The USDA/Land Grant Extension Outlook Program -- A History and Assessment

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-- A History and Assessment

The 87 year endurance of the USDA/Land Grant Extension Outlook Program attests to its value for farmers, agri-businesses, the food system, policy makers, consumers, rural leaders and others. The program has generated short run and year to year forecasts with commendable accuracy and has established long range projection baselines that are useful for policy analysis and reviews of alternative futures. In addition, the program has been effective in elevating the understanding of economics by the audiences drawn to the outlook subject by its popular nature.

As stated by Dr. Samuel Johnson, a noted British author, "Whatever draws us from the power of our senses, -- whatever makes the *past*, the *distant* or the *future* preponderate over the *present*, advances us in the dignity of thinking beings." This insight provides a rationale for reviewing the long 87 year history of the USDA/Land Grant Extension Outlook Program, itself a continuing effort to peer into the future.

In 1961-62, Bushrod Allin of the USDA was president of the American Farm Economics Association and heavily involved with the National Agricultural Outlook Conference and regular Situation Reports. He was instrumental in establishing the theme of the AAEA annual meeting in 1962 entitled, "The Federal-State Farm Economic Intelligence Service." This embraced not only the traditional outlook program, but also the USDA-state agricultural statistics services which provide the data so crucial for forecasting.

Indeed, even before the launch of the outlook program in 1923, estimates were being generated on prospective crop and livestock production. The first pig crop report was issued in 1922 which also included producers' intentions. Planting intention surveys were also taken in the spring of 1923. Of course, the crop reporting service, upon which much of the outlook work is based, started in 1862 during the Civil War. But it was 1923, under the leadership of Secretary Henry C. Wallace, when the USDA/Land Grant outlook program formally began.

Structure and Purpose, 1923 to 1960

The first National Agricultural Outlook Conference was held on April 20 and 21, 1923 in the conference rooms of the Bureau of Agricultural Economics (BAE) with Dr. H.C. Taylor, Chief of the BAE, as chairman. Secretary Wallace, in consultation with his son, Henry A. Wallace -- along with Taylor -- approved this meeting. With the creation of the BAE in the USDA in 1922, many in the department felt that some procedure should be developed to disseminate the results from economic research to farmers in a manner that would serve as useful guides for their production and marketing decisions the following year (USDA, 1942). The conference was designed to provide this outlook.

Conference attendees included economists from banks, economic research institutions, agri-businesses, academics and a representative of the American Farm Bureau Federation. A second conference of these individuals was called for July for further analysis. Apparently, the first year's report was generally well received and was

followed in the second year as an internal operation of the BAE without outside participation. The second annual report was so favorably evaluated that the decision was made to organize the work on a permanent basis. Special committees were formed around the major agricultural commodities plus domestic demand, agricultural competition and the demand in foreign countries (USDA, 1942).

By 1926, a few of the leading state agricultural economists were involved in preparing the annual report. The role of state research economists shifted to extension specialists, who were invited to the USDA for training sessions on the outlook. As the result, a strong partnership developed between the USDA and the Land Grant institutions in which the state extension economists both gained from and contributed to the development of the outlook material, making it applicable to the farmer constituency. By 1928, 34 states had prepared outlook reports based upon this joint effort with the BAE (Dixon, 1928).

County extension agents were directly involved in each state's program. On February 4, 1929, H.M. Dixon, Extension Economist in Farm Management in the USDA, delivered a 7 minute address on the National Broadcasting Company in which he stated, "Probably no one in your county is in better position than your county agricultural agent to help you analyze the agricultural outlook for the crops and livestock you plan to raise. Many county agents and other extension workers are busy analyzing the outlook information with farmers today -- have been for some weeks -- and will continue such work for the next several weeks. In fact, a number of the State extension services issue outlook information the year round." He then reported on numerous outlook meetings scheduled in Iowa, Illinois, Missouri, Georgia, Arkansas, Oklahoma, Oregon, Washington, Colorado, Arizona, New Mexico and most eastern states (Dixon, 1929). The earliest indication of programming in Indiana and Michigan was in 1929 when the USDA reported that these states were using commodity meetings, weekly and daily publications and radio for disseminating outlook information.

At the outset of the Federal-State Outlook program, state specialists involved were primarily trained in farm management and served as the link between the USDA and the county extension agents to implement the program. Considerable attention was given to the process of integrating the outlook information into an ongoing farm management program, which had concentrated on budgeting with county staff and farmers.

At the 1930 National Agricultural Outlook Conference, 25 states were represented. A survey of 12 state outlook programs revealed that annual and monthly outlook reports were commonly issued with radio also being a frequently employed media. County agricultural extension agents (90 percent) made definite use of economic information and outlook material. Outlook meetings were almost universally held. An early feature of the program at the national and state levels was the development of charts to illustrate trends in production, prices, etc.

Regional conferences were also integral to the outlook program, which allowed more local extension agents and specialists to attend. In a report on the Central States Outlook

Extension Conference in Ames, IA on September 25 to 27, 1930, the attendance of 98 was broken down as follows (Dixon, 1930):

Federal Farm Board	3	Michigan	2
BEA	5	Minnesota	4
Extension (Federal)	6	Missouri	3
Illinois	3	Nebraska	11
Indiana	5	North Dakota	3
Iowa	33	Ohio	5
Kansas	3	South Dakota	7
Kentucky	2	Wisconsin	3

As the structure of the USDA/Land Grant Extension Outlook program took shape, Dr. H. C. Taylor, a major proponent, expressed its philosophy: "Our proposal was not to formulate an agricultural program but to draw a picture of the conditions with respect to the probable supply and demand throughout the competing area. …. The farmers were not to be told what to do but given the facts they needed in order to act intelligently. …. It is well recognized that orderly marketing must be effected if farm prices are to be stable. The thinking farmers have already grasped the idea that orderly production is the basis of orderly marketing" (USDA, 1942). As the program further matured, leaders became aware that the subject "outlook" was attracting audiences ripe for general economic education.

The AFEA Shows Concern

By 1931, the program came under criticism for issuing forecasts which were increasingly indefinite. Many state extension economists insisted that the reports must be made more concrete if they were to benefit farmers. Also, at the end of 1931, the American Farm Economics Association (AFEA) scolded the USDA and drafted the following resolution:

Whereas, the outlook reports issued in recent months by the United States Department of Agriculture have contained practically no statements concerning the outlook for farm products, and practically no statements that will aid farmers in deciding what readjustments in production will be most advantageous; and
Whereas, the Federal outlook reports have a vital relation to the economic research and extension programs of all the state colleges;
Be it resolved, that the American Farm Economic Association requests the Secretary of Agriculture and the Chief of the Bureau of Agricultural Economics to return in their outlook work to the policy which has been followed in former years of preparing and issuing reports representing interpretations of data with the best judgment of the outlook workers of the Department concerning the outlook and market prospects for the different agricultural commodities for the purpose of aiding farmers in making the readjustments in production that will be most advantageous to them.
Be it further resolved, that the Secretary of Agriculture and the Chief of the Bureau of Agricultural Economics be asked to give this request immediate consideration and to inform the agricultural colleges of the action taken on it in sufficient time for the agricultural colleges to take it into account in making plans for participation in the

National Outlook Conference to be held in January 1932 (*Journal of Farm Economics*, 1932).

The resolution continued to commend the U.S. Bureau of Census for classifying farms by type in the 1930 Census. In any case, the AFEA's concern about the outlook program indicates how highly valued the program had been and their assessment of its importance at the present and in the future.

Emphasis Shifts to Agricultural Adjustment

As can be noted in Figures 1 and 2, the twenties were a difficult time for U.S. farmers. After World War I, farm prices fell sharply as measured by the Index of Prices Received by Farmers. The Index of Prices Paid by Farmers also declined but by much less. The "terms of trade" went against agriculture. This was also tracked by the "Parity Ratio," which is simply the Index of Prices Received divided by the Index of Prices Paid by Farmers (Figure 2). The years of 1910 to 1914 were declared a period of stability in the relationship between prices farmers received and paid -- the appropriate base to measure future terms of trade. For the decade of the 1920s, the Parity Ratio averaged 90 percent.

