AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

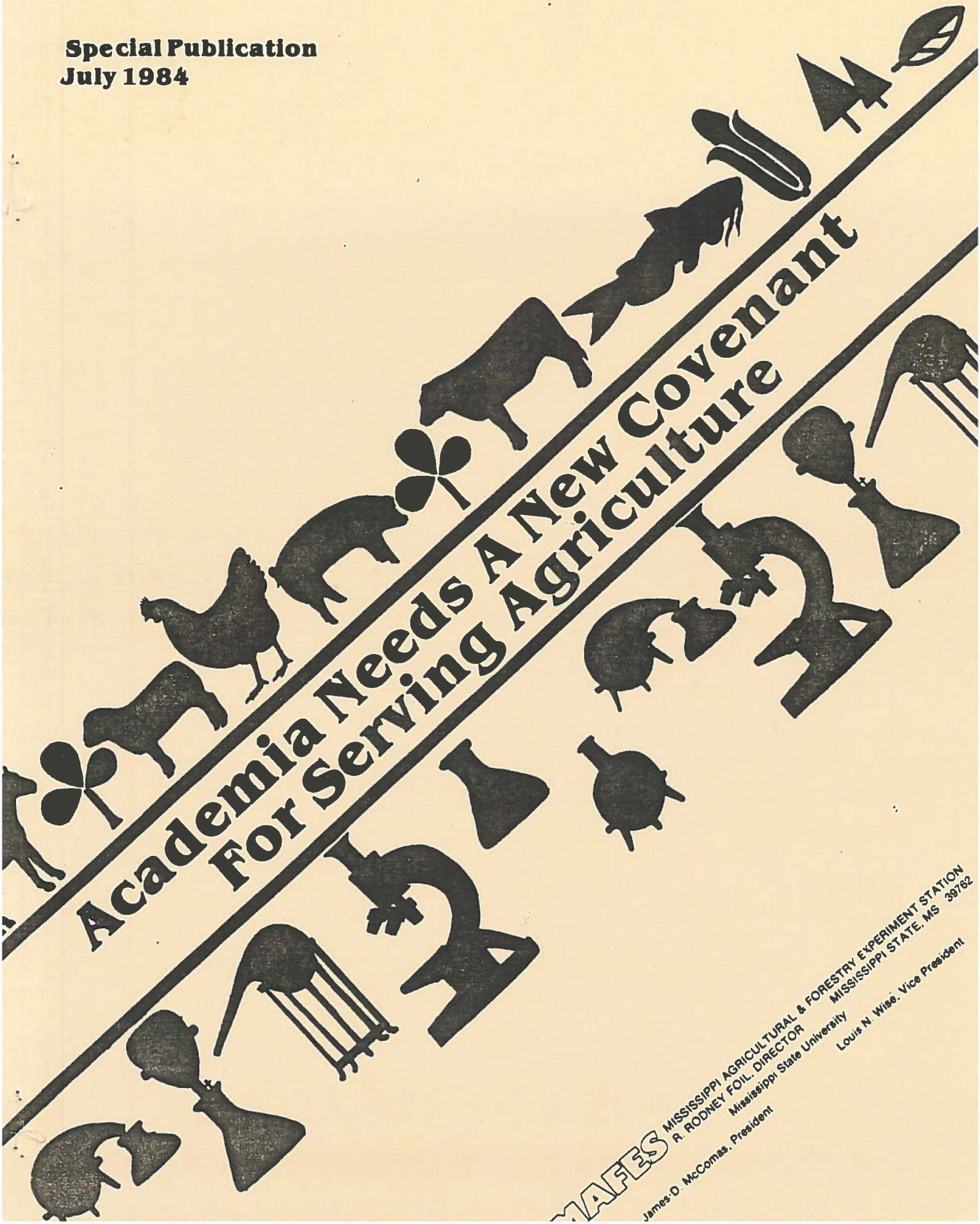
Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Special Publication
July 1984

Academia Needs A New Covenant For Serving Agriculture



MAFES MISSISSIPPI AGRICULTURAL & FORESTRY EXPERIMENT STATION
R. RODNEY FOIL, DIRECTOR MISSISSIPPI STATE, MS 39762
Mississippi State University
James D. McComas, President
Louis N. Wise, Vice President

Academia Needs A New Covenant For Serving Agriculture

Glenn L. Johnson

Michigan State University

ACADEMIA NEEDS A NEW COVENANT FOR SERVING AGRICULTURE*

Glenn L. Johnson
Michigan State University

In this paper I look at what we should expect from U.S. agriculture in the next fifty years and at the assistance U.S. agriculture will need if it is to achieve what is expected. This will reveal magnificent opportunities for universities to help solve the practical agricultural problems in this period. I stress the importance of helping solve practical problems for agriculture with an examination of problem solving processes including attention to the roles of power and covenants among holders of power in making decisions. I then look at some of the internal divisions of universities which interfere with their capacity to serve agriculture. My examination of these divisions reveals that, unfortunately, the universities and their closely linked governmental agencies have now exported the divisions to congressional sources of financial and political support. This reveals a need for a new covenant among the factions of academia to be extended after establishment to governmental sources of support. Because this lecture was originally delivered at Mississippi State University which appears to have a desirable local covenant, I close the paper with some attention to the situation there; however in so doing, I recognize that the local Mississippi covenant is threatened by the lack of a nationwide covenant.

What We Can Reasonably Expect from U.S. Agriculture by 2030

We can gain some perspective on the next half century by looking back over the last century. Figure 1 shows that we increased agricultural output about sevenfold from 1880 to 1980 with a major part of that increase occurring since the end of World War II. The increases have been due to technological advances, and to major improvements in both public and private institutions serving agriculture (Johnson and Wittwer, forthcoming) and particularly to the generation of more highly skilled and educated people to handle high technology on our increasingly sophisticated farms and to staff and operate the institutions serving agriculture.

A report to Resources for the Future by Sylvan Wittwer and me deals with desirable increases in the capacity of U.S. agriculture to produce over the next 50 years. We concluded that the U.S. should have as a target the doubling of capacity to produce a more stable level of agricultural products. Having such capacity does not necessarily mean that we would actually use all of it. We conclude that we need such capacity for a number of reasons. World population is increasing rapidly. We see a possible need to use agricultural biomass as a source of fuel and as an industrial feedstock. We also see a need to earn foreign exchange through the export of agricultural products in order to pay for essential imports including, especially, fossil fuels. As the agricultures of other developed countries are improving rapidly, we believe we must increase our own capacity in order to keep U.S. agriculture competitive in world markets. There is also a matter of national food security for the U.S. and for our Allies.

