College of Agricultural & Life Sciences
UNIVERSITY OF WISCONSIN-MADISON
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UW Extension

THE CERES TRUST

U.S. Dairy Forage Research Center

Maximizing Milk Production on Wisconsin Pastures: Lessons from the Paddock

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Organic Dairy

- 6 billion dollar industry in 2015
  - Wisconsin has over 25% of national organic dairies
- Limited land for expansion in Wisconsin
- Pasture Rule

Objective

- Determine the state of organic dairy pastures
- Evaluate factors associated with potential milk production
  - plant
  - soil
  - management

Intention

- Use this information to **prioritize** pasture or grazing management to improve productivity.

Sites

- 20 sites
  - 2013-14
- Visited within 3 days of a grazing event
  - June
  - September

Farmers Selected Pastures

Based on their perceptions of productivity (Acceptable/Unacceptable)

Productive

Unproductive

20 farms * 2 paddocks = 40 paddocks total visited

Pasture Measurements

- Biomass (lbs/ac)
  - Rising plate meter
- Cover classes (point transects)
  - Improved Grass (%)
  - Improved Legume (%)
  - Weeds (%)
  - Unimproved Grass (%)
  - Unimproved Legume (%)
- Nutritive value (NDF, NDFD)
  - NIRS

Soil Measurements (0-15 cm)

Soil Fertility

- Macronutrients
- Micronutrients
- Organic matter
- pH

Also included…

- Soil type info
  - Slope, Yield Potential, Drainage Class
- Solvita (soil respiration indicator)

Management Variables

1. Pasture inputs and renovation

1. Pasture management

1. Animal management

Paddock Measurements

Variable	Average	Range
Available Forage (lbs/ac)	940	39-2925
Cover of Improved grasses (%)	47	0-98
Cover of Improved legume (%)	33	0-100
Cover of weeds (%)	31	0-92
Cover of unimproved grasses (%)	55	0-100
Cover of unimproved legumes (%)	20	0-96

Soil Fertility

Characteristic	Average	% Below Rec. Range
Macronutrients		
Calcium	1896 ppm	0
Magnesium	404 ppm	0
Phosphorus	46 ppm	20
Potassium	215 ppm	23
Micronutrients		
Boron	0.72 ppm	76
Manganese	10.9 ppm	53
Zinc	5.0 ppm	57
Other		
pH	6.8	9
Organic Matter	4.1	NA

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Other		
pH	6.8	9
Organic Matter	4.1	NA

Grazing Management

Variable	Average	Range
MIRG experience (years)	11	2-26
Annual grazing events (#)	5.5	3-17
Turn in height (inches)	13	4-30
Residual height (inches)	9	1-7
Rest period (days)	28	7-52
Start date	4/26	4/1 to 5/15
End date	10/25	9/30 to 11/25


Milk Production

How We Determined Potential Milk Production/Acre

Milk Model

- Included forage quantity (biomass)
- Nutritive value (NDF, NDFD)

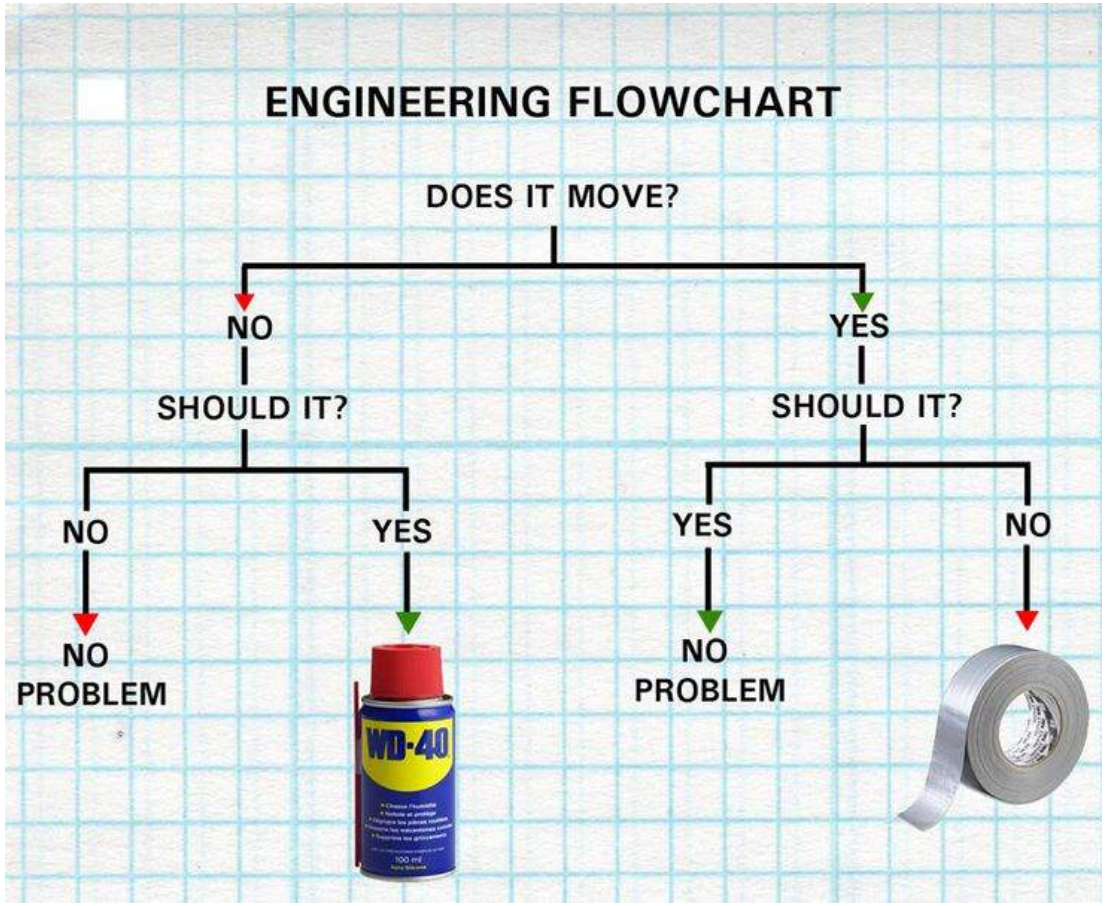
- Model result: lbs 3.5% fat corrected milk/acre of pasture