Obviously, there was some pressure on the Federal-State outlook program to address this imbalance and to direct producers to match output with demand at satisfactory prices. While the program's forecasts provided such a tone, the best interests of individual farmers were to go against the grain. The leadership in the outlook program recognized that their role could not be to assure farmers parity prices.

The concept of parity prices was developed, discussed and argued during the 1920s; but it was not a part of legislation until the formula was written into the Agricultural Adjustment Act of 1933. This act was a recognition that famers acting independently in their own interests would not solve "the farm problem." The role of the Federal-State outlook program shifted to explaining the provisions of the newly enacted agricultural legislation. The government's efforts were not all that successful in the 1930s as the parity ratio averaged under 80 percent for that decade. As one astute farmer of that era observed, "The depression of the '30s would not have been so bad, but it came right in the middle of 'Hard Times'."

With the implementation of the Agricultural Adjustment Acts of the 1930s, the role of the leadership in the Federal-State outlook programs changed with this sudden transition from a laissez faire to a controlled economy. At the end of 1933, D.C. Wood felt that the traditional outlook program was an asset. "During its relatively short period of activity, outlook extension has performed an invaluable service in preparing the way for a program of controlled production. It has brought about a broad understanding of price alternatives particularly as applied to adjustment between enterprises of the individual farm. It has built up an army of farmer leaders of economic vision who are destined to take an important part in the undertaking of bringing about an immediate control of agricultural production. The laborious accumulation of regionalized, localized and

Figure 1.

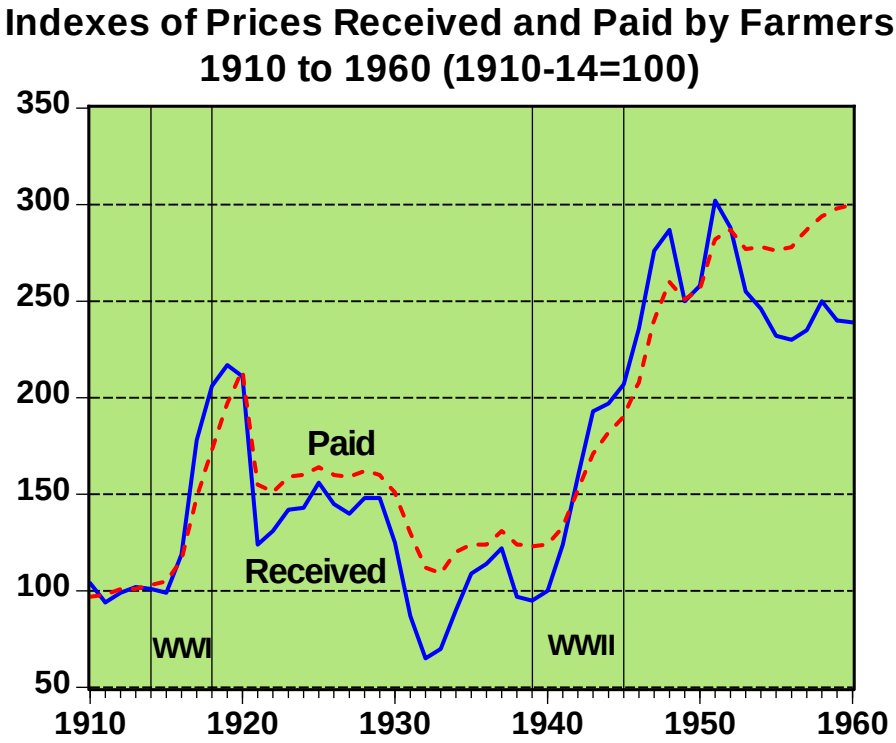
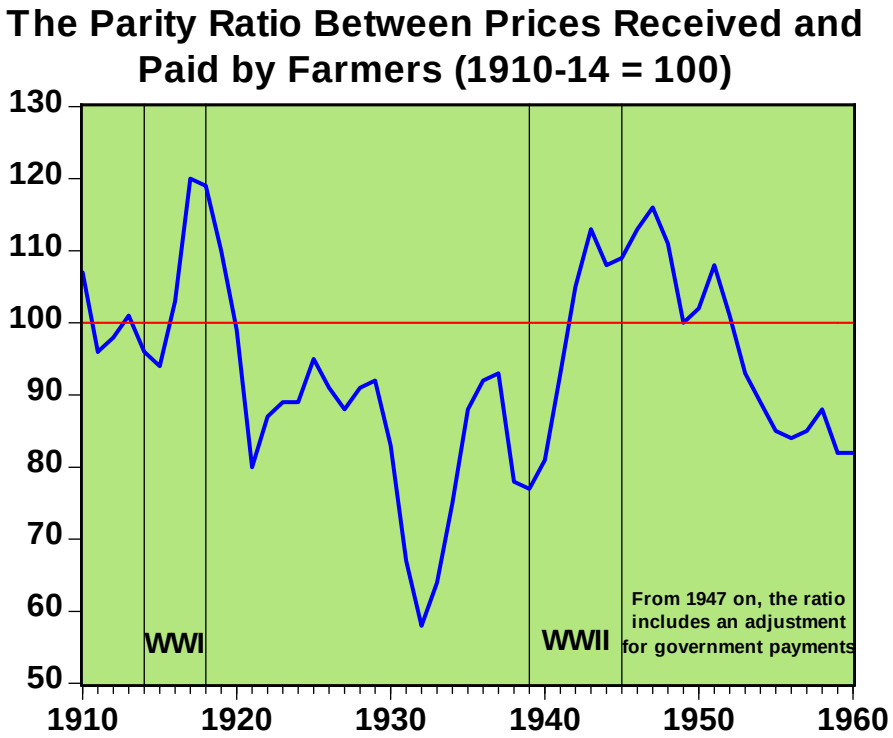


Figure 2.



internal farm organization data under the old order will continue to serve their purposes under the new order" (Wood, 1934).

Wood was concerned about the reduction in flexibility in farm operations under the adjustment programs. However, he felt that refinements in the new program could inject some degree of flexibility which would not necessarily disturb the allotment principle. In a discussion of Wood's paper, it was mentioned that at the November 1934 National Outlook Conference, representatives from 24 states reported that the outlook meetings planned would be combined with meetings at which both outlook and agricultural adjustment organization work would be discussed.

With the advent of the agricultural adjustment programs, the BAE eventually became a part of the policy making process supported by its strong background in outlook. This relationship had been cultivated in the 1920s directly and informally when Henry C. Wallace was Secretary and H.C. Taylor was Chief of the BAE. This involvement in policy analysis faded until Henry A. Wallace as Secretary of Agriculture and A.G. Black as head of the BAE arrived on the scene in 1935 (Black, J.D., 1947). This tie to policy making again faded with the departure of Henry A. Wallace to become Vice President in 1941.

In 1935, a program planning division in the Agricultural Adjustment Administration (AAA) and the BAE sponsored four regional conferences with deans and directors of experiment stations and the heads of agricultural economics departments from the Land Grant colleges. They were asked, in effect, "What adjustments in farming should be made to maintain fertility and control erosion in your state?" A committee was established in each of the state colleges to prepare an answer. This was followed by the organization of a County Agricultural Adjustment Planning Project in the fall of 1935. More than 2,400 county committees took part, sponsored cooperatively by the Program Planning Division of the AAA and the Extension Service (USDA, 1942).

These committees addressed the question of what production of the various farm products could be expected after all land not adapted to agriculture had been diverted to other uses with consideration to soil fertility and erosion. Another question was related to shifts between agricultural enterprises. The answers from these county committees and the state colleges provided the basis for revision of the AAA program to conform more with individual and regional differences.

This structure of county committees and state involvement must have been invaluable to the AAA and BAE and subsequently an important asset during World War II a few years later when the emphasis shifted dramatically from controlling (reducing) the agricultural production machine to stimulating it for the war effort. This became a challenge of gearing U.S. farm output to the food needs of not only the US but also of its Allies.

Again, as in 1935, four regional meetings were held (September 1941) where production goals were announced. The production goals were closely related to the agricultural

outlook, and their establishment was made possible through use of much of the basic research and techniques upon which outlook work was founded (USDA, 1942).

