ON ORIENTING FARM COMMODITY RESEARCH TO STRUCTURAL
AND MARKET CHANGE

by George D. Irwin*

Commodity orientation has fallen from style in farm policy dis-
cussion. We now talk of a people orientation.1/ So what is the
place of a discussion on commodities, and what is the relevance of
commodity research? I intend to use this question as a vehicle for
proposing a general theme. I will then expand on the theme in
selected areas where changes have particular impact on research
priorities.

Rationale of Commodity Orientation

I propose that studies related to farm commodities remain vital,
even though the general policy focus is in terms of people. We have
merely added a dimension to policy2/ which may actually increase
the significance of commodity problems and permit a clearer look at
them. It may be useful to review six reasons why this is true:

1. Since people orientation has freed commodity price from a
general agricultural welfare function, price is likely to become a
more important corner post of the welfare of commercial farmers.

2. Commodity analyses and policies have an additional special
significance for rural welfare arising from the aging of the farm popu-
lation and its immobility. The effect is two way. The aging phenomenon,
and people policies related to retirement and consequent recombin-
ation of freed resources, impose an important dimension in supply
response work. And on the other hand, results in the commodity
market help determine the extent to which aging creates a continuing
welfare problem in the commercial agriculture industry.

*Agricultural Economist, Economic Research Service, U.S. Department
of Agriculture, stationed at Purdue University. P. L. Farris, G. E.
Schuh, R. C. Haidacher, J. Havliceck, and J. H. Berry suggested
several improvements made from an earlier draft.

1/ Paarlberg, Don. Emerging Farm Policies. Presented at 17th Annual
Institute of Animal Agriculture, Purdue University. April 2-4, 1967.

2/ Ruttan, V. W. Agricultural Policy in an Affluent Society. J. Farm
3. Commodity is related to general welfare programs through the cost of food and its availability.

4. Structure and functioning of commodity markets have important overall policy implications in terms of long run income distribution between consumers and owners of factors of production.

5. Commodity price is still the primary means of getting consumer preferences reflected back to raw materials. Increasing loss of identity through processing will continue to offer more difficult imputation problems and may reinforce pressure for more specification buying. This could serve to increase the number of commodities and to increase clarity of the price signals, besides its less clearly positive structural implications for efficiency in the food marketing chain.

6. Commodity is, some observers suggest, the focus about which farmers may organize in the future to concentrate their influence, and thus, is likely to continue as an important policy concern.

A General Theme

Many of the pressures for change in recent years have come from the farm input markets. Thus the general theme I wish to convey is that we cannot any longer take input and other product prices as given in commodity research related to farm policy. Nor is it possible to automatically assume structure as given. That is the import of the changes discussed in the background papers. It is the message of Ruttan\(^3\), as he described the five sets of market relationships through which interactions between farm and nonfarm economies are restructuring agriculture. It is also a major lesson dramatized by the regional adjustment studies which swept the country during the past decade. For lack of homage to this new dictum, we often found the terrain rocky in trying to relate individual economic units to aggregates in our regional supply studies. This partial failure was to some extent understandable, for until recently, the product market was the primary link to the nonfarm economy. We built models without interdependence on the input side, and were surprised when the models traced through to yield the general theme I have asserted. This serendipitous result, which was reinforced by other separate analyses arriving at the same conclusion, is perhaps the most significant outcome of the regional studies. It brought home to a great many researchers the need to widen their horizons in response to the changing real world. At the same time, it spoke well that the general economic models were able to trace through to an unanticipated result.

\(^3\)Ruttan. *op. cit.*
Research Orientations

What can we learn from this which will help us in future research? Is the only lesson that we may expect our future efforts to falter on the rocks of erroneous assumption? Perhaps. Certainly the danger is real, but I find it significant and hopeful that many of us are now aware of the changed research environment we must encompass to be relevant to policy needs.

It is my feeling that most commodity research has policy implications, but that it is certainly appropriate and feasible to look at priorities. Juers,\textsuperscript{4} from the viewpoint of a policy adviser, noted that making research useful for decisions implies an understanding of at least three features of the policy process:

1. The analysis must be timely. Preferably, this means the research must be completed before the issue becomes "hot" in the political arena. This, in the public eye, correlates with objectivity.

2. Results need to be presented in a decision making framework. We must provide a general research understanding. Then comes the all-important, often neglected step. Someone must spend the time to interpret it in terms of current issues. Specialization has hit in this area, too, and we tend to be either researcher or policy analyst.\textsuperscript{5} We as researchers are often prone to assume that a research report on the general results will be enough, and that anyone can frame it for decision making. This step, whether you call it adaptive research, extension, or policy analysis, has become more difficult as our research models become more complex, powerful, and difficult to comprehend. My point is that we need to reconsider the question of who is to put results into the decision framework. Perhaps the researcher has a contributory role, and probably he stands to gain from this experience a new sense of relevance in his future efforts.