Regression Tree Analysis

- Allows for use of **categorical** and **numerical** non-normal data

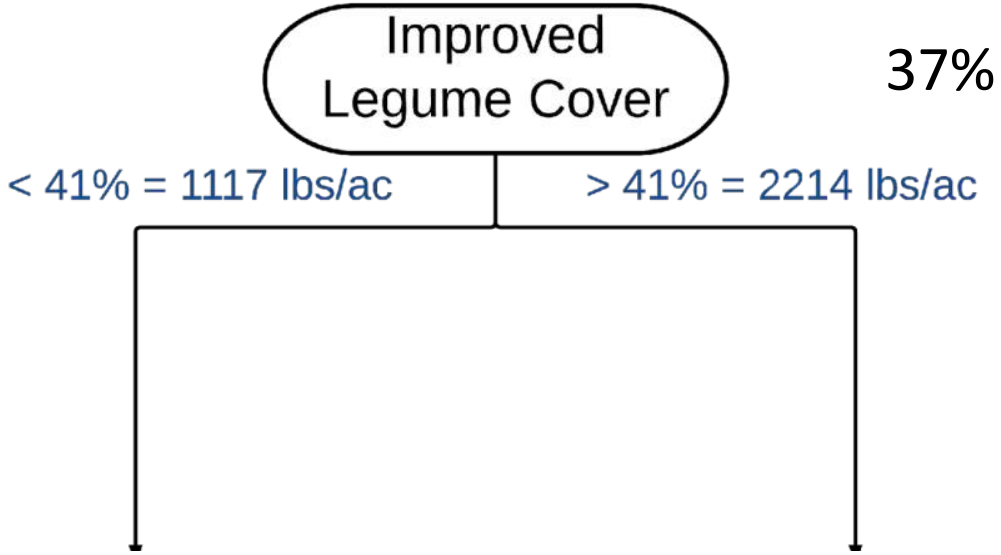
- Predictor variables are repeatedly selected that minimize data variability of potential milk production
  - **32 predictor variables possible**