In the post-World War II period of the 1950s, the outlook program began receiving increased attention from agricultural economist researchers in support of extension's effort. For reasons related to the post World War I period (Figures 1 and 2), farmers were concerned about what would happen to their terms of trade after World War II. As an indicator of this interest, in 1947 there were 260 Purdue outlook meetings in Indiana with attendance of 33,722 persons (Hurt, C. 2010).

The Next 50 Years, 1960 to 2010

The outlook programs varied from state to state over the 1960 to 2010 period, and new electronic media were quickly applied in the individual states. In Michigan, for example, an annual report in the mid 1960s of the extension specialist involved with field crops and livestock listed 38 farm magazine articles (including regular issues of the major state farm publication), 25 articles in departmental, other university and trade publications, 70 radio programs, 45 public speeches and the organization of 20 outlook meetings. Other outlook presentations were part of programs sponsored by farm and agri-business organizations. Other commodity extension specialists covered the outlook for dairy, poultry, fruit and vegetables.

Later, outlook programs shifted to television, electronic links to county extension agents and to the internet. One of the innovations James Hilker in the Department of Agricultural, Food and Resource Economics at Michigan State University introduced in the 1990s was a regular feature on the web entitled, "Market Outlook and Probabilistic Price Forecasts for Livestock and Grains." Hilker was responding to earlier prodding by his profession for probabilistic forecasts such as were promoted by Gene Nelson (Nelson, A.G., 1980).

The National Agricultural Outlook Conference

In the 1960s and 1970s, the format of the USDA/Land Grant Extension Outlook Program was fairly well established. In the fall or early winter when the National Agricultural Outlook Conference was held, one or two representatives from most of the Land Grant institutions attended. Usually, these persons would be identified as extension specialists in market analysis and also in farm policy.

The value was an opportunity to hear from the commodity experts -- mostly from the Economic Research Service (ERS) -- the replacement for the BAE. But broader than that, those in attendance also were privileged to hear from economists outside agriculture on the general business outlook, foreign competition and other issues of interest to rural populations. Of course, government farm programs became a standard topic in this period. In addition, agricultural economists from agri-business and foreign nations were in attendance to add to the mixture of expertise. Attendees also took advantage of the opportunity to sit down with the ERS commodity specialists to obtain more specific

answers to inquiries. Informal gatherings with other extension specialists and agri-business colleagues were also a feature.

Regional Outlook Conferences

Possibly more important than, or at least as important as, the national meeting were the regional conferences. The standard Midwest Agricultural Outlook Conference, for example, could focus on the commodities and issues most relevant to that region of the U.S. These meetings were held at a strategic time (in August) as the state specialists were preparing for the fall and winter outlook meetings. Key USDA economists were invited to participate, but state specialists provided most of the program. The attendance was restricted to the state specialists and invited USDA personnel.

Information is limited on the history of the regional conferences. At times, there were as many as four: New England, Midwest, Southern and Western. The Midwest meeting has been continuous, and this is possibly true for the Southern and Western meetings. In recent years, the Midwest and Western groups have combined their conferences. The Livestock Marketing Information Center, located in Colorado, is and has been providing a linkage among the regional outlook meetings and regular services to 28 member state Extension Services.

While the regional conferences have remained a mainstay among the state extension economists, the role of the national conference renamed the "Agricultural Outlook Forum" has diminished in importance for them. This can be traced to the development of the internet and the excellent communication this instrument provides between the USDA and the states. Also, in recent years, state budget restrictions have limited travel. However, the attendance in total at the Agricultural Outlook Forum has increased over time and has been holding at around 1,825 in recent years.

About half the attendees are USDA employees and 80 to 100 are representatives of foreign nations. Of the non-government attendees, about 36 percent come from agribusiness and the sphere of money management, investment and credit. Others include farmers, academics, research scientists and the news media (Chapin, B., 2010).

Evaluation of the Federal-State Outlook Program

In the December 1966 issue of the JFE, Tyrus R. Timm, then head of the Department of Agricultural Economics and Sociology at Texas A&M University, prefaced his paper on "Proposals for Improvement of the Agricultural Outlook Program of the United States" with "The agricultural outlook program in the United States, as a cooperative undertaking between the United States Department of Agriculture and the land-grant universities, is the most comprehensive and the most accurate, has the best timing, and is the most widely used of any agricultural outlook program of any country" (Timm, T.R., 1966).

Timm had nine suggestions for improvement, summarized as follows:
1. Support USDA with more and better studies in the states.

2. Question whether the program overemphasizes product welfare vis-à-vis farmer welfare.
3. Determine whether the program could use quantitative probabilities in differentiating forecasts.
4. Determine and evaluate the shifts taking place in decision-making power in both the agricultural production plant and the marketing system in terms of price-making consequences.
5. Assure that public outlook programs for farmers compare favorably with private outlook assistance rendered to big agribusinesses.
6. Reassess the adequacy of the program in guiding agricultural commodities to international markets.
7. More effective means must be found for using the program to project probable actions for government programs.
8. Provide useful projections relative to comparable returns for all four factors of production.
9. Accelerate explorations in electronic data processing and data banks as basic vehicles for an improved agricultural outlook program.

Perhaps the best validation of the federal-state outlook program is that it has endured for 87 years with strong roles at the national, regional, state and county levels even though the emphasis at these levels has been modified. Many have assumed that the outlook program is for farmers. Over time, and certainly by 1960, the value of the forecasts transcended production agriculture and spread to agri-businesses, the food industry, consumers, rural leaders, policy makers, etc.

Another by-product of the outlook program was the shift in responsibilities from farm management specialists to commodity and policy analysts. Demands for price forecasts in extension programming encouraged both extension and research specialists to explore analytical techniques. However, in 2009, agriculture economists at the University of Illinois lamented that "the agricultural economics profession has largely abandoned traditional price forecasting work in the last 15 years." (Colino, E.V., S.H. Irwin and P. Garcia, 2009)

Other criteria for evaluation relate to the news coverage of outlook reports and such factors as the extent to which farm magazines have market pages and how well they are read. Objective surveys of readership of farm publications have revealed the market/outlook page to be the most popular.

A unique approach to assess a state's outlook program was undertaken at Ohio State University using "Contingent Valuation." (Roe. B., T. Haab and B. Sohngen, 2002) This was a survey of attendees at the "Agricultural Outlook and Policy" program series in Ohio in 2001. Subsequent analysis suggested that participant benefits exceeded departmental costs of conducting the program with benefit-cost ratios of 1.07 under conservative assumptions and 1.74 under moderate assumptions.

One should not overlook the role the outlook program has played in general economic education. Topics such as business cycles, credit, inflation, exchange rates, tariffs, supply and demand elasticities, government programs, etc. have been integral to the program. Separate from commodity outlooks, such topics might not draw a crowd.

As shared by Carrol Bottum at Purdue, "The longer term value isn't your forecast – which may change tomorrow due to changing information – rather it is the opportunity to teach how economics works, and how an understanding of economic principles can help them make better decisions in their business and in their lives." (Hurt, C., 2010)

Accuracy of Year to Year and Shorter Term Forecasts

In 1924, H.C. Taylor, Chief of the BAE, stated, "While agricultural forecasting by public agencies is a new thing, substantial progress is being made and it is believed that if the work in this field is confined largely to the collection and dissemination of facts which give the basis of judgment on the part of farmers and others in making decisions for themselves, the benefits will be very great." (Taylor, H.C., 1924) This maiden voyage by public institutions into forecasting opened the question of accountability and how this activity would be evaluated. Early in the history of outlook, concerns about this were frequently expressed.

In 1926, a major article appeared in the JFE entitled, "Batting Averages in Agricultural Forecasting." (Green, R.M., 1926) Evaluated were monthly forecasts from Kansas State College, a commercial source and the USDA. Commodities included wheat, corn, hogs and cattle. On wheat, the "hits" ranged from 8/12 to 9/11; on corn, 8/12 to 8/10; on hogs, 9/12 to 10/11 and on cattle, 3/4 to 8/9. "Hits" were defined as the number of times the direction of change was correct.

In 1929, O.C. Stine judged "agricultural forecasts are generally about 65 to 75 percent perfect." (Stine, O.C., 1929) Of BAE forecasts, he estimated that about 87 were correct. These were essentially monthly forecasts.

