

AUTHOR'S NOTE

In 1950 I participated in a national survey of the ingredient hedging activities of feed manufacturers. I was assigned to survey the Midwest. The survey included all of the large firms and numerous small firms. They were on-site, in-depth interviews with repeat visits over a time span of several months. The focus was on the use of futures by feed manufacturers, but the study evolved into a review of total risk management activities of feed manufacturers. Exposure to the complexities of managing ingredient price risks was extremely useful in subsequent research and teaching in matters having to do with the use of futures by commercial firms. I learned about hedging from the ground up. The paper was widely circulated in the industry and resulted in the exchange of information and views with people in the industry for many years.

PRINCIPLES OF INVENTORY AND RISK MANAGEMENT

CHAPTER 4

In considering the accumulation of inventories and disposition of risks, certain basic principles must be taken into account.

First, futures trading is not a standardized, foolproof method of operating with complete immunity to price changes. Hedging is not the direct transfer of risks but, rather, the assumption of additional risks, presumably opposite to the hedged position in the expectation of gain or loss. For example, if a feed manufacturer has an inventory of corn and sells corn in a futures market, he has taken on an additional speculation. It is the similarity of movement of the prices of cash corn and corn futures that reduces his total risk. In effect, he has substituted a basis speculation for his original inventory speculation.

This basis does not, however, remain constant. It may change to the advantage or disadvantage of the hedger. At times the basis is a good one for hedging, and at other times it is not. Hedgers must understand the basis and watch it carefully. It is not possible to hedge successfully by buying cash commodities and automatically selling against them without regard for relationships between cash and future prices.

Second, futures trading does not meet all of the direct hedging needs of feed manufacturers. There is no futures trading in many of the important feed ingredients, and the volume of trading in some contract markets is not large enough to provide the liquidity essential to hedging. However, with new contract markets in soybean meal and grain sorghums and increased volume in others, the markets seem to be improving in this respect.

Third, feed manufacturers as a group do not hold inventory risks to the minimum consistent with adequate supplies of satisfactory quality. They accumulate much larger than minimum inventories when price increases are expected, and reduce inventories to very low levels when declines are expected. The amount of ingredient speculation varies among firms, both in absolute size of inventories and in relation to the length of time that inventories are expected to last. Whether the maximum inventories are expected to last three weeks or twelve months, they are

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varied on the basis of price expectations. In the Midwest the proportion of firms that held inventories to a minimum was not large. Because mixed feed is priced on the basis of replacement cost of ingredients, manufacturers must take inventory profits and losses. It is not possible to hedge and speculate at the same time. No system can possibly guarantee against speculative losses and at the same time retain the potential of speculative profits.

Fourth, individual feed manufacturers vary in many respects: in size, location, kinds of feed manufactured, capital structure, capacity to withstand losses, and inclination to speculate. These differences affect inventory and hedging programs in such a way that it is not possible to apply one inventory and hedging program to all firms. Inventory and hedging programs must be individually tailored.

Fifth, in view of these four things—basis risk, inadequacy of existing futures markets for the direct hedging of feed ingredient inventories, the desire of the industry to speculate in ingredient prices, and the individual nature of inventory problems—we need to consider the total inventory management problem of firms rather than the hedging of ingredient inventories in futures markets. The problem is how to manage inventories so that inventory profits can be maximized and losses held to a minimum. The first phase of the problem is how to avoid being forced into unwanted speculative positions, and the second is how to stack the cards in favor of gaining as compared to losing. Trading in futures markets is *one* part of an inventory management problem.

ELEMENTS OF AN INVENTORY MANAGEMENT PROGRAM

An inventory management program must include the entire inventory problem of the firm. An inventory program includes several separate elements. It must insure that sufficient supplies of ingredients will be on hand to meet the physical requirements of mixing plants. No plant can afford to run out of any single feed ingredient or fall behind in its delivery schedule, nor can it afford to overcrowd its working space with supplies of some ingredients at the expense of others.

The procurement program must assure supplies of satisfactory quality, advantageously located with regard to freight rates. Because considerable time is required to get supplies of some ingredients into mixing plants after they are purchased, inventories of such supplies must be larger than the quantity actually on hand at the plant. This inbound flow of raw materials must be maintained. It is particularly important for large companies to keep supply large enough to insure operation. Sometimes market supplies of some ingredients disappear, or so nearly disappear that they cannot be obtained in sufficient quantity on a hand-to-mouth basis. Frequently, the desired qualities of ingredients can be obtained only if they are procured well in advance. Such situations must be anticipated. When ceiling prices

are in force, the problem becomes more acute, and it is necessary to reach out farther for supplies. The tight soybean meal situation during the last two weeks of September of this year is an excellent example.