3. Political and administrative considerations, as well as economic, enter the policy analysis. And the weight given economics depends on the economic analysis available.

From this standpoint, I find it useful to think of farm commodity-related research in this rapidly changing economy in a dichotomous framework. On one hand, we need to study and describe the leading edge of developments in order to get inductive insights into the

\textsuperscript{4}Juers, Linley E. Adequacy of Current Research and Education as Viewed by a Farm Program Analyst. \textit{J. Farm Econ.}, Dec. 1962.

\textsuperscript{5}The parallel between research and extension in farm management on one hand, and policy research and analysis on the other is significant.
relevant external and internal forces, and the direction they are taking us. These areas are not very amenable to our supply-demand models, but they furnish invaluable fuel for propelling their development into useful channels. On the other hand, for reasons I shall expand upon later, we also need studies encompassing the whole of a commodity - or the aggregate and its components. Where is it going as a result of these forces, and where are its lagging components in terms of income and welfare? These are the areas where formal research models can best be adapted. Looked at in another way, the dichotomy contrasts the basic difference in emphasis between short run possibilities with existing structure and equilibrium models, on one hand, and the longer run, necessarily less formal procedures designed to isolate potential sources of breakdown in our analyses which assume fixed parameters. One approach streetlights an entire scene, the other spotlights its moving border.

At the Leading Edge

Where are the moving borders, the issues we need to work on in commodities? I will concentrate on five conventionally defined areas which seem particularly relevant. For them, specific detailed attention seems warranted. The areas also provide an important component of variability which must be accounted for in the aggregate analyses I will get into later.

Demand Forces

Some analysts would contend that the major unstable elements have been on the supply side in recent years. Demand forces are destined to take a less passive role.

The most prominent reflection is in the expanding world market, which already has shown both spectacular increase and great year to year variability. For example, recent work on feed grains indicates an export market for about 1/5 of the production by 1972, against less than 1/7 in 1964. Instability was demonstrated by the dramatic jump in 1965-66, and the equally significant fallback in the 1966-67 figures due to better world production conditions. Our grain stocks in reserve insulated the United States market from much of this impact. The next time, our stocks might not be so adequate.

The point is that these markets furnish important components of, and important instabilities to United States production requirements. Several nations have high income elasticities of demand for commercial exports of feed grains derived from their domestic demand for meat. But projection has some different twists from that done for the United States where population and per capita income (and in a few cases changing tastes) are the significant demand shifters. The world market portion of United States commercial demand also depends on the situation of competitive suppliers and on such policy aspects as national balance of payments. Of course, the noncommercial exports of food aid are a direct resultant of United States foreign policy. The fact that these forces are less than completely economic in their outcome does not lessen the importance they carry in future United States commodity demand. As self interest, we need to place a high priority on exploring and understanding them as far as possible.

A second demand force is found in what amounts to a proliferation of commodities in the United States market, which make the relationship to a broadly classified raw commodity increasingly tenuous. A result is the tendency toward specification buying by processors. Another is in contracting and integration. One aspect of this proliferation is a consequence of sub-specification of consumer tastes. Langemeier and Thompson recently completed a study which showed United States consumers now differentiate between fed and nonfed beef. A similar development, though originating on the technology side, is the coming breakdown of corn into several commodities. We already have sweet corn. High lysine (protein) corn promises great improvement in human, swine, and poultry nutrition, and has potential impacts on the oilseed proteins which are poorly understood. We may expect certain industries to develop high-starch corns to meet their needs. And improved grain hybrids, bred for short stalks, are increasingly unsuited to high silage yields. The point I make is that our domestic demand studies cannot be satisfied with traditional commodity categorization if they are to meet these changing needs. Another aspect of proliferation arises in better recognition of the divergence between raw product and consumer product. One dairy representative recently noted that the loss of butterfat sales in the


switch to low fat milk by consumers was just about offset by the increase through sour cream. A meatpacker noted that the so-called meat-type hog provides larger hams and loins, which are discounted because those sizes have been associated with lower priced sow pork, and because they are too large for the average consumer. New products are obviously called for if the desired gain in hogs prices from the meat-type animal are to become fact. Each of these examples points to increasing distance between initial and final product, and for the need to recognize and identify these products in studies of demand. A further aspect of proliferation arises in the large proportion of housewives in the labor market. They require convenience foods in more processed forms.

A thread winding through the discussion of proliferation leads to a third demand force - the increasing difficulty of relating farm level to consumer demand. We need to look at these imputation problems in terms of the market structure and power possessed by buyer and seller at the various levels. The simple notion of a marketing margin is likely to become less and less satisfying as a summarization of the set of relationships between the raw product producer and the retailer. Tracing these impacts in a form useful for decision making will frequently require us to make shorter term demand analyses, and to recognize interrelations with supply.