Figure 2 tells us something about what will be needed to double our capacity to produce agricultural products in the next 50 years. We will probably need to increase our achievable average yields around 70 percent -- in the case of corn our target should probably be one of doubling achievable yields per acre. We assume a population increase in the U.S. of 35 percent. During the next 50 years we anticipate the virtual elimination of stoop labor from U.S. agriculture but see a substantial expansion in the use of highly skilled labor to handle increasingly complex more technical machinery, land management schemes and potentially dangerous chemicals on our farms. We also anticipate a need for much greater marketing and agribusiness skills and for highly skilled people working in public and private research, educational and other agencies servicing agriculture. Along with the 70 percent increase in achievable yields, we anticipate a possible 25 percent increase in the intensity with which land will be farmed. We also anticipate a possible 16 percent, or roughly a 60 million acre, increase in the amount of cultivated land. Much of the additional land to be farmed will include fragile soils which will require complex, advanced land management programs and technologies to prevent erosion and other deterioration of our land and water resources. Though not shown in Figure 2, it is

---

*Originally delivered as a university-wide lecture entitled "Difficulties Experienced by Academia in Serving Agriculture," Mississippi State University, April 16, 1984. This paper has benefitted greatly since then from comments by Michigan State University colleagues: James Anderson, Dean, College of Agriculture and Natural Resources; James Bonnen, Professor of Agricultural Economics; John Cantlon, Vice President for Research; Robert Gast, Director, Agricultural Experiment Station; and, Sylvan Wittwer, Director Emeritus, Agricultural Experiment Station. Many helpful clarifying suggestions have been incorporated. However, a few comments and suggestions have not been used as the author, who alone remains responsible for this document, disagreed with them or judged them inappropriate or at variance with what he (the author) intends. Nonetheless, all comments and the efforts involved in making them were greatly appreciated.

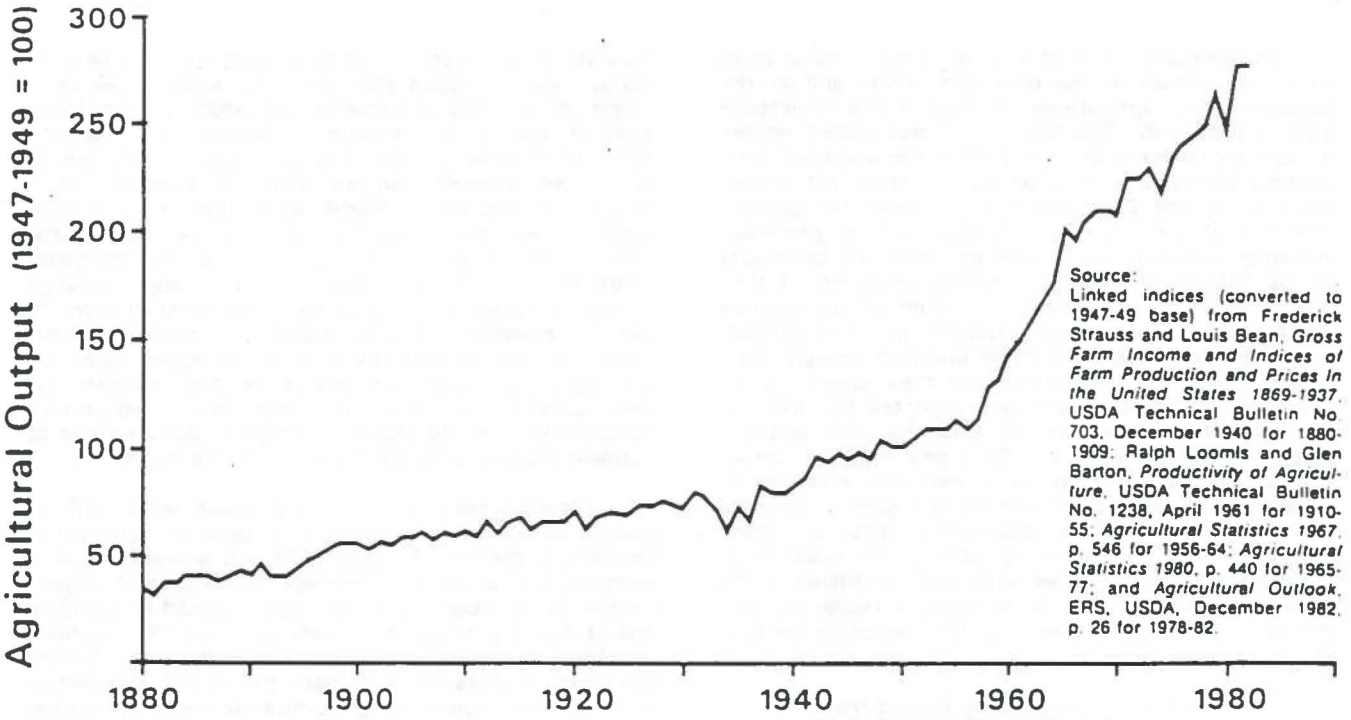


Figure 1. Index of the Volume of Agricultural Production, 1880-1982

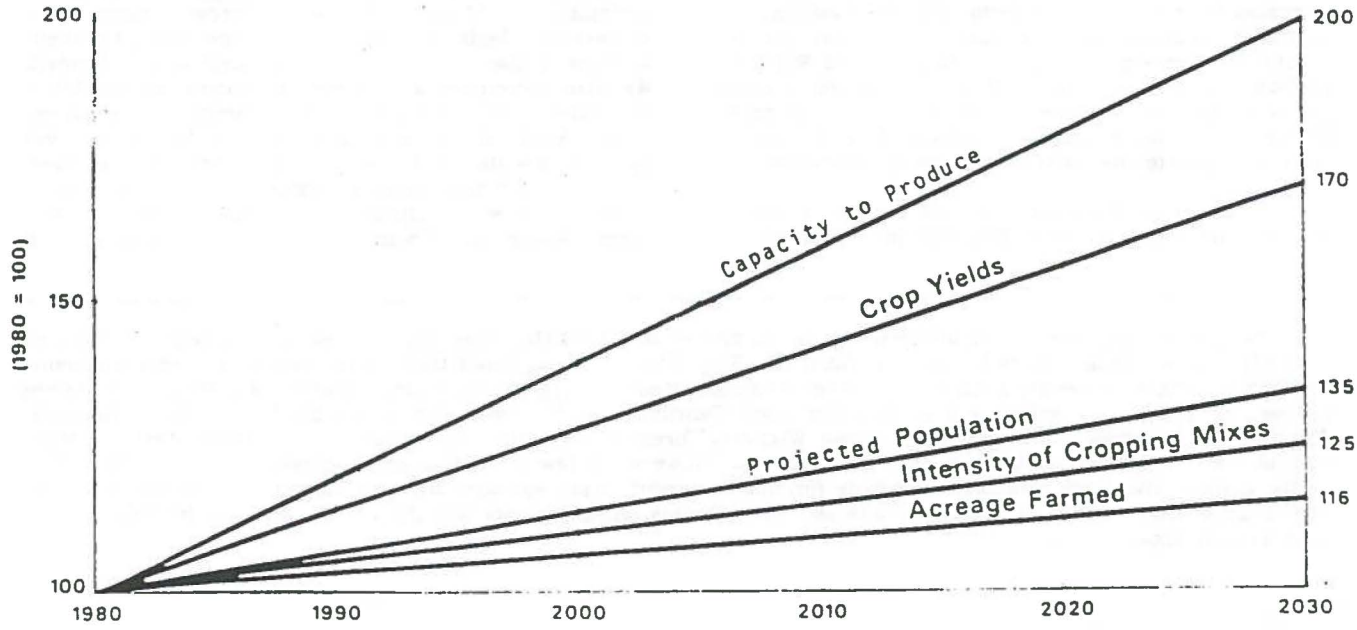


Figure 2. Desirable Changes in Capacity to Produce, Yields, Cropping Intensity and Acreage Farmed Along With Population Projections, U.S. Agriculture, 1980-2030

noted again that the next 50 years will see the need for greatly improved public and private institutions to serve agriculture.