After 1929, little attention was given to accuracy of forecasts, at least in the JFE, until 1949 when R.E. Seltzer of the University of Arizona and R.J. Eggert with the American Meat Institute evaluated livestock forecasts at Kansas State College (Seltzer, R.E. and R.J. Eggert, 1949). The data base included 16 years of monthly forecasts for hog and cattle prices from 1925 to 1940. In summary, the hog price forecasts averaged 64 percent "correct," the cattle price forecasts were 63 percent "accurate."

Three years later, Purdue economists addressed the question, "How Accurate is Outlook?" (Baker, J.D. and D. Paarlberg, 1952) The forecasts were those generated by the federal government including the USDA and were for varying time periods, from three months to two years. The variables included: industrial production, demand, farm income, prices received by farmers, and wheat prices, production and carryover. The ratings were based on changes. The value was 100 percent if the change was accurate, zero if it was not and 50 percent if predicted increases or decreases turned out to be

stability. The results were as follows: industrial production, 77; demand, 77; farm income, 78; prices received by farmers, 60 and wheat prices, 69.

The authors introduced a test based on whether the forecasts were an improvement over trend. The score for all series combined (except wheat) was 75 compared to trend forecasts of 68, suggesting a "skill" score of 7 (75-68).

John F. Heer of Iowa State College was critical of the Purdue study which divided the forecast variables into thirds, based on the ranges of change, declaring the upper third an increase, the lower third a decrease and the middle third stability (Heer, J.F., 1954). Heer argued that a more realistic approach would be to define "stability" as a change of anything less than 5 percent in either direction. Using price forecasts from the "Iowa Farm Outlook Letter" during the three year period from July 1, 1948 to July 1, 1949, the average score for a number of commodities was 70.8; 71.3 in the following year of 1949-50; and 81.8 for 1950-51. For the three year period, the results were as follows: Hogs, 73.5, Beef Cattle, 73.1; Grain, 71.9; Poultry and Eggs, 66.7; Dairy, 83.3; General Farm Price Level, 86.5 and Other, 86.1.

With some reservation to evaluate his own forecasting, this author will provide the results of price forecasts on livestock over nearly a 10 year period "for what it is worth." From 1959 to 1969, he prepared a market page for a monthly publication called the National Live Stock Producer, involving some 116 issues. As a feature, he was asked to forecast prices on Choice steers, barrows and gilts and Choice lambs a month ahead. A problem was that the publication delay meant that he had to make the forecast a month ahead of publication, that is for two months ahead. For the three species, he judged that his forecasts were within a $1.00/ cwt. about 55 percent of the time and exceeded $1.50 one time out of four – showing room for improvement. The forecasts for direction of change were correct 70 percent of the time; the forecast for "steady" when prices were actually higher or lower in about 13 percent of the time; the forecast for higher or lower but actually turned out "steady" in about 7 percent of the time; and dead wrong about 10 percent of the time.

Price forecasts for more than a month but less than a year were right two-thirds of the time on cattle and 80 percent of the instances on hogs and lambs. The occasional forecasts out more than a year proved correct 70 percent of the time on cattle, 95 percent on hogs and 80 percent on lambs.

Following Baker and Paarlberg's suggestion to compare outlook forecasts with trends, Helmers and Held introduced multiple empirical models plus futures to test two sources of outlook information on cattle and hog prices -- Successful Farming and USDA's "Livestock and Meat Situation Reports" (Helmers, G.A. and L.J. Held, 1977). The time period was 18 four month feeding periods between June, 1969 and February, 1975. In essence, the USDA model ranked at the top and the Successful Farming model ranked at the bottom in performance. The performance of the futures market was about average among the 8 models tested.

In 1978, the AAEA Agricultural Statistics Committee initiated a survey of AAEA members in July concerning the outlook for the coming year on major agricultural variables (marketing year on crops and calendar year on livestock) plus a few on the general economy. The survey continued since with three early evaluations and one just completed. The earliest evaluation reviewed three years of the results (Cornelius, J.C., J.E. Ikerd and A.G. Nelson, 1981). An important by-product of the survey is to provide parameters of the risks inherent in year to year forecasts.

An analysis of 8 calendar years on livestock and 9 marketing years on crops was completed in 1987 in which error measurements from the survey were compared to (1) the USDA's forecasts published in the August "Agricultural Outlook," (2) the futures market and (3) a naïve model in which values for the succeeding year were assumed to be the same as the current year (Ferris, J., 1987). Of the 34 items tabulated, the ratio of the root mean squared percentage errors of the survey to the naïve model was less than one on 25 items meaning that the survey outperformed the naïve model on 75 percent of the variables forecast. The performance of the survey was very close to that of the USDA and futures market but did not exceed either.

A more thorough examination of the survey by economists at Kansas State University and the University of Missouri was completed in 1997 encompassing the years 1983 to 1995 (Kastens, T.C. Schroeder and R. Plain, 1998). They sorted out the university extension economists charged with the outlook program in their analysis and concluded that the forecasts from these extension economists are more accurate than those of the USDA for livestock but not for crops. Secondly, the composite (combination of all the respondents) forecasts from the survey are more accurate than the subset of extension specialists and the USDA. Results with comparison with futures markets were mixed.

In 2010, Ronald Plain of the University of Missouri, who was involved in conducting the survey since 1988, prepared an analysis of the survey for 1978 to 2009 on crops and from 1995 to 2009 on livestock (Plain, R., 2010). Following are two tables from his presentation in which he compared the forecast errors of the survey with the USDA's World Agricultural Supply and Demand Estimates (Tables 1 and 2).

In terms of the number of items listed on crops, the performance was about equally divided at six each for AAEA and the WASDE. On livestock, the AAEA had the edge.

Value of USDA Reports and Ways to Improve Forecasting

The University of Illinois took a different approach in evaluating the USDA's part of "The Federal-State Farm Economic Intelligence Service" by registering the impact on markets of the release of estimates from the National Agricultural Statistics Service and outlook information as included in the World Agricultural Supply and Demand Estimates (WASDE) and separate commodity reports from the ERS (Irwin, S.H., D.L. Good and J.K Gomez, 2001 and Isengildina, O., S.H. Irwin and D.L. Good, 2005). The first study examined the impact of the monthly WASDE reports on the futures markets on corn and soybeans on the day of their release. The conclusion was that the implied volatility was

Table 1.

Mean of Absolute Errors of Forecasts of Annual Supply, Utilization and Price
For Corn, Soybeans and Wheat, 1978-2009 [1]

	Units	Corn		Soybeans		Wheat	
		AAEA	WASDE	AAEA	WASDE	AAEA	WASDE
Production	Mil Bu	575	585	126.8	134.5	72	60
Exports	Mil Bu	277	267	95.3	91.2	102	95
Ending Sto	Mil Bu	437	485	93.6	90.0	109	114
Price	$/Bu	0.34	0.36	0.76	0.72	0.28	0.30

[1] AAEA is the composite of the survey. WASDE is the USDA's World Agricultural Supply and Demand Estimates.

Table 2.

Mean of Absolute Errors of Forecasts for Livestock, 1995-2009 [1]

Percent Change in Next Year's Production			Annual Average Price	Units		
	AAEA	WASDE			AAEA	WASDE
Beef	2.4	3.3	Steers	$/Cwt	5.43	5.88
Pork	1.8	2.1	Hogs	$/Cwt	6.21	6.40
Broiler	1.6	1.6	Broilers	$/Cwt	4.91	5.58
Turkey	2.8	2.8	Turkeys	$/Cwt	5.56	5.21
Eggs	0.9	1.0	Eggs	$/Doz	0.139	0.139
Milk	1.2	1.1	Milk	$/Cwt	2.23	

[1] AAEA is the composite of the survey. WASDE is the USDA's World Agricultural Supply and Demand Estimates.

lower for both corn and soybeans on the report day than the previous day 60 percent of the time – a result they claimed to be "welfare-enhancing." The second study measured the impacts on cattle and hog futures with the release of the reports on Cattle, Cattle on Feed, Cold Storage, Hogs and Pigs, the Livestock, Dairy and Poultry Outlook Report and the WASDE. The effects were statistically significant on all but the Cattle and Cold Storage Reports on hog futures and all but the Livestock, Dairy and Poultry Outlook Report on cattle futures.

