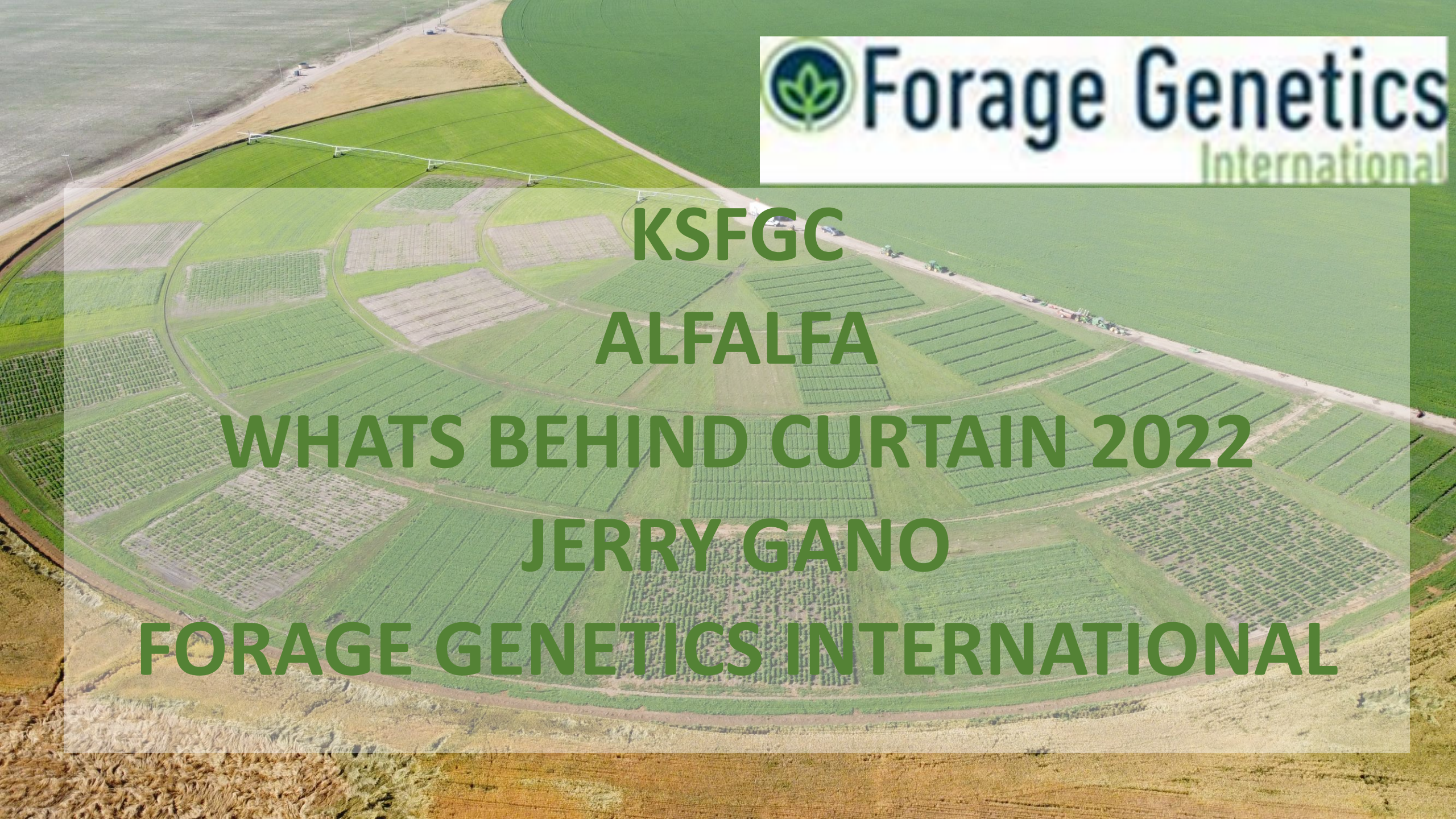
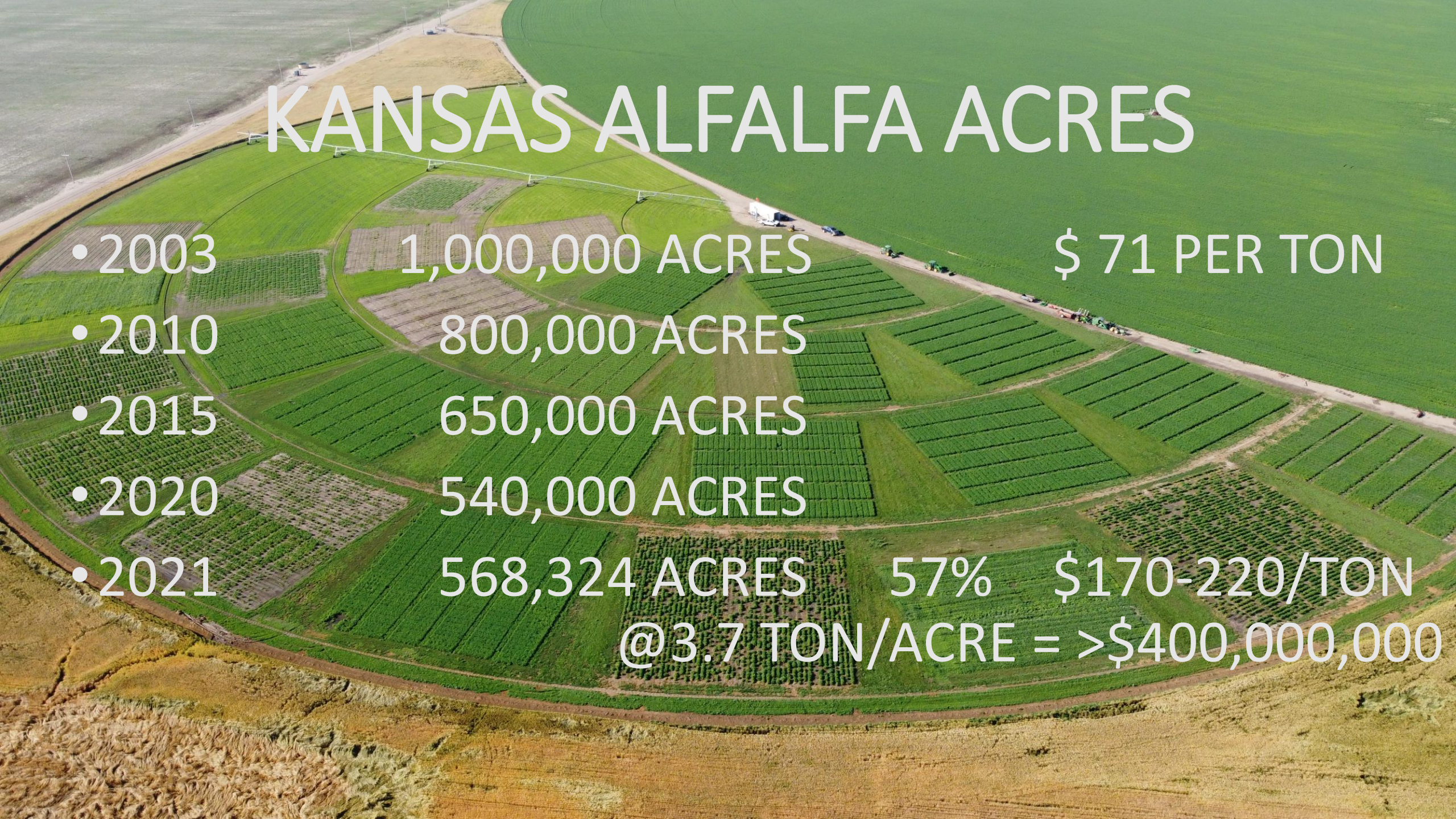
KANSAS FORAGE & GRASS DECEMBER 8 NEWTON, KS