The Contributions of the Academic World to Agriculture in the Next Half Century

In addition to training agricultural scientists, farmers, government administrators, agribusiness personnel, leaders and academicians, the academic world will have three major kinds of contributions to make to agricultural development in the next 50 years. They are the same general contributions it made to the phenomenal expansion in agricultural production of the last 50 years or so.

First, the academic world will do problem-solving (PS) research and carry out PS activities for agriculture. By PS, I mean research or activities designed to solve a particular practical problem for a decision maker who faces that particular practical problem in the world beyond academia. PS research and activities are multidisciplinary and multidepartmental.

The second kind of research and activity which has and will be carried out in the academic world is what I refer to as subject-matter (SM) research or activities. I define SM activities as those designed to produce multidisciplinary information on a subject important to a fairly well-defined group of important decision makers facing a fairly well-defined set of important problems. An example of SM research would be multidisciplinary research to provide multidisciplinary and multidepartmental information on energy which would be useful to Mississippi Delta farmers producing cotton. Such information would probably not be adequate to solve any one problem faced by any one farmer; however, it would be useful to a large number of Delta cotton farmers facing problems involving the utilization of energy. Agronomy, animal husbandry, agricultural engineering, horticultural and agricultural economics departments are typically multidisciplinary SM departments. They are more like institutes than traditional disciplines.

A third kind of activity carried out by universities is the development and dissemination of disciplinary (DISC) knowledge. DISC knowledge is knowledge which improves one of the traditional basic disciplines such as chemistry, physics, economics and biology by improving its theory, its fundamental measurements and its techniques as well as improving its ancillary disciplines such as statistics, mathematics and philosophy. Though not all DISC research is relevant to agriculture some of it is known to be relevant to the solution of agricultural problems. It is mainly this latter kind of DISC research which is of concern in this lecture.

While some have argued that we will have less need for publicly-supported research on agriculture in universities and governmental agencies in the decades ahead because such research will be done in the private sector, we anticipate that additional efforts will be required from both private and public agencies including, particularly, the universities. Not all publicly desirable technologies will turn out to be privately profitable. If privately unprofitable but socially desirable technologies are to be developed and utilized, it will be necessary for the public to support their development and distribute them at least to where it is privately advantageous for agribusinesses to take them over and for farmers to use them. Still further, there will be some technologies which it will be so easy for private businesses to appropriate benefits that public action will be required to prevent exploitation of farmers and/or consumers. In still other instances it will be so easy and privately advantageous to impose damages on others that the public will have to regulate utilization (Schmid, forthcoming). Further, some technological advances permit and others are generated for purposes of concentrating power in agriculture and agribusiness in manners inconsistent with the public good (Mueller, et al., 1982; Schertz and others, 1979). Thus, there will be many instances in the next 50 years in which the public should support research on problems of technological change and in which public action will have to be taken. Technological change, education and institutional development for agriculture cannot be safely left entirely to the private sector.

Problem Solving Processes, Power Covenants, Kinds of Knowledge and Philosophic Orientations

When we think of the above three kinds of research and activities, we see that the PS, SM and relevant DISC activities of universities are all related to the practical problems of agriculturists and those dependent on agriculture outside the academic world. The concern in this paper is with how the academic world will serve or fail to serve the needs of the public and private decision makers who will be involved in doubling and stabilizing productive capacity by solving the practical problems of agriculture in the next 50 years. Thus, it is necessary here to focus on the process of solving practical problems. For this reason I want to look at PS processes in enough detail to see more clearly (1) how the academic world assists in solving practical agricultural problems and (2) the importance of covenants among the holders of power.

Figure 3 is a diagram of PS processes (Johnson, 1977). This somewhat abstract diagram views problem solving as involving six different steps proceeding from problem definition at the top through observation and analysis to decision making and on. In the diagram, a decision as to what is the right action to take to solve a problem is followed by its execution and the bearing of responsibility for the consequences of the action taken.

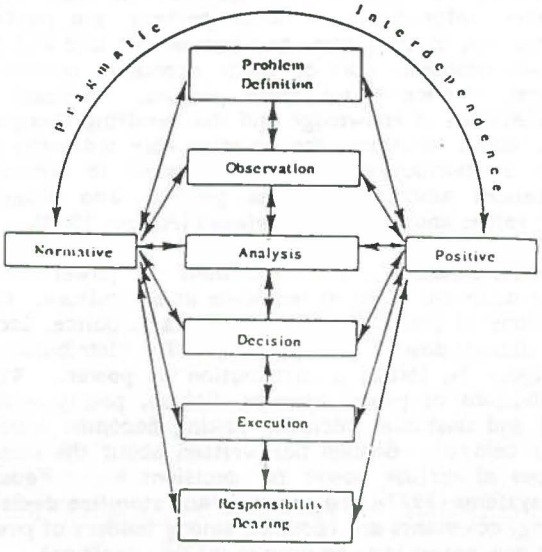


Figure 3

There are two information banks in Figure 3 which contain perceptions and attitudes about what is true. On the left-hand side is a normative information bank containing knowledge and perceptions about values -- about the goodness and badness of conditions, situations and things -- as well as some prescriptive knowledge about how to solve standard problems (recipes), laws, regulations, and social mores and norms. Knowledge about values is needed in at least three tenses -- the past, present and future or predictive. On the other side of the diagram is a positive information bank containing information, perceptions and attitudes about conditions, situations and things other than about their goodness and badness and rightness and wrongness. This information is also needed in the past, present and future (Johnson, et al., 1961; Lerohl, 1972; Begg, 1982) tenses. Problems are defined with information from the two information banks as situations subject to possible improvement through greater attainment of goodness and/or the avoidance or alleviation of badness. As the diagram is drawn, the two information banks can be viewed as either independent of or dependent on each other. Because there are pragmatists who argue that information about values and positive information are interdependent in the context of the problem being solved, an over-arching loop recognizes the possibility of a pragmatic interdependence between the two kinds of knowledge (Runes, 1961, pp. 245f).

Making Decisions, Decision-making Rules, Power Distributions and Covenants: -- I turn now to more specific consideration of the decision making step in solving a problem. The outcome of decision making is a prescription. A prescription indicates "what ought to be done" to solve a problem at hand. Prescriptions deal with "what is right" and, by implication, "what is wrong" to do. They are based on both information about values and positive information. These two kinds of information may or may not be viewed as interdependent depending on whether or not the viewer has a pragmatic orientation.

In order to derive a prescription from the two kinds of information, a decision rule is required. Under perfect knowledge and foresight the decision rule is simple. One merely subtracts goods from bads for all alternative actions and decides to do that act for which the excess of goodness over badness is maximized or the excess of badness over goodness is minimized. However, information is never perfect and perfect information, often viewed as reserved for God and the abstract economic man of static economic theory, is infinitely expensive for mere persons. Because of imperfections in knowledge and the resulting disagreements about solutions, the decision rule ordinarily involves a distribution of power in order to reconcile differences among concerned persons who disagree about values and positive knowledge (Arrow, 1963).

There are many distributions of power which affect different kinds of decisions in agriculture. Distributions of political, market, military, police, social and religious powers are important. The distribution of knowledge is, itself, a distribution of power. When distributions of power become diffuse, poorly understood and unstable, decision making becomes chaotic and is delayed. Bonnen has written about the consequences of diffuse power for decisions about Federal data systems (1977). To speed up and stabilize decision making, covenants are required among holders of power about how power is to be used in making decisions.

