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Valuing forage resources with the Forage Risk Analyzer tool

Platte County cattle producers Ryan and Lonna Johnson* recently had a neighboring landowner approach them about an opportunity to lease cropland.

The neighbor has 140 acres of irrigated alfalfa/grass for hay that is nearing 10 years old. Normally, the neighbor would plow under the alfalfa and rotate to corn and other row crops; however, because of low prices, he is considering grazing the forage in an irrigated pasture system.

He is concerned about the short-term profitability of corn, as prices are below his break-even. On a long-term basis, he is worried about sustainability of his row-crop system in terms of reduced soil quality, pest and weed management issues, and the increasing fertilizer and chemical needs.

The neighbor believes a switch to irrigated pasture could be the answer; the problem is he has no livestock and doesn't want to own any. He would like to lease the land as summer pasture. The Johnsons are interested, provided they can establish an accurate estimate of the costs and an equitable lease arrangement for both parties.

Forage Risk Analyzer Tool (FRA) from RightRisk.org

The Forage Risk Analyzer (FRA) helps producers like the Johnsons determine the full value of a forage resource and in turn develop a fair and equitable lease arrangement for the parties involved.

The FRA tool estimates the benefits and costs for up to six different parties (three suppliers, three users) and calculates the full value of the forage resource involved. The associated risks can also be explored with the FRA. The idea is that, with a better understanding, the parties improve their chances of writing a fair and equitable agreement.

The tool is divided into six resource categories, including land, livestock, housing, stored feed, labor, and machinery. The tool provides an allocation summary and performs net return and risk analysis for all parties after entering all the pertinent resource information. Accompanying the tool is a user guide with appendices for nutrient requirements and feedstuff composition for beef cattle and AUM equivalents for various livestock types.

FRA Tool Application

Following the Johnson's situation, we examine the feasibility of converting the 140 acres of sprinkler-irrigated cropland to irrigated pasture. The landlord would provide the land and the irrigation water under the proposed lease arrangement.

The landlord estimates $40/acre for irrigation water and delivery costs for an average year. We enter these costs into the FRA, selecting Hay Land under the Land tab, then enter acres (140) and total AUMs available for

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Table 1.

HAY Land

Description	Acres	TOTAL AUMs Available	Cost per Acre	AUMs per Acre	Average Percent-TDN per AUM	TOTAL Cost per year
Irrigated Alfalfa/grass mix to graze	140	420	$120.00	3.0	73%	$ 16,800
				-		-
				-		-
				-		-
				-		-
				-		-
				-		-
				-		-
				-		-
				-		-
				-		-
				-		-
				-		-
				-		-
				-		-
				-		-
	140	420	-	-	-	$ 16,800

Table 2.

WATER Resources

Description	Number of Water Points	Cost per Water Point Installed	Total Years of Useful Life	Water Expenses per Year	*click a button below to enter other costs*	WATER Annual Labor Costs	TOTAL Expenses per year
Stock Water pipeline for Irrigated Pasture	2	$1,500	30	$400			$ 830
Center pivot sprinkler for irrigated pasture	1	$65,000	20	$5,600			$ 13,470
					WATER Labor Cost	$ 700	-
							-
							-
							-
						WATER Machinery and Equipment Costs	-
					WATER Machinery and Equipment Cost	$ 4,250	-
							-
							-
							-
	3	-	-	$ 6,000		$ 4,950	$ 14,300

Table 3.

Annual Livestock Expenses

Description	ANNUAL Livestock Supplies	ANNUAL Veterinary Expenses	ANNUAL Medical Expenses	ANNUAL Expenses Other	ANNUAL Expenses Other	*click a button below to enter other costs*	LIVESTOCK Annual Labor Costs	TOTAL Cost per year
Cow-calf pairs	200	1,500	5,000					
						LIVESTOCK Labor Cost	$ 500	
							LIVESTOCK Machinery and Equipment Costs	
						LIVESTOCK Machinery and Equipment Cost	-	
	200	1,500	5,000	-	-		$ 500	$ 7,200

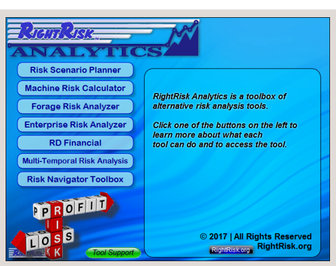
Table 4.

FENCE Resources

Description	Miles of Fence	Cost per Mile Installed	Total Years of Useful Life	Fence Expenses per Year	*click a button below to enter other costs*	FENCE Annual Labor Costs	TOTAL Expenses per year
two wire electric fence	2	$1,500	10	$200			$ 4,825
					FENCE Labor Cost	$ 400	-
							-
							-
							-
							-
						FENCE Machinery and Equipment Costs	-
					FENCE Machinery and Equipment Cost	$ 4,000	-
							-
							-
							-
	2	-	-	$ 200		$ 4,400	$ 4,825

For more information

To learn more about estimating the value of your forage resources using the Forage Risk Analyzer tool, visit RightRisk.org and select "Risk Management Tools" from the "Resources" tab at the top of the page. FRA is just one of many useful tools available to help producers with risk management planning; the site includes courses, producer profiles, and numerous other resources.



