

Determining Pasture Rental Rates

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Livestock producers and landowners have asked for a simple and fair method to determine pasture rental rates. This tends to be a difficult question to answer because prices can vary from region to region due to market demand and supply.

However, several methods are available for computing a pasture rental rate. Before computing a pasture rental rate, a variety of factors that influence rental rates are important to understand.

Pasture rental rates vary based on:

- Forage quantity and quality
- Forage species and composition – rangeland, improved pasture¹, annual cover crop, crop residue
- Condition of fence
- Water quality and availability
- Management practices required by landowner
- Presence of a grazing system on rangeland and improved pastures
- Fertility practices on improved pastures
- Supply and demand

¹ Improved pastures usually refers to seeded pastures and may include tame grass species such as crested wheatgrass, brome grass, wheatgrass mixtures, and expired Conservation Reserve Program lands in the northern Plains.

Pasture Rental Rate Options

Many options are available to calculate pasture rental rates as a starting point for negotiations between the landowner and tenant. Because North Dakota is primarily a cow-calf producing state, the best rental rate options that fit our region are based on:

1. Rental Rate by Acre

- Current market rates based on annual surveys – U.S. Department of Agriculture (USDA) National Agricultural Statistics Service
- Return on pasture investment - return based on value of land

2. Rental Rate by Animal Unit Month (AUM)

- Rent per head of livestock (animal unit equivalent) per month

Other pasture rental rate options or methods to calculate a rental rate value are available.

3. Performance Method

This is an option used when payment is made based on livestock performance. This method is **not** recommended for permanent pasture types such as native rangeland or improved pastures grazed with cow-calf pairs in the northern Plains. Performance Method is calculated based on weight gain of livestock.

- Used primarily with yearling cattle
- Based on break-even rate for cost/pound of gain x pounds gained on pasture per head
 - The break-even rate for cost/pound of gain is extremely variable across a region and the country, thus leaving a wide range of potential rental rates. Publications throughout the country list a range of \$0.30 to 0.60 as a break-even rate for cost/pound of gain (1, 2).

4. Pasture Quality Factors

This is a method recommended for annual forage pastures such as cover crops, crop residue and annuals planted for grazing.

- Uses current market value for hay price per ton x pasture quality factor x animal unit equivalent
- This method does not work effectively for rangeland and will undervalue rental rates, especially with good cattle prices and lower hay values (i.e. \$60/ton grass hay x 0.15 x 1.15 (1,200-pound cow with calf = \$10.35/AUM)

Pasture rental rates often are influenced by commodity prices such as commercial hay, corn, barley, byproducts and alternative land uses. Pasture rental rates need to be competitive with the production values of these crops that typically are fed to cattle as alternative feeds.

Responsibilities

The responsibility of the tenant and landowner must be considered when negotiating rental rates. In most cases, unless specified in a written contract, the **tenant** is responsible for those activities related to livestock production and management. These activities include:

- Checking livestock
- Checking/maintaining water sources
- Providing salt, mineral and fly control
- Fence repair
 - Often negotiated between tenant and landowner
 - Material typically provided by landowner, but can vary from region to region

The **landowner** typically is responsible for those activities related to land production. These activities include:

- Fence
 - Responsibility for material and repair may vary, and often is negotiated between landowner and tenant
- Water
- Weed and brush control
 - Negotiable, but landowner provides chemical
- Fertilizing and reseeding improved pasture
 - Negotiable, but landowner provides fertilizer and/or seed

Landowner and Tenant Considerations

A **landowner** typically expects rental rates to cover the real estate taxes, cost of land maintenance (fence repair, water source costs, weed control/management, etc.), insurance and any interest in the investment if the land is being purchased. A landowner should be able to cover all out-of-pocket expenses from the rental payment; however, in some cases, this may be unrealistic due to current range and pasture values

A **tenant** should determine the level of affordability to rent a pasture based on current livestock market values, availability and costs of alternative feeds and availability of other pastures within a reasonable distance. Basically, tenants need to know what they can afford based on their return per head or herd and projected annual budget.