It is particularly important to understand that the power distributions involved in the decisions currently being made about agricultural research policies are now diffuse, poorly understood, devisive and in need of clarification and reorganization into a new covenant. The present USDA/land-grant university covenant has lost its effectiveness as it does not adequately cover those doing agriculturally relevant research outside land-grant universities, outside colleges of agriculture in land-grant universities and in the private sector. We need an expanded covenant to improve the decisions which will be made on agricultural research and service policies as they will affect our capacity to double and stabilize agricultural production in the next 50 years. Later I will give additional specific attention to establishing such a covenant.

Three Kinds of Knowledge: -- If we think back to Figure 3, we see that three kinds of knowledge are involved in solving problems. The academic world can provide some of all three of these kinds of knowledge to agriculture's decision makers.

There is positive knowledge. By positive knowledge I mean knowledge about conditions, situations and things in the real world other than about their goodness and badness. The so-called hard sciences in universities and elsewhere are particularly effective in generating positive knowledge.

Another kind of knowledge generated in universities is normative knowledge which includes knowledge about values. By knowledge about values, I mean knowledge about the goodness and badness of conditions, situations and things -- intrinsic or extrinsic, instrumental or more ultimate, monetary or non-monetary, and aesthetic or less aesthetic. Normative knowledge also includes some prescriptive knowlede including that expressed as recipes, laws, regulations, social mores and norms which may not be specific about the problem under consideration.

We have already discussed the meaning of prescriptive knowledge -- knowledge about what ought, and by implication, what ought not to be done in order to solve a specific problem. Prescriptive knowledge is not the same as knowledge about values. It is not always right to do that which is good if something still better can be done without utilizing more resources in order to do it. Conversely, it is sometimes right to do that which is bad if it is the least bad that can be done among known alternatives. In some instances, the right decision involves maximizing net gains and in other instances the minimization of net losses. Prescriptive knowledge is almost unavoidably multidisciplinary.

Philosophic Orientations: -- There are many philosophic orientations in universities which affect ability to produce positive knowledge, knowledge about values and prescriptive knowledge. We will look at three of these orientations briefly in order to understand some of the difficulties the academic world encounters in helping solve the problems of agriculture.

Logical positivism provides the orientation for much of the work done in the so-called hard sciences and in the multidisciplinary, physical science departments of colleges of agriculture. It also orients some of the work of social scientists. Logical positivism places great reliance on experience and logic (Runes, 1961). It is particularly effective in providing methods

to produce positive information in the so-called hard sciences. While it is of some use in describing values held by various groups of people, it takes the position that it is impossible to know what "really does or does not have value" in the real world. As such, this philosophic orientation limits the problem definition and problem solving capacity of its practitioners.

Philosophically there is also a normative orientation in the academic world. This orientation is often practiced in the arts, humanities and some of the social sciences (including economics) where the concern is with the nature of goodness and badness and, for that matter, rightness and wrongness. This philosophic orientation supports the generation of information about values and the development of decision rules and prescriptions to solve agricultural problems.

A pragmatic orientation was touched upon earlier in discussing the "pragmatic loop" of Figure 3. In pragmatism, the truth of a proposition depends upon its consequence including especially its consequences when used in problem solving (Runes, 1961). The pragmatic orientation is particularly concerned with practical problems and their solutions. The research and views of personnel in colleges of education are often based upon a pragmatic orientation. Pragmatic educators are particularly interested in teaching PS processes to those they educate. The pragmatic orientation of the colleges of education also tends to orient such agricultural educators and organizations as extension workers, vocational agriculture teachers and the 4-H, Future Farmers of America and Future Homemakers of America clubs. Other professional schools and colleges (medicine, engineering, business administration, architecture, etc.) with their interests in problem solving often have a pragmatic orientation.

Interrelationships Among Kinds of Activities, Kinds of Knowledge and Philosophic Orientations

At this point, it seems advantageous to use a diagram to summarize some of what has been stated above with respect to the activities and orientations of universities. Figure 4 presents a cube for this purpose. On the vertical dimension of this cube, we find the kinds of research and activities discussed earlier -- disciplinary, subject-matter and problem-solving. On one horizontal dimension, we find the three philosophic orientations which we discussed -- positivism, normativism and pragmatism. On the other horizontal dimension, we find the three kinds of knowledge generated in a university -- positive knowledge, knowledge about values and prescriptive knowledge. In a sense, then, this cube presents a structural view of what goes on in a university. Study of it indicates much about the ability of the universities to serve the practical decision makers of agriculture and the other sectors interacting with agriculture as they participate in the PS processes diagrammed in Figure 3.

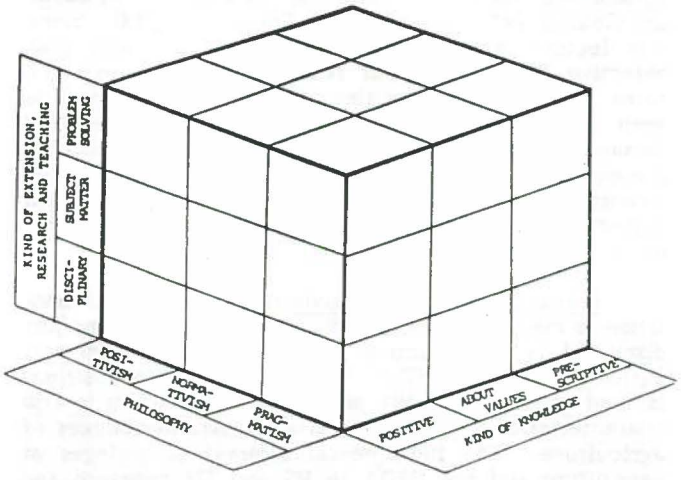


Figure 4

The Academic World and Its Sources of Support are Split by Chauvinisms Which Reduce Ability to Serve Agriculture

As I see it, our universities are now badly split internally by loyalties and chauvinisms. These splits reduce the ability of universities to serve the agricultural decision makers of the non-academic world. Further, and very unfortunately, we in the universities have now transferred these splits to our sources of political and financial support. These splits now endanger public support for (1) the agricultural work of not only the USDA and land-grant college system, but (2) much needed agriculturally relevant DISC work outside colleges of agriculture in land-grant universities and in non-land-grant universities.

I will refer to the causes of the splits just discussed as academic chauvinisms. The dictionary defines chauvinism as "undue, especially invidious attachment or partiality for a group or place to which one belongs or has belonged." This definition of chauvinism is almost a definition of bias. Chauvinism or bias -- it makes little difference which we call it -- is both anti-intellectual and out of place in universities. Though neither should have legitimate places in the academic world, our views on serving agriculture are now divided by our chauvinisms -- by our "undue, invidious attachments" to:

(1) philosophic orientations
(2) disciplines
(3) land-grant agricultural colleges with heavy stress on production
(4) non-land-grant universities
(5) narrowly defined concepts of academic excellence, and
(6) anti- and pro-administrative positions.

In the pages to follow, I look at each of these chauvinisms to increase our understanding of them.