Regression Tree Analysis



June Results

June



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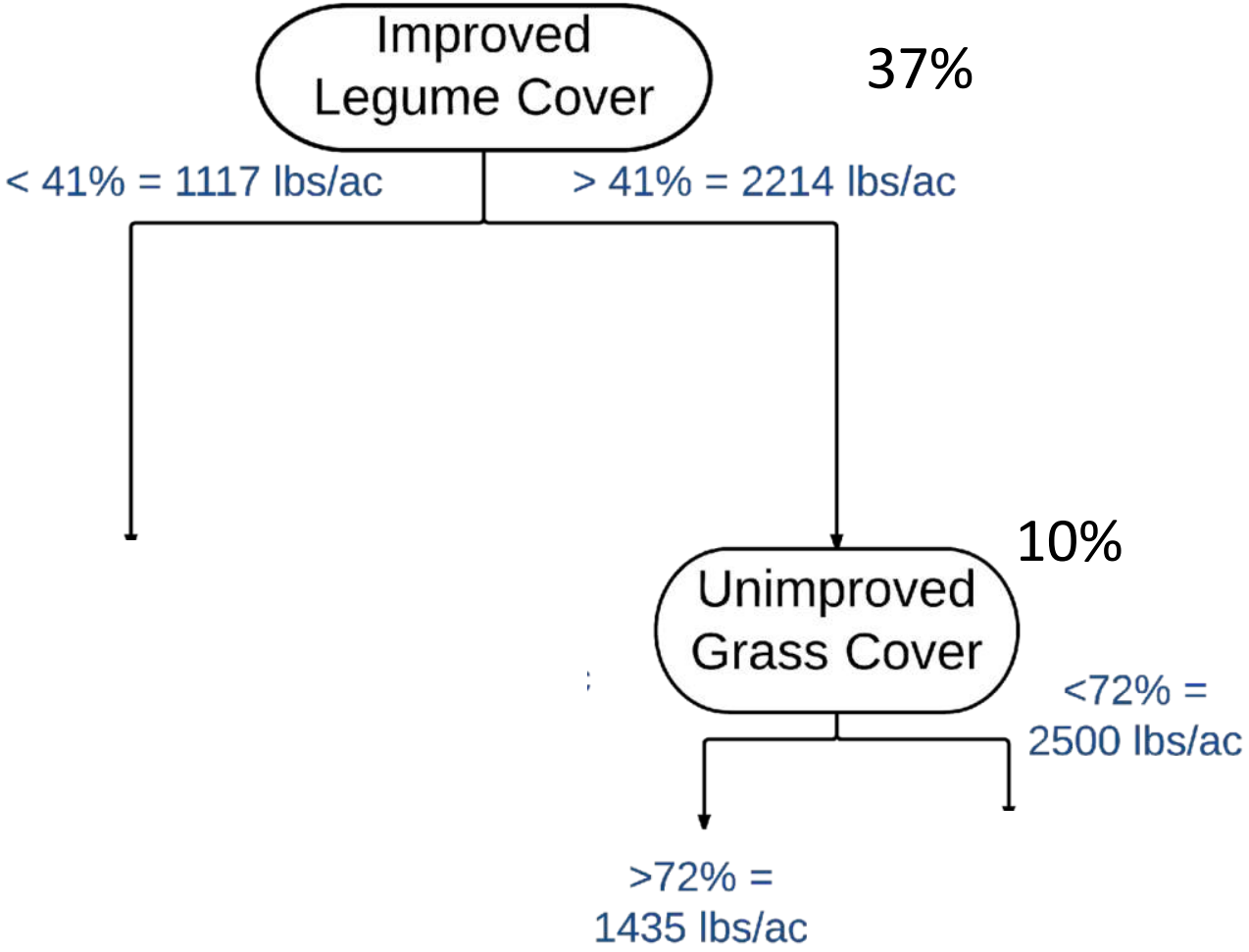
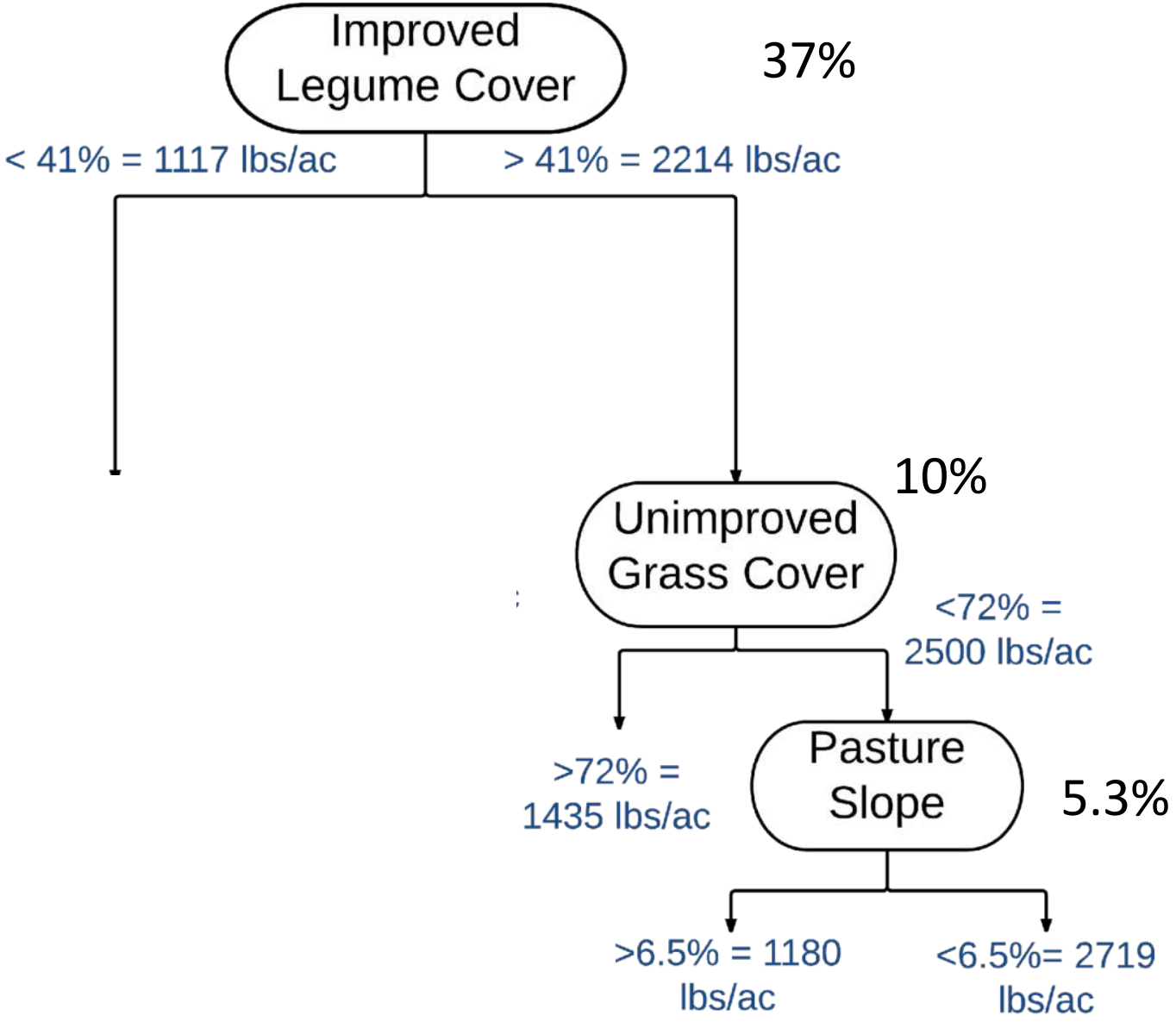