Renting by the Acre

Renting by the acre is the simplest option because it creates a direct payment rate for each acre of land grazed and is most familiar to livestock producers and landowners. However, this method has the greatest potential for economic and land conservation efforts.

Leasing pasture by the acre sets a value on the land for the entire operating year (*based on North Dakota Century Code*) and usually is not tied to livestock numbers unless specified in a contract. This method usually benefits, economically, the tenant because that person can add more livestock without adding payment.

This method also can increase the risk of overgrazing because adding more livestock doesn't add more expense to the tenant. Increased livestock numbers reduce the direct costs per head of livestock and potentially create overgrazed pastures if too many livestock are added during a period of time. The livestock producer may experience poor livestock performance and the landowner may experience resource degradation when overgrazing occurs.

Current Market Rates — Survey Data

The USDA National Agricultural Statistics Service (NASS) for North Dakota provides average pasture rental rates and range/pastureland values that are created based on annual surveys of farmers and ranchers. Approximately 8,000 North Dakota agricultural producers responded to the 2020 survey.

Table 1 shows county-level data for range and pastureland average and most frequently reported rental rates per acre, and average value of rented pasture and rangeland in 2021 (North Dakota Department of Trust Lands 2021). We advise the reader to exercise discretion when using these county averages and use these values as one factor to establish rental arrangements.

Return on Investment

Landowners can determine rental value based on the desired return of investment from their estimated value of the pastureland or rangeland. This is a fairly simple method to estimate the base rental rate per acre. The base rate then can be used to negotiate the final rate depending on contributions by each party.

To determine the base rate, multiply the estimated value of the land (Table 1 or the value of the land if known) by an accepted rent-to-value ratio and divide by 100 (for example, 3.5% / 100 = 0.035).

Rent-to-value ratios will vary from year to year based on typical returns you would expect from a bank or investment. These numbers can vary from 1.5% to 8%, depending on county, region, area and state.

Table 1. Average rental rates, most frequently used average rental rate, and average value of land for rangeland and non-irrigated pastureland in North Dakota in 2021.

County	Average Rental Rate	Most Frequently Reported Rental rate	Average Value of Rented Pastureland
----- dollars/ac -----			
Adams	21.00	20.00	739.00
Barnes	26.80	20.00	1,332.00
Benson	21.30	15.00	833.00
Billings	16.70	15.00	790.00
Bottineau	18.60	10.00	751.00
Bowman	13.60	15.00	700.00
Burke	11.70	10.00	628.00
Burleigh	23.80	25.00	1,263.00
Cass	31.90	25.00	1,850.00
Cavalier	(D)	(D)	(D)
Dickey	38.90	30.00	1,327.00
Divide	9.80	10.00	571.00
Dunn	16.00	18.00	1,129.00
Eddy	17.90	12.00	731.00
Emmons	25.40	25.00	1,193.00
Foster	20.40	15.00	939.00
Golden Valley	13.80	10.00	625.00
Grand Forks	25.40	25.00	921.00
Grant	17.60	20.00	893.00
Griggs	21.40	15.00	1,117.00
Hettinger	21.80	18.00	934.00
Kidder	23.60	18.00	1,043.00
LaMoure	32.20	20.00	1,036.00
Logan	24.70	20.00	1,186.00
McHenry	19.50	15.00	828.00
McIntosh	29.40	25.00	1,193.00
McKenzie	10.60	10.00	733.00
McLean	16.70	15.00	904.00
Mercer	18.80	18.00	1,127.00
Morton	19.70	20.00	997.00
Mountrail	11.80	10.00	654.00
Nelson	20.90	25.00	805.00
Oliver	16.00	18.00	1,064.00
Pembina	17.80	18.00	989.00
Pierce	19.80	11.00	798.00
Ramsey	29.50	25.00	810.00
Ransom	33.80	25.00	1,494.00
Renville	16.70	15.00	763.00
Richland	44.00	40.00	1,865.00
Rolette	16.90	20.00	671.00
Sargent	36.30	30.00	1,665.00
Sheridan	17.70	20.00	765.00
Sioux	13.50	12.00	698.00
Slope	14.00	15.00	732.00
Stark	20.70	25.00	1,100.00
Steele	19.70	15.00	1,020.00
Stutsman	25.30	25.00	1,088.00
Towner	17.60	15.00	619.00
Traill	(D)	(D)	(D)
Walsh	22.80	20.00	871.00
Ward	17.20	15.00	800.00
Wells	18.70	20.00	875.00
Williams	10.60	8.00	543.00