We should note that each chauvinism has its strengths and weaknesses. Their strengths account for the continued existence of each chauvinism. On the other hand, it is the weaknesses of each which makes it chauvinistic to hold to it to the exclusion of contributions from the others. Thus, it is unlikely that any of those things to which we devote undue partiality will be entirely eliminated. Instead, our challenge is one of understanding their strengths and weaknesses so that we can more objectively avoid the latter while exploiting the former.

Philosophic Chauvinism: -- This chauvinism can exist in many forms. I am concerned here mainly with the chauvinisms of logical positivism, normativism and pragmatism.

Of the three, I believe that the chauvinism of logical positivism does the most damage to our ability to serve agriculture by elevating the pursuit of positive knowledge as a dominant academic end while denigrating the pursuit of knowledge about values crucial to problem definition and solution as "unscientific" and "unobjective" and noncompetitive for resources and awards. The strength of logical positivistic chauvinism is, of course, the contribution which it makes to the ability of the sciences to develop positive information useful in generating new technology for agriculture.

There is a reciprocal normative chauvinism which treats knowledge about values and prescriptions as superior to and more important than what normativists sometimes chauvinistically refer to as the "mechanistic, reductionist knowledge" of the hard sciences (Feigl, 1953). The contribution of normativism is the improvement it brings about in the processes of accumulating knowledge about values and prescriptions to solve problems. Normative chauvinism is damaging when it results in downplaying the value of positive knowledge generated in the so-called hard sciences. Both positivistic and normativistic chauvinism are forms of anti-intellectualism which can open the door to mysticism and flights from knowledge.

Pragmatic chauvinism does damage by downplaying the independent work of the scientists attempting to increase our stock of positive knowledge and the independent efforts of humanists and students of the arts to accumulate independent knowledge about values. The strengths of pragmatism are in its emphasis on solving practical problems and its recognition that there are important instances in which knowledge about values and positive knowledge are interdependent. Another strength of pragmatism is its tendency to view problems realistically in terms of all of their important multidisciplinary dimensions. Its weaknesses include (1) its tendency to avoid recognizing instances of sufficient independence of knowledge about values and positive knowledge to legitimatize their independent pursuit without regard to immediate practical problems and (2) a complexity which is sometimes unnecessary.

Disciplinary Chauvinism: -- This chauvinism is rather closely related to philosophic chauvinism in that "hard science" disciplines tend to be comitted to logical positivism whereas the arts and humanities tend to be committed to various forms of normativism and personnel in colleges of education tend to be committed to pragmatism (Whitney, 1946).

The disciplinary chauvinism of the hard sciences involves loyalty to those sciences and to positive knowledge while downgrading knowledge about values and prescriptions from the arts, humanities and the social sciences concerned with decision making. The hard science disciplines of the traditional universities have succeeded in transferring (or, perhaps, also creating in place) their particular disciplinary chauvinism to the National Academy of Sciences (NAS) and the National Science Foundation (NSF). The hard science chauvinists from NSF and NAS and the universities have transferred their chauvinism to important members of the U.S. Congress (Lepkowski, 1982; Marshall, 1982; Mayer and Mayer, 1973; New York Times, 1982; Office of Science and Technology Policy and Rockefeller Foundation, 1982; Science, 1982).

There is also a disciplinary chauvinism of the arts and humanities. In recent years this chauvinism has had some impact on agriculture. Five conferences have been held on agro-ethics which were organized by humanists. One of these conferences was held in Texas in 1981, another at Delaware in 1981 and two at the University of Florida (Haynes and Lanier, 1982) while the fifth was organized by the National Council of Churches of Christ (Knowles, 1981). These conferences dealt with important issues such as agricultural science policy, the changing structure of U.S. agriculture, world hunger, poverty, environmental pollution and contamination of the food chain. This form of chauvinism has placed extremely important issues on the agricultural research and debate agendas and helped provide important knowledge about values and prescriptions. The damage done by this form of chauvinism grows out of its adherent's lack of positive knowledge and knowledge about values with respect to agricultural technology, institutions and people and a certain intolerance of agriculturists sometimes regarded as members of a conspiracy of large farmers, the agricultural colleges and agribusinesses to exploit farm laborers and consumers while engaging in irresponsible degradation of the agricultural environment and contamination of the food chain.

There is also disciplinary chauvinism among social scientists. Though undoubtedly extensive, this chauvinism is probably not as important as the chauvinism of the humanists which is, in turn, much less important (in my judgment) than the chauvinism of the hard science disciplines. If this is true it is mainly because of the dominance of the hard science disciplines in agricultural research. This conclusion is supported by an analysis which I did of the World Food and Nutrition Study (Johnson, forthcoming(a)). The World Food and Nutrition Study was commissioned by President Ford and delivered to President Carter.

The pragmatic chauvinism of agricultural educators is discussed below under the rubric "practical agrarian chauvinism."

Related to all three forms of chauvinism are the roles played by activitists concerned with agricultural and agrarian issues (Johnson, forthcoming(b)). A number of these groups tend to be pro-disciplinary and anti-agricultural research establishment (George, 1976; Lappe and Collins, 1977; Nelson, 1980; Perelman, 1978). Since this lecture was originally presented, the less than objective anti-agricultural research establishment TV Nova "documentary" entitled "Down on the Farm" has been aired. In this author's opinion, this so-called documentary is more of a one dimensional activist presentation than an objective assessment of the strengths and weaknesses of the present agricultural system and its technologies and of the changes underway in the system.

Practical Agrarian Chauvinism: -- In some opposition to the philosophic and disciplinary chauvinisms just discussed is the practical chauvinism of colleges of agriculture and the USDA. The phrase "some opposition" is used because logically positivistic chauvinism is also characteristic of some physical scientists in colleges of agriculture. The fundamental interest of colleges of agriculture and the USDA in PS and SM research and activities is substantially different from the interests of the traditional disciplines of much of

the remainder of the land-grant universities and of much of the non-professional colleges of U.S. non-land-grant universities. The practical chauvinists of the land-grant/USDA system have, in some instances, become unduly defensive and tend to go on "offensive defenses" against the disciplinary chauvinists in their own land-grant universities, in non-land-grant universities, in the National Academy of Sciences and the National Science Foundation (Budiansky, 1984; Cahill, 1984). The practical chauvinism of some agricultural researchers has caused them to defend technologies and institutional structures long after their negative impacts were clearly established. On the other hand, this same chauvinism has helped form bastions of defense when wild and unsupported criticism has been leveled against the agricultural establlishment by other chauvinists.

A special form of practical chauvinism in the colleges of agriculture and the USDA is the chauvinism of the pragmatic adult and youth educational agencies -- the Cooperative Extension Service, the 4-H Clubs, vocational agriculture system and the Future Farmers of America and Future Homemakers of America clubs. The strength of this form of chauvinism is its attention to PS and practical SM research and activities. Its weakness is that DISC work in the hard sciences and in the arts and humanities is sometimes downgraded.