A question often raised but seldom analyzed is whether averaging separately derived forecasts generates improved accuracy. A study at the University of Illinois suggested that it can (Colino, E.V., S.H. Irwin and P. Garcia, 2009). In this analysis, hog price forecasts from four well recognized outlook programs (University of Illinois/Purdue University, Iowa State University, University of Missouri and USDA) were each combined with futures-based forecasts, ARIMA and unrestricted Vector Autoregressive (VAR) models. The period was from the first quarter of 1994 to the fourth quarter of 2007 with the forecast horizons 1, 2 and 3 quarters ahead. "On the average, the equal-

weighted composite forecast reduced the outlook root mean squared errors (RMSEs) by 16.4%, 18.2% and 7.2% at the first, second and third horizons. While it was difficult for the equal-weighted-composite forecast to beat futures at the first horizon, it reduces futures errors by an average of 5.9% at the second and third horizons." However, futures outperformed outlook forecasts at most horizons.

A subsequent study at the University of Illinois built on the paper on composite forecasting, concentrated on improving Iowa State's hog price forecasting (Colino, E.V., S.H. Irwin and P. Garcia, 2009). Their paper indicated that the combination of basic VARs can reduce the forecast error (RMSE) by between 7.9 and 17.4%. Their pitch to the profession is that, "It appears that recent innovations in the forecasting literature have the potential to substantially improve the accuracy of outlook price forecasts." Adding an earlier reference to their concern about the profession abandoning price forecasting in the past 15 years, they also raised the issue as to whether the agricultural economics profession under-invested in price forecasting research in recent years?"

Long Range Outlook

***"I would willingly say that forecasting would be an absurd enterprise were it not inevitable. We have to make wagers about the future; we have no choice in the matter."* -- Bertrand de Jouvenel**

The Federal focus has been on the coming year or quarters of the coming year except early on when they did cover the short run. States have concentrated on annual and short run forecasts. Only nominal attention has been given to the long run (5 years or more) until the 1960s. However, even though long range projections were not an integral part of the standard outlook program, extensive activity by those associated with the program in the 1923 to 1960 period can be documented.

1924 to 1960

As early as 1924, H.C. Taylor, Chief of the BAE, recognized the importance of dealing with long term prospects for agriculture (Taylor, H.C, 1924). He persuaded Secretary Wallace to appoint a special committee on land utilization. The committee was to bring together the facts with regard to the past trends and the outlook during the next three or four decades with respect to crop and pasture acreage, per capita and total consumption, exports and imports and changes in productivity per unit of land area. These lines of study were focused on the objective of trying to determine the probable requirements of land for crops, pasture and forests.

In 1927, 31 pages of the JFE were devoted to the subject "The Outlook for Agriculture," which was also the topic in the annual meeting of the American Farm Economics Association (AFEA) in 1926. The focus was on the long term outlook with a challenge from E.G. Norse of the Institute of Economics in the lead paper with the following thesis: "The outlook for American agriculture is far from bright, the industry being faced by portentous technological changes while its organizations and institutions are such as to

make extremely difficult, indeed in large part impossible, a prompt and suitable adjustment to these circumstances" (Norse, E.G., 1927). He saw the role of farmer cooperatives increasing, but they lacked the ability to materially improve the prospects for agriculture. While others registered disagreements, he proved to be essentially correct. With the Great Depression of the 1930s came a host of strong federal government programs to address the distress in agriculture.

One of the first instances of the states undertaking the task of generating mid range (5 year) forecasts was at the Southern Agricultural Outlook Conference in 1930 (Watkins, D.W., 1931). The subjects included land prices, livestock and cotton.

The first evidence of an attempt to generate specific long range price forecasts was by James Nielson (Nielson, J., 1953). More than developing a methodology for long range price forecasts, Nielson's plea was that such efforts are so critical for providing farmers with realistic prices received and paid for generating budgets. With a set of assumptions involving war, peace, weather, population, incomes, etc. at the national level, he generated specific prices for Michigan if the state prices related to the U.S. as in the past. Cost projections were derived from the USDA's BEA estimates for a river basin study. Nielson also made a pitch for probability forecasts. A year later, the USDA's Nathan Koffsky took on the challenge to look ahead 10 to 20 years (Koffsky, N., 1954).

The 1960s

In the 1960s, both the USDA and the Land Grant institutions began to recognize the need for longer looks into the future. In 1966, Rex Daly, chair of the USDA's Outlook and Situation Board, stated "Increasing specialization and large investment in specialized equipment require greater emphasis on outlook for intermediate and long term periods." (Daly, R., 1966) Daly had earlier published articles on the long run demand for farm products and the national environment for business and agriculture in the 1970s (Daly, R., 1956 and 1963).

Dale Butz, Director of Research for FS Services (an agri-business firm), pointed out that only a relatively few long range studies and projections have been generated by the USDA (Butz, D.E., 1966). He mentioned that a few states have been active in this area, but the output was sketchy and often very general. He noted that agri-business needed at least 5 years and preferably 10 to 15 year projections for budgeting and investment purposes, adding that the same was true for farmers. Proposing that more attention should be given to the demand for inputs, Butz also suggested that the USDA and the colleges should coordinate setting assumptions and applying the methodology.

One of the states which had initiated a long term view of agriculture was Indiana. Carroll Bottum of Purdue pointed to a publication released in 1961 looking ahead at Indiana agriculture in 1970 (Bottum, J.C., 1966). Bottum suggested that such studies should be repeated and updated every few years. Purdue did just that 5 years later and maybe more.

Actually, the states did take the lead in the 1960s in pursuing the challenge of long term forecasting. This activity might be considered somewhat tangential to the strictly defined USDA/Land Grant Extension Outlook Program because it was much broader, involving departments outside of agricultural economics and stakeholders outside of the college and university as well. But the linkage with the USDA was still there.

The earliest state projection publication was for California, dated April 1961 for the period 1957 to 1975. National projections from the USDA were cited and attributed to Rex Daly. This was internal to the department at the University of California at Davis (Dean, G.W. and C.O. McCorkle, 1961). The 1961 Purdue study cited by Bottum was next and also a department project. Another departmental project was at Hawaii for 1960 to 1975, with the publication date of December 1962. A project at the University of Maryland employed representatives of college departments looking at prospects for 1981 from the view in 1961. Another departmental projection set was generated by W. Maki at Iowa State University for 1964 to 1974 (Maki, W.R., 1965).

Michigan State University's "Project '80" initiated in early 1964 was one of the first to engage not only other departments in the college of agriculture but those in other colleges with experiment station and extension staff. Also, reviewers of the basic documents included farm leadership and representatives of agri-business.

Project '80 was designed to answer three questions; (1) What will rural Michigan be like in 1980, *in the natural course of events*? (2) What do rural people and others concerned want it to be like in 1980? (3) What can be done to capitalize on the opportunities, avoid impending problems, or change the natural course of events and redirect Michigan's rural economy toward the goals? Interdepartmental committees were assigned to answer these questions. Preparatory papers provided them with assumptions, analyses and projections at the national level from members of the Department of Agricultural Economics.

In Phase 1 of the project, papers were prepared on the environment for rural Michigan in 1980 including population and income growth, agricultural programs, the U.S. demand for food, foreign trade prospects and organization of markets. Projections on the U.S. demand for food were furnished by Rex Daly of the USDA. In Phase 2 of the project, papers were prepared on the outlook for major crop and livestock enterprises, farm adjustments, farm labor, farm machinery and equipment, credit and food wholesaling and retailing. Other papers covered use of land and water resources, outdoor recreation and tourism, the timber industry and commercial fisheries. Attention was also given to rural family living and rural youth.

In total, some 50 discussion papers were prepared involving more than 100 individuals. In Phase 3 of the project, about 200 individuals outside the college joined the faculty for a two day seminar in the spring of 1965 to review the papers and provide input. A series of 16 reports were published and summarized in *Highlights and Summary of Project '80* (Ferris, J., 1966).