Transportation costs are also important, and ingredients from some locations carry better freight billings than others. If supplies are out of position, freight costs are increased.

The sales and pricing policy is another important element of an inventory program. Although most mixed feed is priced on the basis of replacement cost of ingredients and forward bookings are usually limited, there are exceptions. Some firms price on an average-cost basis and others on actual cost. Some firms make rather extensive forward sales of feed, and others contract at firm prices for bulk tonnages. These sales represent inventory positions quite as much as ingredient purchases.

Many firms tend to eliminate the extreme highs and lows of ingredient prices in calculating price lists. Tight spot markets on certain ingredients are usually not reflected in feed prices. For example, we have rarely seen \$100 soybean meal figured into feed prices, although the spot market has sometimes reached that figure in recent years. An important aspect of inventory management seems to be the avoidance of tight spot markets.

Another very important element is risk policy. There is no industry risk policy. It would be difficult to find two firms whose risk policies were identical—and rightly so, because firms vary in their need for speculative profits, inclination to speculate, capacity to withstand losses, skill in forecasting price changes, and amount of attention they can afford to give to their inventory positions. The important aspects of a risk policy are (1) that it be definite, (2) that it fit the individual situation of the firm, and (3) that it be consistent and continuing.

Every firm should have a carefully-worked-out risk policy and should adhere strictly to it. First, the policy should clearly recognize the fact that inventory positions are basically speculative. The fact that inventories are accumulated for later consumption makes them no less speculative than those purchased for resale. Second, the firm should know how much it can and is willing to take and should establish the policy of never exceeding this maximum. Third, it must establish a policy regarding its unavoidable inventories of ingredients—those accumulated to assure supplies, quality, etc. This policy may be (1) to hold inventories to a minimum and carry them open, expecting gains and losses to average out, (2) to try to hedge them all with sales of some kind or other, and (3) to selectively hedge them; or (4) to use a combination of the three plans. Fourth, a firm should know under what conditions it wishes to speculate. Few firms will speculate unless the chances

of gaining seem greater than those of losing. Some firms will speculate if the odds seem only a little in their favor. Others require that the speculation seem nearly a sure thing. There are all gradations between. There is no articulate way to express this certainty level, but each firm must form an idea of it and consistently apply it.

Out of these several elements each firm must build its procurement and hedging programs; these two programs are intermixed and mutually dependent. Hedging programs for inventories and requirements depend, of course, on the procurement of supplies. That hedges depend on inventory position is obvious. A more important point is that in general procurement programs depend on opportunities to hedge or speculate on a satisfactory basis.

HEDGING

Hedging is a term hard to define. It means different things to different people. For our purpose, hedging may be defined as any market operation that is expected to offset an existing market position. A hedge is therefore an opposite or offsetting position, although not necessarily in the same commodity.

As was noted earlier, a hedge involves the assumption of additional risk, the changing of a market speculation to a basis speculation. It follows, then, that successful hedging depends upon a thorough knowledge of price relationships.

There are several different kinds of hedging problems. The first and simplest is disposition of the risks that accompany minimum inventories. If the overall inventory program of the firm indicates that these minimums should be hedged, the problem is to find the appropriate short positions.

The second kind of hedging problem is the selection of ingredients for accumulation that can be hedged advantageously. This is the principal hedging problem of terminal grain merchants. They buy grains when they expect the basis to hold steady or narrow, and sell when a wider basis is indicated. It is through this basis change that they earn carrying charges.

The third hedging problem is that of limiting speculation. One such problem is the fixing of speculative profits. Suppose that a feed manufacturer accumulates a long line of alfalfa meal for scattered shipment in the fall, and the price goes up by December to a level that offers a nice profit and that seems vulnerable to decline. His problem is to fix the profit while retaining control of the meal. Or suppose that he has accumulated a line of soybean meal in some period as February 1951, at the \$70-\$72 level and by April has taken all of the loss that he can afford. His problem is how to stop his losses. Or suppose that feed grains get out of line with vegetable meals but that it is uncertain whether feed grains will decline or meals

will increase. The problem is to limit the speculation to the difference between the two sets of prices.

HEDGING PROGRAMS

There are three rather distinct kinds of hedging programs that will meet the different hedging problems of feed manufacturers. These we may call direct hedging, cross hedging, and selective hedging.

