CONSIDERATIONS FOR A GRAIN RESERVE POLICY

Vernon R. McMinimy and Francis A. Kutish*

Much of the recent concern regarding adequate reserve levels has centered on wheat and feed grains. Reserves of these commodities, on the basis of percentage of utilization, are down significantly from recent years and are at levels equivalent to those held in 1952.

The Unanswered Question

Recently, considerable attention has been focused on the level of reserves that should be maintained. During the late 1950's, many thought the nation had accumulated excessive and burdensome reserves of grain. But during the past year of two, some have expressed concern that our reserves of grain might be inadequate.

Where do we stand now on our reserves (also commonly referred to as stocks or carryover)? What size reserves should we hold?

The following table shows the level of reserves we expect to have on hand at the beginning of the 1967-68 marketing year as well as the reserves we have held in previous years. These reserves are expressed both in terms of physical quantities and as a percentage of utilization.

These figures indicate where we are at present on reserves held, but the question remains, what level of reserves should we carry?

Theoretically, the grain reserve that had best be carried in the United States should be decided on the basis of a study of weather variability from one year to the next, and its interrelationship with variability in demand -- coupled with the degree of price variability the nation is willing to experience.

The history of the past several decades, however, indicates that the size of grain stocks in the United States in fact has been a result of decisions made primarily with other objectives in mind. In most cases, stocks were accumulated as by-products of public activities designed to assist farmers by raising prices.

*Staff Economists, U.S. Department of Agriculture. Views expressed are those of the authors and do not necessarily represent those of the Department.
Beginning stocks of selected commodities, actual and as a percentage of annual utilization, Averages 1930-49, Annual 1950-66.

<table>
<thead>
<tr>
<th>Marketing year beginning</th>
<th>Wheat</th>
<th>Rice</th>
<th>Feed grains</th>
<th>Soybeans</th>
<th>Cotton</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quantity</td>
<td>Percentage of utilization</td>
<td>Quantity</td>
<td>Percentage of utilization</td>
<td>Quantity</td>
</tr>
<tr>
<td>Average:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1935-39</td>
<td>154.5</td>
<td>20.8</td>
<td>---</td>
<td>---</td>
<td>10.6</td>
</tr>
<tr>
<td>1940-44</td>
<td>446.1</td>
<td>46.3</td>
<td>2.6</td>
<td>9.4</td>
<td>18.8</td>
</tr>
<tr>
<td>1945-49</td>
<td>193.3</td>
<td>16.5</td>
<td>1.3</td>
<td>0.4</td>
<td>15.6</td>
</tr>
<tr>
<td>1950</td>
<td>424.7</td>
<td>40.2</td>
<td>3.5</td>
<td>9.0</td>
<td>30.5</td>
</tr>
<tr>
<td>1951</td>
<td>399.9</td>
<td>34.4</td>
<td>4.5</td>
<td>9.3</td>
<td>28.6</td>
</tr>
<tr>
<td>1952</td>
<td>256.0</td>
<td>26.2</td>
<td>2.0</td>
<td>4.0</td>
<td>20.1</td>
</tr>
<tr>
<td>1953</td>
<td>605.5</td>
<td>71.2</td>
<td>1.5</td>
<td>3.1</td>
<td>27.0</td>
</tr>
<tr>
<td>1954</td>
<td>933.5</td>
<td>105.4</td>
<td>7.5</td>
<td>17.7</td>
<td>31.7</td>
</tr>
<tr>
<td>1955</td>
<td>1,036.2</td>
<td>109.1</td>
<td>26.7</td>
<td>55.9</td>
<td>39.1</td>
</tr>
<tr>
<td>1956</td>
<td>1,033.5</td>
<td>90.8</td>
<td>34.6</td>
<td>53.6</td>
<td>43.2</td>
</tr>
<tr>
<td>1957</td>
<td>908.8</td>
<td>91.4</td>
<td>20.1</td>
<td>45.1</td>
<td>48.8</td>
</tr>
<tr>
<td>1958</td>
<td>881.4</td>
<td>83.8</td>
<td>18.2</td>
<td>39.7</td>
<td>59.0</td>
</tr>
<tr>
<td>1959</td>
<td>1,295.1</td>
<td>116.7</td>
<td>15.7</td>
<td>27.4</td>
<td>67.5</td>
</tr>
<tr>
<td>1960</td>
<td>1,313.5</td>
<td>103.6</td>
<td>12.1</td>
<td>21.4</td>
<td>74.6</td>
</tr>
<tr>
<td>1961</td>
<td>1,411.2</td>
<td>106.1</td>
<td>10.1</td>
<td>17.2</td>
<td>85.0</td>
</tr>
<tr>
<td>1962</td>
<td>1,322.0</td>
<td>108.0</td>
<td>5.3</td>
<td>8.3</td>
<td>72.2</td>
</tr>
<tr>
<td>1963</td>
<td>1,195.2</td>
<td>82.7</td>
<td>7.7</td>
<td>10.9</td>
<td>64.4</td>
</tr>
<tr>
<td>1964</td>
<td>901.4</td>
<td>65.9</td>
<td>7.5</td>
<td>10.2</td>
<td>69.3</td>
</tr>
<tr>
<td>1965</td>
<td>817.3</td>
<td>51.1</td>
<td>7.7</td>
<td>10.4</td>
<td>54.8</td>
</tr>
<tr>
<td>1966</td>
<td>535.2</td>
<td>37.6</td>
<td>8.2</td>
<td>9.7</td>
<td>42.1</td>
</tr>
<tr>
<td>1967</td>
<td>426.0</td>
<td>29.5</td>
<td>8.5</td>
<td>9.4</td>
<td>37.0</td>
</tr>
</tbody>
</table>
Federal Farm Board