The value of Project '80 was more than providing something of a blueprint for rural Michigan for 15 years into the future. The subject of outlook was of common interest to the broad base of Michigan State University faculty, its administrators and its stakeholders beyond the campus. This furnished a forum for substantive discussion.

The value of this type of a long range look ahead has been verified by the number of times similar efforts have been undertaken later at Michigan State University and other universities. From 1972 to the mid 1990s, three additional such projects were completed at Michigan State. Tabulations through 1983 revealed that at least 10 other states had initiated broad based long range outlook studies, in two cases twice.

An innovation in a second such project at Michigan State University was a "Delphi" analysis. An issue in long range forecasting or projecting is the importance of those quantitatively inclined versus those who are very close to the industry and can render subjective analysis. The Delphi approach addresses how to integrate expert opinion in the long term forecasting and has had several forms. The essential feature is the solicitation of the judgment of authorities. Typically, a relatively small group of experts are surveyed repeatedly with the results from the previous survey fed back to the respondents for their consideration. Another feature is anonymity of the respondents. The questions are answered in private and consequently the "band wagon" effects and the influences of strong personalities or administrative superiors are removed. Other procedures have been developed to elicit expert opinion such as "Nominal Group Techniques" (Ferris, J. 1973).

Long Range Projection Models in the 1970s

During the 1970s, development of long-range projections was undertaken with increasing frequency by private firms, government agencies and Land Grant institutions. Models for generating these projections were also employed. At the national level, the USDA's "Outlook and Projections Branch" of ERS published "A View of Food and Agriculture in 1980" (Culver, D.W. and J.C. Chai, 1970) and a series of projections studies to 1985, published in 1973.

ERS developed a program called the "National-Interregional Agricultural Projection (NIRAP) System." This was a computerized simulation model of U.S. agriculture with interrelated component models dealing with all major facets of U.S. agriculture. According to Leroy Quance, leader of the program, "Paralleling the development and use of the NIRAP System is a structure of coordinated projection teams representing program areas across ERS and other government agencies and universities…. Technical and social scientists serving on the coordinated projection teams have the first and last word as to what goes in and what comes out of the NIRAP system….." (Quance, L., 1976).

While promising because of the linkage of a broad base of technical experience with the economic expertise within ERS, the application of this model apparently faded. However, modeling did continue in ERS under several different names. Next, ERS developed the Grain-Oilseed-Livestock (GOL) model which had more structural

components than past procedures and was the base for projections for *Alternative Futures for World Food in 1985* (Rojko, A., et. al., 1978). This activity merged into a framework known as "Static World Policy Simulation" (SWOPSIM).

Modeling activity spread into the Land Grants, with the formulation of the CARD simulation model at Iowa State University, designed to project national data for U.S. agriculture annually to the year 2000 (Reynolds, T.M., E.O. Heady and D.O. Mitchell, 1975). Oklahoma State's "POLYSIM" model employed USDA projections and then used standard econometric and simulation techniques to generate annual estimates around the baseline projections. A feature of the model was the ability to make probability forecasts handling unpredictable weather in a stochastic manner.

In the mid 1970s, Deere & Company, needing regular long term agricultural projections both domestically and internationally, approached Michigan State ag economists for assistance – and the MSU Agricultural Model was established. Constructed on a main frame computer, the model was eventually replaced by a desk top version called AGMOD in the mid 1980s.

Long Range Projection Models, 1980s and Beyond

Also in the mid 1980s, the Food and Agricultural Policy Research Institute (FAPRI) was established by a grant from the U.S. Congress and has been a dual-university research program. With research centers at the Center for Agricultural and Rural Development (CARD) at Iowa State University and the Center for National Food and Agricultural Policy (CNFAP) at the University of Missouri-Columbia, FAPRI has been using comprehensive data and computer modeling systems to analyze the complex economic interrelationships of the food and agriculture industry.

The earliest FAPRI projections appeared in "Ten-Year International Agricultural Outlook" in March 1988 (Food and Agricultural Policy Research Institute, 1988). By the end of the decade, several other models could be identified: WEFA Group, FAPSIM (USDA), AGSIM (Auburn University), POLYSIM (Oklahoma State University), COMGEN (Texas A&M University) and a model of Sparks Companies, Inc. A global model called "The Basic Linked System" (BLS) was developed by the International Institute for Applied Systems Analysis (IIASA) in Laxenburg, Austria.

With the growing number and complexity of these large-scale agricultural models, an American Agricultural Economics Association pre-conference workshop was held in August 1988 (Taylor, C.R., K.H. Reichelderfer and S.R. Johnson, 1993). The objectives were to (1) compare aggregate economic impact estimates, (2) reveal the structure of the models, and (3) identify ways for improving the models. Included in this workshop were AGMOD, AGSIM, CARD LP, COMGEM, FAPRI, NAC/BLS, and POLYSIM. CARD LP is a regionalized linear programming model of crop and livestock production in the U.S. NAC/BLS is a linked set of econometric/programming models for most of the major agricultural countries.

While the USDA has maintained models which generated long term projections in the past, it was not until the new agricultural legislation in 1996 called the Federal Agricultural Improvement and Reform Act (FAIR) that the projections were published annually. With regular annual reports from FAPRI since about 1988 and from the USDA's "World Agricultural Outlook Board" in the Office of the Chief Economist (OCE) since 1997, a data base has been established with which some evaluation of long term projections can be made (World Agricultural Outlook Board, various issues).

The extent to which these models and the long term projections they have generated over the past 40 or so years have been incorporated into the Land Grant extension outlook programs has not been documented. This might be a good subject for further research.

Accuracy of Long Term Projections

In an extensive review of the literature, this author found only one analysis of long range projections, this involving the USDA and FAPRI (Wisner, R.N., M. McVey and C.P. Baumel, 2001). The event involved was the application of USDA projections by the U.S. Army Corps of Engineers to evaluate the costs and benefits of upgrading the locks and dams on the Upper Mississippi River. Agricultural commodities are, by far, the dominant products transported on the Upper Mississippi River, so such plans depend heavily on prospective volumes. At the outset, consultants for the Corps of Engineers extrapolated linearly one set of the USDA 10-year baseline projections of grain and soybean exports 40 years ahead. The authors were quite critical of the methodology used by the consultants, reminding us of the wisdom of Mark Twain about the same river.

In the space of one hundred and seventy-six years the Lower Mississippi has shortened itself two hundred and forty two miles. That is an average of a trifle over one mile and a third per year. Therefore, any calm person, who is not blind or idiotic, can see that in the Old Oolitic Silurian Period, just a million years ago next November, the Lower Mississippi River was upward of one million three hundred thousand miles long, and stuck out over the Gulf of Mexico like a fishing-rod. And by the same token any person can see that seven hundred and forty-two years from now, the Lower Mississippi will be only a mile and three quarters long, and Cairo and New Orleans will have joined their streets together, and be plodding comfortably along under a single mayor and a mutual board of aldermen. There is something fascinating about science. One gets such wholesale returns of conjecture out of such a trifling investment of fact.

-- Mark Twain, "Life on the Mississippi," *The Family Mark Twain*, Harper & Brothers, New York.

As pointed out in this evaluation of export projections, baselines as published by the USDA and FAPRI are designed to calibrate the large-scale agricultural models and test alternative farm programs rather than to make forecasts. Even so, the authors found serious errors in the tendency to overestimate grain and soybean exports, particularly grain (corn and wheat). They concluded, "Sources of forecasting errors include rapid

structural changes in global agriculture, inadequate projections of technological change, limitations in supply functions, restrictive assumptions about income elasticity of demand and failure to adequately utilize information from past forecasting errors. Substantial funding will be required to convert these policy oriented models into reliable forecasting models."

In view of the lack of other attempts to review the performance of long range projections, this author felt compelled to do so, and selected the baselines of FAPRI and the USDA, models with the longest continuous history in the public sector. Two projection years were selected from each report for analysis, the fifth year and the terminal year, usually the ninth or tenth year of the projection period. The results are presented on selected crop and livestock variables in Tables 3 to 6.