The general practical chauvinism of the colleges of agriculture and the USDA has been transferred to members of Congress and conflicts now arise between supporters of the DISC research outside and those inside of the USDA/colleges of agriculture system. These conflicts influence the ability of universities to finance PS and SM research in support of agricultural development. More especially, this is sometimes expressed as outright conflict between the supporters of NSF and NAS, on one hand, and supporters of the USDA, the land-grant agricultural colleges, state agricultural experiment stations and state extension services, on the other. The disciplinarians argue that they can get more for the buck doing DISC research than can be obtained in the USDA and agricultural colleges which they allege fritter away resources on insignificant, trivial "brush fire" kinds of research some of which is unjustly regarded as duplicative because the place specificity of much PS and SM work is ignored. DISC research tends to be elevated while SM and PS efforts tend to be put down. Even in some land-grant universities, the conflict between the practical chauvinism of the agricultural colleges and the disciplinary chauvinism of the traditional disciplines in the university makes it difficult to obtain promotions and recognition for PS and SM activities and research in direct support of agriculture.

Still more damaging is the destruction of the very real complementarity which exists between PS and SM research, on one hand, and DISC research, on the other. The conflict tends to deprive disciplinarians of the contact which PS and SM research would give them with problems of farmers, and with agricultural people, institutions and technology. Kuhn, in his book on scientific revolutions (1970), has argued that the major advances or revolutions which occur in scientific disciplines result from the confrontation of disciplines with problems they cannot handle. The other form of lost complementarity is the gain for PS and SM research from a greater output of DISC research relevant for the solutions of agricultural problems.

The conflict between disciplinary and practical chauvinism also manifests itself in a conflict between departments in colleges of agriculture and the more DISC departments of the remainder of land-grant universities. There is a similar conflict or competition between colleges of agriculture in land-grant universities and non-land-grant universities. Both have been transferred to Congress via the USDA connection with agricultural colleges and via the NAS/NSF connection of the DISC hard sciences.

The American Association of Universities (AAU) strongly encourages and supports congressional efforts to strengthen the basic science programs in the National Science Foundation, the Department of Energy, the National Institutes of Health and the Department of Defense. These efforts are also supported by the disciplinary faculties in the National Association of State Universities and Land Grand Colleges (NASULGC) institutions. The strong agricultural college presence in the NASULGC together with efforts of their engineering and medical colleges encourages and supports PS and SM programs of the Departments of Agriculture, Interior, Health and Human Services, National Aeronautics and Space, Defense and Energy. These efforts are strengthened by the engineering and medical faculties of the AAU institutions.

The National Academy of Science and its affiliated National Research Council have fluctuated over the last 20 years from organizations with strong efforts in both basic and problem solving areas to ones in which the problem solving focus suffered serious atrophy. In very recent years, it is stated that they are attempting to rebuild the former, more balanced approach. Though agriculture, in particular, is receiving greater attention today by NAS/NRC than it was three years ago, the emphasis appears to be more on agriculturally relevant DISC than directly on PS and SM research for agriculture.

Academic Excellence as a Chauvinism: -- There is a related chauvinism involving the definition of academic excellence which tends to detract from the ability of universities to serve agriculture. This chauvinism involves loyalty to a narrow definition of academic excellence or quality which elevates disciplinary accomplishments while denigrating PS and SM activities. This makes it difficult for universities to finance, promote and give adequate recognition to PS and SM excellence. In some cases this chauvinism is so bad that solutions to practical problems are regarded as lacking academic excellence as when the development of new rust resistant varieties of wheat is downgraded in favor of DISC work in microbiology. It also leads to undue and inappropriate reliance on disciplinary peers for the evaluation of PS and SM research who are unfamiliar with the problems and issues being addressed. In some universities, agricultural experiment station and extension service publications simply do not count for faculty trenure, promotion and recognition purposes; instead, the emphasis is on peer reviewed articles published in disciplinary journals. This chauvinism also precludes reliance on reviews of PS and SM work by the decision makers who use results of PS and SM work and by persons affected by their decisions. Overcoming this form of chauvinism requires an expansion of our concepts of academic excellence to include excellence in doing PS and SM work and the recognition that while this kind of excellence is different from DISC excellence and requires a different group of peers to evaluate it, it is still excellence (Johnson, 1976).

The Chauvinism of Non-Land-Grant Universities: -- This discussion of chauvinism would be incomplete without a discussion of the chauvinism of non-land-grant universities which is, of course, closely related to philosophic, disciplinary, and academic chauvinism considered earlier.

For a considerable period of time, non-land-grant universities had little sustained interest in agriculture. This began to change after World War II as non-land-grant university personnel became interested in the development of less developed countries which were largely agrarian. Though the non-land-grant universities concerned with development were slow to see the importance of agriculture, once they saw it their interest in agriculture grew (Schultz, 1964). The interest of non-land-grant universities in agriculture expanded even more sharply after the short-lived food shortages and the much longer-lived energy shortages which burst upon us in the early seventies. Then, too, the agricultural interests of non-land-grant universities expanded still more as agricultural technology became more advanced, complicated and dependent upon disciplinary advances. The activists who have been critical of the agricultural establishment in the 1970s also increased the interest of non-land-grant universities in agriculture -- in fact, many of the anti-ARE activitists are from non-land-grant universities.

The growing interest of non-land-grant universities in agriculture is particularly crucial for agriculture which badly needs the relevant DISC contributions these universities can make; however, it has to be noted that researchers in non-land-grant universities tend to lack firsthand knowledge of agricultural technologies, environments, institutions and people -- further they lack the physical facilities to carry out PS and SM research. This nation's agricultural experiment stations, field stations, physical resources and institutional resources for researching crop and livestock production are mainly in the land-grant colleges of agriculture, not in the non-land-grant universities. Non-land-grant universities have good facilities for doing DISC research relevant to agriculture but poor facilities for doing PS and SM research --some wag has observed that not much corn grows in Harvard's yard. He might also have observed that not much grows in the rectangles of the University of Chicago where I received my Ph.D. Non-land-grant chauvinism is damaging when personnel from such universities denigrate the PS and SM work of the USDA and land-grant colleges of agriculture despite their own lack of firsthand agricultural knowledge, of PS experience, and of agricultural research facilities. These deficiencies make it difficult for personnel in non-land-grant universities to know what is and is not relevant DISC research for agriculture, the importance of PS and SM research for agriculture and, hence, to grant respectability to the PS and SM research of the land-grant system.

Anti- and Pro-Administrative Chauvinism: -- In order to understand the difficulties which the academic world experiences in carrying out PS and SM research and other activities to support agriculture, it is also necessary to consider both anti- and pro-administrative chauvinism both of which are unduly common in academic circles.

Anti-administrative researchers and workers fail to understand and often resent the greater amounts of administration needed for doing PS and SM as contrasted to DISC research. These two kinds of research generally require more administration than DISC research because multidisciplinary teams of PS researchers and multidisciplinary "institute-like" SM departments need to be adjusted with changes in the problems and issues important for agriculture. Making these adjustments involves abolition of old teams and departments and the creation of new teams and departments within and outside of colleges of agriculture. This requires high quality administrative work. Still further, ability to bring together people from diverse disciplinary backgrounds into configurations requires that administrators know the problems, people, and institutions of agriculture as well as the different multidisciplinary subjects important to agricultural decision makers.

The tenured staff person or professor who resists administration of PS and SM research and tries to reduce the amount of administration available is practicing a particular kind of anti-administrative chauvinism which might be labeled "tenured professor" chauvinism. I have heard at least one administrator who was frustrated in his attempts to organize the work of tenured professors on practical agricultural problems and subjects make the observation that tenured professors have no brakes, steering wheels or accelerators and, as such, are beyond administrative control.