The first active public step in this direction of stabilization was taken in 1929 when the government established the Federal Farm Board. Loans were made to cooperatives for merchandizing programs in which commodities were withheld from the market to facilitate "orderly marketing."

However, in 1932 the depression proved too much of a strain and the Farm Board died.

The next move by Congress was to establish in the 1930's the Agricultural Adjustment Administration, through which the government undertook to control farm production and make price support loans. In response, the ever-normal granary was launched, with a comparison to the biblical parable of storing during the seven years of plenty for the years of lean.

The efforts at control were not very successful and government stocks began to accumulate. Then World War II broke out and provided new demands for farm production. The war, followed by early postwar reconstruction in Europe, provided enough demand to absorb all farm production as well as the stocks which had accumulated during the 1930's.

With the end of the postwar reconstruction era in the late 1940's, surplus grain stocks in governmental hands again began to mount. National farm output once again expanded faster than the market could absorb at prevailing prices, and carryover stocks grew.

The Korean Conflict provided brief relief, but by 1953 the expansion of surplus farm stocks again was on its way. The mounting surplus stocks caused Congress to pass the Soil Bank Act in 1956. But it did not prove very effective in restraining output and the program was largely abandoned in 1959.

By 1961, feed grain carryover stocks had built up to nearly 85 million tons and wheat stocks to over 1.4 billion bushels. It became apparent that something had to be done. It was costing the Department of Agriculture over a million dollars a day just to store and maintain the surplus stocks.

Controlled grain production

So, the government's farm policy again became one of attempting to control grain production. At this time, the Congress directed the Department of Agriculture to reduce its holdings of commodities. About 60 million acres of land were idled under farm programs during the early
1960's. Under these programs, the idea was to restrain farm production to below what was used. Then the difference between the reduced production and the larger use would be made up by taking some of the grain and other farm products out of the surplus stocks on hand.

There was a great deal of discussion as to the desirable level of stocks. In the early 1960's the National Agricultural Advisory Committee suggested a level of 40 to 50 million tons of feed grains and 600 million bushels of wheat. These figures were well below the level of stocks then on hand. However, the Department of Agriculture never adopted any official figure as a desirable reserve for either wheat or feed grains.

Along with the policy of reducing Government stocks, a new objective was adopted. It was to expand market outlets. Public Law 480 had been passed in 1954. It permitted the Government to sell surplus grains and other surplus stocks in Government hands to developing countries for local currencies. Some products could be donated, such as wheat for school lunch programs and wheat and feed grains to poor people in foreign countries.

In 1965 and 1966, India and Pakistan had a bad drought. The United States shipped large amounts of grains to both countries under the program authorized by P.L. 480. At about the same time, communist countries entered the world market for grains, further drawing down world supplies. By the summer of 1966, there was mounting apprehension over the world food outlook.