Because of the anomalies that often appear in a single year in agriculture, the projections were compared with a centered three-year average of the actual values. This smoothing of the data is particularly important for crop yields and prices to lessen the errors attributed to unpredictable weather impacts. Another assumption was that the USDA World Agricultural Outlook Board's assessments for crops in 2010-11 and livestock for calendar 2010 are reasonably accurate as published in their June 10, 2010 report. This provides the third year for the average for 2009 and substitutes for a three year average for 2010. The footnotes to Tables 3 to 6 provide the details on the years involved, ranging from 16 projection years for 5 year sets for FAPRI livestock to 5 projection years for the nine to ten year sets for USDA crops and livestock.

As can be noted in Table 3, FAPRI tended to consistently overestimate exports of coarse grain (combination of corn, sorghum grain, barley and oats) and wheat in 15 years of 5 year projections between 1992 and 2010 as well as in 9 to 10 year projections in 11 years between 1996 and 2010. Possible reasons for this were addressed by economists at Iowa State University previously cited (Wisner, et al.) On the other hand, soybean exports were consistently underestimated. FAPRI also missed the major decline in wheat acreage which followed the decoupling in the FAIR farm legislation of 1996. Major challenges remain in projecting ending stock balances and the attendant crop prices. Surprisingly, the record on prices was an improvement in the long run versus the 5 year time horizon.

The challenge to generate projections on livestock is apparently less than on crops (Table 4). In any case the performance was notably improved, with the largest absolute error on production at about 7 percent (broilers) in the 5 year framework and 12 percent (broilers and turkeys) in the long run. The average absolute error on prices in the 5 year time horizon ranged from about 9 percent on turkeys to about 16 percent on eggs; in the 9 to 10 year horizon, from 11 percent on turkeys to about 18 percent on steers.

The evaluation of the projections in the corresponding tables for the output of the USDA's World Agricultural Outlook Board (Tables 5 and 6) is not directly comparable with that of FAPRI's because of the shorter time period involved with the USDA's reports. However, there were similar errors such as the over estimation of coarse grain and wheat exports and the miss on the declining wheat acreage following 1996. The

Table 3.

Evaluation of the Fifth and Terminal Year Projections from FAPRI for Selected Crop Variables [1]

Item	Fifth Year [2]		Terminal Year [3]	
	Mean Errors	Absolute Value of Errors	Mean Errors	Absolute Value of Errors
	%	%	%	%
Coarse Grain				
Harvested area of corn	-1.7	3.6	-1.3	5.2
Yield of corn	-2.2	3.8	-3.3	5.3
Feed and residual use	3.7	4.6	5.0	7.2
Exports	13.7	14.2	32.9	32.9
Ending stock-utilization ratio	6.8	21.9	44.6	49.3
Farm price of corn	-8.1	18.5	-4.4	18.6
Soybeans				
Harvested area	-5.6	7.0	-7.6	7.6
Yield	-0.8	4.1	0.2	3.6
Crushings	-2.0	8.0	-2.1	10.6
Exports	-11.6	13.9	-12.3	12.4
Ending stock-utilization ratio	50.5	57.6	54.6	62.7
Farm price	-11.9	20.9	-8.1	16.6
Wheat				
Harvested area	10.1	11.0	22.7	22.7
Yield	-0.8	3.7	0.4	4.4
Food use	0.3	4.5	2.9	10.0
Exports	15.7	16.9	37.5	37.5
Ending stock-utilization ratio	-4.7	32.2	-14.7	24.6
Farm price	-8.4	19.6	-6.5	13.8

[1] The fifth year is year of publication plus the suceeding four years. The terminal year is the most forward year of the projections, usually nine to ten years ahead. Percentage errors are calculated by dividing the projections by the centered three-year averages of the actual values. For 2010, the actual values were the USDA's World Agricultural Outlook Board's projection on June 10, 2010.
[2] The data base was 15 projection years from 1992 to 2010 excluding 1993, 1994, 2002 and 2006.
[3] The data base was 11 projection years from 1996 to 2010 excluding 1998, 1999, 2006 and 2007.

directions of over or under- estimating on the crop variables were mostly the same. Both underestimated farm prices on crops in the 5 and 9 to 10 year time horizons. The USDA tended to underestimate the coarse grain ending stock-utilization ratio while FAPRI overestimated it, but the absolute errors for both models were about the same.

As with crops, the average direction of the errors on livestock variables was fairly consistent between the USDA and FAPRI (Tables 4 and 6). For both time periods, both models tended to underestimate livestock prices except for FAPRI's longer run projection on hog prices and the USDA's longer run projection on milk prices.

Of particular interest is the performance of both models in establishing the *price* levels for major crops and livestock – a traditional focus for the short run year to year analysis for the USDA/Land Grant Extension Outlook program. One can note a strong bias to

Table 4.

Evaluation of the Fifth and Terminal Year Projections from FAPRI for Selected Livestock Variables [1]

Item	Fifth Year [2] Mean Errors	Fifth Year [2] Absolute Value of Errors	Terminal Year [3] Mean Errors	Terminal Year [3] Absolute Value of Errors
	%	%	%	%
Beef				
Number of beef cows, Jan. 1	3.1	4.0	1.7	6.6
Production	0.5	4.0	-2.2	7.5
Steer price	-3.6	12.2	-2.3	17.8
Pork				
Production	-4.6	5.3	-8.0	8.0
Barrow and gilt prices	-0.5	11.1	2.1	15.0
Broilers				
Production	-2.2	6.9	-3.9	11.7
12-city market price	-10.8	12.6	-14.0	14.6
Turkeys				
Production	2.6	5.3	6.7	12.2
Price, hen turkey (whsle)	-5.8	8.7	-7.2	11.0
Eggs				
Production	-1.3	3.6	-3.6	6.3
Price, NY Grade A Large	-12.1	15.6	-16.1	16.4
Milk				
Number of milk cows, Jan 1	-0.6	2.5	-0.9	4.4
Milk producton per cow	1.1	2.0	1.1	3.6
Milk production	-0.1	2.6	0.1	3.4
Farm Price	-12.3	12.3	-13.4	13.4

[1] See footnote 1 in Table 3.

[2] The data base was 16 projection years from 1992 to 2010 excluding 1994, 2002 and 2006 except 12 years from 1997 to 2010 (excluding 2002 and 2006) for the number of beef cows; 14 years from 1995 to 2010 (excluding 2002 and 2006) for the price of turkeys and 13 years from 1998 to 2010 (excluding 2002 and 2006) for the production and price of eggs.

[3] The data base was 11 projection years from 1997 to 2010 excluding 1999, 2003, and 2007 except 8 years from 2001 to 2010 (excluding 2003 and 2007) for the number of beef cows; 9 years from 2000 to 2010 (excluding 2003 and 2007) for the price of turkeys and 7 years from 2002 to 2010 (excluding 2003 and 2007) for the production and price of eggs.

underestimate prices in Tables 3 to 6 --- 22 times out of 24 in terms of the averages. In all fairness to FAPRI and the USDA, the events of the past 5 years have been responsible – events which would have been very difficult to have taken into account in establishing the baselines.

As became evident in the fall of 2006, world agriculture was undergoing a major structural change precipitated by a rapid expansion underway and planned in U.S. ethanol production and accompanied by similar activities in renewable fuels abroad. Supportive were government programs. Unforeseen was a spike in crude oil prices which doubled between 2005 and 2008. Other surprises included shortfalls in global crop production and international trade restrictions to protect domestic food supplies.

How these dramatic changes affected the performance of the FAPRI and USDA models in projecting prices is captured in Table 7, which compares the average errors before and

Table 5.

