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**DISCUSSION: NEEDED RESEARCH WITH RESPECT TO
ENERGY USE IN AGRICULTURAL PRODUCTION**

Milton L. Holloway

Drs. Havlicek and Capps have made a beginning in determining regional sensitivity of agricultural production to rising prices of energy. Although rising prices and shortages of energy will have some effect on all of agriculture, we must know which enterprises and which areas of the nation will be most affected. Prospects are that major shifts will occur in cropping patterns, regional distribution of agricultural production, irrigated acreages, farm incomes and land values; but these impacts will obviously not be equally distributed.

The ability of technological innovations to provide a profitable alternative to current fuel sources is likely to be subject to large variations among enterprises and regions. Broiler production currently so dependent on natural gas or LP gas appears to be a good prospect for solar energy applications. The long term prospects for replacing diesel fuel for tractors and other mobile power units used intensively in row cropping, however, is not very promising. Regions relying mostly on natural gas for irrigation face either the prospect of curtailments or rapidly rising prices. Texas irrigated agriculture is currently facing major adjustments and recent studies have indicated that significant changes will take place in irrigation levels, irrigated acreages, cropping patterns, farm incomes, land values and perhaps a loss of some crop production from Texas if the price of natural gas continues to rise at recent rates [1, 2]. A major portion of existing irrigation wells are powered by natural gas engines. Development of these units was based on 30¢ and 40¢ natural gas; recently prices have risen rapidly to \$1.25 to \$1.50 per mcf. Further rises to \$2.25 and above may have significant effects in the High Plains; \$1.85 gas has already contributed greatly to farmers'

decisions to abandon irrigation in the Trans-Pecos area of Texas.

The authors correctly recognize that although agricultural production requires only about three percent of the nation's energy consumption, production of agricultural commodities is likely to be very sensitive to quantity restrictions or large price increases for energy.

Comparisons of energy consumption in southern agriculture among enterprises and relative to the nation is instructive and a step in the right direction to a prescription of energy policy for agriculture. It is unfortunate that attempts to estimate demand functions for different fuels in selected enterprises were not successful. In view of the inability to estimate demand functions, it is also surprising that the authors did not pay more attention to the need to collect and report energy data for agriculture. More importantly, no mention is made of the adequacy or inadequacy of research methods and techniques to address the problems of energy in agriculture.

The authors otherwise discuss the important research needs regarding rapidly rising energy prices and probably quantity restrictions. Their discussion includes: (1) collection and reporting of data, (2) determination of direct and indirect impacts of high energy prices, (3) economically feasible options available to agricultural producers, (4) demand for different types of energy in various agricultural production enterprises, (5) supply of different types of energy, (6) manufacture of agricultural inputs, and (7) food processing and distribution energy demand.

A discussion of who should collect energy data in agriculture and exactly which data should be collected is needed. Enterprise budgets are badly out of

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date in many states. The agricultural census becomes available too late and too infrequently. No agency collects adequate price data on agricultural inputs. Important energy policy decisions are being made now and we are grossly unprepared to guide those decisions with reliable data and analyses.

Another area of major importance overlooked in the discussion of options available to individual producers is the importance of research to guide the allocation of RD&D funding in agriculture. The primary source of federal funding of research in new energy technology for agriculture will come from the Energy Research and Development Administration. Guidance from the agricultural research community is greatly needed both in terms of identification of the most critical areas for new technology development and the most effective delivery system for putting the technologies in place.

A very useful addition to the paper would be a discussion of the importance of past FPC price controls and allocation priorities on the completion position of various irrigated areas. To some extent, the Texas High Plains and Trans-Pecos areas have enjoyed relatively lower fuel cost (natural gas) than areas without natural gas supplies; more recently the sudden rise in energy prices has been much greater in natural gas and, therefore, Texas irrigated agriculture is losing a part of its competitive advantage.

The authors' discussion of the impacts of increased energy prices point out an important result not widely recognized. The fact that input prices and net farm incomes do not always move in opposite directions is not commonly understood by any group outside of the discipline of economics. Misinformed decision makers continually support the wrong side

of political issues in the mistaken belief that their actions are in favor of agricultural producers. Research to indicate the individual input price to farm income relationships is therefore very important. The companion question of equal importance is the relationship between changes in various agricultural input prices and the consumer surplus for agricultural products.

An opportunity also exists for provision of "spin off" benefits from the agricultural research community to other disciplines and institutions currently involved in energy research. The commonly used research tools of budgeting, regression analyses, linear programming and others are now being applied to other industries for the first time. The federal energy agencies are searching for a "delivery system" to reach millions of United States citizens and businessmen with new information on energy options. The many years of experience with these tools and systems in agriculture can be very helpful to other researchers and institutions to avoid pitfalls and to take advantage of agriculture's successes.

As an ending comment, the authors could have included a discussion of policy alternatives available to states. The Texas legislature is now considering a bill to place agriculture under natural gas utility price regulation for the first time. The intent is not to maintain low prices *per se*, but to insure this class of users the opportunity to be heard regarding contract abuse, curtailments, unfair practices, etc. Universities in Texas are also devoting considerable resources to means of improving current pumping, distribution system and engine efficiencies; they are also testing wind and solar applications for irrigation.

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