Improved Legume Cover
37%
< 41% = 1117 lbs/ac
> 41% = 2214 lbs/ac
10%
Unimproved Grass Cover
<72% = 2500 lbs/ac
>72% = 1435 lbs/ac

June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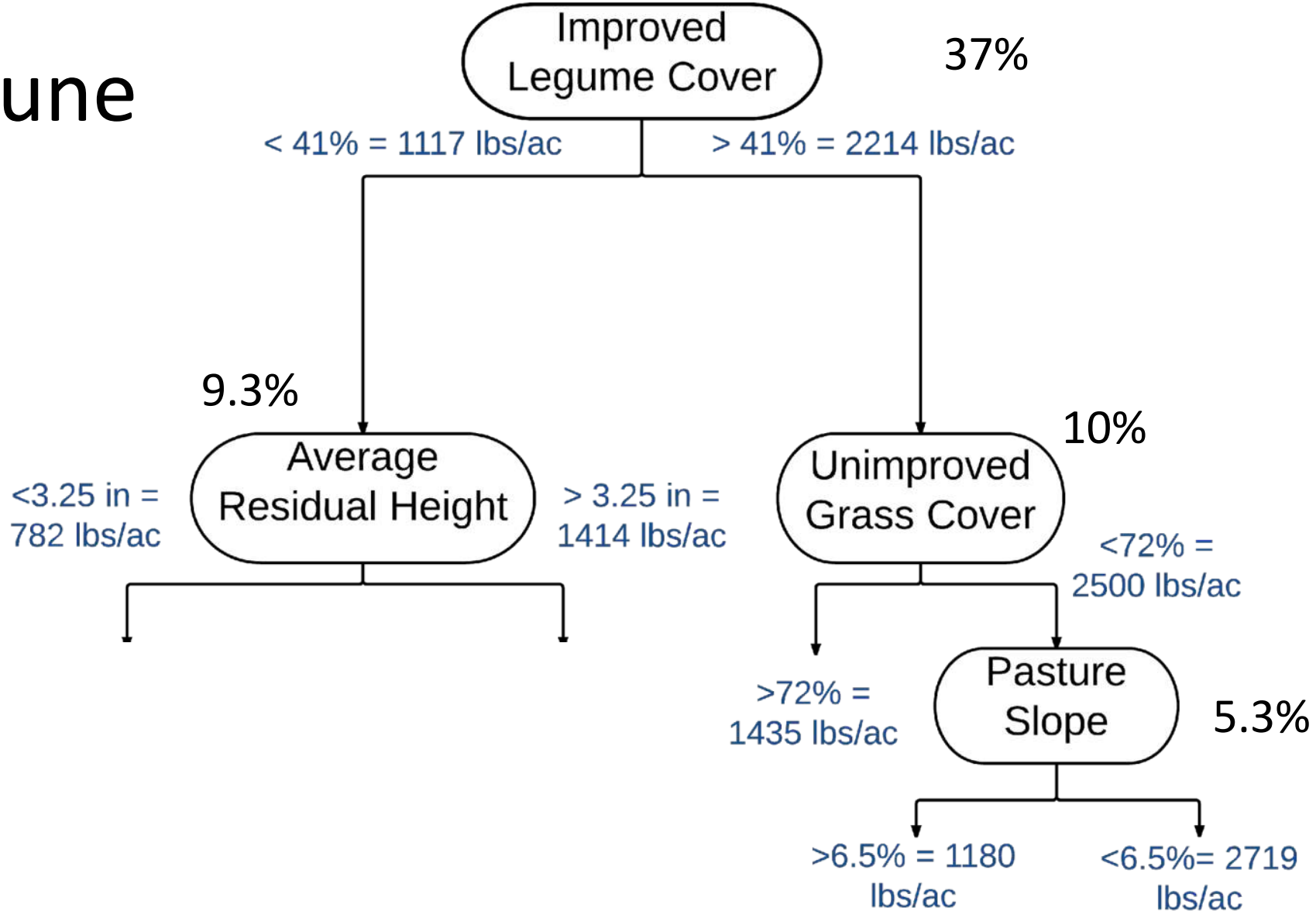
Pasture Slope
5.3%
>6.5% = 1180 lbs/ac
<6.5%= 2719 lbs/ac