By the end of 1966, most of the American grain surpluses were gone. Instead of being concerned about surpluses, the public clamor then became one over whether the nation had adequate reserve stocks. It appeared that wheat stocks might fall below 400 million bushels on July 1, 1967, and that feed grain stocks might fall to 25 million tons or less on October 1. Some believed that wheat stocks would fall below 300 million bushels and possibly even as low as 200 million bushels. Because of this, the feed grain and wheat programs for 1967 relaxed acreage restraints and some 20 million acres were brought back into production.

However, after the 1967 programs were announced, bumper crops were harvested all over the world. The world wheat harvest was 14 percent higher than a year earlier. The U.S. feed grain harvest for 1967 was up 12 percent, setting an all-time high. Carryover stocks of both wheat and feed grains now seem certain to rise. We appear to have met the 1966 food emergency with the U.S. reserve production capacity not fully tested, and with no undue pressure on our carryover stock position.
Some Level of Reserve

Recently, attention again has been placed on the need for "reserve stocks" and a "reserve" policy. This seems to be one point on which all groups can generally agree -- that there should be some level of reserves maintained by the public through Government action and at public expense.

Today, few proposals are embraced by so many for such dissimilar reasons. Yet the acceptance of the reserve concept by people of diverging views on related matters may signal divergence of views when the details of a tangible proposal are put forward. Certainly the only agreement reached on the latest reserve proposals introduced in Congress was an agreement to disagree. Much of the producer interest stems from the price-strengthening effects that would accompany the accumulation of such "reserve stocks." At the same time, concern is expressed by producers over the rules of management and release of such "reserve stocks."

Although it split on several important questions, the National Food and Fiber Commission agreed that we need a national reserve policy. One side felt that a reserve policy would facilitate stabilization within the operation of the annual land adjustment programs, while the other group felt that a reserve policy would be a stabilizing influence under a completely market-oriented agriculture.

No reserve policy can be expected to achieve complete acceptance by all interested parties unless the parties seek the same objectives, and the prescribed reserve program seeks these ends with means that do not materially affect policy parameters in other areas.

What are the objectives that a reserve policy should seek to achieve? What are its goals? Certainly the first and overriding goal is to provide adequate supplies in times when production falls short of satisfying needs.

Dr. Fred Waugh, in his study on reserve stocks for the Food and Fiber Commission, listed seven possible aims which could be served by a reserve program. They are: provide adequate working stocks; reduce the danger of a food shortage both here and overseas; assist in maintaining commercial exports; stabilize farm income and the general economy; increase the average level of product prices and farm income; assist growth in the underdeveloped countries; and foster private industry.

Any reserve program must in one way or another indicate which of these objectives it wishes to achieve and what level of achievement it wants to attain. Unless these goals are rather clearly defined the development of a lasting reserve program will prove difficult.

Among the objectives just listed there are some which will be achieved whether or not we adopt an "official reserve program." First among these is maintaining an adequate working stock. Working stocks will be maintained whether or not the Government officially adopts a policy to hold additional stocks at public expense. Thus, while one needs to recognize such a requirement we need not be concerned beyond estimating its probable magnitude. Also, the objective of fostering private industry means that the reserves should not be acquired, held, or discharged in a way which would stifle private industry. Again this is an objective which can be readily facilitated.

Five objectives

The really meaningful problems are contained within the five remaining objectives. What is their order of importance, and to what extent do we wish to achieve them and at what expense?

The order of importance within the remaining five objectives probably would be: (1) reduce the danger of a food shortage here at home (secondly overseas); (2) stabilize farm incomes; (3) maintain commercial exports; (4) increase the average level of grain prices, and (5) assist growth in the underdeveloped countries.

As one can see, any such ordering creates problems; some objectives are interrelated and the achievement of one objective will move another closer to realization.

The ultimate question posed is what constitutes an adequate level of reserve. To answer that question, several others must first be answered. What demands do you want to meet -- domestic demand, commercial export demand, concessional demand? How much adjustment in each are you willing to endure? How much uncertainty are you willing to tolerate in each? How much price fluctuation or adjustment are you willing to experience? What is the ceiling price you wish to protect? Correspondingly on the supply side, what is the variability of supplies you are likely to experience -- in one year, over two years or more? How much influence can you exert on supplies through prices, adjustments in acreage programs, and non-price adjustments in the allocation of supplies to various uses?