Pro-Administrative Chauvinism takes different forms in the traditional DISC departments of the university than it does in the SM departments of agicultural colleges and in the USDA. In both cases, though, undue loyalty to existing administrative arrangements makes it difficult to restructure to tackle new problems and issues important for agriculture in a timely manner. Loyalty to existing SM departments in colleges of agriculture and to DISC departments makes it difficult to obtain personnel and skills from different departments for reconstitution into new departments or institutes in agricultural colleges to research such multidisciplinary subjects as energy, hunger, environmental pollution, and contamination of the food chains not to mention the concentrations of power developing in agribusiness and among large agricultural producers.

The Cooperative Extension Services tend to be more flexible and better oriented to PS and current issues than either the DISC or multidisciplinary SM departments just considered. Though this flexibility of the Cooperative Extension Services tends to offset the damaging influence of the pro-administrative chauvinists of the traditional DISC departments and of the SM departments of colleges of agriculture, extension work is often unjustly denigrated by disciplinarians and researchers in the multidisciplinary SM departments of agricultural colleges. Ernest Nesius, who used to be director of the Cooperative Extension Service at the Universaity of Kentucky, once observed that "the difficulty is that universities have departments while farmers have problems." I think it might have been even better had he said "the difficulty is that universities have disciplines, departments, department chairpersons, deans, directors and professors, while farmers have problems."

Attempts to separate agricultural experiment stations and extension services from the remainder of universities only accentuate the problem of reconstituting their departments and of drawing on expertise from the rest of the university. This limitation becomes increasingly important as agricultural technologies, institutions and personnel requirements be-

come more complex and dependent on disciplinary advances.

A New Covenant Is Required of Us

I believe that a new covenant is now required if academia is to overcome its chauvinistic divisiveness to serve agriculture adequately with PS, SM and DISC research and activities in the next half century. The present destructive competition between the practical chauvinism of the USDA and land-grant system and the more academic chauvinisms of the non-agricultural colleges of land-grant universities and non-land-grant iniversities must be countered constructively with a new expanded "land-grant-like" covenant. More disciplinary work is needed but this is no time to do this by taking resources away from PS and SM activities; instead, more resources are needed for both. Further, I believe that the political clientele for PS and SM research for agriculture would fight with much justification a reduction in support for PS and SM agricultural research. I believe we must rise above our chauvinisms so as to avoid their constraints and exploit their strengths and seek a balanced and expanded political and financial base for all three types of work -- PS, SM and DISC -- in support of agriculture.

It is also clear that universities, in toto, must learn to respect PS and SM work and to seek a balance between the two of them, on one hand, and DISC work, on the other. Excellence in doing all three must be recognized in order to improve the promotion and recognition of PS and SM work and workers and in order to utilize the appropriate evaluative peer groups for PS and SM research.

The required covenant must represent a compromise between the practical chauvinisms of the USDA and land-grant colleges, on one hand, and the disciplinary philosophic, academic and non-land-grant chauvinisms which were discussed above. This political compromise or covenant is required in order to obtain additional support for DISC as well as PS and SM work all of which will be needed if agriculture is to obtain the levels of productive capacity targeted at the beginning of this paper. We also need this compromise agreement or covenant in order for the agricultural establishment and the traditional disciplines to exploit the complementarities between DISC work, on one hand, and PS and SM work, on the other.

Along with the need for a new covenant is the internal need of the universities to recognize, award and provide for the greater amounts of administration required for PS and SM research. In order for this additional administration to be effective, we also need to recognize, reward (Johnson, 1971) and provide for interactions of administrators with the decision makers of agriculture and with the people who are affected by the decisions of agriculture's decision makers (Rossmiller, 1978).

We, in the colleges of agriculture and the USDA, must abandon a substantial amount of that part of our practical chauvinism which denigrates the disciplinary. We need and must seek out additional relevant DISC work from biological and physical scientists, social scientists and scholars from the arts and humanities outside the colleges of agriculture. To this end, Sylvan Wittwer and I have advocated substantial expansion of the competitive grants for agriculturally relevant DISC research in the biological and physical sciences (Johnson and Wittwer, forthcoming). We have also advocated the initiation of additional competitive grants to be awarded both inside and outside the USDA/land-grant college system for (1) agriculturally relevant DISC work in the social sciences and in the arts and humanities and (2) PS and SM research for agriculture.

It would also be strategic for agricultural faculties to form a broader interchange with faculties of engineering, medicine, education, business administration, etc. Clearly, agricultural facilties share with these other faculties a common interest in PS and SM research as well as a common dependence on disciplinary advances.

Some Special Observations with Respect to Mississippi State University

I believe that Mississippi State University is fortunate to have a local covenant of the kind I advocate for the nation. As a consequence, I believe it is better organized to do PS and SM research than most universities. Perhaps it has this covenant because it has partially avoided or has not yet fully encountered the chauvinisms I have deplored above. Alternatively, her disciplinarians may not yet be rich enough to be chauvinistic. In any event Mississippi State has an enviable record in doing PS and SM research for agriculture -- for farms, for agribusinesses, for consumers of farm products and, I believe, for rural nonfarmers and government. The record is good whether one looks at catfish farmers, rice producers, minimum tillage, the introduction of fertilizers, improved varieties, herbicides, pesticides or forestry.

I think it's fair to observe that Mississippi State is somewhat short on DISC research relative to the typical land-grant university. Nonetheless, the PS and SM researchers and other workers at Mississippi State have either been able to do enough DISC research of their own or have been able to obtain disciplinary results from other institutions to serve Mississippi agriculture well. As the biological and institutional revolutions gain further momentum in the years ahead, though, Mississippi State will have to ensure that it will be able to get an increased flow of DISC knowledge. I doubt that a few "flagship centers" of agriculturally relevant DISC research will be sufficient for Mississippi or any state without such a center and, for that matter, even for states with such centers. Mississippi, like all other states, will need disciplinarians in touch with the problems of her farmers. Much more DISC knowledge will be needed if Mississippi's very substantial agricultural resources are to make their full contribution to the technologically and institutionally more complex agricultural and agribusiness systems of the U.S. in the next fifty years. Mississippi's agricultural technologies, institutions, and organizational problems are now getting more complex and the process is only starting. Disciplinary advances in the biological and physical sciences, in the humanities and especially in the social sciences will become increasingly important. Mississippi State needs to give specific attention to where it will get the necessary relevant disciplinary advances if it is to address the complex, practical problems and subjects which will be important for Mississippi in the years ahead. Mississippi will also face an increased need for skilled agriculturists, agribusiness persons, institutional managers and civil servants knowledgeable of agriculture.

It should not be forgotten that Mississippi State University is part of the national picture, that national support for PS and SM research and other work is threatened and that DISC research will not necessarily be relevant for Mississippi's agriculture unless disciplinarians are kept in contact with the agricultural problems of the state. Mississippi State gets much of its support for agricultural PS and SM research from the national budget and that national support for agricultural work is now threatened. Mississippi has a stake in a national covenant as her state covenant will not continue to be adequate unless a national covenant is created.

