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Will Agricultural Research Make Future Irrigation Reductions Easier?

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Market Report	Yr Ago	4 Wks Ago	8/29/08
Livestock and Products, Weekly Average			
Nebraska Slaughter Steers, 35-65% Choice, Live Weight	$93.96	$97.15	$99.32
Nebraska Feeder Steers, Med. & Large Frame, 550-600 lb.	129.44	119.16	120.00
Nebraska Feeder Steers, Med. & Large Frame 750-800 lb.	119.51	114.69	114.83
Choice Boxed Beef, 600-750 lb. Carcass	146.53	158.84	161.23
Western Corn Belt Base Hog Price Carcass, Negotiated	61.74	82.02	*
Feeder Pigs, National Direct 50 lbs, FOB	53.84	24.14	34.57
Pork Carcass Cutout, 185 lb. Carcass, 51-52% Lean	69.57	87.73	82.80
Slaughter Lambs, Ch. & Pr., Heavy, Wooled, South Dakota, Direct	102.50	111.75	94.75
National Carcass Lamb Cutout, FOB	255.87	277.41	275.59
Crops, Daily Spot Prices			
Wheat, No. 1, H.W. Imperial, bu.	6.39	6.98	7.23
Corn, No. 2, Yellow Omaha, bu.	3.10	4.98	5.54
Soybeans, No. 1, Yellow Omaha, bu.	8.02	12.75	13.02
Grain Sorghum, No. 2, Yellow Dorchester, cwt.	5.07	7.82	8.39
Oats, No. 2, Heavy Minneapolis, MN , bu.	2.53	*	*
Feed			
Alfalfa, Large Square Bales, Good to Premium, RFV 160-185 Northeast Nebraska, ton.	135.00	190.00	190.00
Alfalfa, Large Rounds, Good Platte Valley, ton.	87.50	77.50	77.50
Grass Hay, Large Rounds, Premium Nebraska, ton.	*	85.00	85.00
Dried Distillers Grains, 10% Moisture, Nebraska Average.	*	167.50	180.00
Wet Distillers Grains, 65-70% Moisture, Nebraska Average.	42.00	60.50	58.50

***No Market**

Nebraska agricultural research has historically improved farm income, increased land values, reduced food costs, enhanced the Nebraska economy and contributed to the general good throughout the world. These contributions often resulted from improving the productivity of our land and water resources. Over the past 40 years, corn and soybean yields per acre of land and per acre-inch of water consumed have each increased by about 60 percent. In short, we have learned how to produce more with less!

These research induced improvements in productivity have contributed to making our land and water resources increasingly valuable. Nebraska irrigated land that sold for less than $500 per acre in 1970 now sells for over $4,000 per acre, which after adjusting for inflation of 430 percent, amounts to a near doubling in the real value of land that has access to irrigation water. This makes it very expensive to meet water policy objectives which require reduced irrigation in the Nebraska Platte and Republican Basins.

As Nebraska struggles to find affordable ways of reducing the use of increasingly valuable irrigation water, there has been a chorus of calls for expanded agricultural research to produce more with less. Is agricultural research an answer to the water policy challenge? If so, what types of research should we be encouraging?

Agricultural research can contribute substantially to meeting water policy objectives, but this is likely to happen only if there is more focus on research which addresses basin-wide conservation needs and does not increase the profitability of irrigation. Forty years ago in Central Nebraska an acre of fully irrigated corn consumed approximately 9 inches of irrigation water and produced an average yield of 110 bushels. Today, as a result of research, an acre of irrigated corn still consumes about the same amount of water, but produces 175 bushels. We could choose via regulations or subsidies to produce yesterday's fully watered yield with less water, but we are reluctant to

do so because it would reduce the available economic returns to irrigation. If we continue to emphasize research which increases water use efficiency by increasing yield per acre with no change in water consumed per acre, there will be no market driven reductions in water consumption for irrigation, and the cost of public policies to reduce consumption will continue to increase.

Those who look to agricultural research which enables us to produce more bushels per acre-inch of water as one method, perhaps even the preferred method of reducing future irrigation water demand, may want to reassess this expectation. If a decade from now research has made it possible to produce today's irrigated yields with, for example, 20 percent less water, but the profit maximizing per acre yield is much higher and requires as much water as an irrigated acre does today, then there will be no reduction in irrigation demand and it will be even more costly to reduce irrigation than it is today.

Still, agricultural research can help us meet future water needs, but paradoxically the most helpful research will be that which reduces instead of increases the economic returns to irrigation. The economic returns to irrigation are equal to the difference in returns between irrigation and the best dryland alternative. Research which improves the profitability of dryland compared to irrigated crops decreases the return to irrigation, and thus decreases the opportunity cost of water policies designed to reduce the amount of water consumed by irrigation.

It might also be possible for scientists to find ways of reducing consumptive use per acre without reducing yield potential. If such a research effort was successful, resulting in a profit maximizing irrigation management strategy which reduces consumptive use per acre, the water policy implications would be mixed. On the one hand, some producers would voluntarily adopt this more profitable option, which would decrease the demand for irrigation water. On the other hand, if voluntary market driven adjustments are insufficient to meet water policy objectives and public action to induce irrigation cutbacks is still necessary, then the presence of this more profitable irrigation management option means higher costs per acre-foot of forced reduction.

Another research area having mixed consequences involves irrigation application efficiency. Some observers argue that research and technology which improves irrigation application efficiency saves water and helps us meet basin-wide water policy objectives. Application efficiency is the proportion of applied water which can be used by the crop. Improving application efficiency reduces the amount of water applied to the crop, which reduces irrigation costs and improves irrigation profitability, but in most cases it does not reduce consumptive use from a basin perspective. Improving application efficiency usually means that less water is lost to field run-off, deep percolation, wind drift or evaporation from the soil surface. Water lost to field run-off or deep percolation is usually returned to the aquifer or the river and is not lost to the basin. In many cases only the water consumed by the crop as evapotranspiration (ET), or evaporated without reaching the crop, is lost to the basin.

If the water policy objective is to reduce consumptive use from irrigation, as it is in the Republican and Platte Basins of Nebraska, then research and technology adoption which improves application efficiency may actually make the Basin worse off for two reasons. First, improved application efficiency increases the profitability of irrigation and makes it more costly to reduce consumptive use through acreage retirement or regulations. Second, if improved application efficiency results in doing a better job of meeting crop needs throughout the entire field, as it often does, then the efficiency improvement actually increases consumptive use which worsens the basin-wide water balance.

Agricultural research produces many benefits and often makes it possible to produce more with fewer natural resources, including water. But if our intent is to encourage research which facilitates reducing the consumptive use of irrigation water, then we should pursue a very focused research agenda. Paradoxically, this agenda should focus on improving the productivity of dryland rather than irrigated agriculture. Improved dryland agriculture may allow us to sustain our agriculturally based Nebraska economy while reducing irrigation over the long-term in a manner consistent with resource availability.

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