June


Improved Legume Cover
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> 41% = 2214 lbs/ac
9.3%
Average Residual Height
<3.25 in = 782 lbs/ac
> 3.25 in = 1414 lbs/ac
10%
Unimproved Grass Cover
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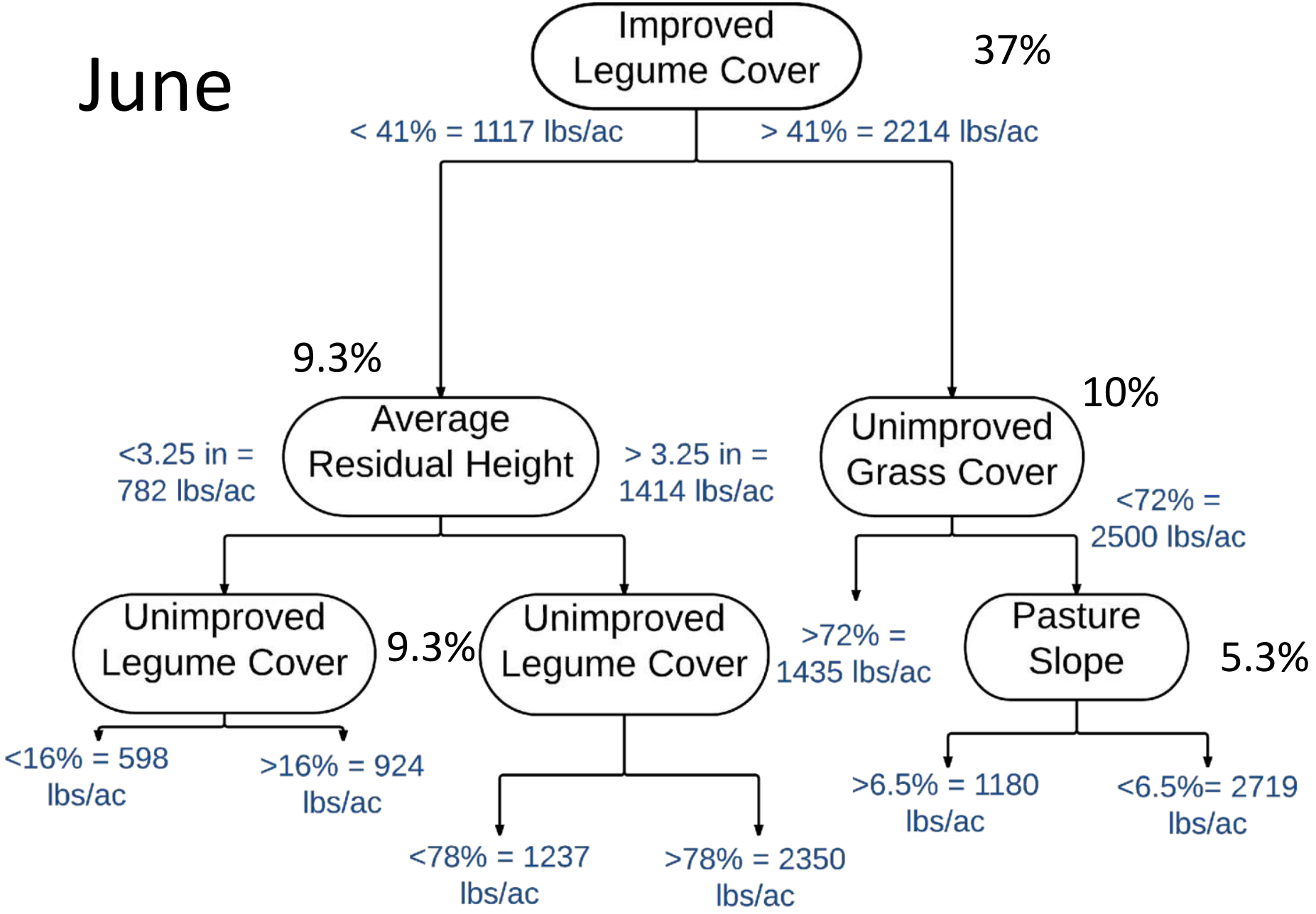
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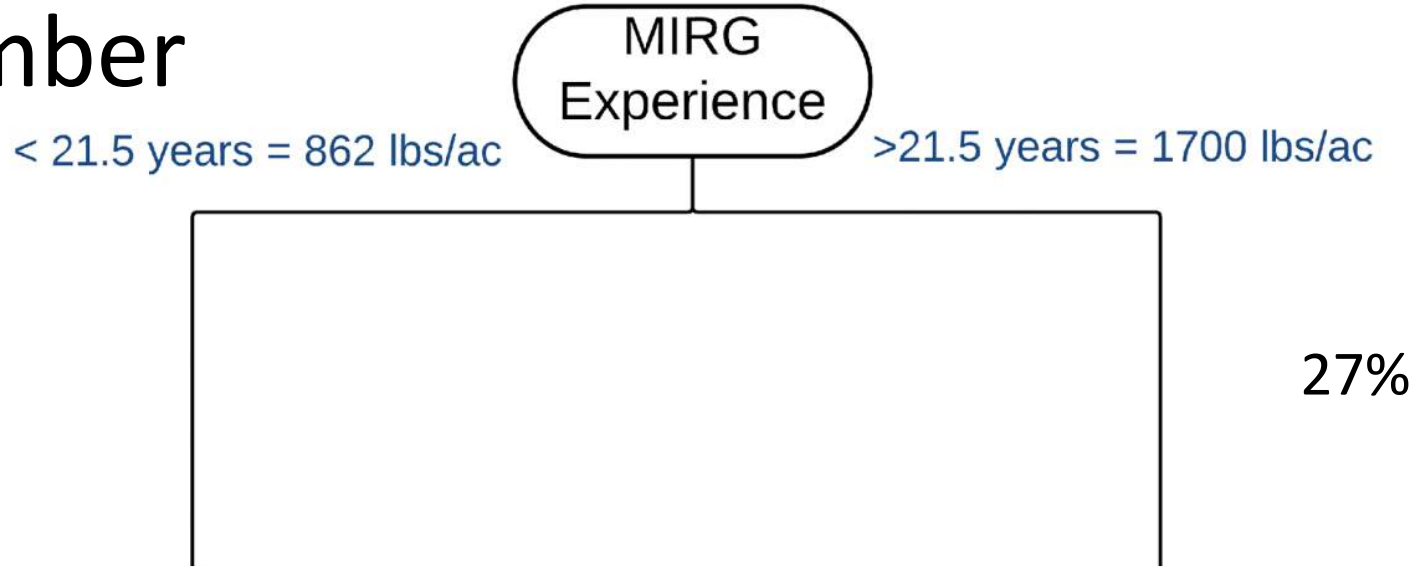
Unimproved Legume Cover
9.3%
Unimproved Legume Cover
Pasture Slope
5.3%
<16% = 598 lbs/ac
>16% = 924 lbs/ac
<78% = 1237 lbs/ac
>78% = 2350 lbs/ac
>6.5% = 1180 lbs/ac
<6.5%= 2719 lbs/ac