RightRisk Analytics

The free RightRisk Analytics toolbox is at RightRisk.org. The toolbox contains several tools for budgeting and quantifying risk for all types of agricultural operations. The accompanying guides offer real-world examples and helpful assistance with tool entries and interpreting results.

Cation exchange capacity and what it can tell you about your soil

Ever wondered what the cation exchange capacity (CEC) value on a soil test means and what that says about the health and function of the soil?

A process called ion exchange is one way plants extract nutrients from the soil. Plants secrete hydrogen ions (H^+) into the soil solution to "exchange" with other ions they need like potassium, calcium, magnesium, and micronutrients. These positively charged ions are called cations, and the capacity of the soil to hold and exchange these ions is called the cation exchange capacity. The CEC is typically measured in amount of charge per unit mass of soil. The higher the CEC value for a soil, the higher the nutrient holding capacity.

This is an important value to understand.

Why Higher CEC is Better

In soils with a low CEC, nutrients with a positive charge are quickly leached and lost below the rooting zone by irrigation or rain. Soils with a higher CEC are typically higher in clay, will have a higher water holding capacity, and are more likely to accumulate excess salts. In regions with acidic soils, more lime is required to neutralize the pH in soil with a higher CEC.

The CEC of a soil is dictated by the number of cation binding sites on the clay and humus (highly stabilized organic matter) particles in the soil. Some clays have many exchange sites, while others only have a few. Most clay and clay loam soils in Wyoming have a relatively high CEC due to the large number of exchange sites found on the smectite clays common across the state.

Soil and CEC relationship*

Soil or soil material	CEC (cmolc/kg)
Soil humus	200
Pure smectite clay	100
Clay loam	20-40
Sandy loam	10-20

cmolc/kg = centimoles of charge per kilogram of soil.

** The higher the CEC, the higher the water holding capability of the soil.*

The amount and type of clay in the soil is a constant, but the amount of humus is a variable over which we have some control. For this reason, any changes in CEC seen within our lifetimes will be a direct result of changes in soil humus. Increasing organic matter levels in a clay soil with a high CEC will help reduce compaction, increase aeration and drainage, and reduce salt accumulation in the rooting zone. Increasing organic matter levels in a sandy soil with a low CEC will increase nutrient and water holding capacity.

Soil Humus Benefits

Unlike most clays, soil humus also provides positively charged sites to hold negatively charged anions like nitrate and sulfate in the rooting zone where plants can use them. And it is also humus that adsorbs pesticides and prevents or slows their movement to the groundwater. These large complex organic molecules get stuck to the humus particles and are vulnerable to soil microbes that break them down.

Mike Fabrizius of Mile High Ranch in Fremont County and extension educator Caitlin Youngquist examine the organic matter in Fabrizius' soil.

Soil organic matter is made of about 50 percent carbon and 5 percent nitrogen. The rest is oxygen, hydrogen, and all other essential plant nutrients. As organic matter is consumed by the bacteria and fungi in the soil, these nutrients are released in a form plants can use, and what was once raw materials like manure and dead plants eventually becomes humus.

Not all sources of soil organic matter are equal, however. The materials we call humus is highly decomposed, very stable, makes up about 60-80 percent of the soil organic matter, and has a very high CEC and water holding capacity.

Soil organic matter additions like compost and manure from ruminants and horses are more readily converted to humus than additions from cover crops and manures from animals fed a low fiber diet like poultry.

Soil CEC is an important indicator of soil function, and one we have significant control over as soil managers. Consider the value of managing soils to increase soil humus levels by additions of manures or composts and reducing tillage. Healthier, more profitable soils will be the result.

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Valuing forage continued

an estimated four months of grazing. For this example, we will assume 0.75 AUMs per acre for four months or 420 AUMs total.

The cost per acre is based on $40/pair/month, resulting in a cost per acre of $120 ($40/pair/month × 0.75 AUMs/acre x 4 months).

The FRA tool also allows the user to account for forage quality differences via estimated total digestible nutrients (TDN)/AUM; for this example, we use 73 percent (the median value between mixed pasture spring and summer), Table 1.

The Johnsons are responsible for fence, water, cattle care, and maintenance under the lease agreement. For stock water, they determine the existing well will work, but they will need to install 2,000 feet of pipeline ($1.50 per foot, $3,000 total) and two stock tanks ($600 total) to utilize all the potential forage. They also estimate an annual stock water cost of $400 (electricity).

The landlord will provide irrigation water and associated labor ($5,600 total irrigation water and $500 labor). The FRA tool has input screens for labor associated with the water as well as machinery and equipment cost. For stock water and irrigation water, the cost would be minimal, periodic checking ($200 for stock water and $500 for irrigation), Table 2.

The Johnsons would provide up to 70 cow-calf pairs for summer grazing under the lease. They enter the livestock veterinary, medical, supply, labor, and machinery costs under the Livestock tab, Table 3.

To access the forage, the Johnsons estimate they will need approximately 2 miles of two-wire electric fence at a cost of $1,500/mile installed, along with machinery labor expenses (Table 4).

In the next installment, we will explain how the FRA tool allocates the various benefits and costs of this lease between the two parties. We will also demonstrate how the FRA risk analysis can help establish the value of the forage and a lease rate.

** The Johnson operation is a case study example created to demonstrate RightRisk tools and their applications. No identification with actual persons (living or deceased), places, or agricultural operation is intended nor should be inferred.*

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