Research Updates

Dr. Heather Darby

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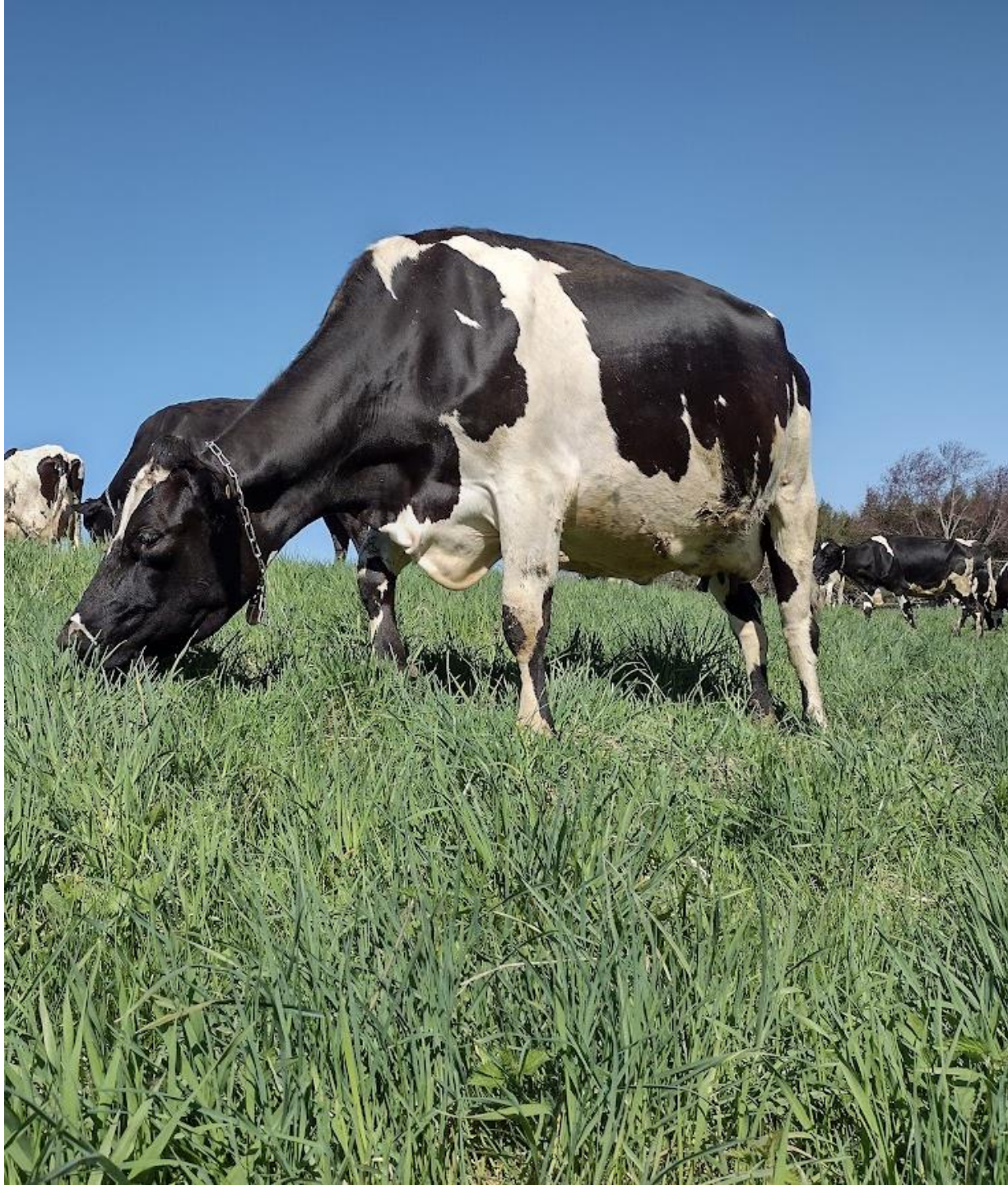
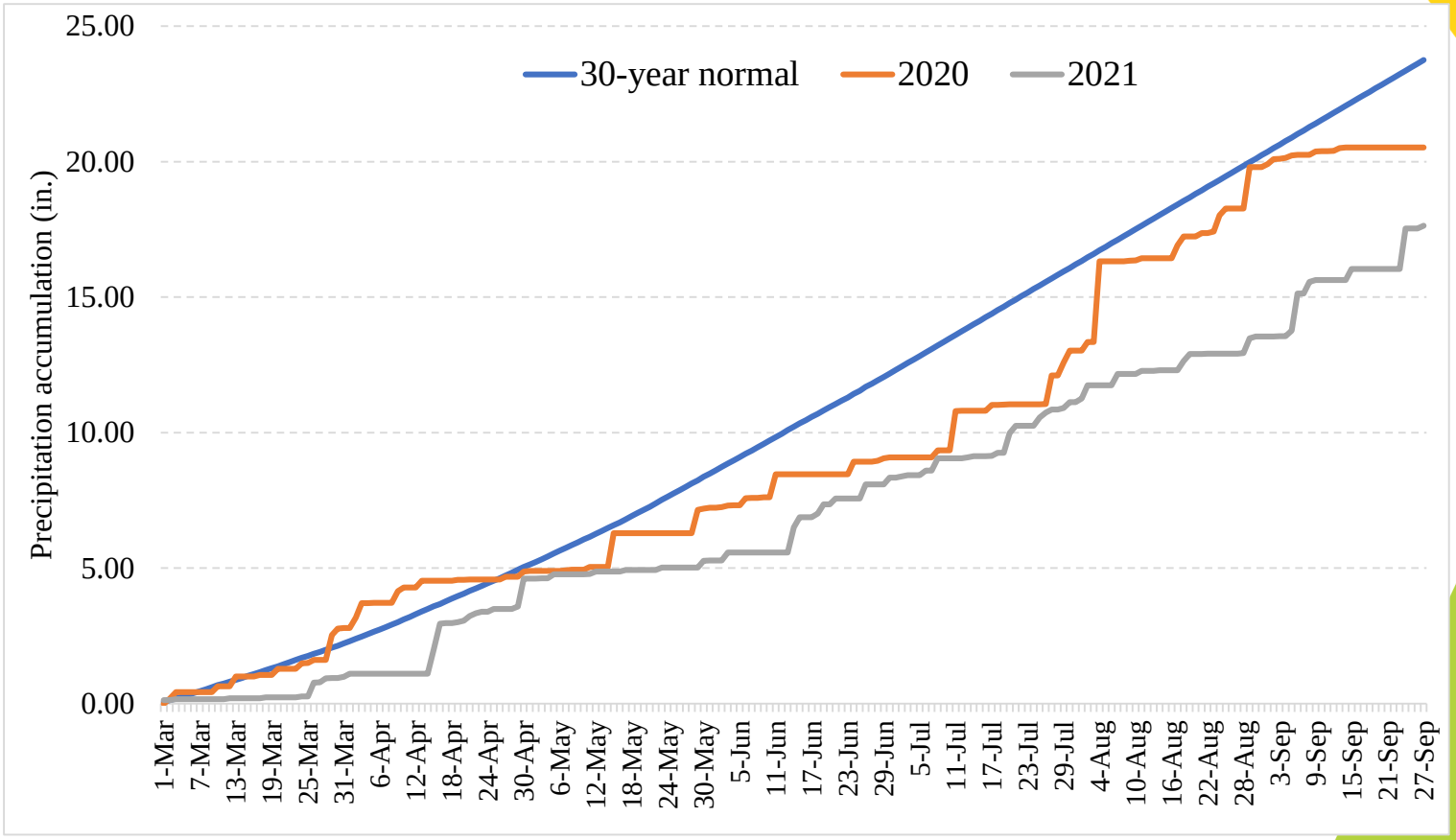