Forage Genetics
International



KSFGC
ALFALFA
WHATS BEHIND CURTAIN 2022

JERRY GANO
FORAGE GENETICS INTERNATIONAL



KANSAS ALFALFA ACRES

- 2003 1,000,000 ACRES $ 71 PER TON
- 2010 800,000 ACRES
- 2015 650,000 ACRES
- 2020 540,000 ACRES
- 2021 568,324 ACRES 57% $170-220/TON

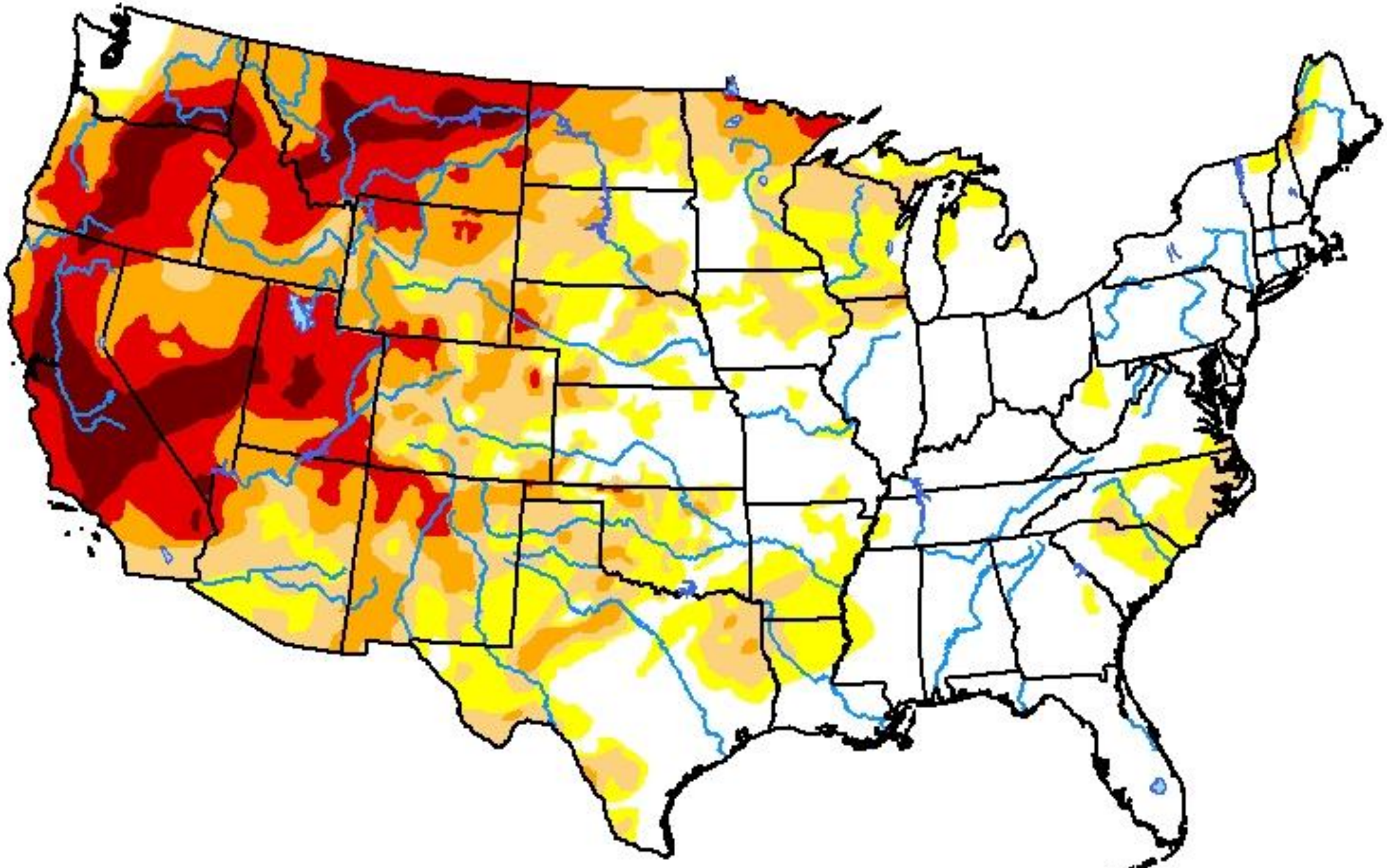
@3.7 TON/ACRE = >$400,000,000

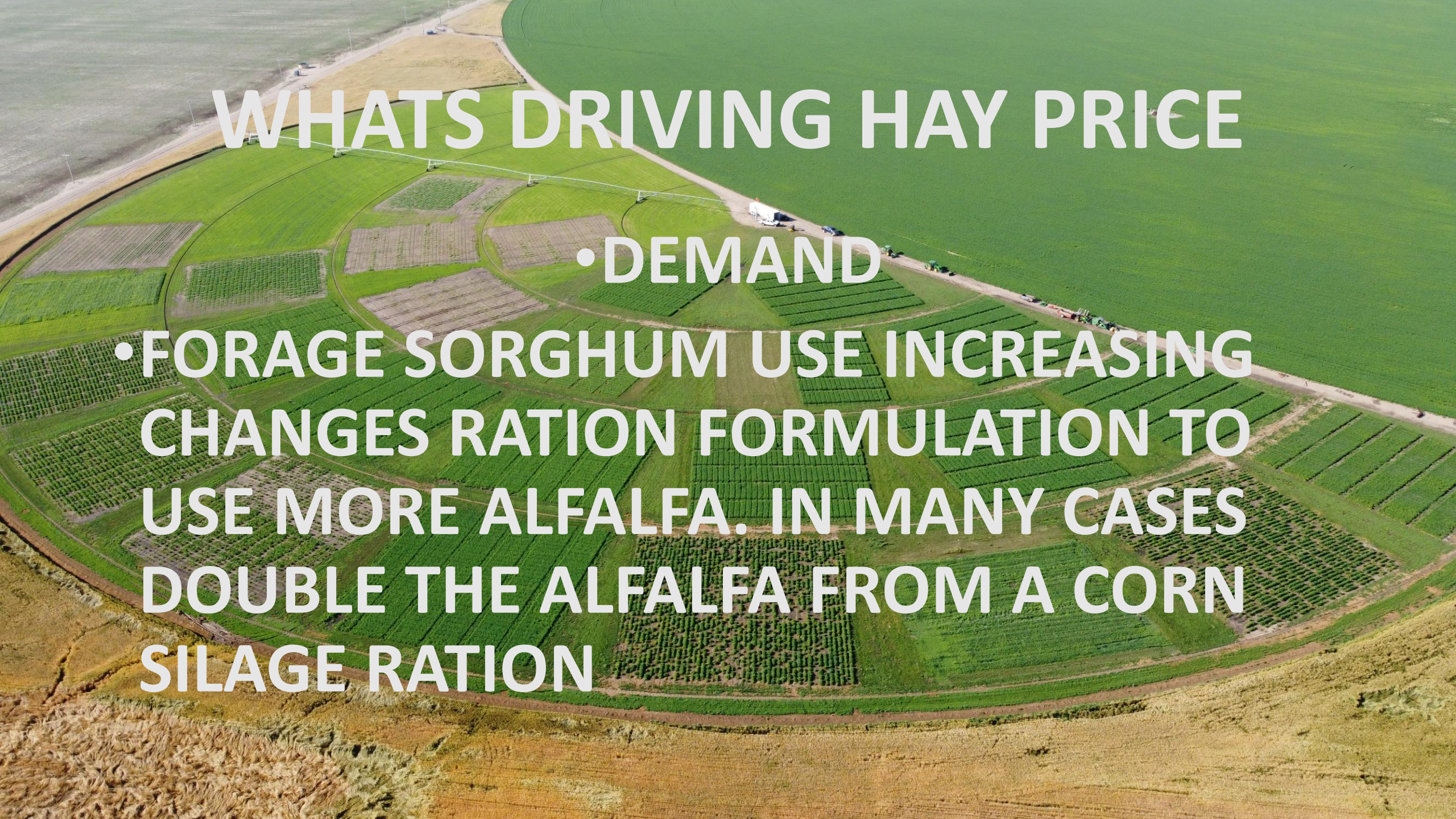
