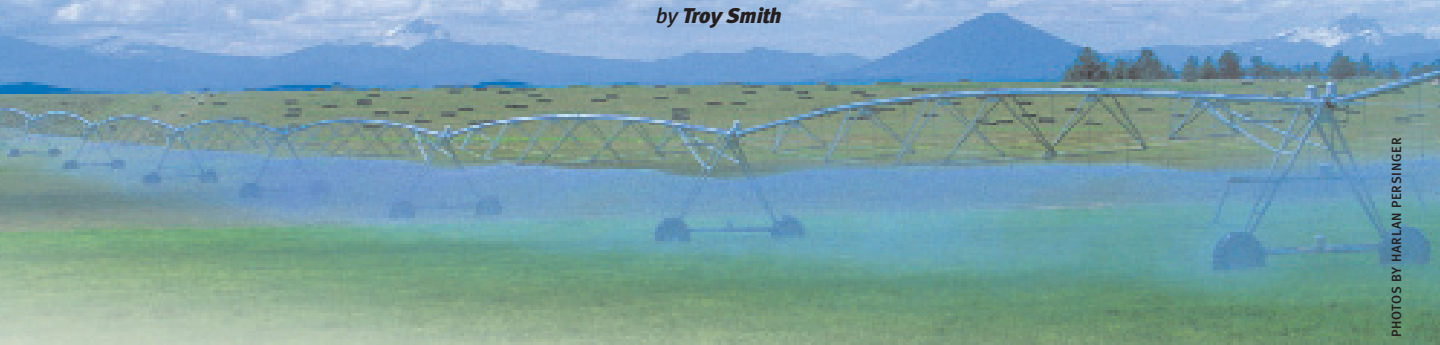
Economics of Irrigated Pasture

Carefully consider costs and benefits when creating an irrigation plan.

by ***Troy Smith***



PHOTOS BY HARLAN PERSINGER

Irrigated pasture is not a new idea, but it has received renewed attention during recent years. Much of that attention has been drought-driven, as producers have sought to supplement dried-out range and pasture resources. In other cases, producers have looked to irrigated pasture as an alternative crop on marginal irrigated land. Whatever the reasons, consideration of irrigated pasture involves the most basic of questions: Will it pay?

Irrigation experiences

Drought prompted Dennis Thaler to establish his first irrigated pasture more than 30 years ago. The Lagrange, Wyo., cow-calf producer used irrigated cool-season grass early in the grazing season, delaying turnout of cattle onto his drought-stressed range. And, cattle could be returned to the irrigated pasture in the fall, relieving pressure on the range as warm-season forage production faded.

Today, Thaler maintains an eight-pasture grazing system irrigated by two center pivots. With careful attention to fertilizer and water requirements of the grass-legume forage mixture and by planned pasture rotation, Thaler utilizes irrigated pasture throughout a majority of the summer grazing season.

"It definitely takes more management, but because we have more forage, we can run more cattle," Thaler says. "Because of the flexibility it lends to our grazing program and the boost to cattle production, irrigated grass works for us."

When Sam Hands, his brothers and his father needed grazing land for a cow-calf enterprise, there wasn't much additional range to be had. Grain fields dominated the landscape near their Garden City, Kan., location. Thanks to their own farming interests, partners in the family-run Triangle H Grain and Cattle had an abundance of crop residues to provide economical winter feed for cows. However, summer grass was in short supply.

"We developed irrigated pastures, and they fill the gap between crop residue availability as good as or better than native range," Hands says. "We have green grass when we come out of residue in April. And we still have green grass for the weaned calves when we send their mothers back to residue in the fall."

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>
> **—*Dennis Thaler***

Managing costs

Through the grazing season, Hands can stock a cow-calf pair for every acre of irrigated pasture, instead of a pair to 15 acres of native range. A rotational grazing system targets optimum utilization of the forage, consisting of at least two different varieties of brome, plus orchard grass and creeping foxtail.