The University of Vermont

Weather: Less consistent rainfall and extended periods of drought



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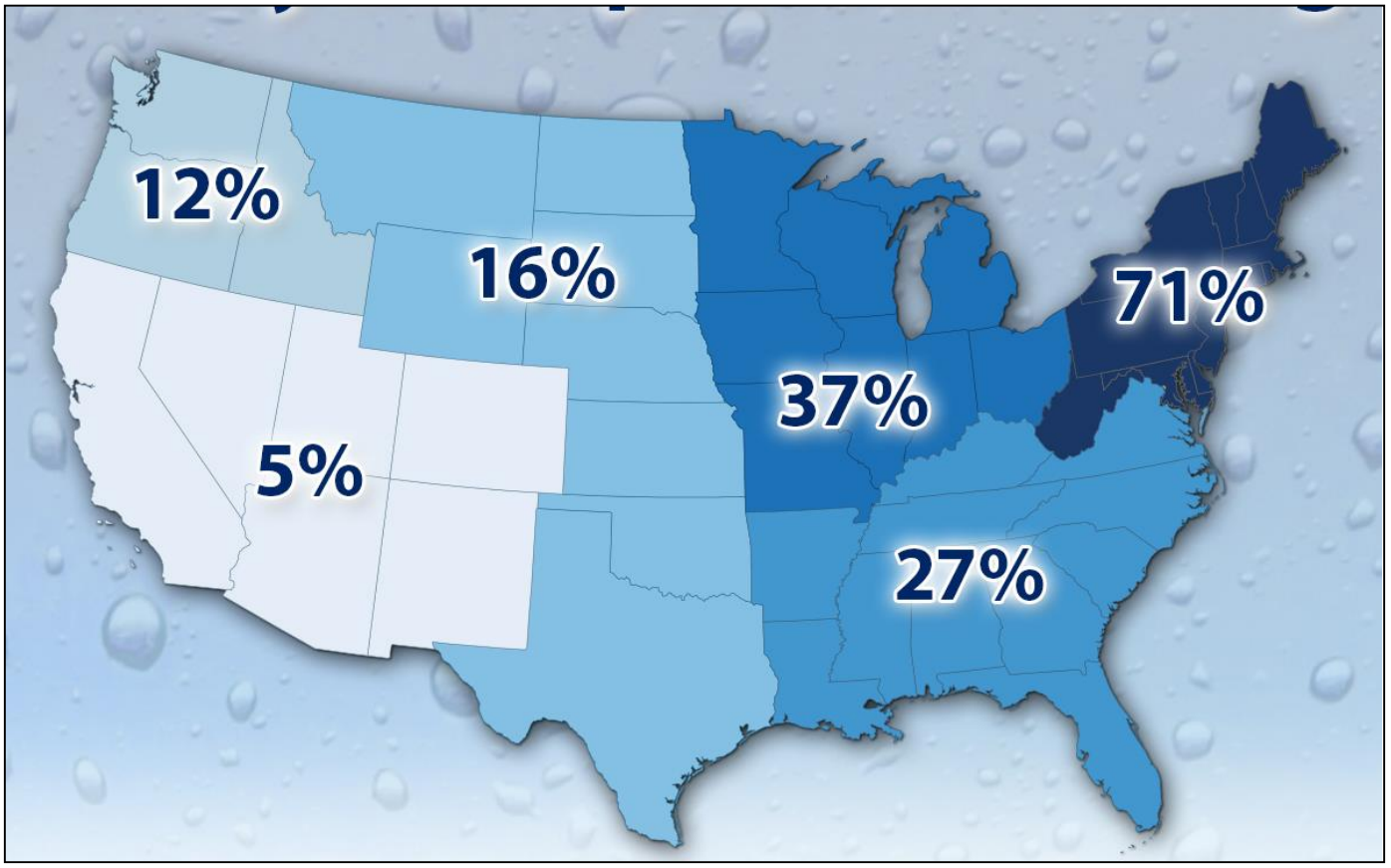
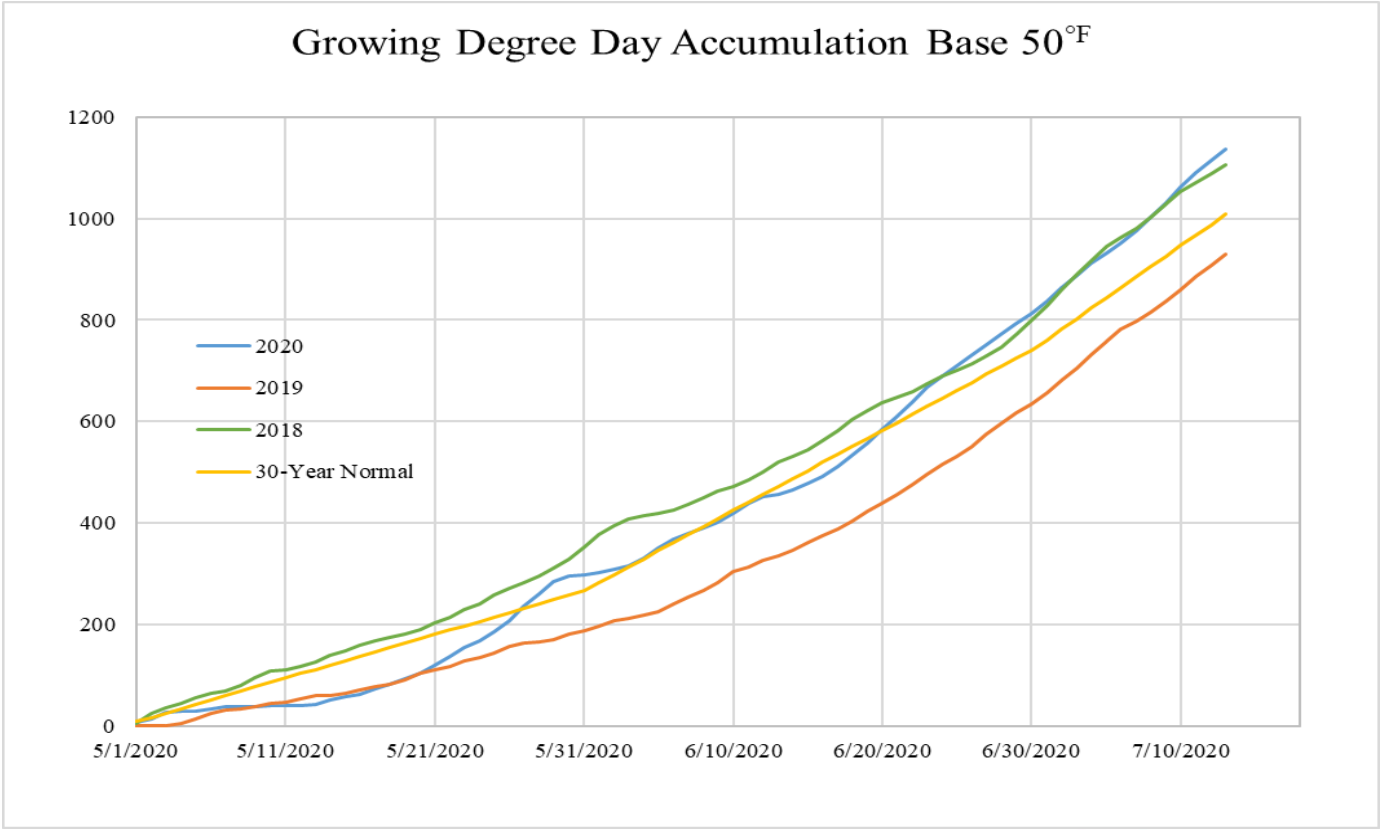
Trends in Extreme Precipitation