CURRENT CASH ALFALFA HAY

AREA	SUPREME	FAIR
SOUTH CENTRAL KANSAS	$220	$165
SOUTHWEST KANSAS	$220	$170

WHATS DRIVING HAY PRICE

- DROUGHT





WHATS DRIVING HAY PRICE

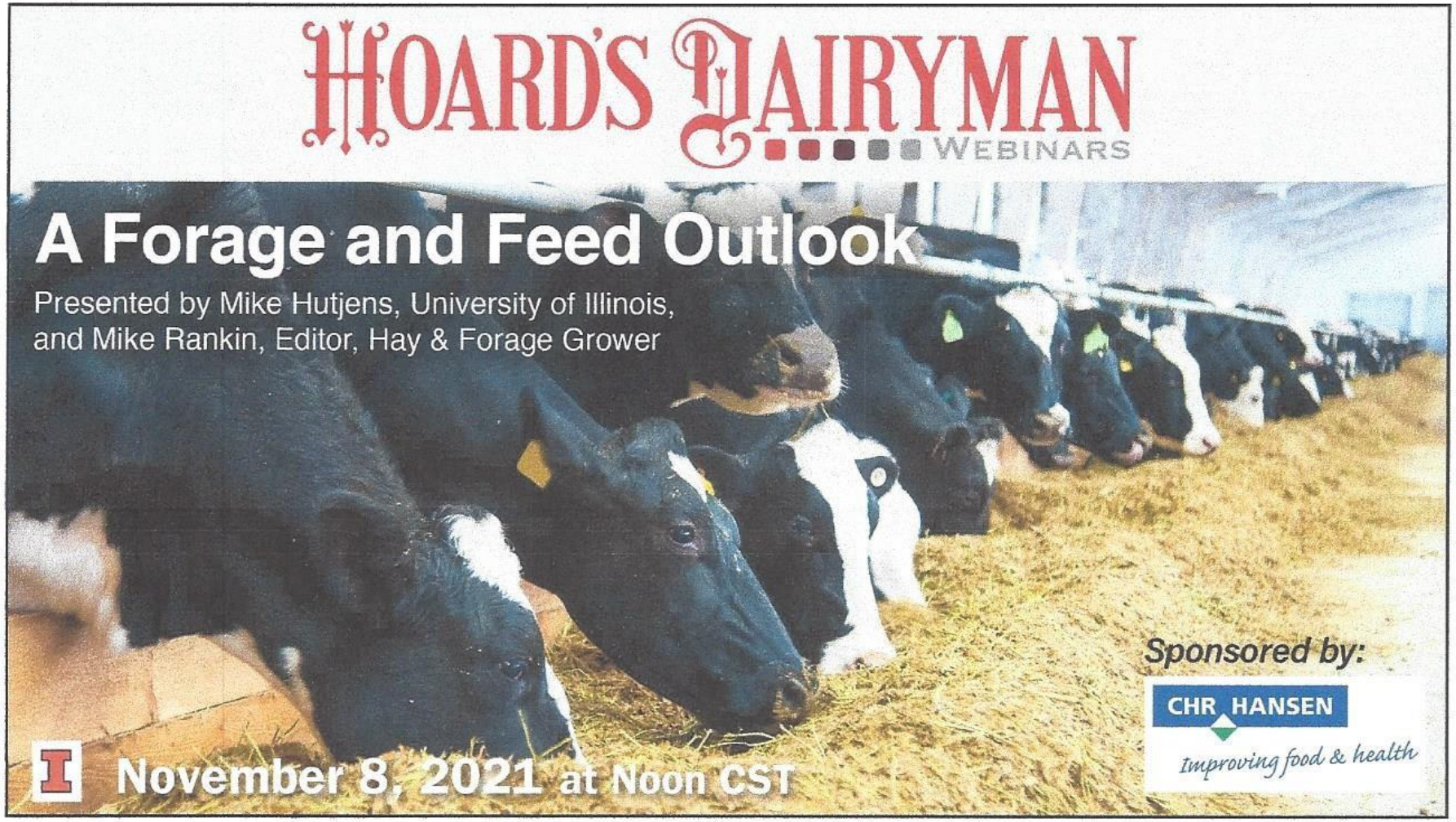
- DEMAND
- FORAGE SORGHUM USE INCREASING CHANGES RATION FORMULATION TO USE MORE ALFALFA. IN MANY CASES DOUBLE THE ALFALFA FROM A CORN SILAGE RATION