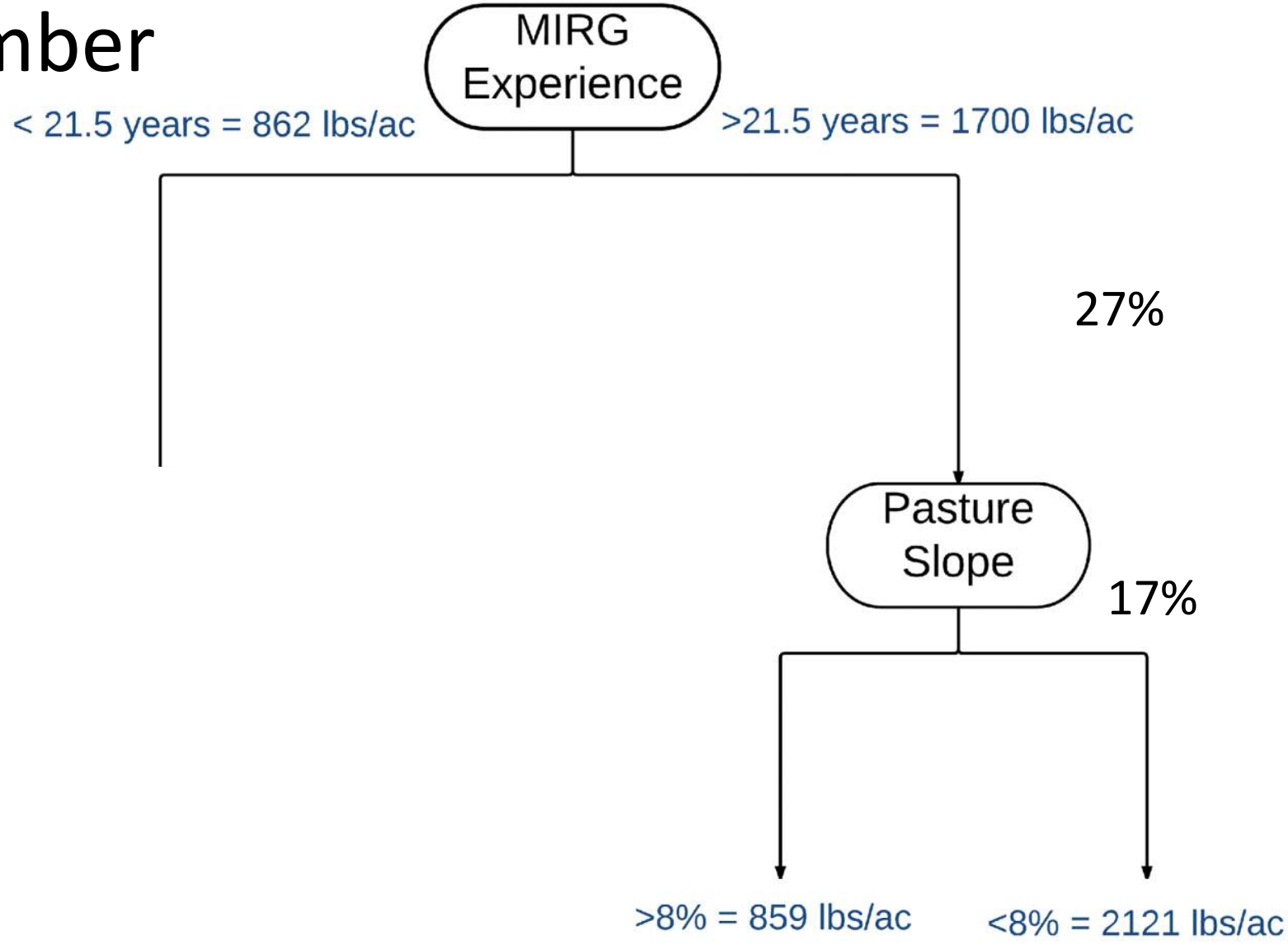
September Results

September

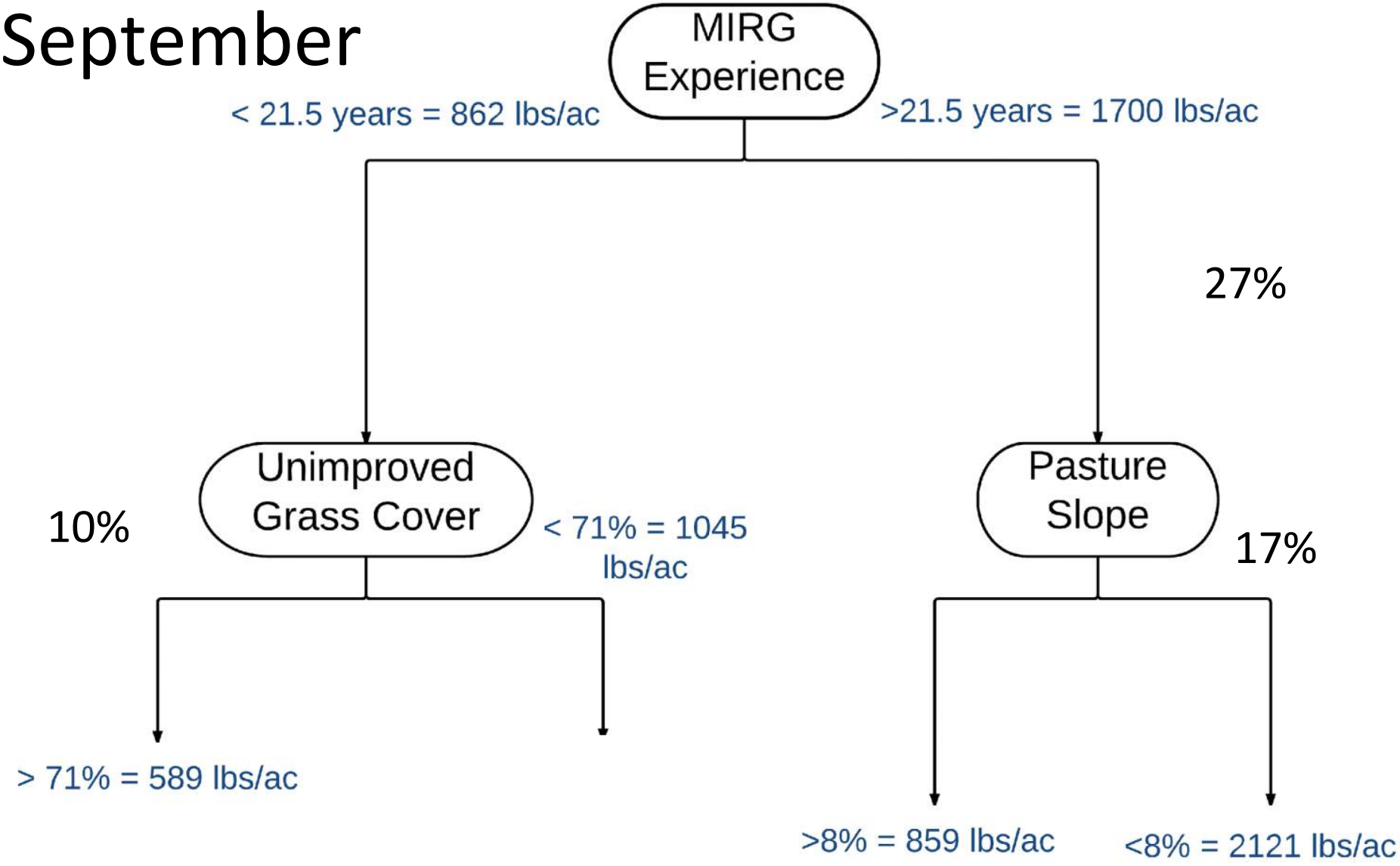


27%

September


MIRG Experience
< 21.5 years = 862 lbs/ac
>21.5 years = 1700 lbs/ac
27%
Pasture Slope
17%
>8% = 859 lbs/ac
<8% = 2121 lbs/ac

