definitely in the negative. The type the farm was in 1939-40 apparently had nothing to do with the ability of the operator to increase meat production.

Having dismissed the idea that production may have shifted from some other production to meat production, the fourth question suggested by the data is, what resources had to be added to accomplish the increased production, and can the increased production be accounted for by resources added?

¹Unused capacity may be accounted for by the indivisibility of many of the resources employed in production. On a farm, for instance, one full time hired man is indivisible. See Stigler, George, Production and distribution in the short run, Journal of Political Economy, Vol. 47, June 1939, p. 307.
Some labor was added to the farms which increased meat production most, and the farms which made the smallest increase lost some of their labor. Some small part of the increased production among the first groups can be accounted for by increased labor resources.\(^1\) The same is true of resources in livestock equipment. There seems to be some relationship between the increased meat production and the investment in livestock equipment. The additional investment above that required to offset the depreciation was greater in the groups where meat production was increased most. Increases in the investment in other equipment and in improvements apparently had very little to do with the differences in meat production. In fact, there seems to be an inverse relationship both between the amount of investment in permanent improvements in 1939-40 and the amount this type of investment was increased by 1942. Perhaps the explanation is not to be found in economics. Perhaps the answer is in the psychology of the operator. Possibly the kind of operator who responded to increases in demand for food put his available labor and money into resources for rapid expansion.\(^2\) Perhaps the kind of operator who does not adjust quickly is the kind of man who likes permanent improvements. With the additional income of these four years and the labor available they went on to expand their permanent improvements.

\(^1\)As mentioned above, using months of labor as a measure does not indicate anything about how much the day was lengthened under pressure of the manpower situation.

\(^2\)Stigler, George. Production and distribution in the short run. Quarterly Journal of Economics, Volume 47, June 1933, p. 316. This is an illustration of Stigler's second method of attaining flexibility; that is by reducing fixed plant relative to variable services. These operators expanded largely by adding fixed and short lived equipment rather than fixed investment like new permanent improvements.
As would be expected there seems to be a direct relationship between the per cent of raised feed fed and the per cent of increase in meat production. Either purchase of feed or payments of commodity credit on loans was necessary to attain this level of production. Credit or cash both for these feed purchases or payments and for the additional livestock breeding stock was readily available to these men.

The last question which the data suggested is, were new techniques of production used and, if so, were these important to increased meat production? By using certain kinds of new equipment and practices were resources, especially labor, freed for increased meat production? If the frequency data of Tables 6 and 7 can be depended on for this kind of information, it would seem that much of the increased meat production was made possible by the new equipment and the new practices adopted. Apparently the new techniques made it possible to increase production very materially on these farms with very little additional resources of labor and capital other than feed and breeding stock.

How much of the increase was due to the adoption of the new techniques and how much was due to the fuller utilization of the resources on the farms these tables do not show. Undoubtedly part of the increase was due to the fact that the farmers and their families worked longer hours and harder.

Implications of the above, however, indicate that the pressure of war demands has caused the adoption of techniques which increased the output per unit input of labor and capital and thus have lowered marginal
costs in terms of physical quantity of the resources of production.

Feed stands out as the limiting factor to continued increased production. The level attained probably would be difficult to maintain. Though evidence is lacking, there is no indication of a like increase in the efficiency in the use of feed due to the new techniques.

In fact, due to overcrowded housing, heavier concentrations in lots and pastures and using all resources to or a little beyond their full capacity, it is logical to assume there has been some loss of efficiency in feeding. At least, the risk of loss from disease has been increased.¹

Assuming that the anticipations for the future as suggested in the introduction are correct, what do these adjustments seem to imply for the future?

The first period for concern is what has been called in the introduction the duration of the full war period. In this period it has been suggested that the adjustments needed are: a further increase in the intensity of the cropping with a decided reduction in the roughage-consuming livestock enterprises, and a moderate reduction in hog and poultry production.

The operators included in the data and especially those who made the greatest increases in meat production have reduced those marginal costs that arise out of labor and equipment. It is feed, however, that it has been suggested is to become the limiting factor. If the market

¹This is a simple application of the Law of Diminishing Returns.
for feed were free, the most efficient operators could buy the feed that is available and maintain their volume of production even though feed prices were rising. This, however, is not true. The institutional factor of price control is making it impossible in some places to buy feed. Fodder is always hard to buy because transportation on so much bulk often makes the prices prohibitive. These operators, even though they become more efficient, still will be forced by the feed situation to reduce livestock production, and it will probably be in the national interest for them to do it.