WHATS DRIVING HAY PRICE

- LESS ACRES
- US TOTAL ACRES

•2010	20,732,000 ACRES	
•2020	16,230,000 ACRES	78%

HOARD'S DAIRYMAN

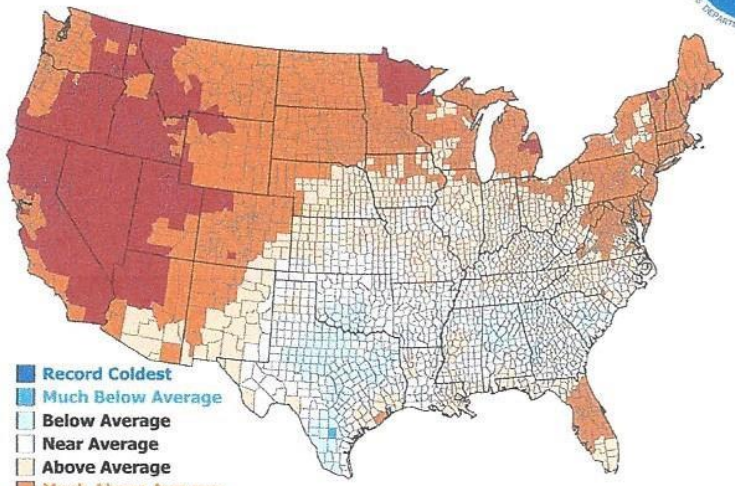


HOARD'S DAIRYMAN

The 2021 Growing Season

County Average Temperature Ranks

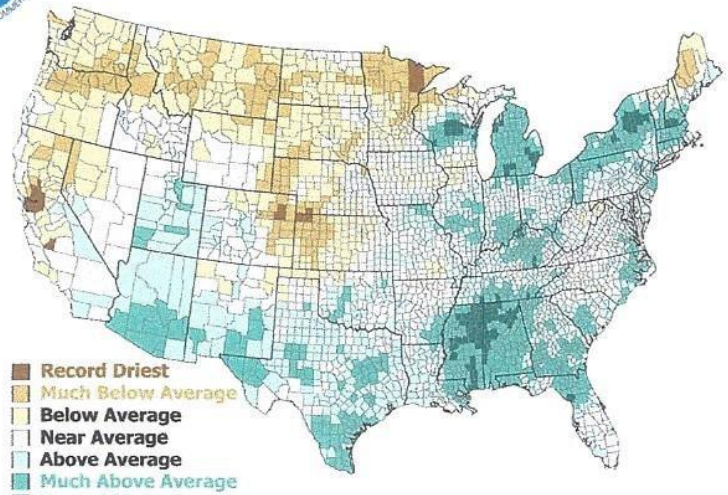
June – August 2021Period 1895 - 2021



- Record Coldest
- Much Below Average
- Below Average
- Near Average
- Above Average
- Much Above Average
- Record Warmest

County Precipitation Ranks

June – August 2021Period 1895 - 2021



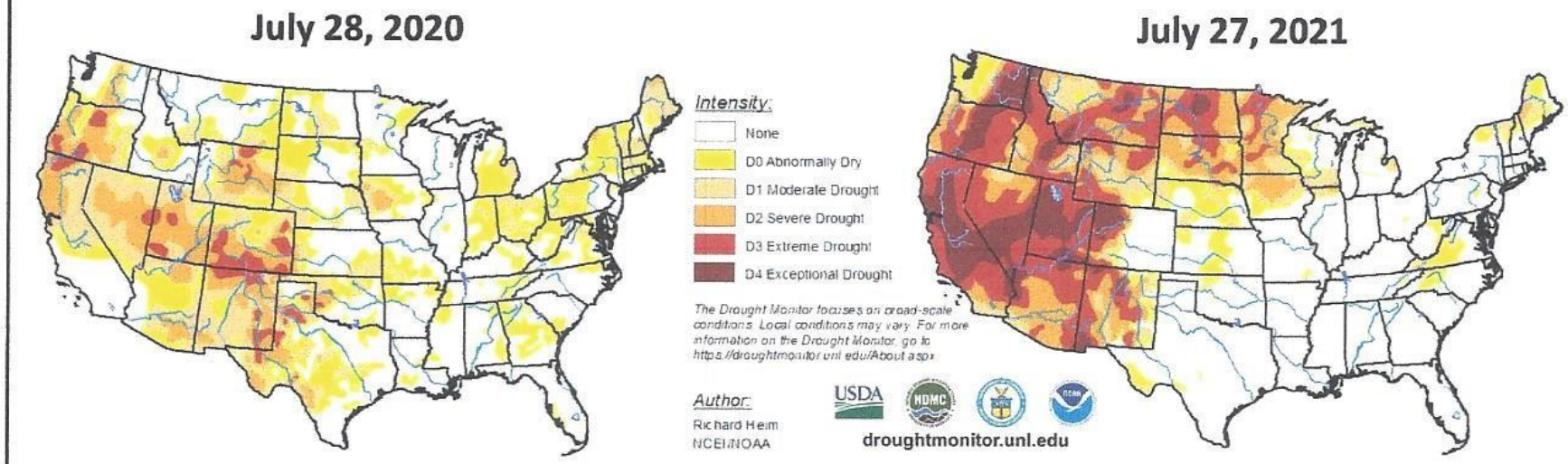
- Record Driest
- Much Below Average
- Below Average
- Near Average
- Above Average
- Much Above Average
- Record Wetest