Based on published reports, pasture rent appears to range from 1.5% to 2% of market value in the Midwest (Hofstrand and Edwards, 2015) and 3.5% to 6% of market value reported in the west (Hendrix, 2015). You as a landowner or tenant can determine what ratio-to-value return you are comfortable with when starting negotiations.

Formula:
$$\frac{\text{\% desired return}}{\text{\% desired return}} \div 100 \times \frac{\text{Value of land/ac}}{\text{Value of land/ac}} = \frac{\text{Rental rate/acre}}{\text{Rental rate/acre}}$$

A landowner can determine a starting point for return on investment based on land value and calculate a return on investment with which the individual is comfortable. The landowner can compare with the North Dakota NASS report and compare rental values of calculated rents versus survey rental reports for the individual's county.

Landowners should be open to negotiate based on supply and demand, trust and positive relationship with potential tenants, current livestock market values and trends, and acceptable contributions by both parties on the management of the livestock herd and upkeep of the pasture infrastructure.

Renting by the Animal Unit Month (AUM)

Renting by the animal unit month (AUM) provides the most equitable option for the landowner and tenant while reducing the risk for overgrazing or understocking. Overgrazing reduces the long-term ecological function of the plant community, reducing plant vigor and forage production potential in future years, and impacts overall livestock performance of the herd (gain per day and gain per acre), especially for future years.

Understocking leads to reduced income potential for the landowner because the tenant only pays for that number of animal units grazed. Understocking may be desirable in some cases; for example, when improved wildlife habitat is desired to increase wildlife populations.

Caution should be noted that understocking during a period of many years (two years or longer, depending on location) will create a buildup of litter and a cooler, wetter micro-climate that favors invasion of exotic, cool-season grasses in the northern Plains, thereby negatively impacting plant communities on native rangelands.

Example 1

Rangeland in Mercer County

Average land value in 2020 at \$1,127/acre

Fair market return at 2 percent: $0.020 \times \$1,127 = \$22.54/\text{acre}$

Fair market return at 3.5 percent: $0.035 \times \$1,127 = \$39.45/\text{acre}$

North Dakota NASS 2021 average rental rate: \$18.80; most frequent rate: \$18

Calculating AUMs — Stocking Rate

Using the AUM rental method, the tenant pays rent based on the number of animals grazed and length of time the pasture is used. To determine AUMs, you first must convert the livestock class to an animal unit equivalent (see Table 2). An animal unit (AU) is based on forage consumption of a 1,000-pound cow with a calf up to 6 months of age, or daily consumption of 26 pounds/day of oven-dry forage or 30 pounds/day of air-dry forage. An AUM is the amount of forage consumed by one AU for one months (M).

Example 2

Brome Grass (tame) Pasture in Ransom County

Average land value in 2020 at \$1,494/acre

Fair market return at 2 percent: $0.020 \times \$1,494 = \$29.88/\text{acre}$

Fair market return at 3.5 percent: $0.035 \times \$1,494 = \$52.29/\text{acre}$

North Dakota NASS 2021 average rental rate: \$33.80; most frequent rate: \$25

Stocking Rate Formula:

$$\frac{\text{\# of head}}{\text{\# of head}} \times \frac{\text{AUE (table 2)}}{\text{AUE (table 2)}} = \frac{\text{Animal units (AU)}}{\text{Animal units (AU)}} \times \frac{\text{Months (M)}}{\text{Months (M)}} = \text{AUMs}$$