Increase in the number of 2” rainfalls per year from 1958 to 2011

Growing Degree Day Accumulation 1-May to 13-July, Alburgh VT,



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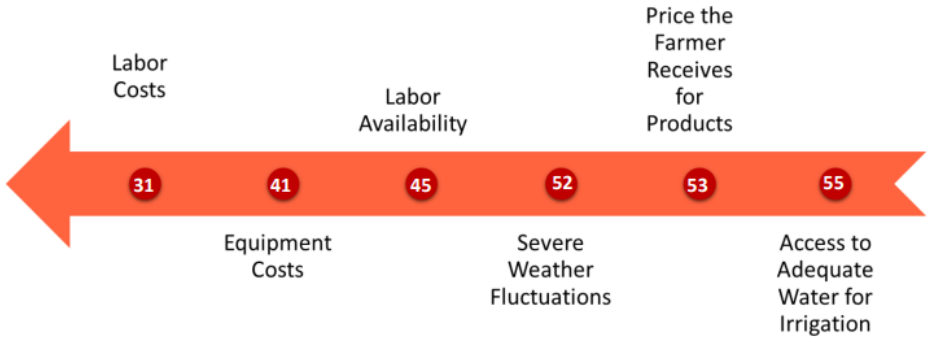
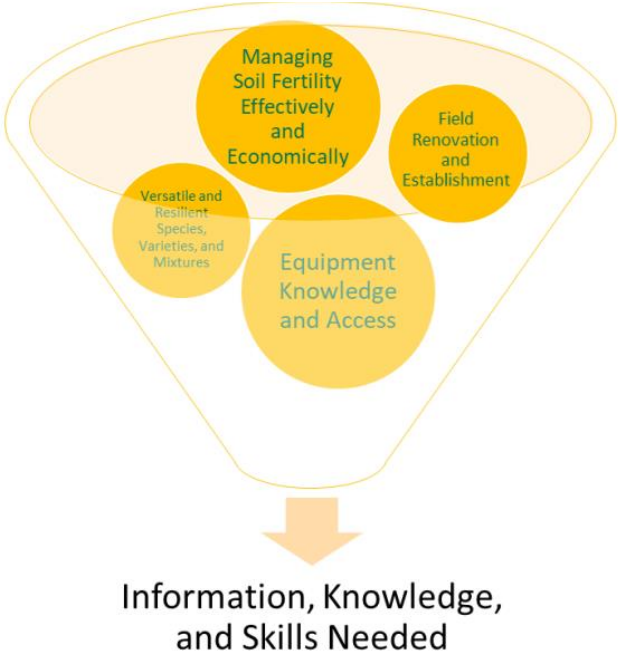
Managing Forages on Organic Dairy Farms – National Survey

% of farmers reporting these factors as somewhat or significantly limiting their forage operations



<u>In response to adverse weather…</u>

- 46% increase purchased feed
- 36% increased purchased grain
- 47% increase irrigation use
- 43% increase acreage in grazing system



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Topics needed and of interest to organic forage producers

Climate Change Resilience

- Heat tolerance
- Water use efficiency
- Nutrient use efficiency
- Pest and disease resistance
- Regional/local adaptation
- Diversity
- Drought and heat resistant varieties
- Factors affecting winter survival
- Carbon sequestration
- Soil biology's connection to productivity and quality

Forage Quality

- Fiber digestibility
- Energy
- Harvest timing
- Storage and inventory management
- Nutrient management
- Diversity
- Sugar content and types
- Mineral content
- Milk yield per ton of forage
- NDF absorption vs butterfat
- Non-starch carbohydrates
- Pectin