Hay&Forage Grower

HOARD'S DAIRYMAN

The 2021 Growing Season

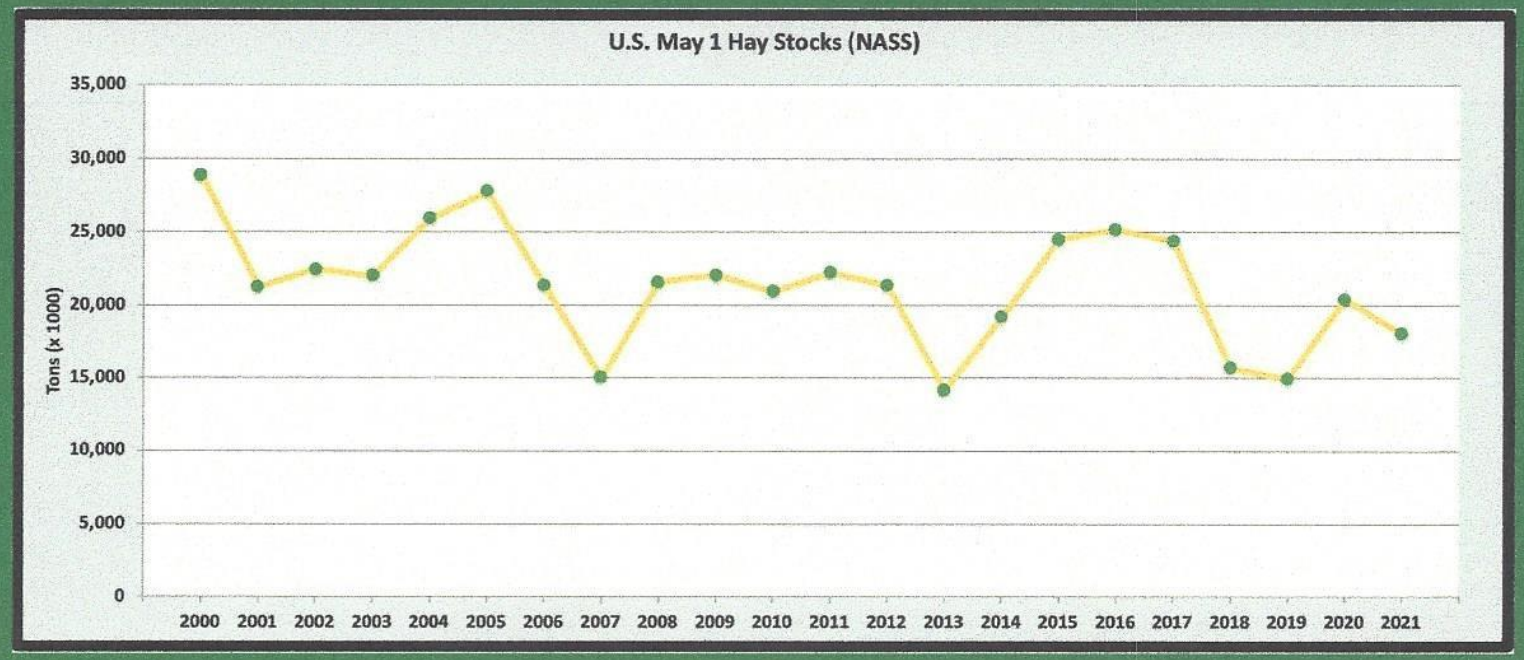
U.S. Drought Monitor: Continental U.S. (CONUS)