Example 3

Rangeland in Golden Valley County

Average land value in 2020 at \$625/acre

Fair market return at 2 percent: $0.020 \times \$625 = \$12.50/\text{acre}$

Fair market return at 3.5 percent: $0.035 \times \$625 = \$21.88/\text{acre}$

North Dakota NASS 2021 average rental rate: \$13.80; most frequent rate: \$10

Example 1

100 1,200-pound cows with calves with a planned grazing schedule of May 15 - Nov. 1. Four mature bulls grazed from July 1 - Sept. 15

$100 \times 1.15 = 115 \text{ AU} \times 5.5 \text{ M} = 632.5 \text{ AUMs}$

$4 \times 1.40 = 5.6 \text{ AU} \times 2.5 \text{ M} = 14.0 \text{ AUMs}$

Total **646.5 AUMs**

Example 2

250 sheep with lambs with a planned grazing schedule of June 1 - Nov. 1. Five rams from Sept. 1 - Nov. 1

$$250 \times 0.20 = 50 \text{ AU} \times 5 \text{ M} = 250.0 \text{ AUMs}$$

$$5 \times 0.25 = 1.25 \text{ AU} \times 2 \text{ M} = 2.5 \text{ AUMs}$$

Total 252.5 AUMs

Calculating AUM Rental Rate — Carrying Capacity

The value for pasture rental rates using the AUM method can be highly variable and driven by supply and demand. Little to no survey data is available in North Dakota that provides an average or most frequently used AUM rate. However, once you have calculated your rental rate by the acre, you can convert that value to an AUM rate.

Calculating the AUM rate requires that the average carrying capacity for your pasture be determined. For landowners who do not know the carrying capacity of their pasture or rangeland, Table 3 is included to provide an estimated stocking rate guide for different regions (see Figure 1 for multiple land resource areas) of North Dakota.

The landowner and tenant agree upon a per-acre rental rate and determine total payment for pasture using the assumption the livestock will graze for the entire planned grazing season (even if they don't). Then the landowner estimates the carrying capacity of the pasture to be rented. Determining actual carrying capacity using a current or past conservation plan is highly recommended.

The landowner must categorize all acres within the pasture by upland and lowland vegetation types (also includes soil type). Each vegetation type is multiplied by the recommended stocking rate from Table 3 to determine AUMs available. Finally, you divide the total payment by AUMs available in the pasture to determine the AUM rental rate.

By using this value, the tenant only pays for the number of animal units grazed for the given time period. Refer to NDSU Extension publication "Determining Carrying Capacity and Stocking Rates for Range and Pasture in North Dakota" for more information on estimating carrying capacity.

Table 2. Animal unit equivalents (AUE) guide¹.

Kinds/Classes of Animals	Animal Unit Equivalent (AUE)	Forage Consumed in Pounds (air-dried ²)	
		Day	Month
1,000-pound cow, dry	0.92	28	851
1,000-pound cow, with calf	1.00	30	913
1,200-pound cow, with calf	1.15	35	1,064
1,400-pound cow, with calf	1.29	39	1,186
Cattle bull, mature	1.40	42.5	1,295
Weaned calves to yearling	0.60	18	547
Yearling cattle (600-800 lbs)	0.70	21	638
2-year old cattle (800-1,000 lbs)	0.90	27	832
Bison cow, mature	1.00	30	913
Bison bull, mature	1.50	45	1,368
Horse, mature	1.25	38	1,155
Sheep, mature with lamb	0.20	6	182
Sheep ram	0.25	7.5	228
Goat, mature	0.15	5	152
Deer, white-tailed, mature	0.15	5	152
Deer, mule, mature	0.20	6	182
Elk, mature	0.60	18	547
Antelope, mature	0.20	6	182
Sheep, bighorn, mature	0.20	6	182
Jackrabbit, white-tailed	0.02	0.6	18
Prairie dog	0.004	0.1	3

¹ Adapted from NRCS National Range and Pasture Handbook (1997) and Montana State University Range and Pasture Records (1993).