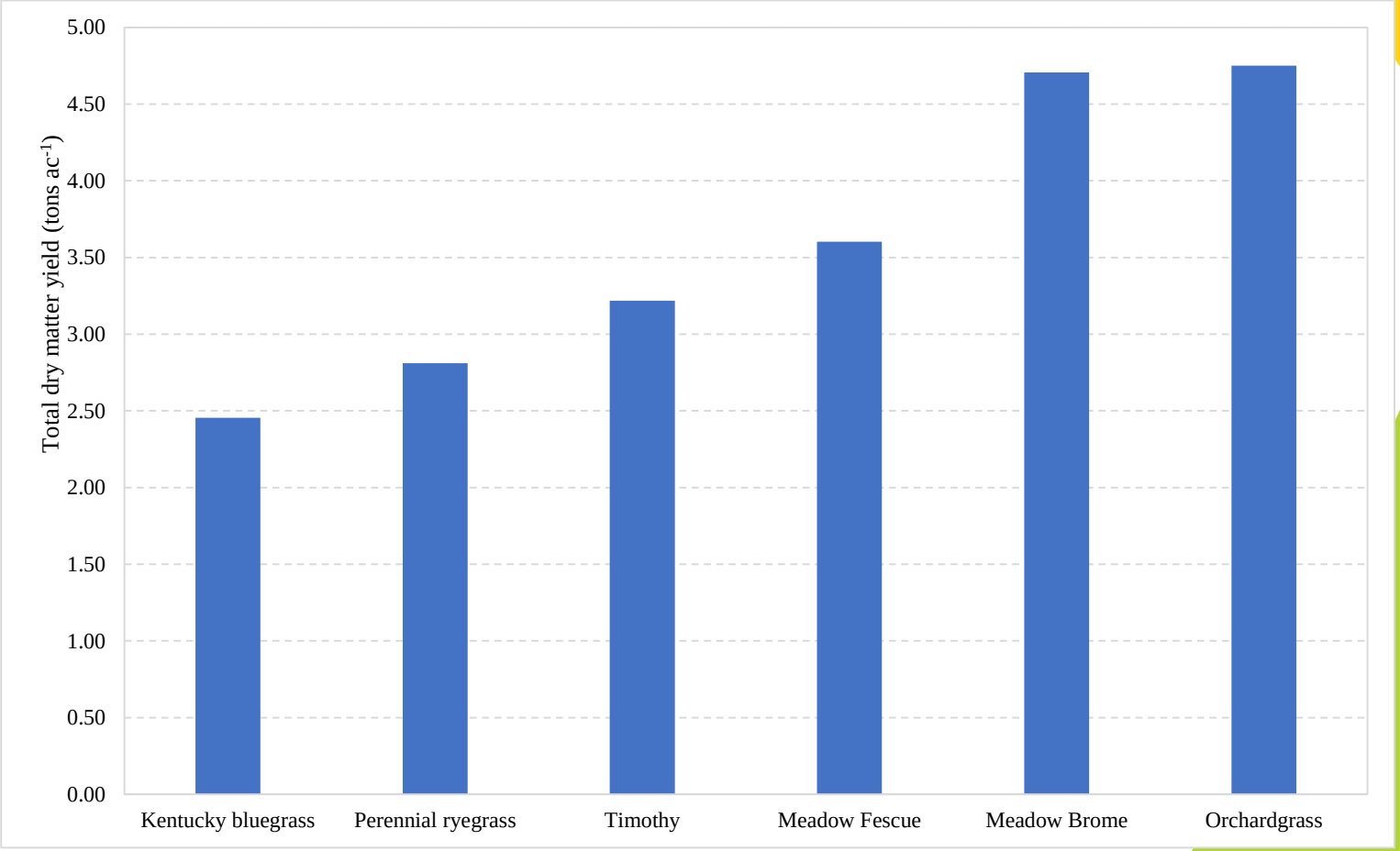
Mixtures and Varieties

- Legumes for grazing
- Persistent perennial ryegrass
- Late maturity
- Male sterile corn
- New mixtures

Economics

- Return from soil fertility and health
- Return from pasture renovation

Perennial Grass Species Yields 2020-2022



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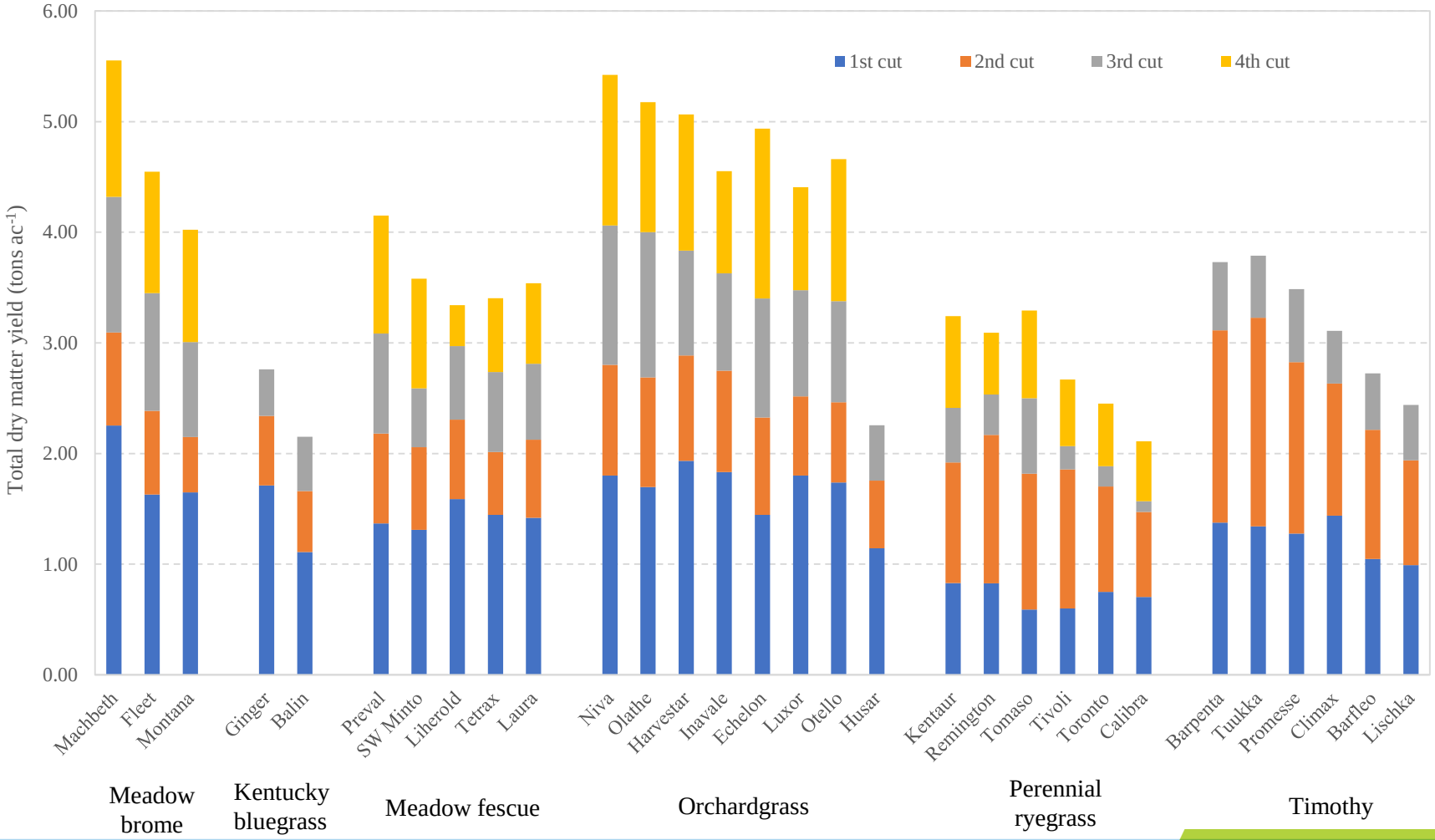