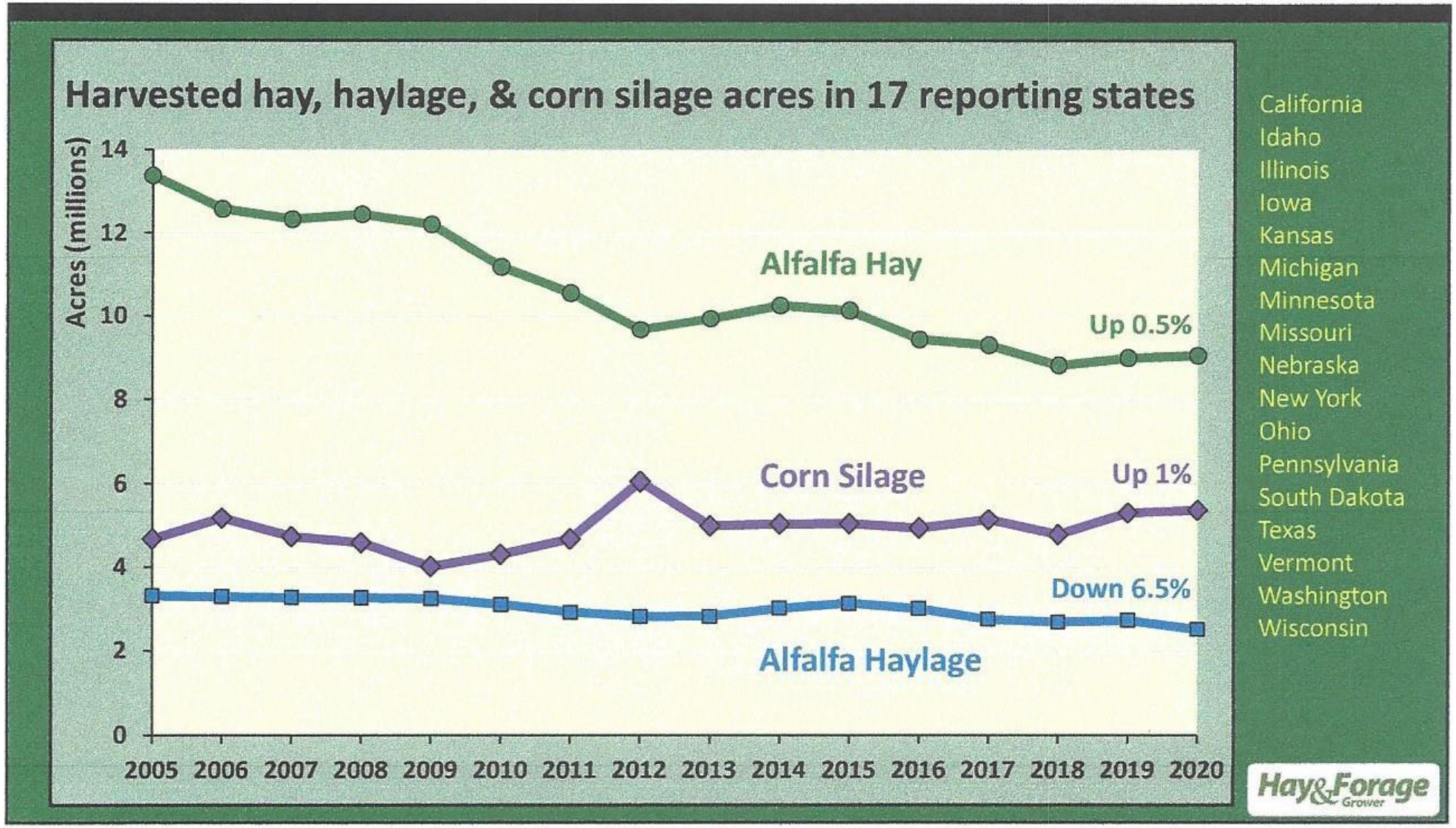


Hay&Forage Grower

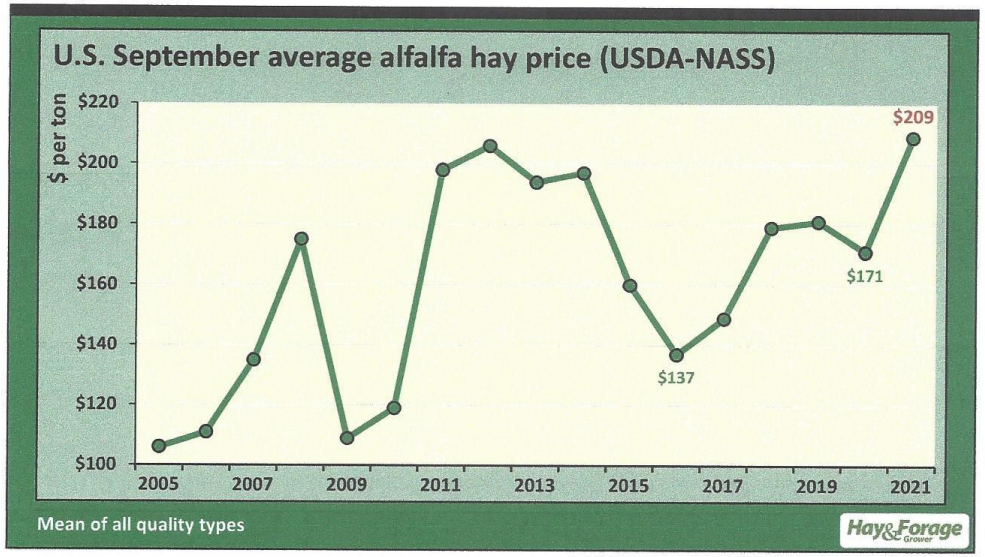
HOARD'S DAIRYMAN

May 1 hay stocks dropped 12% in 2021




Harvested hay, haylage, & corn silage acres in 17 reporting states
Acres (millions)
14
12
10
8
6
4
2
0
2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Alfalfa Hay
Up 0.5%
Corn Silage
Up 1%
Down 6.5%
Alfalfa Haylage
California
Idaho
Illinois
Iowa
Kansas
Michigan
Minnesota
Missouri
Nebraska
New York
Ohio
Pennsylvania
South Dakota
Texas
Vermont
Washington
Wisconsin
Hay&Forage Grower

HOARD'S DAIRYMAN



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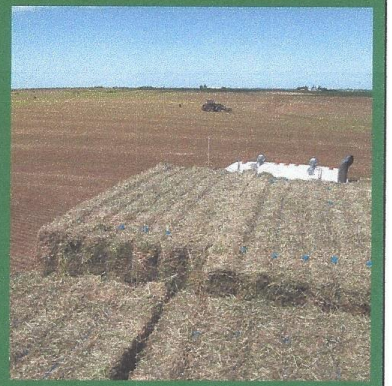
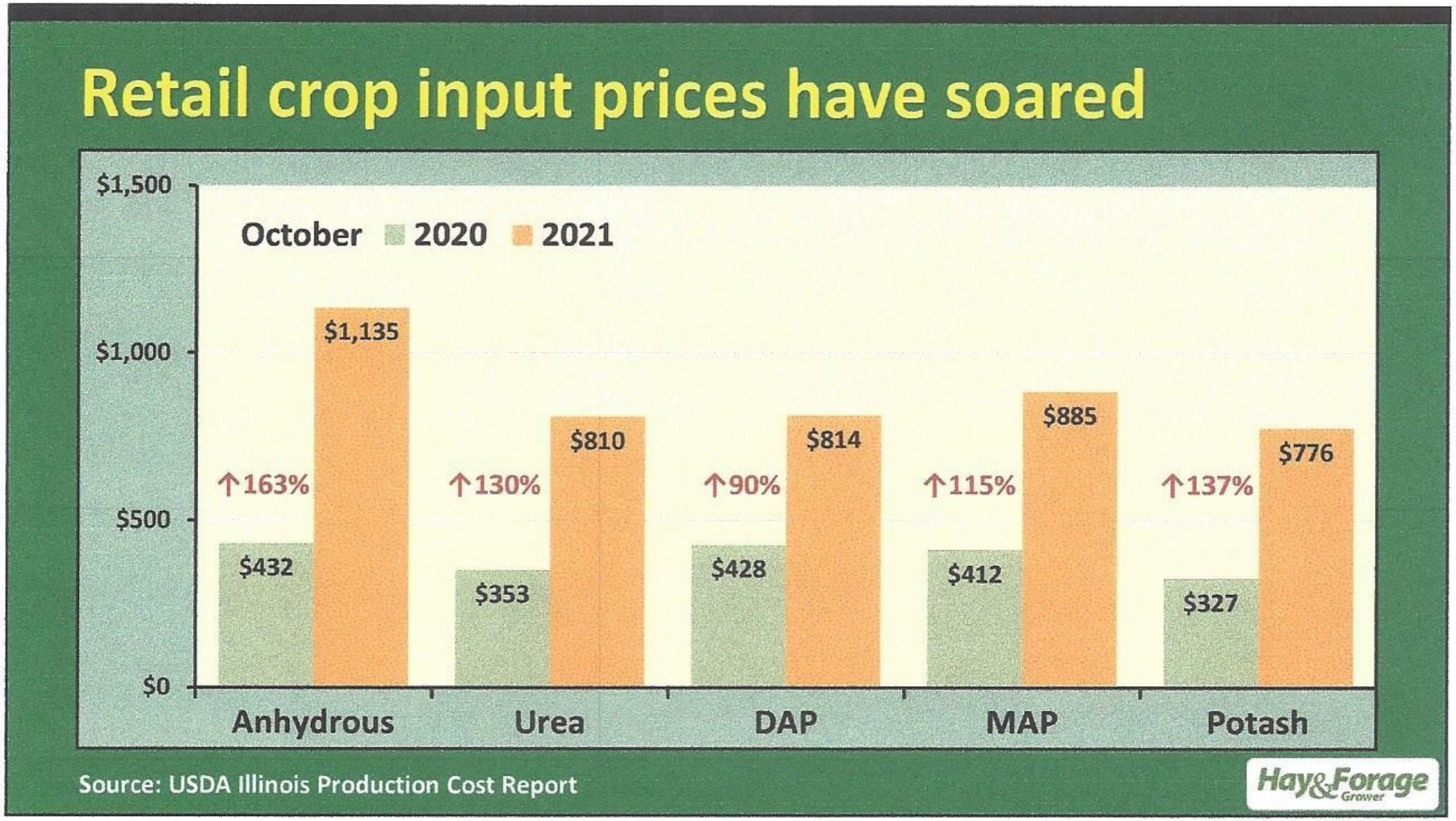
What's supporting high hay prices?