September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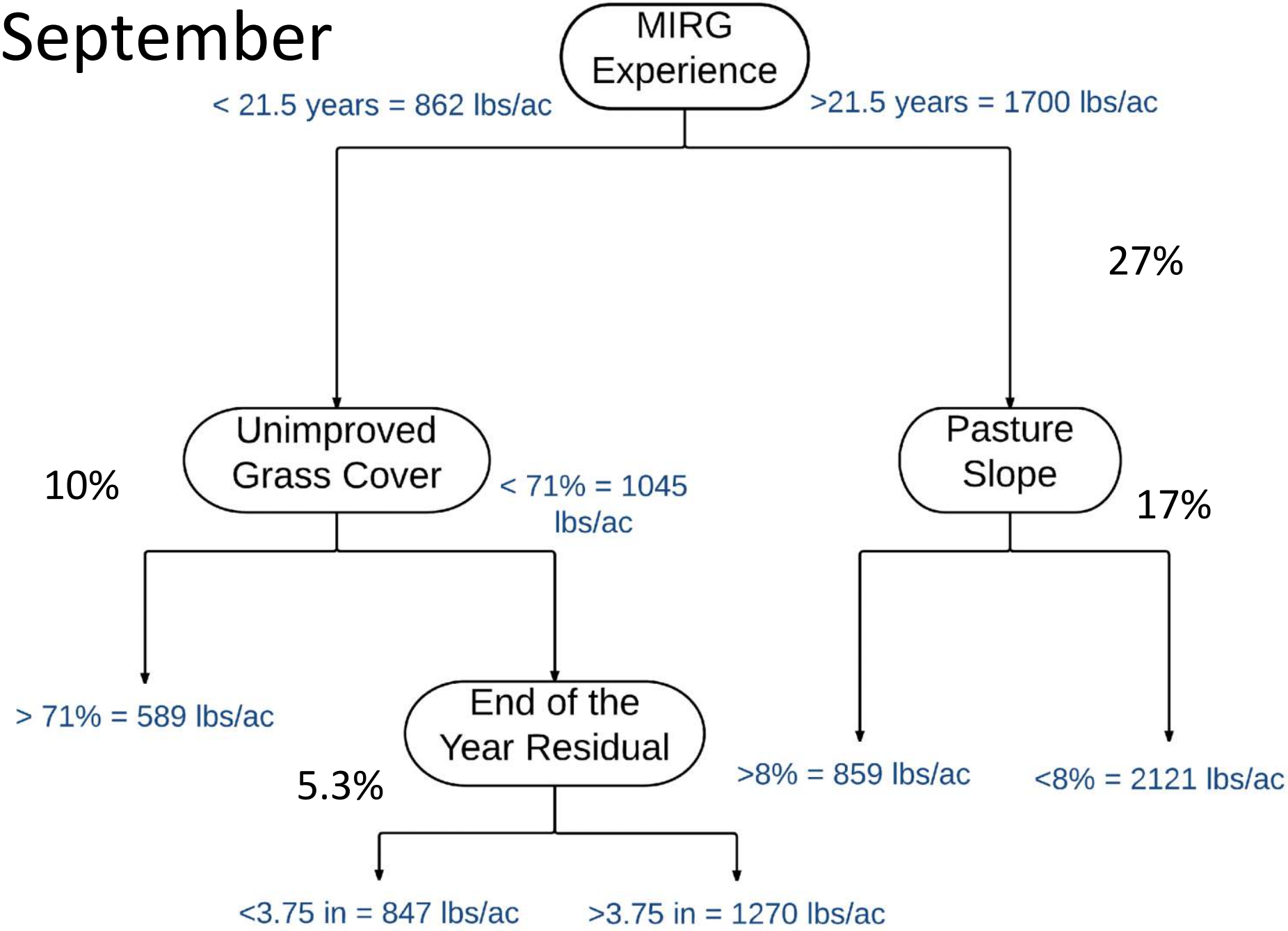
27%
Unimproved Grass Cover
10%
< 71% = 1045 lbs/ac
Pasture Slope
17%
> 71% = 589 lbs/ac
>8% = 859 lbs/ac
<8% = 2121 lbs/ac

September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Pasture Slope
17%
> 71% = 589 lbs/ac
End of the Year Residual
5.3%
>8% = 859 lbs/ac
<8% = 2121 lbs/ac
<3.75 in = 847 lbs/ac
>3.75 in = 1270 lbs/ac

Conclusions

1. Improved legumes are important
   - 40% cover increased milk production over 1000 lbs/ac in June

2. Residual height
   - Leaving 3 to 4 inches increased milk production over 425 lbs/ac in June and September

3. Unimproved grasses reduce production
   - If below 70% cover, increased milk production over 75% in June and September

What factors were not important?

- Soil fertility and health
- Weed populations

Overall Conclusions

- Improvements can be made on organic dairy pastures
- Management is key!

Questions?

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Legume Cover

59% of pastures had <30% cover of improved legumes (recommended)

≠

81% of producers renovated pastures

Legume Establishment

- Graze or clip pasture low the winter before
- Drill seed in early spring
- Maintain adequate residual height once legumes planted