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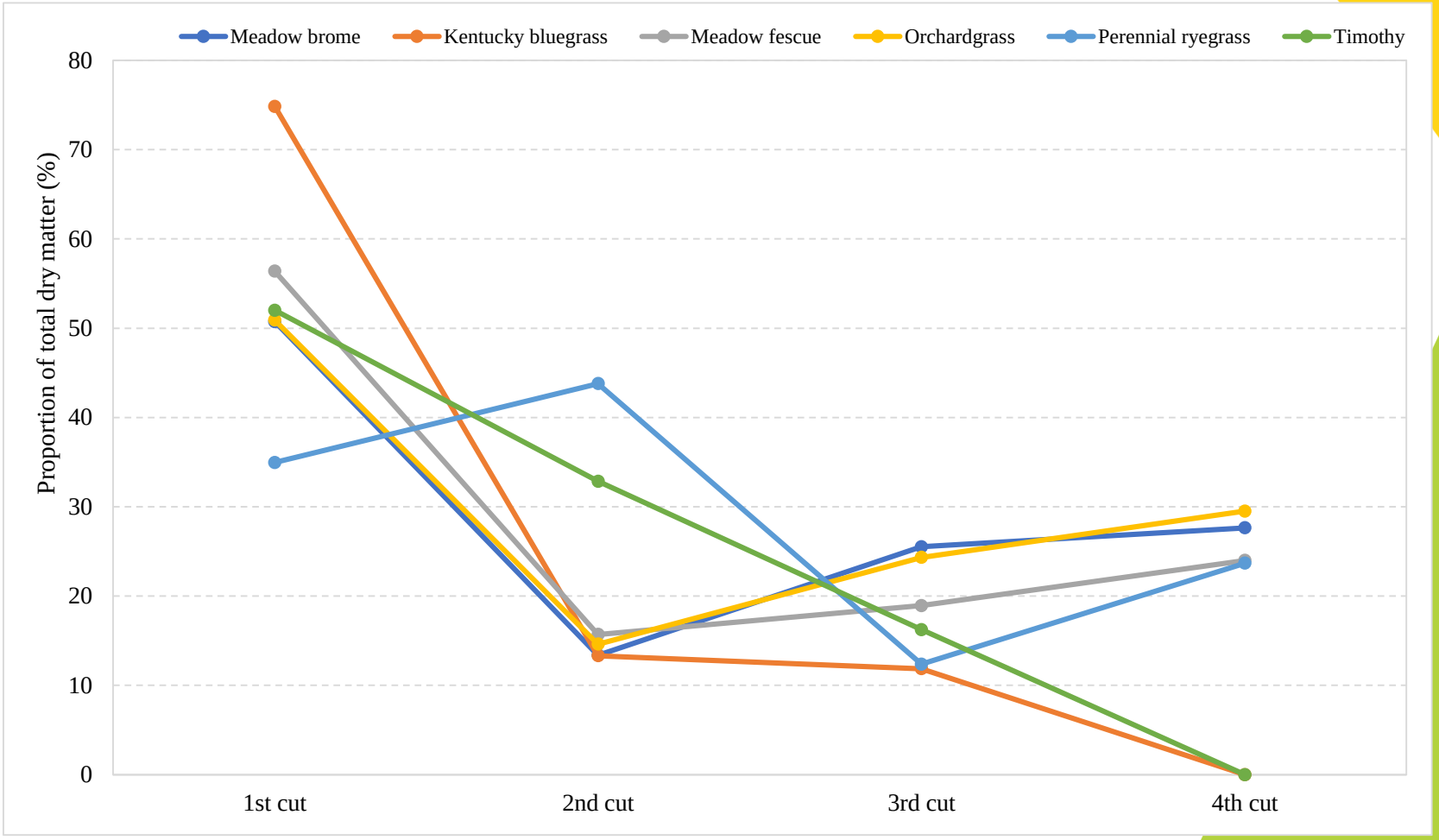
Perennial Grass Species Yields- 2020



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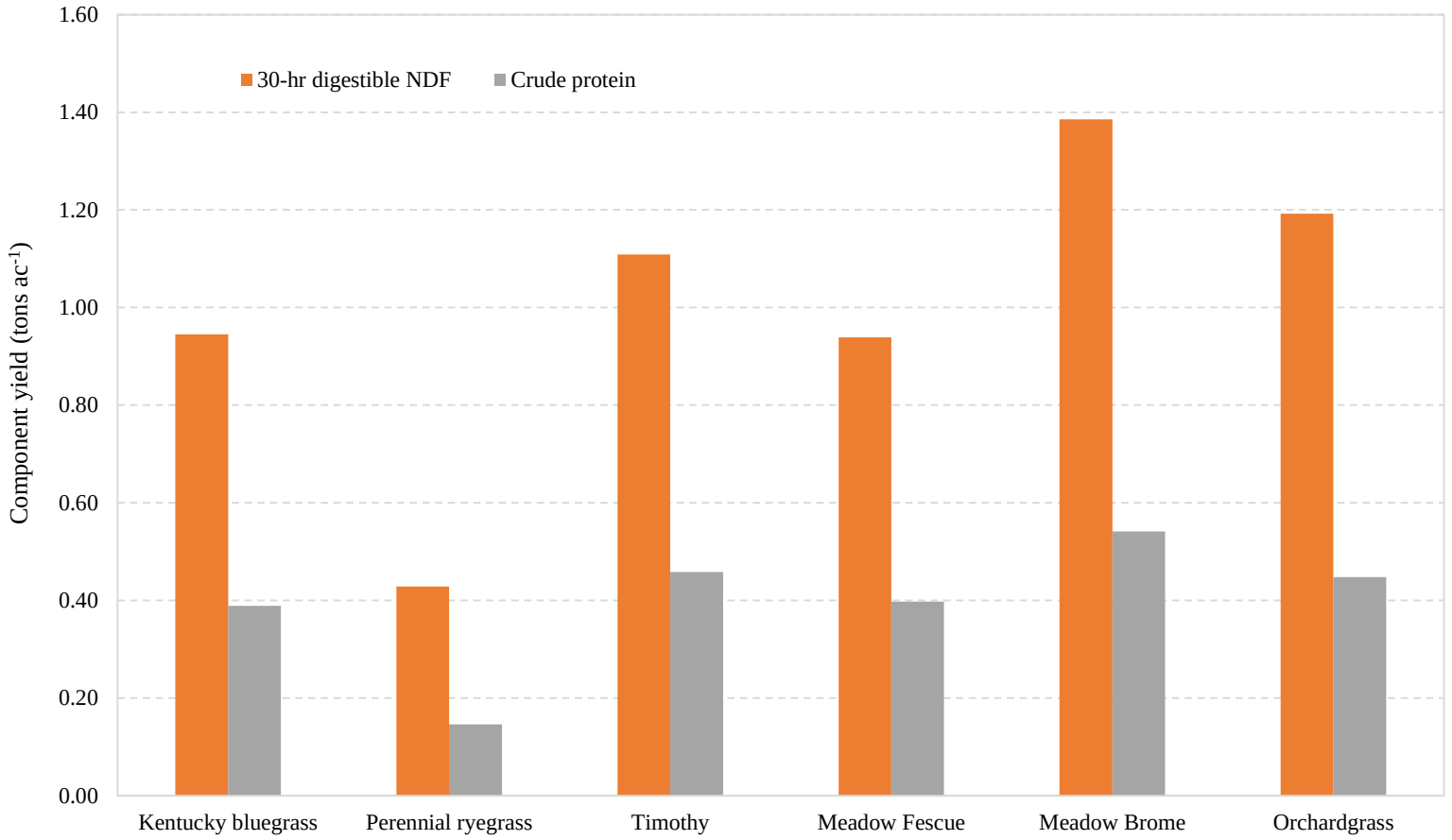
Yield and Quality, 2021



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Timely 1st cut = maximum quality