² Air-dried weight refers to forage that is allowed to dry under natural environmental conditions during an extended period of time, such as plants harvested for hay production. This value is approximately 87 % dry matter versus oven-dried weight, which depicts 100 % dry matter.

Figure 1. Major land resource areas of North Dakota.

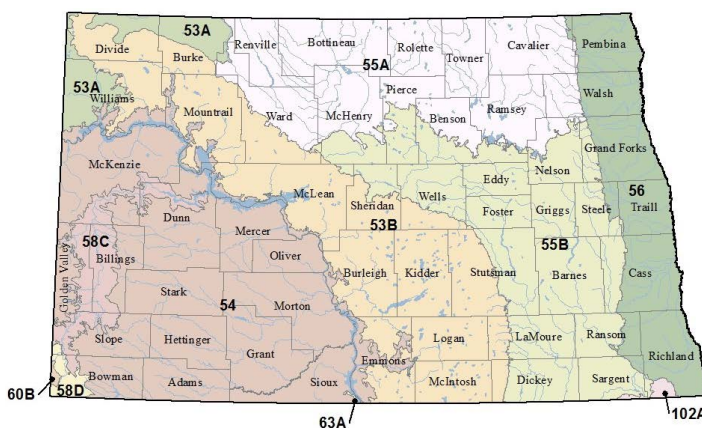


Table 3. Estimated carrying capacity guide in animal unit months per acre (AUM/ac) by site and multiple land resource areas (MLRA) for reference plant communities¹.

Vegetation Type	53A&B	54	55A&B	56	58C&D
Upland					
Loamy	0.66	0.66	0.71	0.85	0.57
Sandy	0.68	0.66	0.77	0.85	0.55
Clayey	0.63	0.57	0.66	0.82	0.52
Shallow	0.60	0.38	0.52	0.60	0.36
Very shallow/ Thin claypan	0.30	0.24	0.37	0.43	0.22
Lowland					
Overflow	0.96	0.87	1.01	1.15	0.57
Wet meadow	1.23	1.16	1.28	1.37	0.92

² Animal unit months/acre by vegetation type are based on a 0.25 harvest efficiency.

Carrying capacity formula: $\frac{\text{_____}}{\text{\# of acres}} \times \frac{\text{Recommended}}{\text{AUM/ac}} = \frac{\text{_____}}{\text{AUMs (Table 3)}}$ (Repeat for all vegetation types)

AUM rental rate formula: $\frac{\text{Total payment based on agreed per-acre rental rate}}{\text{Total AUMs from combined vegetation types using carrying capacity formula}} = \text{AUM rate}$

Recommended head to graze formula: $\frac{\text{Total AUMs}}{\text{Months of planned grazing}} = \text{Max. \# of animal units to graze}$

Example 1

1,000-acre pasture in Mercer County (MLRA 54¹) with an agreed rental price of \$18.80/acre for a total payment of \$18,800. The planned grazing season is May 15 – Nov. 1 (5.5 months). Pasture contains 70 % sandy vegetation type, 20 % shallow vegetation type and 10 % overflow vegetation type.

Sandy: 700 acres x 0.66 AUM/ac² = 462 AUM
 Shallow: 200 acres x 0.38 AUM/ac² = 76 AUM
 Overflow: 100 acres x 0.87 AUM/ac² = 87 AUM

Total: 625 AUM

Rental rate = \$30.08/AUM (\$18,800 ÷ 625 AUMs)

Number of recommended animal units (AU) = 113.6 AU (625 AUM ÷ 5.5 months)

Number of recommended 1,200-pound cows with calves = 99 head (113.6 AU ÷ 1.15 AUE³ - 1,200-pound cow with calf) for 5.5 months

¹ Shown in Figure 1.
² Taken from Table 3.
³ Taken from Table 2.

Example 2

1,000-acre pasture in Ransom County (MLRA 55B¹) with an agreed rental price of \$33.80/acre for a total payment of \$33,800. The planned grazing season is May 15 – Nov. 1 (5.5 months). Pasture contains 70 % sandy vegetation type, 20 % shallow vegetation type and 10 % overflow vegetation type.

