

# Using the USDA ARMS to Answer Montana Land Lease Value Questions

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*MSU Extension is a statewide educational outreach network that applies unbiased, research-based university resources to practical needs identified by the people of Montana in their home communities.*

I'm always looking for sources of data to do that research.

- Montana is really big.
- Montana does not have a comprehensive farm management association.
- Montana does not produce enterprise budgets.
- Montana does not participate in FINBIN.
- **Representative data are hard to come by.**
- *So, we can either collect data or we can work with what we've got.*

- Using weights, ARMS is representative at the state level, for certain states—not Montana (?)
- Otherwise representative at the regional level. ERS Farm Resource Regions
- Questions asked and variable names change over time.
- Dealing with outliers is a big part of dealing with the ARMS.
  - **Example:** Minimum per acre revenue is \$0.10; maximum is over \$300,000. What should be done with these observations?
- Access can be a challenge from the road.

# What we've got has problems, pt. 2: Weighting and representation

- What if we use Montana-only data anyway?
  - 1,057 Montana operations meet our usability criteria over 2003–2014.
  - 577 crop, 480 livestock operations.
- To look at Montana alone, is it better to weight or not weight?
  - Mixed opinions in the literature (Stutzman 2015)
  - Is the distribution of types of Montana operations different from that of the region(s)?

- But, we have a number of years (2003-onward).
- Data are quite detailed.
- Data can be used to construct budgets and benchmarks otherwise lacking.
- We don't have much else.

## **Two main questions:**

Why are lease rates so low?

Why are lease rates so high?

## Data: USDA ARMS Dataset 2003–2014

- Revenue and costs
- Cropping district
- Farm type: crops and livestock
- Farm size
- Crop insurance and subsidy payments
- Farm finance indicators, such as debt:asset ratios
- Operator age
- Urban vs rural



## Regression Results: Effect on Land Rental Rates

	USA	Montana
Revenue	+	+
Variable Costs	+	+
Subsidy	+	+
Livestock	-	-
Rural	-	
N	108,342	1,057
R <sup>2</sup>	0.68	0.62

## **Revenue:**

A 1% increase in revenue is associated with a 0.33% increase in rental rate.

## **Subsidy:**

A 1% increase in subsidy is associated with a 0.20% increase in rental rate.

## **Pasture vs Cropland:**

Livestock operations are associated with a 42% lower rental rate.

## **Development potential:**

Crop districts with rapid development see a premium relative to baseline=Golden Triangle.

- CD 10 (Flathead region): 28% higher
- CD 70 (Gallatin Valley): 112% higher

- Are results sensitive to weighting? Not really.
- Are results sensitive to how region is defined? Sort of.
- Omitted variable bias?
  - Management ability
  - Soil/productivity information
  - Irrigation
  - Probably other things as well

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[msuextension.org/aglease](https://msuextension.org/aglease)

## Farm Resource Regions

### Basin and Range

- Largest share of nonfamily farms, smallest share of U.S. cropland.
- 4% of farms, 4% of value of production, 4% of cropland.
- Cattle, wheat, and sorghum farms.

### Fruitful Rim

- Largest share of large and very large family farms and nonfamily farms.
- 10% of farms, 22% of production value, 8% of cropland.
- Fruit, vegetable, nursery, and cotton farms.

### Northern Great Plains

- Largest farms and smallest population.
- 5% of farms, 6% of production value, 17% of cropland.
- Wheat, cattle, sheep farms.

### Heartland

- Most farms (22%), highest value of production (23%), and most cropland (27%).
- Cash grain and cattle farms.

### Northern Crescent

- Most populous region.
- 15% of farms, 15% of value of production, 9% of cropland.
- Dairy, general crop, and cash grain farms.

### Eastern Uplands

- Most small farms of any region.
- 15% of farms, 5% of production value, and 6% of cropland.
- Part-time cattle, tobacco, and poultry farms.

### Southern Seaboard

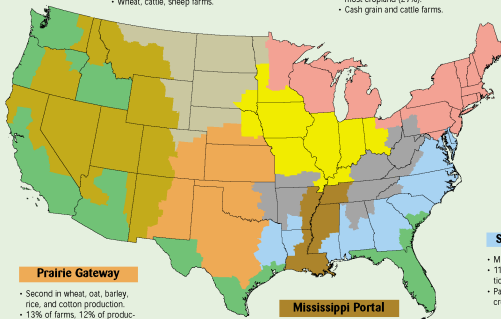
- Mix of small and larger farms.
- 11% of farms, 9% of production value, 6% of cropland.
- Part-time cattle, general field crop, and poultry farms.

### Prairie Gateway

- Second in wheat, oat, barley, rice, and cotton production.
- 13% of farms, 12% of production value, 17% of cropland.
- Cattle, wheat, sorghum, cotton, and rice farms.

### Mississippi Portal

- Higher proportions of both small and larger farms than elsewhere.
- 5% of farms, 4% of value, 5% of cropland.
- Cotton, rice, poultry, and hog farms.



Electronic files linking counties to the Farm Resource Regions are online at the [ERS home page](#).

For more information about ERS publications and data, see our [home page](#).