Then there is the matter of sharing the burden of world risks with other countries -- either through multilateral or bilateral agreements.
How much of the world reserves should be held in the form of physical reserves, and how much in the form of financial resources to trigger purchases of stocks needed to meet emergencies? Finally, how do you define an "emergency"? On these, there must be agreement.

Answer these questions and you can tell what level of reserves the United States should carry. To date the discussion and debate on reserves has little more than touched on any of these questions.

Factors to Consider in a Reserve Model

Variation in production is a function of acreage and yields. Yields in turn are affected by many factors, including technology and weather. The uncertainty of production arises primarily from weather. Thus, a reserve is basically designed to protect against unexpected adjustments in production due to weather.

While weather is a factor of major importance, its impact on production in a series of events should not be overemphasized. The impact of weather on production during a growing season cannot be corrected during the season. However, its effect on total production can be altered in subsequent time periods through adjustments in acreage as long as there is a reserve of acreage not in production. Production can be increased in subsequent time periods even with a run of unfavorable weather years.

Thus, in estimating the desirable reserve level one needs to consider the adjustments which can be made in acreage. In the United States today we have a reserve production capacity in our diverted acres. These acreages can readily be called into production during the next season if we experience a poor weather year. Certainly the existence of this acreage reserve reduces the level of commodity reserves required to protect us against a given level of risk in time periods of varying lengths.

An adequate reserve policy should take this reserve production capacity into consideration. In considering acreage as a manipulatable variable, it would be advisable to evaluate production variability on the basis of yield variation rather than on historical variation in production. "Normal" yield should be used to determine the acreage required to provide the required production. The probability of deviations from the normal yield can be considered in determining what acreage should be required to assure an adequate supply.

This approach would also be helpful in determining the extent to which we are utilizing our potential acreage capacity -- and therefore how large the reserve capacity is.
On the demand side of the equation, several factors that affect the level of reserves must be considered. First, one must determine the level of utilization that is to be insured. This decision in large part specifies the level to which one is willing to let prices rise -- particularly in those cases where the distribution is based on prices as the sole allocator.

Price is of primary importance in determining the level of utilization for some commodities, such as corn. But it is of less importance in the case of others, particularly wheat and rice. Much of the allocation of the latter commodities is determined by administrative action. The quantity programed under P.L. 480 is almost entirely determined by administrative action. Even commercial exports may be substantially affected through export assistance programs (subsidies).

Where price is the primary allocator, it may be preferable to determine reserve levels in terms of that quantity which will maintain prices below a given ceiling with a 90 percent probability of success. With a commodity such as wheat, in addition to specifying the price ceiling, one will have to determine (within those areas which are largely administratively determined) what level of utilization will be maintained.

**World production variation**

Exports are affected, as we have seen vividly demonstrated in recent years, by the variation in production throughout the world. Here again we must determine what the variation potential is, and how much insurance we wish to provide through reserves.

In the 1960's we have seen the impact that crop failures in other countries can have. Russia, China, India and Pakistan have each had difficulty producing enough to satisfy their needs in the past few years. The major exporting countries expanded their exports significantly, world prices rose, and acreages devoted to grain production expanded. The needs were met. In the case of India and Pakistan, the needs were met not only through increased imports of traditional food grains, but also through substitution of some sorghum grains for wheat and rice. Within India and Pakistan the substitution chain involved rice, wheat, and sorghum grains.

Any determination of the level of stocks required to insure an adequate world grain supply must consider not only the responsibility of the United States but that of the other major exporting and importing nations. It seems proper that a world food-(grain)-reserve policy, should be established, maintained, and administered by some international body,
or at least operated under an international agreement. Otherwise, the U.S. policy regarding reserves should be based heavily on the potential for commercial trade which flows from variations in world production and on the level of development commitment we wish to be able to honor.

Finally, in considering a proper reserve level we should estimate the cost of failing to have adequate supplies to satisfy needs. The cost to the Government of maintaining an adequate reserve is readily calculable; defining and measuring the costs of not meeting needs is more difficult. By the nature of each demand category, the cost of experiencing a shortage of a given magnitude in each category for each commodity is different.

The allocation of reserves by commodity and by type of demand should be such that the cost to the United States is minimized. Achieving this is probably impossible. However, it is why we should be aware, to the degree possible, of the costs of not being able to cover shortfalls of given magnitudes as well as the costs of carrying reserves.