Establishing a stand isn't cheap, and neither is maintaining it. Hands says the annual costs of water and fertilizer are similar to costs associated with growing corn under irrigation. Of course, after a stand is established, there is not much need to run machinery over irrigated pasture. Cattle handle the harvest.

Hands has experience grazing stocker cattle, as well as cow-calf pairs on irrigated pasture. When looking at the economics for a summer grazing season only, the potential for excellent gains on irrigated pasture usually makes stockers look better than cows. In a year-round situation with cows, however, Hands says irrigated pasture complements the grazing of crop residues and allows for planned breeding through use of multiple paddocks.

"Haying some (paddocks) is an option, too," Hands adds. "Irrigated grass has worked pretty well for us."

Thaler and Hands are quick to add that their choices certainly wouldn't suit everyone. The costs associated with irrigated pasture might spook a lot of producers. Both say experience has proven how important it is to apply rotational grazing strategies that optimize forage production, meaning more management is required.

Considering details

University of Nebraska (NU) ag economist Richard Clark says producers thinking about adding irrigated pasture to their production systems should give careful consideration to three areas. The first is the cost of establishing the pasture, including all first-year expenses. Second, producers need to calculate what it will cost to manage and maintain the pasture — the annual cost of using it. And third, producers should have a good idea about what irrigated pasture is going to do for the operation. In other words, what kind of return can be expected?

Clark says costs for establishing pasture

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on acreages with existing irrigation systems usually are comparable, whether they are watered by center pivot or gravity-flow systems. Prices for seed vary to some degree by area, but Clark estimates average seed costs for typical cool-season grass and legume mixtures at $34 to $36 per acre.

First-year expenses also include costs for preparing and seeding the pasture. For a typical quarter section under pivot irrigation, Clark assumes late-summer, no-till seeding directly into whatever cover stands on the acreage. A likely option is to plant a forage crop during the spring prior to establishing pasture. The forage crop can be harvested and the pasture seed mix planted into the residue. Allowing for the cost of a burn-down herbicide to kill other plant growth during seeding, drilling the seed, application of nitrogen (N) fertilizer and a little irrigation in the fall, Clark says establishment costs will climb to about $80 per acre.

If the area has not been used for livestock previously, it will need fencing and livestock water. Fencing costs are highly variable, depending on the type of fencing used. Clark estimates the costs for materials and installation of two-wire, high-tensile electric fence, to use around the pivot perimeter and to delineate five paddocks, at about $80 per acre. Development of a typical livestock watering system could add another $15-$16 per acre.

"After fence and water development, we're pushing $175 per acre in first-year costs," Clark explains. "But some of the biggest costs are the annual expenses for operation and maintenance. These are quite variable, but can easily get up to $150 per acre."

The major annual costs are for fertilizer and irrigation water. On the high plains, for example, pasture can take as much as 20 inches (in.) of water in a normal year. Fertilization with nitrogen and phosphorus (P) are likely to be required for optimum forage production.

Cost for labor to move cattle through pasture rotation should also be recognized. Table 1 offers an example of estimated annual operating costs.

Estimating benefits

After estimating the costs of establishing, operating and maintaining irrigated pasture, what can we expect in return? Even though every producer's situation is different, Clark notes, estimating costs is almost always easier than trying to estimate the value of forthcoming production. One way is to estimate the number of animal unit months (AUMs) of grazing produced. The value of AUMs can be valued according to the going rental rate, per AUM, for pasture.

Clark says a 1,100- to 1,200-pound (lb.) cow and her calf will consume at least 1.4 AUMs per month. If the going pasture rental rate is $20 per month per cow, then an AUM is worth $14.29. Assuming that irrigated pasture will yield 10 AUMs per acre, the gross return would be $143 per acre. If the grass could be rented for $30 per month, an AUM would be worth $21.43 and return $214 per acre.

"Another way to value returns from irrigated pasture is to look at how much gain it can put on yearling cattle," Clark suggests.