Vegetative Jointing Boot Early head Full head

Fiber content

Fiber digestibility

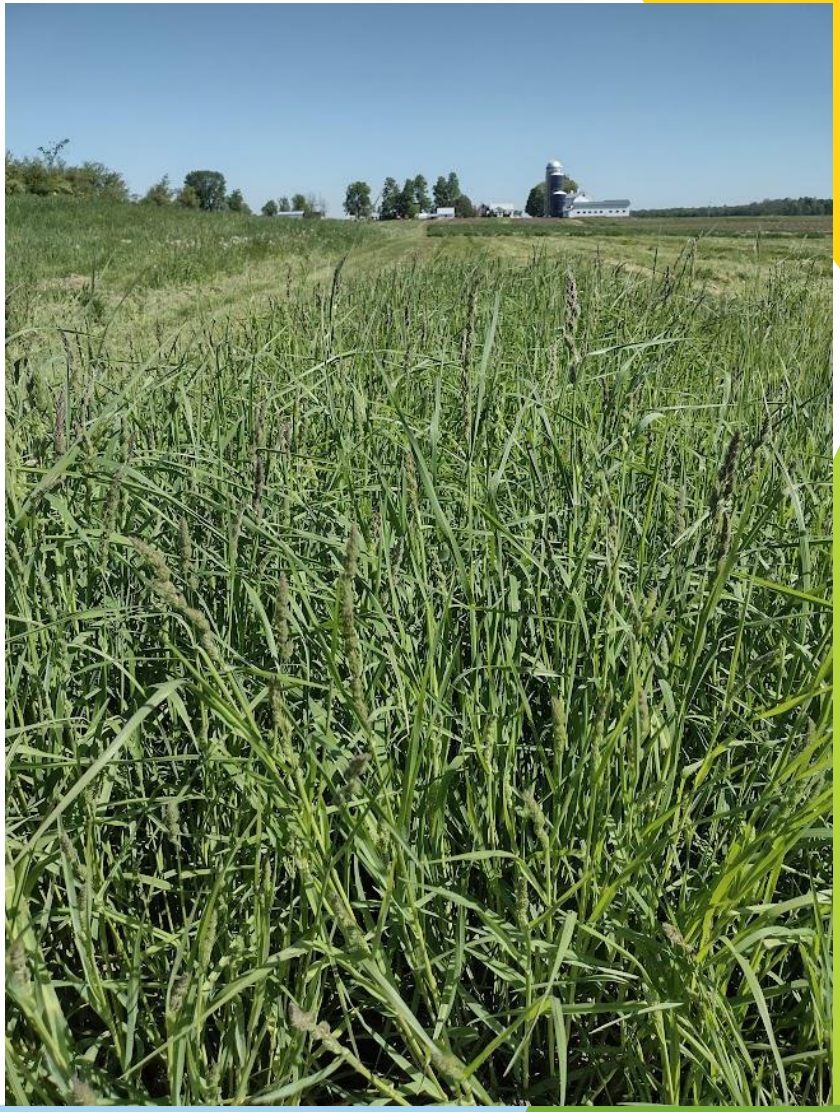
CP and sugar content

Kentucky bluegrass	
Balin Ginger	21-May

Orchardgrass	
Otello	23-May
Olathe	25-May
Harvestar Luxor Niva	28-May
Inavale Echelon Husar	30-May

Meadow brome	
Fleet Macbeth Montana	25-May

Meadow fescue	
Laura Liherold Tetrax SW Minto	30-May
Preval	2-Jun



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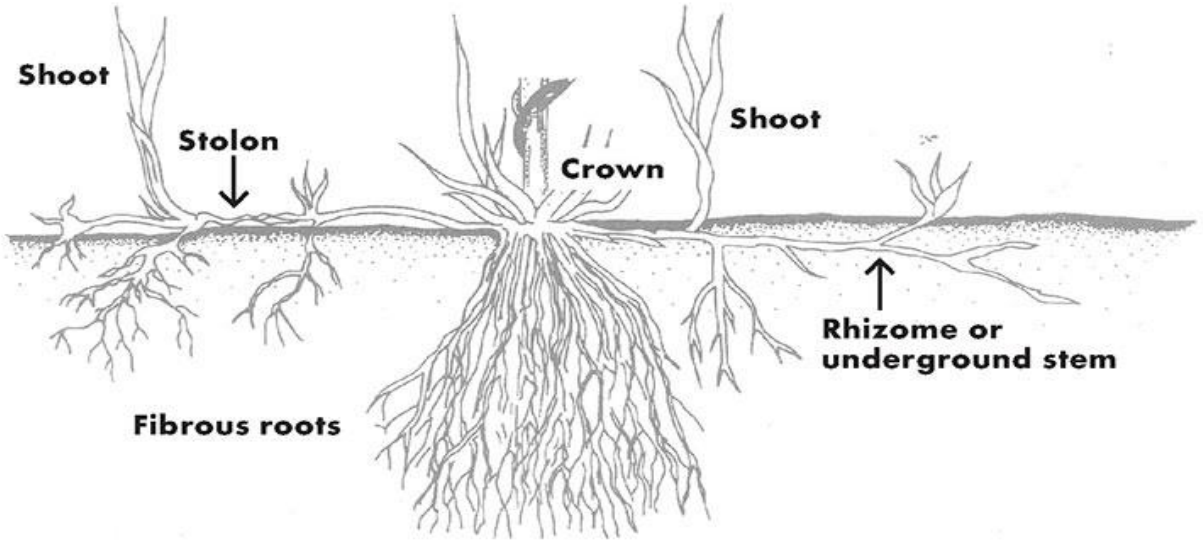
Cutting Height

Regrowth shoots are formed from basal tillers these are not formed until early flowering.

Timothy and smooth bromegrass often fail to persist in alfalfa when the spring crop is harvested at or prior to the early flower stage of alfalfa.

These grasses do not form tillers until flowering and are slow to recover after mowing or grazing.

Tall and meadow fescues are not as severely affected, so these are better companion grasses to mix with alfalfa.