DIRECT HEDGING

Direct hedging is the maintenance of an even market position by taking opposite positions in the futures markets in the same commodity as the inventory position. For example, an inventory of 100,000 bushels of corn is hedged by selling the same amount in corn futures. In this program each inventory is considered separately—corn is hedged without regard to positions in soybean meal, etc. This is the traditional hedging method and is the one used by grain merchandising firms. It is not the answer to feed manufacturers' needs, however, because the ingredients that can be so hedged are usually obtainable on spot markets at no disadvantage and because so few ingredient inventories can be covered in this way.

Direct hedging is used principally by feed manufacturers to earn carrying charges. This is particularly true in areas where grains are produced, but not in sufficient volume to serve all the needs of the area. For example, corn is usually worth substantially more in the eastern states than at Chicago; but at certain times—harvest in particular—the price in the East may be no more or even lower than the price at Chicago. At such times corn can be hedged in Chicago futures with the nearly certain expectation of a remarkable basis gain. This carrying charge may be realized whether corn goes up or down in price. This example illustrates not only an important use of futures markets but also the need for selecting inventories on the basis of their hedgeability.

The basis, or difference between cash and futures, behaves in patterns that repeat themselves over and over. But they do not repeat themselves because of habit. They repeat themselves because the factors affecting the basis recur regularly. If these factors change, the behavior of the basis will change. A hedger must look at the factors that affect the basis in each individual hedging. For example, the price of millfeeds is usually higher in Buffalo than in Kansas City. But this relationship varies. Floods in Kansas City or heavy importations of millfeeds from Canada reverse the usual relationship.

If millfeed inventories are hedged in the Kansas City market on a normal basis, and the relationship is reversed, losses may be greater than they would have been had the inventory been carried open. The effects of the Kansas City floods were antici-

pated as soon as they started, and the hedges were lifted by hedgers who were alert. The importation of Canadian millfeeds was less easy to foresee, and the only way to defend against it was to hold inventories at an absolute minimum. The essential points are that automatic hedging can lead to difficulties and that the hedger must be continually alert.

CROSS HEDGING

Cross hedging is the hedging of a cash position in futures markets for different commodities, that is, short sales of corn against soybean meal, oats against millfeeds, corn against grain sorghums, etc. It involves generally balanced positions and logically considers each inventory separately in the hedging program.

Cross hedging has several purposes: First, it is used to cover commodities for which there are no futures markets. Second, it is used to cover commodities which the existing futures markets are not liquid enough to hedge effectively. Many feed manufacturers who do not feel that they can hedge effectively in certain futures markets prefer cross hedging.

Third, cross hedging is used when the direct hedging basis is not satisfactory. There are situations in which cross hedges work better than direct hedges. For example, it is thought that Iowa may import some oats this year because of the short domestic crop. But because of the Canadian imports, total oat supplies seem adequate. Oats could have been bought in Iowa at freight off Chicago at harvest. At that time the logical hedge was in oats. If the price of oats in Iowa increases to the Chicago price or above, this hedge will be very risky; and a logical hedge for oats might well be in Chicago corn, which can be expected to maintain a carrying charge. In other words, in placing a hedge, the hedger should sell the highest things, which in this case *may* be Chicago corn.

A fourth use of cross hedging is to take advantage of seasonal tendencies in price relationships. During some seasons of the year some commodities gain on others, and at other seasons they lose. There are certain normal relationships that guide hedging programs. Soybean meal seems to gain on corn from fall to early winter, lose into the January–March period, and gain into summer. The ratio depends on the relative supplies of each, both for the year as a whole and for the different seasons of the year. A careful watch of this relationship and the factors affecting it may make it possible to develop a pretty good hedging program for soybean meal. Other rather regular relationships exist.

There is considerable difference of opinion about the advisability of cross hedging. Some firms do quite a lot of successful cross hedging, while others prefer to carry inventories unhedged. A thorough knowledge of price relationships is essential to effective cross hedging. There are severe problems in cross hedging in addition to

the one of price relationships. One is the quantity to sell against an inventory. Whether to sell pound for pound, value for value, or in some other combination requires a careful study of historical price behavior. Another problem is locational differences. Relative values at different points seem to be much more erratic in feed ingredients than in grains, and this erratic behavior must be recognized in placing cross hedges. It does, however, have the offsetting advantage of offering basis profits for those hedgers who understand it.

SELECTIVE HEDGING

The third kind of program, selective hedging, might better be called selective speculation. It is fundamentally a speculative program. It is, however, less speculative than carrying open inventory positions. Selective hedging is the careful selection of inventory positions and hedging plans in order to take maximum advantage of market changes with a minimum of price risk. It involves both direct and cross hedging, as well as generally unbalanced market positions, which are taken on the basis of expected price and price relationship changes. A selective hedging program is a blending of the entire inventory management program with all of its separate prices into one coordinated balance of market positions. This seems to be the single hedging program that fits both the problems and the desires of mixed feed manufacturers.