Sandy: 700 acres x 0.77 AUM/ac² = 539 AUM
 Shallow: 200 acres x 0.52 AUM/ac² = 104 AUM
 Overflow: 100 acres x 1.01 AUM/ac² = 101 AUM

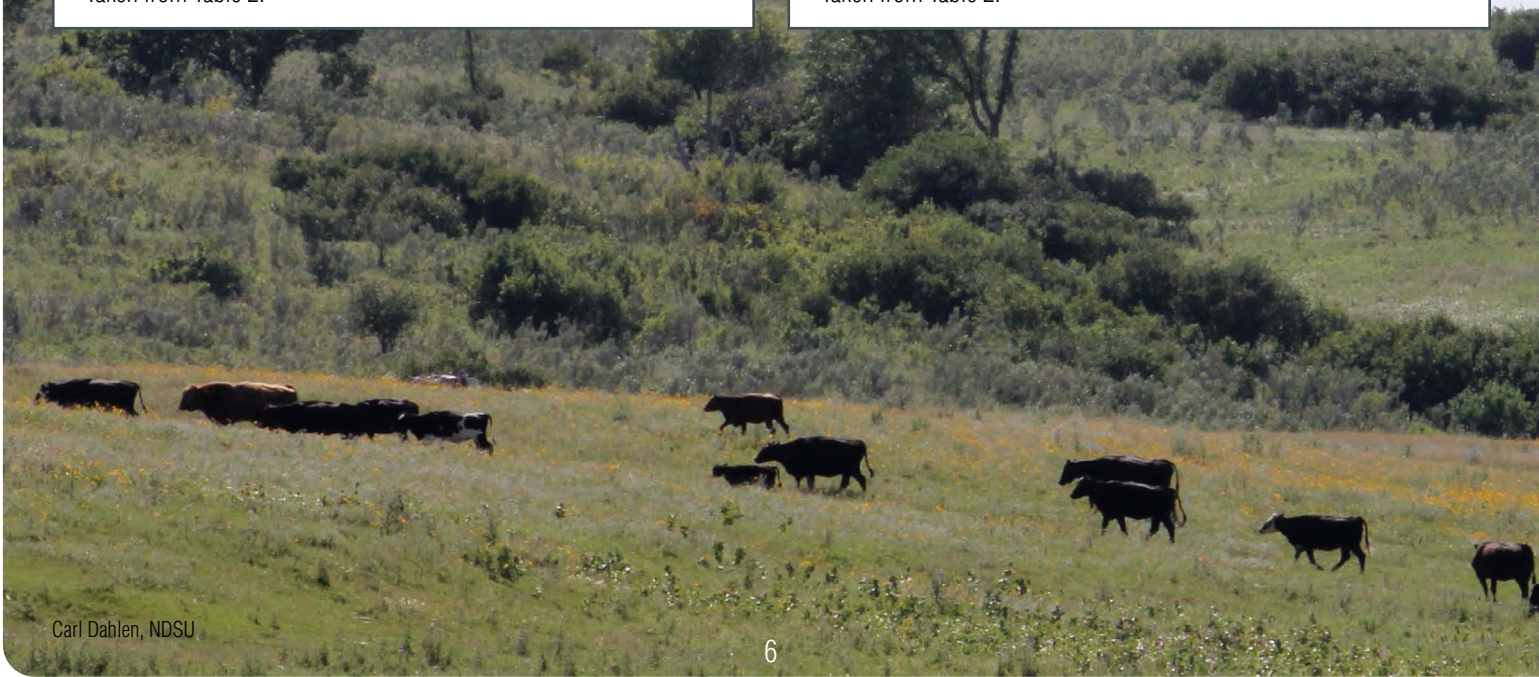
Total: 744 AUM

Rental rate = \$45.43/AUM (\$33,800 ÷ 744 AUMs)

Number of recommended animal units (AU) = 135.3 AU (744 AUM ÷ 5.5 months)

Number of recommended 1,200-pound cows with calves = 118 head (135.3 AU ÷ 1.15 AUE³ - 1,200-pound cow with calf) for 5.5 months

¹ Shown in Figure 1.
² Taken from Table 3.
³ Taken from Table 2.