Consideration of the factors described above takes time and effort. In the meantime, the question of what level of reserves we should maintain remains. Until a reserve model has been produced, it would seem that for the present (with a few exceptions) the level of stocks we will have at the end of the current marketing year will be adequate to meet any foreseeable emergency of the nature encountered in the past decade or two. These levels certainly seem adequate when considered in conjunction with the unused grain production capacity in America.

This unused capacity in effect constitutes a ready-reserve in the form of idle acres that can be brought back into production on a year's notice. The cost of buying and stockpiling more grain than is required to meet "normal contingencies" is greater than the cost of diverting the equivalent productive capacity. And once the bins are filled, acreage diversion will need to be increased to absorb the amount of grain no longer being added to the reserve. From then on, the cost of maintaining the ready-reserve in the form of the idle acres will be no different than if the extra cushion had not been added to the bins. But the added interest and carrying charges of the larger stocks go on yearly, as do their effect on market prices while we await the "unusual contingency." Thus, the total cost of the diversion program and the reserve program would rise unnecessarily during the period we are adding grain in excess of that required to meet "normal contingencies."

**Stocks of rice low**

The holdings at the end of the 1967–68 marketing year will be around 500 to 525 million bushels of wheat, 40 to 45 million tons of
feed grains, 125 to 150 million bushels of soybeans, 6 to 7 million bales of cotton. Stocks of rice undoubtedly are too low, with the carryover in recent years having been consistently (roughly) below 9 million cwt. Demand for U.S. rice has been expanding and world prices rising. At this time, a poor world rice crop would have a significant impact on world rice prices and would cause an increased demand for other food grains. Our reserves of rice should probably be above the 7 to 9 million cwt. of recent years. A level of 12 to 15 million cwt. would be more appropriate -- though possibly not adequate.

In determining the level of reserves, there is a strong tendency to specify how much of each type grain should be held. In the case of wheat, the question can reach the stage of trying to determine how much of each class of wheat should be held.

The extent to which one differentiates between commodities should be determined by the nature of the demand for each. How great is the substitutability of other grains? We found recently in India that wheat could be substituted for rice, and that grain sorghums could be substituted for wheat. This suggests that it might be beneficial to consider a reserve as a total stock of grains, with some minimums specified for those grains which can find substitutes only at very high price differentials.

This concept is further strengthened when it is realized that in some parts of the world, food grains (wheat) are extensively used as feed grains. During the 1960-65 period, the United Kingdom used 27 percent of the wheat it produced as a livestock feed. France fed 31 percent of its wheat. The EEC as a whole fed 18 percent. In recent years the use of wheat as a feed grain has also been increasing in the United States.

There is a substantial capacity to increase the world supply of wheat for food use just by discouraging its use as an animal feed. Because of this substitutability between wheat and feed grains it would seem appropriate to specify the desirable reserves in terms of total grains, with some minimums indicated for the food grains. Thus, if 12 million tons were determined to be appropriate for wheat, grain stocks of say 50 to 55 million tons with at least 12 being wheat might be a more desirable target than attempting to maintain specific reserve targets for each of the grains (to say nothing of maintaining a reserve of specific classes of grains, as some suggest).
Rules Governing Management and Release of Stocks

The issue of how the reserves are managed is now and undoubtedly will continue to be a more sensitive issue than the level of reserves. For the answers to this question, we will have to rely on the political process.

The objective here may not be to obtain the best rules. Rather it may be to avoid those rules which will cripple the ability of the stocks to function as true reserves.

Reserves are meant to be used when needed. Certainly some agreement on how an "emergency" is defined is imperative. Rules that preclude the use of such stocks except under the most extreme circumstances prevent those quantities from serving as useful reserves for meeting the normal shortfall in supplies we have been considering. In such cases, the effect will be to result in larger total carryover stocks than if the rules governing release of the so-called "strategic reserves" were not so restrictive.

While we do not wish to prescribe what the rules should be, we do want to point out that the rules may well affect the size of stocks which must be held to provide the desired level of insurance.

Maybe it is too much to expect that the "reserve policy" debate will provide answers to the question or even consider many of the factors we have discussed. But if the debate doesn't try to center on these questions and these factors, then our reserve policy will continue to be a residual of the farm income programs. We will not have a "reserve policy" per se.