A selective hedging program should be designed to accomplish several different goals: First, it must limit the total risk of the firm to the amount of loss that it is willing to take. If this involves the hedging of part or all of the minimum inventories, then it must provide for these hedges.

Second, the program must assure liquidity of operations. Every purchasing agent must be able to make independent decisions. But the outlook for supplies, prices, and requirements changes very rapidly, and he must be nimble enough in his thinking and trading to adjust to the changes. The inventory program must also be liquid enough to make it possible to adjust to changes. Taking a position and holding it for a long period without the possibility of making adjustments is dangerous.

Suppose that a feed mixer buys soybean meal in October for delivery from January through March at \$60 a ton. He believes that it is priced below the average for the year and that the meal will cost more than that in January, February, and March. By December the price goes up to \$70, which the mixer considers too high. He thinks that the price will decline to \$63. Suppose that he is exactly right in his appraisal. If he carries the original speculation through to its conclusion without deviation, he will make net \$3 a ton. Actually he will have made \$10 and lost \$7. The inventory value of the meal in December is \$70, not \$60. With a flexible inventory program, he could have gotten off a sale against the meal contract and cashed the \$10.

A good military commander always plans his retreat before he launches an offensive. All feed manufacturers who take inventory positions get into situations that go against them. This cannot be helped. The thing to do then is to stop the losses before they get too large. Again you can see the importance of being able to even up quickly. One of the most important uses of futures markets is to provide liquidity. Cash positions are relatively inflexible. They are tied to considerations of adequate supply, proper quality, and transportation costs. You tend to get married to cash positions.

One serious inventory problem is the changing volume of feed sales. A decline in mixed feed prices is usually accompanied by a decrease in volume of sales, and an increase in prices by an increase in sales. Accordingly, an inventory of a given size lasts longer on a declining market than on a rising market. It is difficult to maintain an inventory of constant size in terms of consumption. This is another reason liquidity is important. In a declining market, something in addition to feed sales is needed to get inventories down fast enough.

Third, a selective hedging program is designed to make profits from long positions. This is the *selective* part rather than the *hedging* part of selective hedging. The program calls for deliberate speculations after the potential gains and losses have been appraised and the gains outweigh the losses at the level at which the individual firm is willing to speculate.

Fourth, the program should fix profits from speculations when the balance of potential gains and losses is unfavorable. This is the hedging part.

Fifth, the program is designed to take maximum advantage of carrying charges and price relationship changes and to integrate them into the overall storage and risk program. The overall storage capacity for some ingredients—soybean meal and alfalfa meal in particular—does not seem to be adequate. Erratic price changes indicate this fact. Carrying-charge potential is usually great when commodities are subject to short-run market gluts and shortages. It is possible to take advantage of these temporary market conditions without accepting the risk of changes in the price level.

IMPLEMENTING A SELECTIVE HEDGING PROGRAM

For the sake of presenting a program, we will think in terms of certain steps, but they should not be accepted by and applied to individual firms. Each firm must work out its own checklist.

The first step is to define the risk policy—to establish the maximum load of the firm and determine the level of uncertainty at which the firm will speculate. This latter is a question of how good the odds must be to get into the market.

The second step is to establish the level of minimum inventories that must be maintained. If this minimum level exceeds the maximum risk load, the problem becomes one of how to hedge some of the risks. Even in such a situation the firm may not want to limit its speculations to the minimum-inventory group. The best policy may be to cover them all and take the speculations in other ingredients.

Third, the firm should appraise the speculative potential of the entire list of ingredients. This appraisal should be in terms of prospective gains and losses and the degree of certainty that is felt about the forecasts.

Fourth, the hedging potential should be appraised in terms of basis change. Both direct and cross hedges should be considered.

Fifth, those inventory positions, hedged or unhedged, should be selected that offer the greatest potential profits in relation to potential losses. These should be selected in the order of their favorability up to the desired risk load of the firm.

Sixth, a liquidity program should be worked out. Lines of retreat should be chosen in such a way that, as the situation develops, the inventory program can be kept within the limits of the risk policy of the firm.

This inventory program is a continuous operation. It is not like the plans for a new feed plant because it can never be considered finished and put aside. It does, however, resemble the plans for a new plant in the careful planning and engineering that go into it. It involves a great deal of knowledge and careful and continuous attention.

In the final analysis, all that I have said can be reduced to three main points: (1) decide how much and under what circumstances you want to speculate; (2) plan your speculations carefully with your eyes wide open and take no speculations in which you do not have faith; and (3) integrate your inventory operations into a well-coordinated program.