Evaluation of the Fifth and Terminal Year Projections from the USDA for Selected Crop Variables [1]

Item	Fifth Year [2]		Terminal Year [3]	
	Mean Errors	Absolute Value of Errors	Mean Errors	Absolute Value of Errors
	%	%	%	%
Coarse Grain				
Harvested area of corn	-1.5	5.9	-4.5	5.9
Yield of corn	-3.6	3.6	-6.1	6.1
Feed and residual use	6.9	6.9	17.6	17.6
Exports	21.4	22.0	38.3	38.3
Ending stock-utilization ratio	-21.3	21.3	-41.5	41.5
Farm price of corn	-9.4	26.0	-13.4	25.7
Soybeans				
Harvested area	-4.7	5.7	-6.5	6.5
Yield	2.5	4.3	3.9	4.1
Crushings	4.5	6.4	7.8	12.2
Exports	-9.4	11.4	16.2	16.2
Ending stock-utilization ratio	3.6	20.5	-10.9	35.9
Farm price	-17.3	26.2	-18.5	27.3
Wheat				
Harvested area	12.0	12.8	27.1	27.1
Yield	0.6	1.7	-1.5	1.8
Food use	3.7	4.2	10.2	10.2
Exports	16.3	19.9	50.0	50.0
Ending stock-utilization ratio	-6.8	31.4	-47.6	47.6
Farm price	-13.2	31.0	-11.6	23.6

[1] See footnote 1 in Table 3.

[2] The data base was 10 projection years from 2001 to 2010.

[3] The data base was 5 projection years from 2005 to 2010 excluding 2006.

after circa 2006. A strong bias in underestimating prices was not evident prior to 2006, and the overall performances of both baselines were commendable in establishing reasonable price levels on major crops and livestock. While not analyzed, the results for the non-price variables were undoubtedly much improved if the past 4 or 5 years were excluded from the data base.

Clearly, the performance of the models before 2006 in Table 7 is a better guide for dependence on these baselines in the future than indicated in Tables 3 to 6. At the same time, one should not dismiss the possibilities of major future shocks.

The caveat is worth repeating that these baselines are projections and not forecasts, a statement which has prefaced all the FAPRI and USDA reports. The assumptions are clearly delineated and often alternative projections are presented. The greatest value and use has been to evaluate various proposals for new farm legislation. Such evaluations are possible without having to defend the projection sets as quite accurate. At the same time,

Table 6.

Evaluation of the Fifth and Terminal Year Projections from the USDA for Selected Livestock Variables [1]

Item	Fifth Year [2] Mean Errors	Fifth Year [2] Absolute Value of Errors	Terminal Year [3] Mean Errors	Terminal Year [3] Absolute Value of Errors
	%	%	%	%
Beef				
Number of beef cows, Jan. 1	3.4	4.5	6.4	7.3
Production	-1.3	4.1	-0.5	6.6
Steer price	-4.4	9.8	-6.0	6.0
Pork				
Production	-3.1	3.6	-7.4	7.4
Barrow and gilt prices	-8.6	11.8	-12.3	15.1
Broilers				
Production	3.0	4.4	9.2	9.2
12-city market price	-9.0	10.3	-14.5	14.5
Turkeys				
Production	5.8	5.9	7.1	8.8
Price, hen turkey (whsle)	-10.3	11.6	-16.6	16.6
Eggs				
Production	0.9	2.2	2.6	3.1
Price, NY Grade A Large	-11.9	16.7	-18.8	23.8
Milk				
Number of milk cows, Jan 1	-3.8	3.8	-7.0	7.0
Milk producton per cow	3.0	3.0	4.3	4.3
Milk production	-0.9	1.5	-3.1	3.2
Farm Price	-1.3	8.6	0.5	3.0

[1] See footnote 1 in Table 3.

[2] The data base was 10 projection years from 2001 to 2010.

[3] The data base was 5 projection years from 2005 to 2010 excluding 2006.

wrong baselines can lead to wrong conclusions for establishing farm programs. This analysis of these two models suggests considerable room for improvement. If their model structures were more transparent, perhaps an evaluation of the source of the errors could be examined in more detail, as suggested by Wisner, et al.

A gap remains in the USDA-Land Grant Outlook program in terms of the often stated need for long term forecasts for budgeting and investment decisions on farms, in agri-businesses, and the food industry -- and for farm policy development as well. The baselines of FAPRI and the USDA are about the only public resources available to perform this task, even though not designed to do so. One by-product of this analysis of the errors of these models is to provide some parameters for risk management for long range planning. FAPRI is to be commended for introducing stochastically derived long term projections, particularly useful in capturing crop yield risk.

For over 50 years, futurists have explored subjective approaches to forecasting, both with and without strong quantitative analysis, the latter seemingly more promising. Soliciting expert opinion through structures such as Delphi, Nominal Group Techniques, etc. has

Table 7.

Comparison of FAPRI's Fifth and Terminal Year Price Projections Before and After 2006 and the USDA's Fifth Year Price Projections Before 2006 and from 2006 to 2010 [1]

	FAPRI				USDA	
Item	Fifth Year		Terminal Year		Fifth Year	
Years	1992-2005	2007-2010	1996-2005	2008-2010	2001-2005	2006-2010
Mean Errors	%	%	%	%	%	%
Corn	2.9	-38.3	6.5	-33.3	15.7	-34.4
Soybeans	-1.1	-41.6	3.0	-37.9	2.3	-36.8
Wheat	1.6	-36.2	2.3	-30.0	14.5	-40.9
Steers	0.9	-18.2	5.1	-22.0	-1.3	-9.2
Barrows and gilts	2.8	-16.5	9.3	-17.0	-5.8	-13.8
Broilers	-6.6	-19.0	-8.3	-29.2	-5.8	-13.8
Turkeys	-0.4	-19.5	-1.7	-18.1	-5.2	-17.8
Eggs	-0.7	-32.1	-2.8	-33.8	-1.7	-27.1
Milk	-9.9	-25.0	-11.5	-18.5	4.1	-9.5
Absolute Value of Errors						
Corn	11.3	38.3	13.0	33.3	17.7	34.4
Soybeans	13.4	41.6	8.6	37.9	15.5	36.8
Wheat	13.6	36.2	7.8	30.0	21.1	40.9
Steers	10.7	18.2	16.3	22.0	10.2	9.2
Barrows and gilts	11.3	16.5	14.2	17.0	11.1	12.8
Broilers	9.0	19.0	9.1	29.2	8.1	13.8
Turkeys	4.4	19.5	7.4	18.1	7.5	17.8
Eggs	6.2	32.1	3.4	33.8	9.7	27.1
Milk	9.9	25.0	11.5	18.5	7.2	10.6

[1] Following are exceptions to the indicated years. In FAPRI's Fifth Year for 1992-2005, turkey prices were for 1995-2005 and egg prices were for 1998-2005. In FAPRI's Terminal Year for 1996-2005, livestock prices were for 1997-2006 except 2000-2006 for turkeys and 2002-2006 for eggs. In USDA's Fifth Year for 2001-2005, the years were 2001-2006 for livestock, and for 2006-2010, the years were 2007 to 2010 for livestock.

been applied. A question arises whether the addition of such inputs into the modeling process with FAPRI, the USDA and state efforts would assist in converting long term projections more into forecasts? Is the richness of the expertise in agriculture, agri-business and the food system within the sphere of the USDA-Land Grant complex being fully utilized?

Conclusions

The USDA/Land Grant Extension Outlook Program, as a part of the "Federal-State Farm Economic Intelligence Service" which also embraces the USDA-state agricultural statistics services, has been a successful coordinated effort since its inception in 1923.

The structure of national, regional, state and county involvement has remained intact even though the emphasis has shifted somewhat over time. While the early focus was on assisting farmers with their production and marketing decision making, the program became valued to agri-businesses, consumers, the food system, policy-makers and others. Not to be underestimated is the role the program has played in economic education.

The accuracy of short term and year to year price forecasts has varied depending on the production and the time frame but has tended to range between two-thirds and 80 percent. The documentation of the accuracy of long term price projections is limited with only those of FAPRI and the USDA tabulated. Excluding the period since 2006, the absolute value of errors of FAPRI's 10^{th} year price forecasts averaged about 10 percent. However, in the four years from 2007 to 2010, the errors averaged 34 percent on major crops and 23 percent on livestock, evidence of the turbulence in commodity markets in this period.

Having made this assessment, considerable improvement is possible. Areas needing attention include how to (1) encourage analysts to generate year to year probability forecasts, (2) expand stochastic long range projections, (3) make large-scale econometric models more transparent for evaluation, (4) explore new empirical tools for annual and shorter run forecasts, especially the application of composite forecasts employing the combination of analysts (such as the AAEA survey) and empirical techniques and (5) introduce subjective input into long range projections to help to convert them more into forecasts.

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