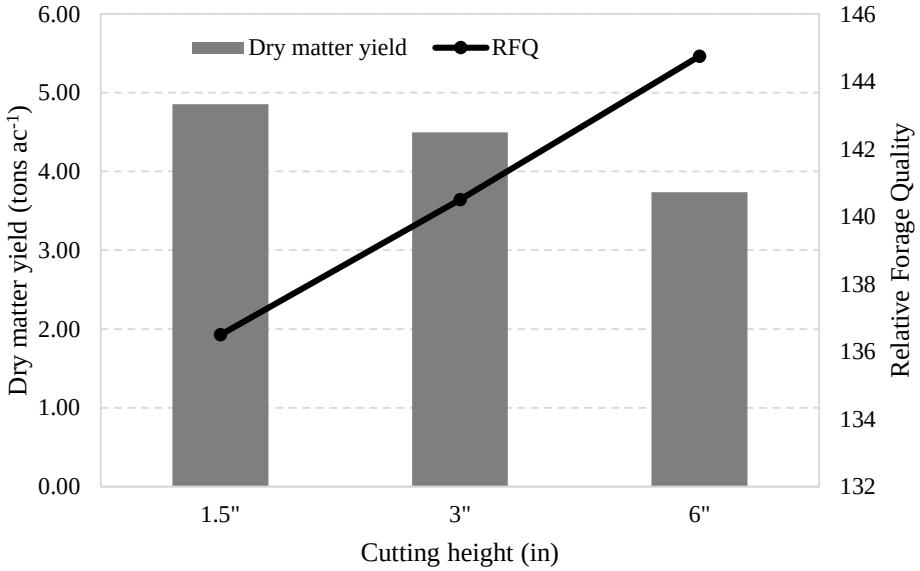
Cutting Height

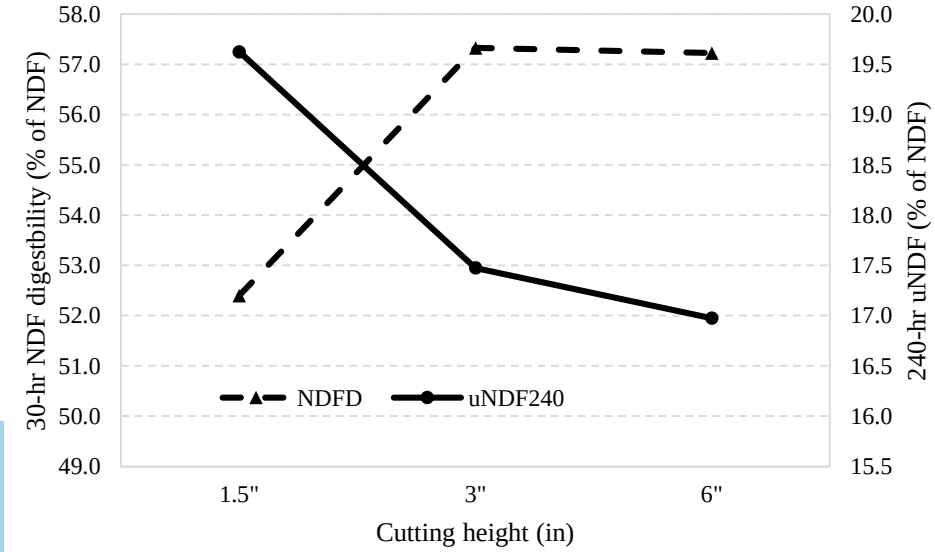
- **Alfalfa or Clover**
- **2" minimum (3” best). F**requent cutting at early maturity will continue to deplete carbohydrate reserves. One cutting of alfalfa should be allowed to reach the bloom stage each year.

- **Cool Season Grasses (Orchardgrass, Timothy)**
- **4" during the establishment year**
- **3" minimum during production years**. This is where we see most of our stand longevity issues. Frequent cutting of cool season grasses at a low height will continue to deplete energy reserves.

- **Mixed stands**
- **You must manage for the predominant species**. Do you have a grass stand with some alfalfa, or an alfalfa stand with some grass?
- **Alfalfa with some grass: 2.5" minimum**
- **Grass with some alfalfa: 3" minimum** (if you want to keep the grass stand!)

Cutting height impact on yield and quality





Yields were reduced by 7-23% by increasing cutting height to 3” and 6”

NDF digestibility increased by 5% by increasing cutting height

Regrowth wasn’t different **but** we had ample rainfall and cool weather. What about in a drought?

What will happen long term?

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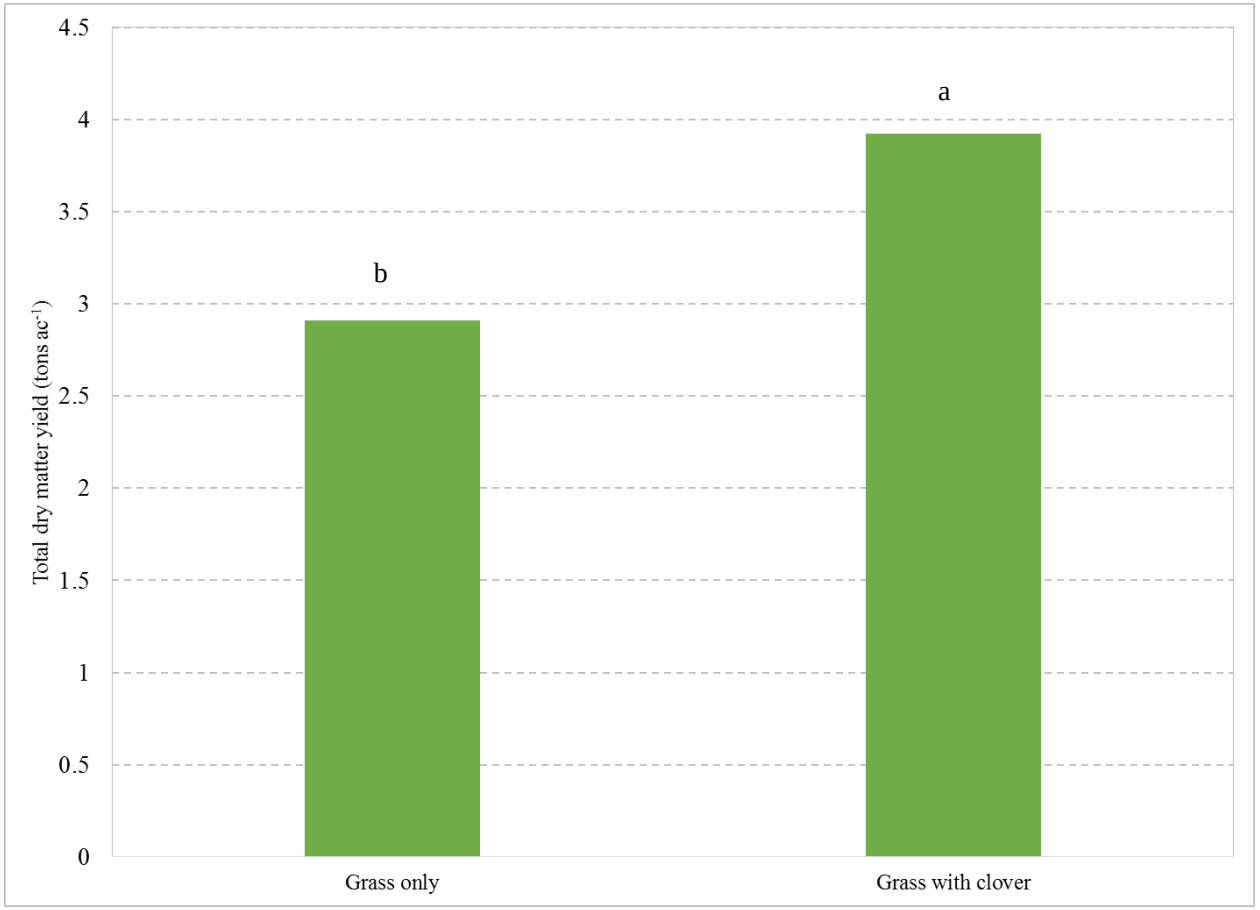
Diversity of stand: Grass/Legume Mixtures

Nitrogen treatment	DM yield tons ac^{-1}
Urea	1.25
Grass-legume mix	1.28
Grass alone	0.607

Can legumes replace N fertilizer?

