2-10-1988

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COOPERATIVE EXTENSION SERVICE

Economics Newsletter

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No. 258 February 10,1988

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Rural electric cooperatives (RECs) and others who supply electric power to irrigators can cut their wholesale purchased power costs if they are able to reduce their peak power demands. Many RECs, therefore, are establishing load control programs with incentives for irrigators to limit pumping during periods of peak power demand. A common incentive involves the waiving of monthly demand charges for irrigators who agree to come under load control.

In this newsletter issue, the highlights of an economic study of irrigation load management controls in South Dakota are reported. Conclusions on (1) the economic advisability of irrigators participating in load management programs and (2) the design of workable and effective load management programs are presented.

Yield losses under load management controls

Irrigators subject to load management controls experience electric power interruptions during periods of peak power demand. The resulting interruptions in irrigation pumping may result in moisture stress induced crop yield reductions.

The results of analyzing South Dakota's Clay-Union and Union REC load management control programs show a great sensitivity of irrigator incomes to such yield losses. In the following discussion, that sensitivity is reflected in terms of "breakeven" losses, i.e., the maximum yield losses that an irrigator can afford to sustain and still remain under load control.

For seasonal "all-or-none" load control programs, the maximum breakeven losses during the full duration of an average irrigation season are no greater than 2% to 7% for high pressure center pivot systems and even less for low pressure and gated-pipe systems. Faced with such limited breakeven losses, only those irrigators having substantially over-sized pumping capacities and/or a willingness to incur substantial risk could rationally decide to participate in a seasonal "all-or-none" load control program. Committing themselves to not pump at any time during the irrigation season when peak power demand is being experienced--even though their irrigated crops may be under yield reducing moisture stress--would be economically damaging for most irrigators.

For load control programs with provisions for voluntary program withdrawals by irrigators, the maximum individual month-by-month breakeven yield losses are even less than those above (a maximum in any one month of 1.8% in the cases examined). Being able to manage irrigation water so as to avoid a level of moisture stress leading to anything less than a 1.8% yield loss during a particular month is an unrealistic management objective for any irrigator.

Incentives adequate to compensate irrigators for yield losses resulting from load control power interruptions to irrigation systems when irrigated crops are under yield reducing moisture stress would need to be at least five times as much as monthly demand charges. Most RECs cannot economically justify such incentive levels.

Conclusions

The study shows that most RECs have

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to realistically resign themselves to the fact that most irrigators will not be able to remain under load controls when their irrigated crops are encountering yield reducing moisture stress. Provision for the voluntary withdrawal of irrigators from load controls is an essential feature of workable and effective irrigation load control programs.

Most irrigators are unlikely to find it economically advantageous to participate in seasonal "all-or-none" load control programs. For load control programs with provisions for voluntary irrigator withdrawals, the answer may be different.

As long as (1) load management incentives more than counterbalance the "personal costs" of load control participation and program withdrawal penalties and (2) irrigated crops are not under yield reducing moisture stress, irrigators are well-advised to be under load controls. But, if moisture stress should arise, and the irrigators' REC is simultaneously experiencing a peaking of power demand, the irrigators should opt out of load control. By continuing to pump, irrigators can mitigate the economically damaging yield losses that otherwise would result from load control power interruptions to their irrigation systems.

Further information

If you would like further information concerning the load management study results, please contact the author (SDSU Economics, Box 504A, Brookings, SD, 57007; tel 605-688-4872). Contact him, also, if you'd like a copy of a just-published paper which addresses questions in South Dakota such as the following.

1. Are investments in new irrigation systems likely to be profitable?

2. Does it pay to operate already installed irrigation systems?

3. How much less do crop yields under low sprinkler pressures have to be for farmers to be well-advised to invest in high rather than low pressure irrigation systems?

4. How much can irrigators afford to pay to convert high pressure center pivots to low pressure?