



A Computer Decision Tool for the Irrigated Pasture Investment Decision

Miles Rollison¹, Daniel Mooney¹, Marshall Fraiser¹, Joe Brummer², and Ryan Rhoades³

¹ Agricultural & Resource Economics, Colorado State University ² Soil & Crop Sciences, Colorado State University ³ Animal Sciences, Colorado State University

Background

Farms and ranches are being challenged to provide greater amounts of food, and increasingly meat, for a growing global population with rising incomes. Intensified livestock production on rangeland in the mountainous U.S. West can help meet this demand.

- The economic feasibility of intensification—especially via irrigated forage systems that allow for greater retained ownership and increased stocking and finishing rates—is uncertain.

- Irrigated forage systems may complement range and other forages enabling producers to maintain more cattle at the ranch, eliminating the need for costly transportation and pasture rental elsewhere.

- Sale of grass-fed livestock may allow producers to tap new markets with price premiums. Conversion to these systems might imply the ranching sector could support a greater number of cattle on the same fixed land resource base, with potential implications for farm profits and sustainability.

Purpose

This poster introduces an interactive, user-friendly computerized decision tool for analyzing the irrigated pasture investment decision

- The decision tool allows users to examine the economic feasibility of converting center pivot irrigation fields to irrigated pasture given user-specified values for stocking density, gain, prices, etc.

- Irrigated pasture is a relatively novel land and water resource management option, so the decision aid was developed to meet producers' need for better educational information about annual costs

Components

The tool allows producers to evaluate different grazing management practices in three ways:

- Simple breakeven analysis of establishing irrigated pasture and operating a leasing or stocker enterprise
- Comparative breakeven analysis of irrigated pasture compared to an annual crop such as corn
- Net Present Value (NPV) analysis over the equipment complement's anticipated useful life

Example Scenario

Data from a production-scale field study of irrigated pasture at Colorado State University's ARDEC research station in Fort Collins, CO are used for baseline values for an example decision tool analysis:

- The ARDEC project and similar research elsewhere have shown that rotational grazing on irrigated pasture using small paddocks and increased stocking density improves forage distribution and harvest efficiency

- This management system implies a unique set of equipment and costs which the producer must also take into consideration. With care when specifying values, users of the decision tool should be able to evaluate a variety of "what if" scenarios

Example Baseline Values

Pasture and Gain Assumptions:

- Late summer land prep and seeding
- Pasture has 15 year useful life
- Graze stockers (steers)

Resource	Case Study	Units
Grazing Period	160	Days/Year
Grazing Area	204	Acres
Animals	1.5	Head/Acre
Purchase Weight	525	Lbs/Steer
Daily Gain	2.0	Lbs/Day
Forage Yield	3.75	Tons/Acre
Grazing Efficiency	70%	Proportion

Capital Improvements:

Item	Useful life	Cost	Salvage	Tax / Insur.
Perimeter fencing	25	\$10,560	10%	1%
Interior fencing	7.5	\$2,400	10%	1%
Energizer	7.5	\$600	20%	2%
Livestock well	25	\$6,000	10%	1%
Watering tanks	15	\$500	20%	1%
Center pivot	25	\$34,832	10%	2%
Field vehicle	10	\$20,000	20%	2%

Example Analysis

Enterprise Budget

		\$/Head	\$/Acre
Revenue	Market Steers (845#, \$1.55/lb)	\$1,310	
	Total	\$1,310	\$1,965
Operating Costs (Variable)	Purchase Steers (525#, \$1.85/lb)	\$971	
	Vet, Meds, Supplies	\$10	
	Death Loss (1.5% of Sale Value)	\$20	
	Hauling & Marketing	\$6	
	Pasture Maintenance (Interseed legumes, P fert)	\$23	
	Electricity, Water, Labor, Fuel	\$74	
	Capital Items: Maintenance & Repair	\$5	
	Miscellaneous	\$0	
	Operating Interest	\$33	
	Total	\$1,141	\$1,712
Ownership Costs (Fixed)	Pasture Establishment (Annualized cost)	\$17	
	Capital Items: Depreciation & Interest	\$22	
	Capital Items: Taxes & Insurance	\$4	
	General Farm Overhead	\$26	
	Total	\$69	
	Return to land, management, and risk	\$99	\$148
Factor Returns (Minimum acceptable opportunity costs)	Land	\$17	
	Management	\$30	
	Return to risk	\$52	\$78

- Breakeven sale price to cover all costs: **\$1.49/lb**

Sensitivity Analysis

Expected net return, per-head			
Avg. Daily Gain	Animals/Acre		
	1.25	1.5	1.75
1.6	(\$83)	(\$45)	(\$18)
1.8	(\$35)	\$3	\$31
2.0	\$14	\$52	\$80
2.2	\$63	\$101	\$128

Expected net return, per-head			
Basis	Marketing and Hauling		
	\$3	\$6	\$9
\$0.40	(\$34)	(\$31)	(\$28)
\$0.35	\$14	\$11	\$8
\$0.30	\$55	\$52	\$49
\$0.25	\$97	\$94	\$91

Production risks affect profitability

- Forage quality
- Weather
- Other factors

Can affect stocking rate and gains

- Irrigation helps to minimize some risks

Record-keeping important!

- Basis is a key risk -- Difference between known stocker purchase price and *expected* stocker sales price

- Need good risk management strategies if a stocker enterprise looks feasible for your operation

Investment Analysis

Cost and Benefit Flows, 15 Year Useful Life for Pasture

Year	0	1	2	...	7	8	9	10	...	14	15
	2018	2019	2020	...	2025	2026	2027	2028	...	2032	2033
Costs											
Pasture establishment											\$510
Perimeter fencing											\$4,858
Interior fencing											\$240
Energizer											\$120
Livestock well											\$2,760
Watering tanks											\$100
Center pivot system											\$16,023
Field vehicle											\$12,000
Operating Costs											(\$1,141)
Ownership Costs											(\$92)
Revenues											
											\$16,008
Net Cash Flows											
											(\$79,992)

- NPV: **\$45,000**
- IRR: **16%**
- 5.4 years** simple breakeven time to cover initial investment

Partial Budgeting

Partial Budget (\$/Acre)
Irrigated Pasture vs Irrigated Corn

Additional Costs: \$1,712 + \$21	Additional Revenue: \$1,965
Reduced Revenue: \$754	Reduced Costs: \$567

What you "give up": \$1712 + \$21 + \$754 = \$2,487	What you "gain": \$1965 + \$567 = \$2,532
Incremental Profit (Net change): +\$47/Acre	