Supply

Some important "leading edge" implications for supply emphasis grow out of two developments: (1) the shift of agriculture from being heavily land and labor based to being capital based, and (2) the average aging of the labor force, with the prospect that this will continue to be with us for several decades.

The switch to capital based production imposes some vital changes in the nature of product supply curves and of production response. They are reflected particularly in reversibility, vulnerability, and uncertainty. Capital basing, as has been pointed out, involves higher cash costs as a percentage of gross income, and thus increases vulnerability. A smaller percentage of the resources are the traditional residual

---


11/ Haynie. op. cit.

12/ J. Havlicek, L. H. Myers and Anthony Prato at Purdue have demonstrated the importance of including supply variables in quarterly demand estimation for beef and pork.
claimants, family labor and capital, which can take deferred compensation as a reaction to unfavorable situations. This cushion is withering. Capital has been imbedded generally in larger enterprise size and increased specialization. Once the investment decision has been made, it is largely irreversible and organizational adjustments are less flexible. Because of the relative ease of entry into agriculture, the biological time lags between decisions and production and the high capital requirements, we have an almost classic opportunity for investment cycles resembling those of industry, and particularly in livestock breeding. Thus, as Kottke\textsuperscript{13} has pointed out, we need to examine firm supply functions with respect to identifying where they are reversible. Specialization also raises questions about efficacy of allocation models, which we will explore later. The increased dependence on purchased inputs emphasizes the need to make supply and demand analyses for these inputs in order to consider these variables in estimating commodity supply.

A parallel influence is the aging of the labor force described by Schuh in his paper. Aging generally means reduction in the number of alternatives to farming. It therefore may reduce supply flexibility and raise questions of income adequacy, particularly since adequacy of business size appears to be inversely related to age. In most research we have not considered age or stage in the family life cycle as classification variables for supply analysis.\textsuperscript{14} We need some work to test the hypothesized relationship between age and response.

**Regional Advantage and Location**

An easily overlooked effect of the capital revolution is that it reduces the extent to which regional advantage is land based. Shifting location of consumption centers and the recent drastic alterations in transportation rate structures come to play a more dominant role. These effects, combined with the specialization and large enterprise trend in beef feeding, have been well demonstrated by the growth of western feedlots. I think we need some work to determine the causes of this rapid location shift of recent years. I might hypothesize that the growth rate curve would flatten out in western locations as the fed beef supply catches up with population in that area. All this is apart from the question of increasing size of feedlot, although we also need to know whether there is some causal interrelation between size and location. It would be useful to test the hypothesis that


\textsuperscript{14} An exception was Ph.D. work done at Michigan State by Orlan Buller on fruit farms.
regional differences in size are due solely to slower adjustment to economies of size in older feeding areas, due to unrecovered investments in smaller-scale fixed assets.

Another series of questions in location arise in the commodities where per capita demand curves are shifting right and being amplified by a growing population. We see this particularly for beef. Rumors are that the western range is nearing its capacity as a source of feed for the beef cow herd, one of the enterprises that has remained strongly land based. Is this true? If so, is the mid-South the region of next advantage? How would an expansion in this area affect the location of feedlots? Comparative costs of shipping grain, feeder animals, fat animals, and meat are changing, and are bringing into question our traditional answers to these important questions.

Comparative Structures and Pricing

Heflebower\(^{15}\) has pointed out that the fruits of technical progress tend to be distributed as wages and profits under oligopoly, but as lower consumer prices in a competitive situation. In commodity areas with different kinds of structure among buyers and sellers, questions of bargaining power arise.

Pressures are felt for coordination through contracting or integration. The pricing mechanism is put to a severe test as an allocator and distributor. It has been suggested that the pricing mechanism works most efficiently when fixed costs are low (marginal costs are allocable), a rapidly disappearing situation in both farming and the processing industries. The rising fixities are embodied in specialization in large enterprises. The switch to capital-based agriculture, plus the specialization foster what we have come to recognize as the cost-price squeeze. The traditional answer economists have given to farmers is volume. Today, we find many who are saying "no - the answer is bargaining." This strikes me as an extremely significant change in the psychological environment of agriculture.

It opens for us as researchers a number of new research doors. We have questions of equity in contracting arising from unequal market power, and of direction of enterprise control which may lead to further vertical integration.

Information serves as a key to success of a pricing mechanism, along with power. An increasingly significant mechanism for focusing information is the futures market. The possibility for hedging in fat and feeder livestock suggests the possibility that the commercial farm may become a producing operation, with the risk bearing portion of the entrepreneurial duties shifted to investors. In addition to needing to study this as an alternative to direct forms of contracting and vertical coordination, we need a great deal of analysis on the information focusing success of the futures market. From the viewpoint of farming, we also need to study it in the context of its functioning in the farm operation. From society's point of view, exchange through a competitive futures market may be an attractive alternative to bilateral bargaining arrangements as a pricing mechanism for specification buying.