The success at Mississippi State in keeping a focus on PS and SM research for agriculture while obtaining necessary DISC research from a conbination of her own DISC work and imports from others should be noted in the national debate on agricultural science policy and agricultural science funding. Her success should be used in forming the required new covenant. For this reason, I am particularly pleased to note Mississippi State's participation in national agricultural science debates. In this connection, the work of Professor Bobby Eddleman with Interregional Project 6 on agricultural research priorities is especially noteworthy. I also think of the discussions which I have had with Vice President for Graduate Studies and Research, M. T. Loftin, Vice President for Agriculture, Forestry and Veterinary Medicine, Louis N. Wise and Experiment Station Director R. Rodney Foil who are fully aware of Mississippi State's success and of the threat of national developments. It is my good fortune to work under a former Mississippi State Experiment Station Director, James Anderson, who is now a Vice Provost and Dean of Agriculture at Michigan State University. He is an effective spokesman in trying to reach a covenant between the supporters of the practical chauvinism of the land-grant colleges and USDA, on one hand, and the supporters of philosophic, disciplinary, and academic chauvinisms of the disciplines outside colleges of agriculture, on the other. He sees the need for this compromise and brings to the debate his experience with the successful agricultural program of research and other activities at Mississippi State as well as his experience at Michigan State.

References

Arrow, Kenneth J. 1963. Social Choice and Individual Values (2nd Ed.), New York: John Wiley and Sons.

Begg, David K. H. 1982. The Rational Expectations Revolution in Macroeconomics, Baltimore, MD: Johns Hopkins University Press.

Bonnen, James T. 1977. "Assessment of the Current Agricultural Data Base: An Information System Approach, A Survey of Agricultural Economics Literature, Volume 2, Quantitative Methods in Agricultural Economics, 1940's to 1970's, Lee R. Martin (Gen. Ed.). Minneapolis: University of Minnesota Press, pp. 386-407.

Budiansky, Stephen. 1984. "Trouble Amid Plenty," The Atlantic Monthly, January, pp. 65-69.

Cahill, Kay. 1984. "Tradition Deep-Rooted at Agriculture Station," The Hartford Courant, Hartford, CT, February 3.

Feigl, H. 1953. "The Scientific Outlook: Naturalism and Humanism," Readings in the Philosophy of Science, H. Feigl and M. Brodbeck (eds.), New York: Appleton-Century-Crofts, pp. 8-18.

George, S. 1976. How the Other Half Dies: The Real Reason for World Hunger, London: Cox and Wyman, Ltd.

Haynes, Richard and Ray Lanier. 1982. Agriculture, Change and Human Values, Vols. 1 and 2. Gainesville, FL: Humanities and Agriculture Program, University of Florida.

Johnson, Glenn L. Forthcoming(a). "The U.S. Presidential World Food and Nutrition Study and Commission on World Hunger -- Lessons for the U.S. and Other Countries," paper delivered at the Theodor Heidhues Memorial Seminar held at the Institute of Agricultural Economics, University of Gottingen, West Germany, November 1980.

_____. Forthcoming(b). "Ethical Dilemmas Posed by Recent and Prospective Developments with Respect to Agricultural Research," Proceedings of Annual Meeting of American Association for Advancement of Science, held in Detroit, Michigan, May 26-31, 1983.

_____. 1983. "The Relevance of U.S. Graduate Curricula in Agricultural Economics for the Training of Foreign Students," American Journal of Agricultural Economics 65(5):1142-1148.

_____. 1977. "Contributions of Economists to a Rational Decision-Making Process in the Field of Agricultural Policy," Decision-Making and Agriculture. Proceedings of XVI International Conference of Agricultural Economists, T. Dams and K. E. Hunt (Eds.), Oxford, England: Oxford Agricultural Economics Institute, pp. 25-46.

_____. 1976. "Who is a Peer?" American Scientist, (letters to the editor), March-April.

_____. 1971. "The Quest for Relevance in Agricultural Economics," American Journal of Agricultural Economcis 53(5):728-739.

_____ and Sylvan H. Wittwer. Forthcoming. Agricultural Technology Until 2030: Prospects, Priorities and Policies, East Lansing: Michigan State University Press, forthcoming.

_____, A. N. Halter, H. R. Jensen and D. W. Thomas (eds.). 1961. A Study of Managerial Processes of Midwestern Farmers, Ames: Iowa State University Press.

Knowles, Louis L. (Ed.) 1983. To End Hunger. Washington, DC: National Council of Churches of Christ in the U.S.A.

Kuhn, T. S. 1970. The Structure of Scientific Revolutions (2nd Ed.), Chicago: University of Chicago Press, Vol. II, No. 2.

Lepkowski, Will. 1982. "Shakeup Ahead for Agricultural Research," Chemical & Engineering News, November 22, pp. 8-16.

Lerohl, M. L. 1972. "Expected Product Prices," The Overproduction Trap in U.S. Agriculture, G. L. Johnson and C. L. Quance (eds.), Baltimore: Johns Hopkins University Press.

Lappe, F. M. and J. Collins. 1977. Food First: Beyond the Myth of Scarcity, New York: Ballentine Books.

Marshall, Eliot. 1982. "USDA Research Under Fire," Science 217(4554): 33.

Mayer, A. and J. Mayer. 1973. Agriculture: The Island Empire. In: Science and its Public: The Changing Relationship. Daedalus (Summer Issue), pp. 83-95.

Mueller, W. F., J. Culbertson and B. Peckham. 1982. Market Structure and Technological Performance in the Food Manufacturing Industries, North Central Regional Research Publication 280, Monograph 11. Madison: Research Division, College of Agriculture and Life Sciences, University of Wisconsin.

Nelson, Jack A. 1980. Hunger for Justice: The Politics of Food and Faith, Maryknoll, NY: Orbis Books.

New York Times. 1982. "The Worm in the Bud" (editorial), October 21, p. 26.

Office of Science and Technology Policy and the Rockefeller Foundation. 1982. Science for Agriculture. A conference at Winrock, Arkansas, June.

Perelman, M. 1978. Farming for Profit in a Hungry World: Capital and the Crisis in Agriculture, Montclair, NJ: Allanhold Osman.

Rossmiller, George E. (ed.) 1978. Agricultural Sector Planning: A General System Simulation Approach, East Lansing: Department of Agricultural Economics, Michigan State University.

Runes, D. C. 1961. Dictionary of Philosophy, Paterson, NJ: Littlefield, Adams and Co.

Science. 1982. "White House Plows into Ag Research," Vol. 217, September 24, pp. 1227-1228.

Schertz, Lyle P. and Others. 1979. Another Revolution in U.S. Farming, Agricultural Economics Report No. 441. Washington, DC: U.S. Department of Agriculture.

Schmid, Allen. Forthcoming. "Property Rights in Seeds and Micro-Organisms," Public Policy and the Physical Environment, R. K. Godwin and H. Ingram (Eds.), Greenwich, CT: JAI Press.

Schultz, T. W. 1964. Transforming Traditional Agriculture, New Haven and London: Yale University Press.

Whitney, F. L. 1946. The Elements of Research, New York: Prentice-Hall, Inc.

Mississippi State University does not discriminate on the basis of race, color, religion, national origin, sex, age, or handicap.

In conformity with Title IX of the Education Amendments of 1972 and Section 504 of the Rehabilitation Act of 1973, Dr. T. K. Martin, Vice President, 610 Allen Hall, P. O. Drawer J, Mississippi State, Mississippi 39762, office telephone number 325-3221, has been designated as the responsible employee to coordinate efforts to carry out responsibilities and make investigation of complaints relating to discrimination.