During three years of NU research, yearling steers demonstrated gains averaging 1.75 lb. per day, and sometimes up to 2 lb. per day, during a 5-month grazing season. To figure the value of gain, Clark offers an example based on average eastern Wyoming and Nebraska cattle prices during a 10-year period. Table 2 shows that steers with an average total gain of 260 lb. had an increased value of $104 per head, or $0.40 per lb. Given the stocking rate, gains of 1.75 lb. per day translated to 668 lb. per acre, for a return of $334 per acre.

Fit your situation

Some situations, Clark says, do not lend themselves to the relatively simple analysis presented. For example, adding irrigated

Table 1: Estimated annual operating costs for irrigated pasture

Item	Cost per unit	Units per acre	Cost per acre
Nitrogen fertilizer (liquid)	$0.23 per lb.	200 lb.	$46.00
Phosphorus fertilizer (dry)	$0.13 + $4 application	50 lb.	$10.50
Irrigation water	$3.65 per in.	20 in.	$73.00
Labor for moving cattle	$8 per hour	1 hour	$8.00
Operate/maintain fence & water	10% of investment		$12.00
Total annual operating costs			$149.50

Source: Richard Clark, NU. Updated estimates for fertilizer material costs as of 2003; fertilizer application cost based on Jose and Brown, 2001; irrigation costs and cattle movement cost from Selly et al. 2001. Irrigation cost assumes electric-powered center pivot pumping at 800 gallons per minute (gpm), 35 pounds per square inch (psi) and lift of 125 ft.

Table 2: Value of yearling gain (1.75 lb. per head per day) on irrigated pasture

Event	Details	Value or Cost
On grass early May	606-lb. steer, May price of $88.77 per cwt.	$538.00
Interest on investment	5 months @ 5%	$11.00
Total cost for steer on grass		$549.00
Off grass late Sept. or early Oct.	866-lb. steer, Sept.-Oct. price of $75.44 per cwt.	$653.00
Increase in value	$653 – $549	$104.00
Value of gain, $ per lb.	$104 per 260 lb.	$0.40

Source: Richard Clark, NU. Price information, courtesy of Livestock Marketing Information Center, represents averages for 10-year period (1992-2001) for eastern Wyoming and western Nebraska markets.

pasture to a cow-calf operation may allow for expansion of the herd, especially if a shortage of early spring and fall grazing is the main concern. In other cases, irrigated grass may allow producers to develop replacement females more efficiently. Whatever the goal, Clark recommends taking the following steps to analyze the potential change to the operation:

- ► Use partial budgeting procedures to look at only the costs and returns that are going to change due to the development of irrigated pasture. Land costs (taxes and return to land), for example, probably won't change and could be ignored in the analysis.
- ► Estimate the number of cow-calf pairs that could be carried with and without the irrigated pasture. Examine the forage requirements and availability in the total system by time period. If irrigated pasture fills a void or shortage in the system, the number of cows carried could be affected.
- ► Estimate the change in cow-calf enterprise costs due to addition of irrigated pasture. These are the costs associated with establishment of the pasture, fencing and water development discussed previously. Also include opportunity cost, or the expected net return given up by not using the irrigated acreage to produce the next best alternative crop.
- ► Estimate the change in total returns with irrigated pasture. The producer may be able to carry more cows, or improve conception, weaning rates and weaning weights. Irrigated pasture may reduce heifer development costs or improve rebreeding among first-calf heifers.
- ► Compare the changes in expected returns to the changes in expected costs. If expected returns exceed the costs, the change may make sense.

The worst thing producers can do, Clark warns, is to have overly optimistic expectations for pasture yields and livestock performance, coupled with underestimation of true costs.

And don't forget the cash-flow implications of a decision to establish irrigated pasture. If the estimated cost of converting irrigated cropland to pasture is $175 per acre, that adds up to nearly $23,000 for a 130-acre pivot. Even if an analysis shows that converting to irrigated pasture makes economic sense in the long run, the producer must have adequate cash to make the change.