Instability of Farm Prices

Almost all of the forces discussed so far lead one to conclude that we may expect greater problems with instability of farm prices. World markets are growing and are annually unstable. The durable equipment associated with specialized enterprises and ease of entry suggest the possibility of widening inventory and price cycles. The uneven advance of technology promotes uncertainty, uneven adjustment in supply, and periodic readjustments. The effect of these instabilities on incomes is accentuated by the extreme stability in prices of purchased inputs. Three decades ago such a price-cost situation led to efforts to stabilize commodity prices. In recent years, supports have lowered in order to get in equilibrium with world markets, and some have implied that they should be eliminated. Yet it seems reasonable to argue that today's high capital agriculture is less able to withstand variability. I am suggesting that we have a potential need for some stabilizing policy recognizing the world market, and that information in this area may be a fruitful goal for some commodity research work. Stabilizing at an equilibrium price level, rather than at a level designed to provide income transfers to agriculture, amounts to a form of forward pricing and absolutely requires keen commodity analysis work.

On the Aggregate Picture

In addition to studying the leading edge to identify the long range developments, we also have obvious needs for knowing about the mass, the aggregate, and its components. In this area, the general theme I

stated at the beginning has its greatest impact. Integrative analyses are called for, involving product demand, input supply, the transportation system, and the production processes. They need at times to be disaggregated regionally, by type of farm, and by age of operator for welfare and other distributional analyses.

The integrated and disaggregated approach has been developing methodologically for some time. One example, combining the successful features of much earlier work, has been the ERS-Farm Production Economics Division national model. It recurses between a demand model and a group of area production models, with the recursing built in a cobweb way on the fact that production decisions are made well in advance of harvesting output. The model has potential for adding a transportation network and more regional demand relations, at the expense of computational size. So far, only limited attention has been given input supply relations. It seems to me that a good conceptual framework for handling the growing complexity of these integrative models may be the Leontif type of model, but expanded in the farm production row and column. Alternatively, we could think of adding a less detailed "activity" to present models to handle the related input and product relationships. The integrative model focuses on a growing need to understand appropriate time lags in responses.

In the area of supply analysis, the structure and market changes have at least two important implications for our models. In commercial farming, the various forces leading to specialization have progressively reduced the enterprise choices. Increasingly, we have a clearly dominant profit situation for a particular enterprise. Decisions are more clear cut. The capital revolution, on the other hand, means an increased possibility of variation in level of inputs on any one enterprise. Thus the implications for our research models are: (1) a need for more attention to multiperiod-investment decision models, and for less of the traditional static enterprise choice models. This puts our analysis more nearly in a firm growth context, where we need to take a close look at the appropriateness of models assuming the growth path follows a sequence of static equilibria. (2) A need to expand the allocative models by making more activities available in the direction of variation of input levels. We may, for example, need to allow several fertilization levels to choose among in studying a corn farmers' response to a new feed grain program.

\[17/\] Dale Hathaway noted this point over 5 years ago in terms of helping farmers. The point is equally applicable to more aggregative analyses. Hathaway, D. E. The Implications of Changes in the Economy for Work in Agricultural Economics. J. Farm Econ., Dec. 1962.
We need to look a long way ahead, and this is particularly difficult in a rapidly changing environment. Results from extrapolating our econometric models based on time series break down after a shorter time in this kind of situation, but I feel they will remain extremely valuable for verifying the changes that take place. They are indispensable for short range policy work, and provide some help in the difficult problem of providing a standard for checking our more anticipatory normative models.

Concluding Comment

In summary, reports of the imminent death of farm commodity research are, to use the well known phrase, very much exaggerated. Reports that we may expect a significant mutation, on the other hand, are accurate. The commodity creature, which was formerly isolated from all except product markets, is fast being exposed to the entire economic environment. Adaptive processes must be forthcoming, and the underlying stresses may be expected to alter its personality and behavior. Some priority research problems lie in developing research models to analyze policy alternatives and their effects over time; but we must avoid the pitfall of getting so involved with the models that we fail to provide the leading edge explorations which nourish these models and also have significance on their own. Both kinds of problems thirst for data, and imply a high priority to isolating the kinds of data needed and to collecting it. Of particular significance in each priority category, it seems to me, are (1) renewed attention to differential aspects of the demand situation by income level, country, and product differentiation, (2) examination of the combined effects of age distribution and capital-inflexible, high cash cost specialization on supply response and on the recombination of land units over time, and finally (3) exploration of the structure of input markets, both to provide supply and demand data for research models and to assess the questions of market power, exchange equity, the external forces for changing structure of farm firms which do not fit our usual formal models.