- **2021 production obstacles**
  - ✓ Drought/excessive heat in NW
  - ✓ Too much moisture
  - ✓ Irrigation water restrictions
  - ✓ Wildfires
- **Logistic challenges (boats, trucks)**
- **High commodity prices**
- **Continued strong exports (China)**
- **U.S. 2021 forage acres and yields will be down (regional differences)**
- **High input costs**



Hay&Forage Grower

HOARD'S DAIRYMAN



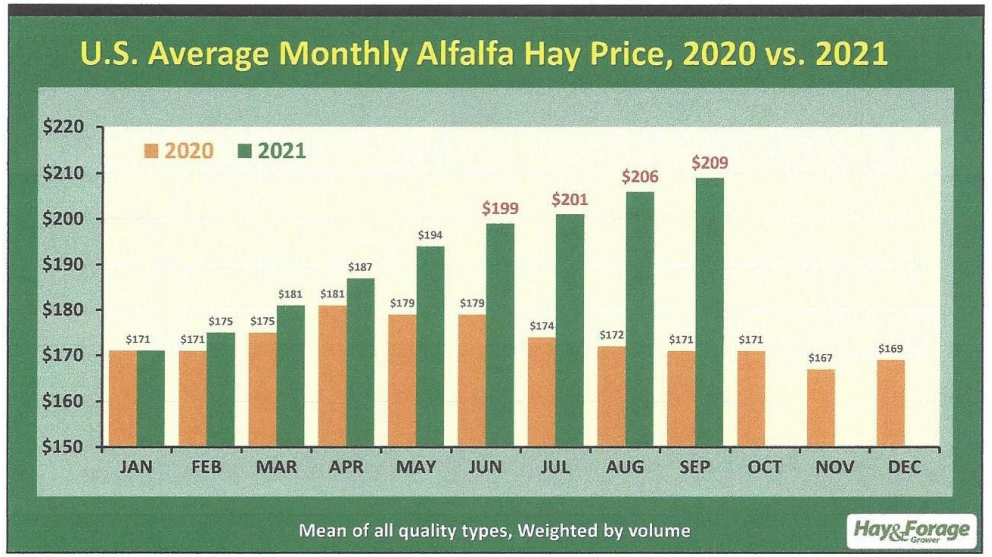
Forage seed supplies will be tight

Average Supply	Tight Supply	Extremely Tight Supply
Annual Ryegrass	Alfalfa (C)	Bromegrass, Meadow
Forage Sorghum	Alfalfa (I)	Bromegrass, Smooth
Orchardgrass, Early (C)	Bermudagrass	Clover, Berseem
Sorghum Sudangrass	Clover, Alsike (C)	Clover, Ladino (I)
Sudangrass	Clover, Ladino (C)	Clover, Red (I)
Teffgrass	Clover, Red (C)	Clover, White
	Festulolium	Meadow Fescue
	Millets	Orchardgrass, Mid
	Perennial Ryegrass, Diploid	Orchardgrass, Late
	Perennial Ryegrass, Tetraploid	Peas, Forage
	Ryegrass, Italian	Reed Canarygrass
	Tall Fescue	Tall Fescue, Novel Endophyte
		Timothy (C)
		Timothy (I)
		Trefoil

Source: Dan Foor, LaCrosse Seeds

Hay&Forage Grower

HOARD'S DAIRYMAN



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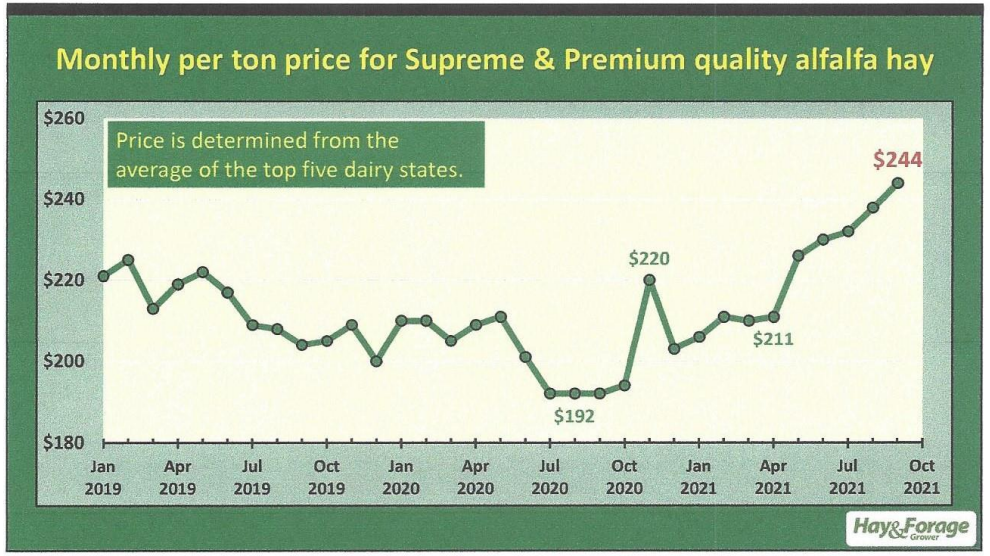


Big Picture

- Forage will be more expensive to both purchase and produce in the short- to mid-term. Prices are still climbing.
  - → Push the pencil on production inputs. Legume and manure nutrients are more valuable than ever.
  - → If soil test levels are high to excessive, low probability of a yield response from additional purchased fertilizer.
  - → If needed, nitrogen for grass/corn crops will always be a good buy.
  - → Preorder and prepay may be more than a tax strategy this year.
  - → Higher fuel costs will impact all forage production activities.
- Forage inventories and quality vary by region and state. Perhaps more so in 2021.