Now what will this new adjustment mean to them? If the first place, demand is very good and prices are high. There would be no disastrous effect on income for this period even if in the first adjustment they had brought in additional labor and equipment resources in proportion to the increased meat production. Since they have not, and since nearly half of their incomes come from crop production, the higher prices and greater intensity for crops should largely offset the downward adjustment in livestock.¹

To the extent that they have increased their equipment (increasing short run fixed costs) and to the extent that they have been buying more feed than they have raised, their income will be adversely affected.

¹This is an example of the idea suggested by Hart and others that diversification is a protection against uncertainty but that costs are associated with diversification. Had the feed-livestock price ratio remained as it was in 1941 and had these operators known it was to remain so, they would have been foolish to use resources producing crops. They could have made larger profits using resources to produce hogs. Hart, Albert Gallard, Anticipations, business planning and the cycle. Quarterly Journal of Economics, Volume 51. February, 1937. pp. 273-291.
On the other hand, to the extent that the increased meat production was achieved by the operator and his family working harder and longer, the new adjustment will make it possible to go back to the old standard. With the increased efficiency of the new techniques it will be possible either still to produce more than in 1939-40 or to get along with less labor. Summarizing, the new adjustment will mean somewhat less income than at the peak production but will require, with the new techniques, less labor.

The period more people are concerned about, however, is the post-war period. It has been suggested that the adjustments for this period would be, first, for good land use, less intensive cropping. Good land use in this area would probably mean fully as much grassland as in the pre-war period. It has been suggested that the level of hog and poultry production might be maintained at somewhat higher than pre-war levels and that the roughage utilization enterprises might be expanded back to near pre-war levels with perhaps somewhat more emphasis on roughage consumption in proportion to grain.

Consider, first, the second source of loss mentioned in the introduction, that occasioned by prices declining so far that production costs cannot be covered. Ignore for the moment losses which were due to declines in inventories. If the analysis has been correct thus far, post-war adjustments suggested would indicate a level of meat production slightly higher than in 1939-40 with the intensity of cropping at near those levels.
The new techniques adopted for livestock production have increased output per unit input in terms of physical resources of labor and equipment. Therefore, in terms of physical resources, marginal costs have been lowered. This is only true in terms of value, however, if the price of these resources has not risen enough to offset the increased marginal physical product.

The price of both labor and equipment have risen materially as well as the price of all those other supplies which make up production costs. Probably they have risen more than enough to offset the increased efficiency. Because of the immobility of agricultural resources, once costs like these rise, their decline usually lags behind the decline in the price of the product. If the price of the resources which go to make up production costs had not risen, it should be possible to cover production costs including the operator's profit at the 1939-40 level with prices as low or even lower than the prices of that period. There was little indication in the data of rising costs of the kind which would of necessity become fixed for the short run period. Under the circumstances, however, even with the increased efficiency, the operator's profits will probably be somewhat less than the 1939-40 level if farm prices decline to the 1939-40 level in the post-war period.

Thus far in the analysis inventory value declines have, however, been ignored as a source of loss. This is a real source of loss that cannot be avoided if sharp price declines follow the close of the war.¹

¹Part of this loss is really only an opportunity cost. The opportunity was there to have made a larger profit had the inventory been liquidated just ahead of the price decline. This is not true, however, on any portion of the inventory that is needed to continue doing business except as it might be sold and repurchased at a lower price.
It can only be modified, as suggested in the introduction, if the inventories are the result of productive enterprises when the capital investment for production is small in proportion to the value of the final product. It was suggested that cash crops marketed promptly and hog production most nearly met this requirement. If the adjustments for the duration of the full war are made as suggested-that is, to intensify crops, to cull cattle breeding stock severely, to feed cattle and lambs only where it is necessary to market roughage, and to produce hogs and poultry in line with feed supplies—then this source of loss should not be serious enough to be disastrous with a price decline to the 1939-40 levels.