Treatment	Crude protein	30-hr Digestible NDF lbs ac^{-1}	Milk yield
Clover	**388**	**993**	**5925**
None	181	491	2834

Total dry matter yield with and without clover



Grass only:
28 lbs ac^{-1} grass

Grass/clover:
20 lbs ac^{-1} grass
8 lbs ac^{-1} red clover

8 lbs ac^{-1} clover =
+1 ton of dry matter

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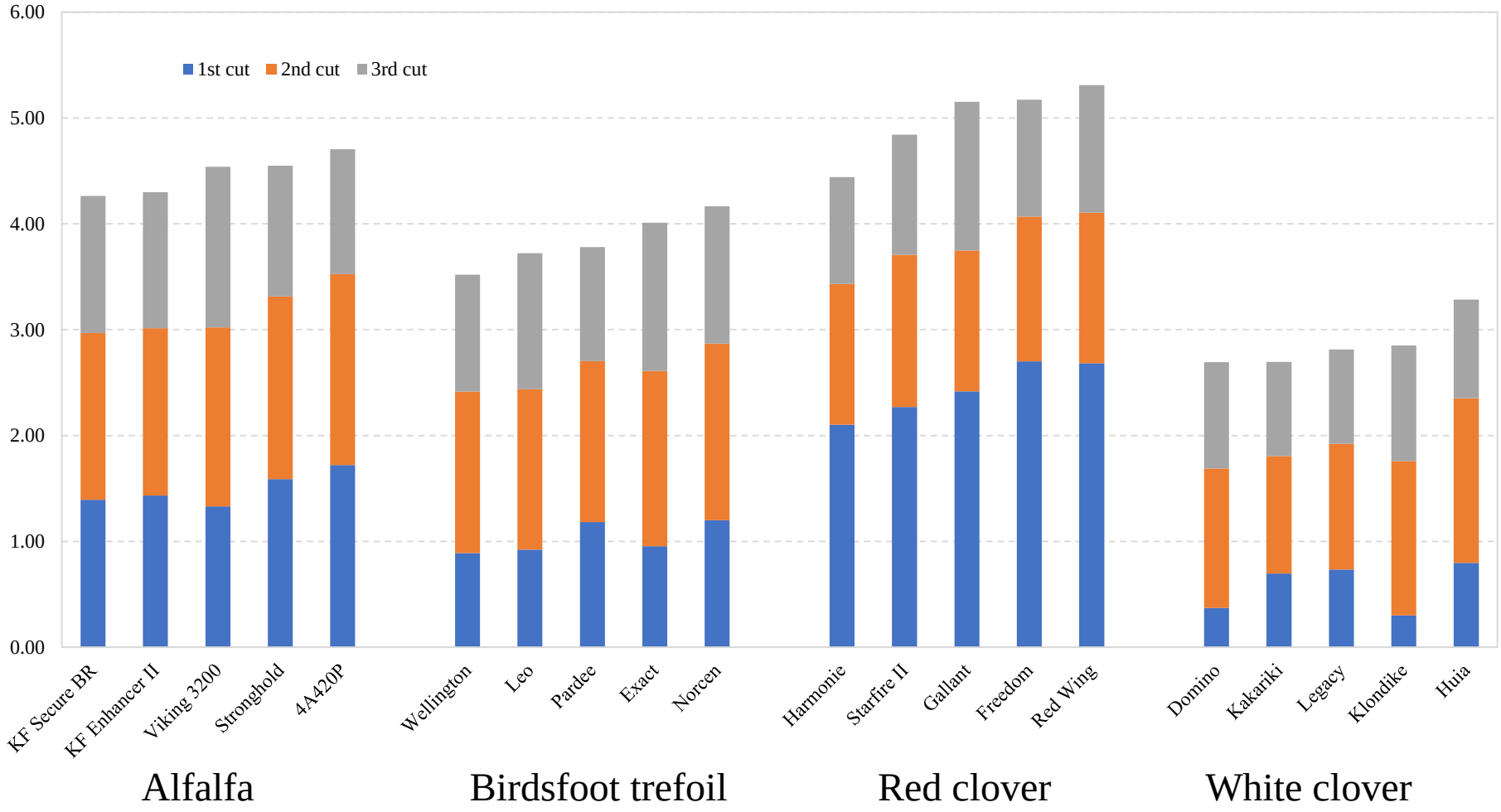
2022 Legume Variety Trial – 1st year post-establishment yields



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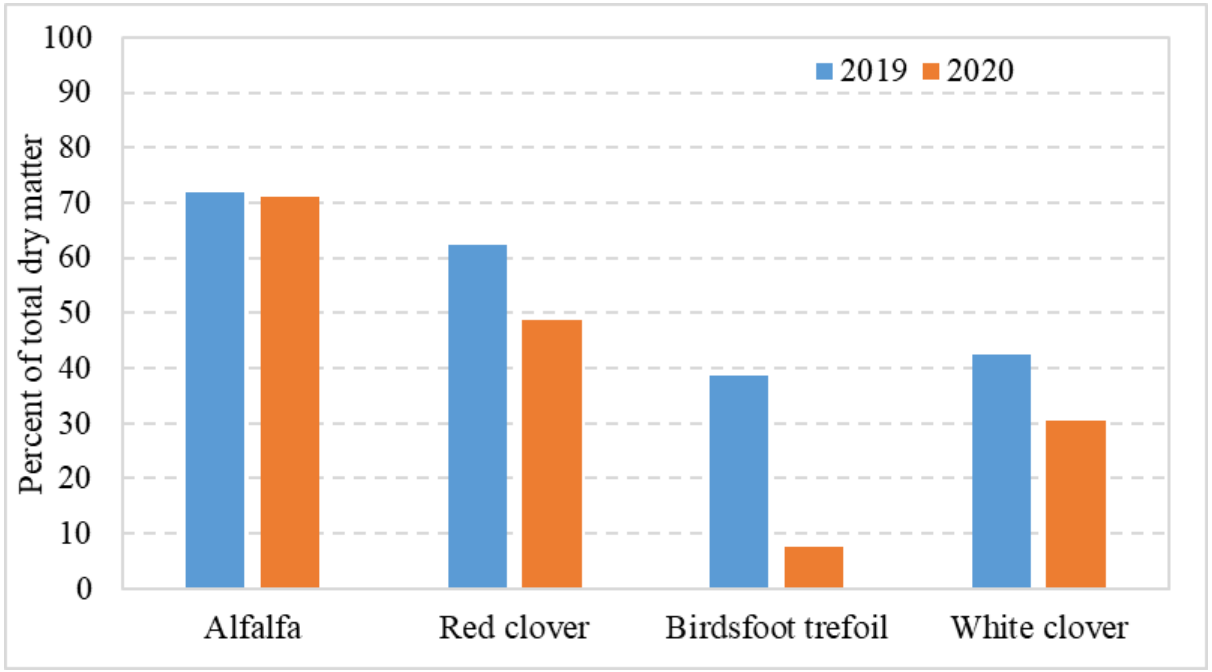
Try adding more legumes first

- Legumes can provide substantial portion of N need to forage crop
- >30% of composition
- They don’t stick around forever, you must manage
- Make sure you’ve set yourself up for success
  - be ready when conditions are right
  - correct underlying pH/fertility issues

Legume species persistence 2019-2020



- Planted 9/1/2017
- Harvested 3x/year
- Winterkill
- Drought conditions
- PLH pressure

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What was left in 2021…..the alfalfa stands alone

Diversity is key- use varietal differences as tools