Renting Using Pasture Quality Factors

(Use for annual forages such as cover crops and crop residue)

Pasture quality factors (PQF) is a method recommended for annual forage and improved pastures. This method commonly is used on improved pastures such as orchard grass and tall fescue in the east-central regions of the U.S. However, it may provide a base price for annual crops and residues in the northern regions.

The PQF method uses current market value for hay price per ton. This hay price is multiplied by the PQF that best describes the pasture type (Table 4). **Note:** The hay price should represent the average price of good-quality grass hay or best representation hay that is equal to the forage type, whichever is larger.

This value then is multiplied by the animal unit equivalent (AUE) for the class and size of livestock grazed (Table 2). The rental rate will be represented by a dollars per AUM rate.

AUM grazing rate formula using PQF:

$$A \times B \times C = \text{Pasture rent per animal unit month}$$

- A = market price per ton of hay
- B = pasture quality factor,
- C = animal unit equivalent (AUE)

For this method, the market value of baled hay and the quality of the pasture are entered into an equation with the appropriate AUE. "A" in the equation is hay market price per ton. "B" is a pasture quality factor. "C" is the AU conversion factor.

This formula works because the renter pays for the forage crop (hay) harvested with livestock as an alternative to machinery. The AUM grazing formula is adapted for forage moisture content, pounds consumed, forage volume within the pasture and plant population.

Example 1

Calculating AUM rental rate for high-quality, lush-growth pasture planted to a cover crop

Market price for equivalent hay is \$140 a ton (**A** = 140)

Pasture quality is lush-growth, cover crop (**B** = 0.22)

Cow/calf pairs (1,200-pound cows - 1.15 AUE) (**C** = 1.15)

$$140 \times 0.22 \times 1.15 = \$35.42/\text{AUM}$$

Example 2

Calculating AUM rental rate for pasture consisting of wheat crop residue with some regrowth

Market price for good-quality hay is \$60 a ton (**A** = 60)

Small-grain residue pasture with some (limited) regrowth (**B** = 0.12)

Cow-calf pairs (1,400-pound cows) (1.29 AUE) (**C** = 1.29)

$$60 \times 0.12 \times 1.29 = \$9.29/\text{AUM}$$

Example 3

Calculating AUM rental rate for very good-quality pasture with some seed heads and green

Market price for equivalent hay is \$100 a ton (**A** = 100)

Very good-quality pasture and green (**B** = 0.20)

Cow-calf pairs (1,400-pound cows) (1.29 AUE) (**C** = 1.29)

$$100 \times 0.20 \times 1.29 = \$25.80/\text{AUM}$$

Table 4. Pasture quality factors and hay type to use for fair market value for determining rental rates by pasture type and quality.

Type of Pasture	PQF ¹	Hay Type to Use for Fair Market Value ²
Lush, green, high-protein pasture, cover crops and new-growth annuals	0.22	Good-quality alfalfa hay (RVF ~ 150)
Very good pasture with limited seed heads; excellent meadows with grass and legumes	0.20	High-quality grass hay or mid-quality alfalfa hay (RVF 100 – 140)
Good pasture, more grass than legumes, plants headed but still green	0.18	Good-quality grass hay (RVF 80 – 100)
Fair to good pasture, dominated by grass in the heading stage	0.15	Good-quality grass hay (RVF 80 – 100)
Unimproved, poor or weedy pasture; small-grain residue with limited but some regrowth	0.12	Good-quality grass hay (RVF 80 – 100)
Cornstalks, small-grain residue with no regrowth	0.10	Good-quality grass hay (RVF 80 – 100)

¹ Hofstrand and Edwards, 2015. Computing a pasture rental rate, Ag Decision Maker File C2-23. Iowa State University, www.extension.iastate.edu/agdm

² Fair market value can be determined through local auctions, advertised rates or contacting your local county Extension agent.