This inventory loss will have to be met regardless of how long it takes or of its extent. If the wartime profits have liquidated all the debt on working assets and built a cash reserve, it can be taken in stride. If, however, wartime profits have gone into the purchase of land at a wartime price with a small down payment or have been dissipated on any unwise investment, this kind of loss can be serious.¹

¹Paying debts and holding cash reserves is a means of attaining a position of liquidity. It is a type of flexibility Hart (op. cit., pp. 20-21) suggests to meet capital rationing. The loss may be serious because, in times of declining price levels, lenders are so hesitant to lend money for either replacement capital or cash for current operating capital that capital may have to be liquidated at a sacrifice to obtain cash. See also Schultz, T.W., Capital rationing, uncertainty, and farm tenancy reform. Journal of Political Economy, Volume 42, June 1940, and Mighell, Albert, Trial and error in farm management, Iowa Agricultural Experiment Station, Mimeograph Series No. 3707, April 1938.
If the adjustments indicated above have been made and wartime profits have been used to build a cash reserve and retire debts, this group of operators should be able to live on the income from their businesses, and, because of wartime savings, both absorb their inventory losses and very appreciably expand their living standards, provided at least two other qualifications are met. The first qualification is a level of employment after the war that will permit a demand for livestock products near the 1939-40 level. The other qualification is a decline in the price of resources which make up production costs sufficient to bring production costs to the 1939-40 level. This means that even though the price of these resources does not come down to the level of 1939-40, they must at least go down to a level where the difference is made up by the increased efficiency.
SUMMARY AND CONCLUSIONS

The farm management adjustments to the wartime demands were achieved by employing three of the four methods of adjustment mentioned above—namely: improving efficiency by using new techniques, adding resources, and by using potential resources which are unemployed. The use of new techniques seemed very important in making these adjustments.

The resources added were mostly in feed and breeding stock rather than in labor and equipment. Apparently the new techniques used made it possible to increase the productive capacity of labor and equipment.

There is little evidence in the data with reference to potential resources which are unemployed, but contact with the families leaves little doubt that the operators and their families worked harder and longer hours.

From the evidence in the data it is concluded that adjustments to the shifting demand for the duration of the war can be made with little impact on income though any change in income will probably be downward. In fact, this conclusion is borne out by the summary of the 1943 records, data for which are not included. There are two factors which, along with the rising price of resources, tend to reduce incomes. One is the loss of profit on that part of the volume which was made possible by the purchase of feed in addition to the feed raised on the farm. The other is caused by the fact that a limited amount of equipment resources will not be used at as high a level of production as at the peak.
In the post-war period adjustment can be made to a decline in demand provided:

1. Liquidity has been increased.
2. The level of employment is such that demand is maintained near the 1935-40 level.
3. The price of resources declines enough to make the new level of costs, after the increased efficiency due to the improved techniques is considered, about equal to the 1935-40 level.

In fact, if these conditions are met, it should be possible for these producers to operate in the post-war with an adequate income. Because of the savings during the period of high profits they should be able to meet any losses which may develop due to declines in inventories and also to improve their living standards. The study justifies the conclusion that anticipations of prices and anticipations of technical rates of output for given input are very important to sound adjustment. If outlook is good economic uncertainty with its costs to the operator and to society may be reduced. The operators in this study use records to improve their anticipation of technical output. This study adds proof to the generally accepted idea that with good anticipations it still takes managerial capacity to adjust resources to meet anticipations. Very few principles for making these adjustments are in writing. By years of experience men in the field of farm management have developed the ability to see how to make adjustments in each case almost by instinct.

No attempt is made in this paper to develop very exact principles for general application. Two rather general principles can be suggested.
1. A system of priorities for making adjustments is essential. This is inherent in the word economics. It means that when dealing with scarce resources choices must be made. In adjusting production priority should be given to the adjustment of the most basic and essential resources. In Corn Belt agriculture land usually merits this position. The adjustment of the cropping system is usually basic to production adjustment because production in the Corn Belt is so dependent on feed. Feed may be purchased, but if it must be, production adjustment is usually modified. In making adjustment priority should be given to those adjustments to which the operator's ability is best fitted. For example, if anticipations encourage the increases of both hogs and feeding cattle, the operator should give priority to expanding the one for which his abilities are best fitted.

2. An understanding of the four alternative methods mentioned above for making adjustments is also essential to sound adjustment. Again a choice is involved. The operator must choose the least costly method of adjusting production from its present level to the desired level. As mentioned above, the operators on these farms chose to add few resources besides additional feed. They chose to adopt new techniques which made it possible to get along with little extra labor and equipment. And finally they probably chose to use their labor more fully—that is, to work harder.
LITERATURE CITED


Mighell, Albert. Trial and error in farm management. Iowa Agricultural Experiment Station, Memo. Series No. 3708, April 1938.


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