Citations

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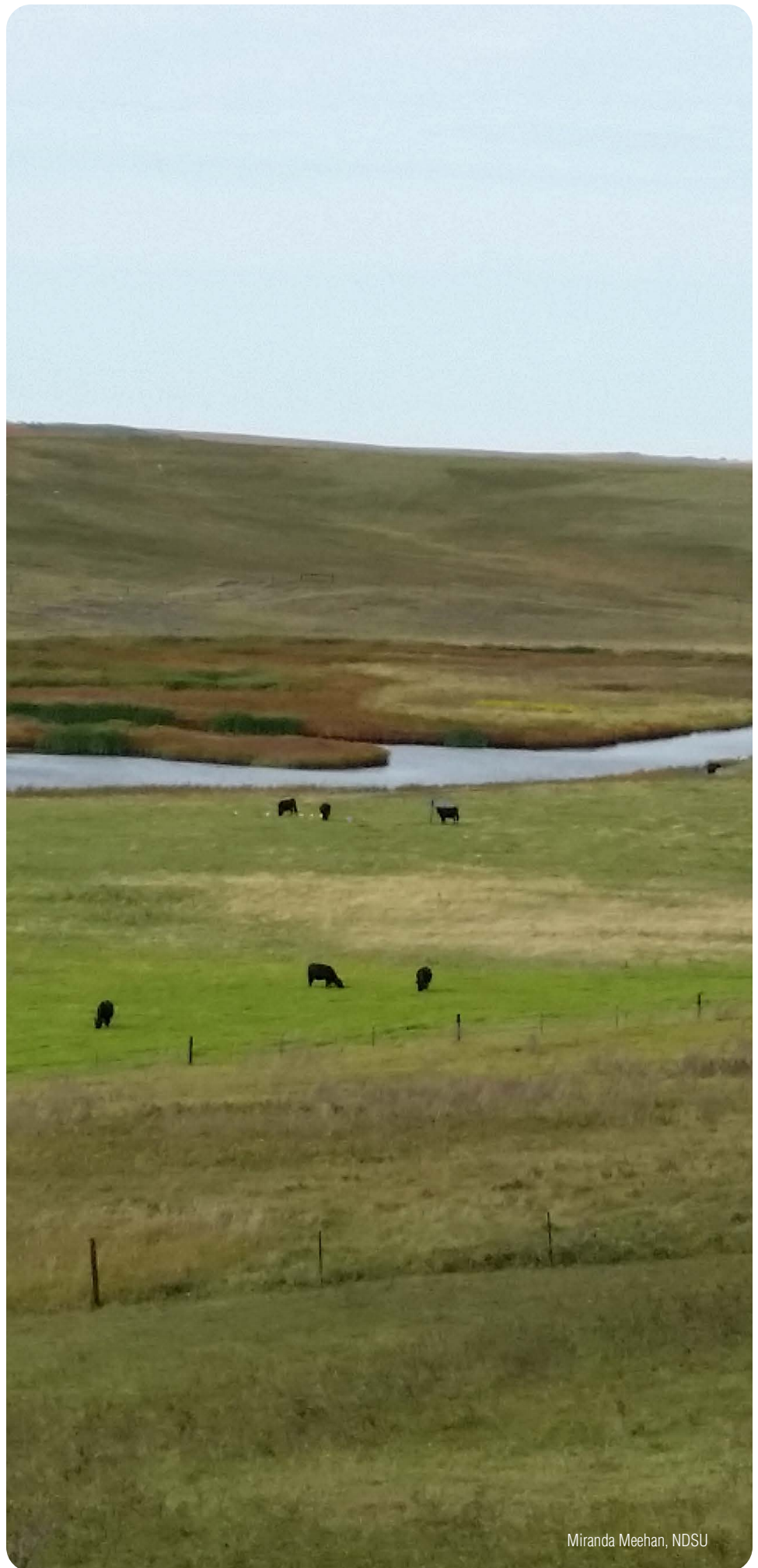
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