Big Picture

- Water continues to be a huge concern in the West. Non-irrigated acres were really hurt in 2021.
- USDA forecasts alfalfa/alfalfa-grass production in 2021 to be down 9% compared to 2020 with slightly lower yields and acres. Official numbers not known until January but expect lower. Also, watch for the Dec 1 hay stocks report.
- Hay exports are trending slightly ahead of 2020. China is big player.
- U.S. dairy and beef herds are being culled.
- There continues to be interest in winter and summer annual forage crop systems. Wide variation in what is planted. Important to forage test and have a storage strategy.
- Corn silage inventories look to be excellent. Good spring - good fall.

ALFALFA ROTATION

- CONSIDER TAKING OUT OLDER STANDS OF ALFALFA AND TAKE THE NITROGEN CREDIT.
  - >4 PLANTS SQ/FT = UP TO 150 POUNDS OF N IN YEAR 1 AND 75 POUNDS IN YEAR 2 FOR CORN PRODUCTION
    - ANHY @ $1100 = $0.67 PER POUND = $100 YEAR 1 AND $50 YEAR 2 N CREDIT
  - 2-3 PLANTS SQ/FT = UP TO 100 POUNDS OF N IN YEAR 1 AND 50 POUNDS IN YEAR 2
    - ANHY @ $1100 = $0.67 PER POUND = $67 YEAR 1 AND $33 YEAR 2 N CREDIT
  - YOUR ROTATED ALFALFA STAND MAY BE WORTH UP TO $150 / ACRE IN NITROGEN CREDIT OVER THE NEXT 2 YEARS

ALFALFA FOR EXPORT

- CHINA STILL DOES NOT ALLOW GM ALFALFA
- DEMAND FOR NON-GE EXPORT HAY MOVES FURTHER EAST
- NO PREMIUM FOR NON-GE ALFALFA

HARVXTRA WITH ROUNDUP READY TECHNOLOGY

- CONSISTANTLY PRODUCES 12-20% HIGHER QUALITY ALFALFA WHEN COMPARED TO CONVENTIONAL ALFALFA OF THE SAME FALL DORMANCY MANAGED AND HARVESTED ALIKE
- HARVEST FLEXIBILITY IS THE MAJOR ATTRACTION FOR PLAINS ALFALFA PRODUCERS
  - ALLOWS FOR A 7-10 DAY HARVEST DELAY AND STILL HARVEST A QUALITY SIMILAR TO CONVENTIONAL HARVESTED 7-10 DAYS EARLIER
  - ON AVERAGE, PLAINS ALFALFA GROWERS WILL HAVE AT LEAST ONE RAIN EVENT PER YEAR DELAYING HARVEST. HARVXTRA TECHNOLOGY PROVIDES THE POTENTIAL TO RETAIN A HIGH QUALITY VALUE EVEN WITH A RAIN DELAY. IF MARKETING QUALITY ALFALFA THAT IS POTENTIALLY $40-50 PER TON ADDED PROFIT PER TON JUST ON THAT ONE CUTTING ALONE, MORE THAN PAYING FOR THE TECHNOLOGY.

Changing Feed Costs

$5.30/bushel

Was over $6.00/bushel

$3.10/bushel

$325/ton

$300/ton

Soybean Meal

Remain High

$200+/ton

By-product feeds follow corn and soybean meal prices

LEAF

LEAVES ENHANCE ALFALFA FORAGE™

LEAF

- PREDICTIVE EQUATION TO HELP DETERMINE ALFALFA LEAF %
- Leaves Enhance Alfalfa Forage
- Leaf percentage is the ratio of leaves in a ground sample of alfalfa
- Used by agronomists. Nutritionists, dairy owner, custom operators, buyers and sellers

LEAF

- LEAF LOSS - 3 MAIN REASONS FOR IT
- MECHANICAL
- INSECTS
- FOLIAR DISEASE
- EVERY TOUCHPOINT COUNTS FOR RETAINING LEAVES
- LEAF LOSS IS ADDITIVE AND CAN OCCUR AT MULTIPLE POINTS IN THE MANAGEMENT AND HARVEST OF THE STAND

LEAF

- WHAT IS THE GOAL PERCENTAGE
- THE IDEAL LEAF PERCENTAGE SHOULD BE ABOVE 45%
- LEAF PERCENTAGE AT 40-45% OFFERS ROOM FOR IMPROVEMENT
  - GROWERS SHOULD CONSIDER EVALUATING AND ADJUSTING MANAGEMENT PRACTICES AND HARVEST TIMING
- LEAF PERCENTAGE BELOW 40% INDICATES SIGNIFICANT LEAF LOSS
  - TROUBLESHOOT THE PROBLEM

LEAF

- BOTTOM LINE
- LOSING A FEW LEAVES HERE AND THERE ADDS UP QUICKLY
- LOSING 10% LEAVES (5 PERCENTAGE UNITS) CAN RESULT IN UP TO A $25-35 TON LOSS IN VALUE.
- TYPICAL LEAF LOSS ON MOST FARMS IS 10%, BUT WITH BALED HAY MAY APPROACH 30%
- A 2% DIFFERENCE IN LEAVES CAN AFFECT RFQ BY ALMOST 10 UNITS

LEAF

- HOW CAN GROWERS USE LEAF PERCENTAGES
- HELP MAKE MANAGEMENT AND AGRONOMIC DECISIONS
- MANAGEMENT IMPROVEMENT
  - FUNGICIDE APPLICATION
  - SWITCH TO VARIETIES WITH HIGH DISEASE AND PEST RESISTANCE
  - HARVEST MANAGEMENT THAT LIMITS MECHANICAL LEAF LOSS

LEAF

- WHERE TO GET YOUR ALFALFA TESTED
- SUBMIT YOUR ALFALFA SAMPLE TO A LICENSED LAB FOR CALIBRATE® HQ ANALYSIS
  - SURE TECH® LABS
  - DAIRYLAND LABS
  - CUMBERLAND VALLEY
  - ROCK RIVER LABS
  - DAIRY ONE

ALFALFA MANAGEMENT HIGH SALINITY

2021 Croplan Virtual Alfalfa Training Event

February 3, 2021

John Dodd

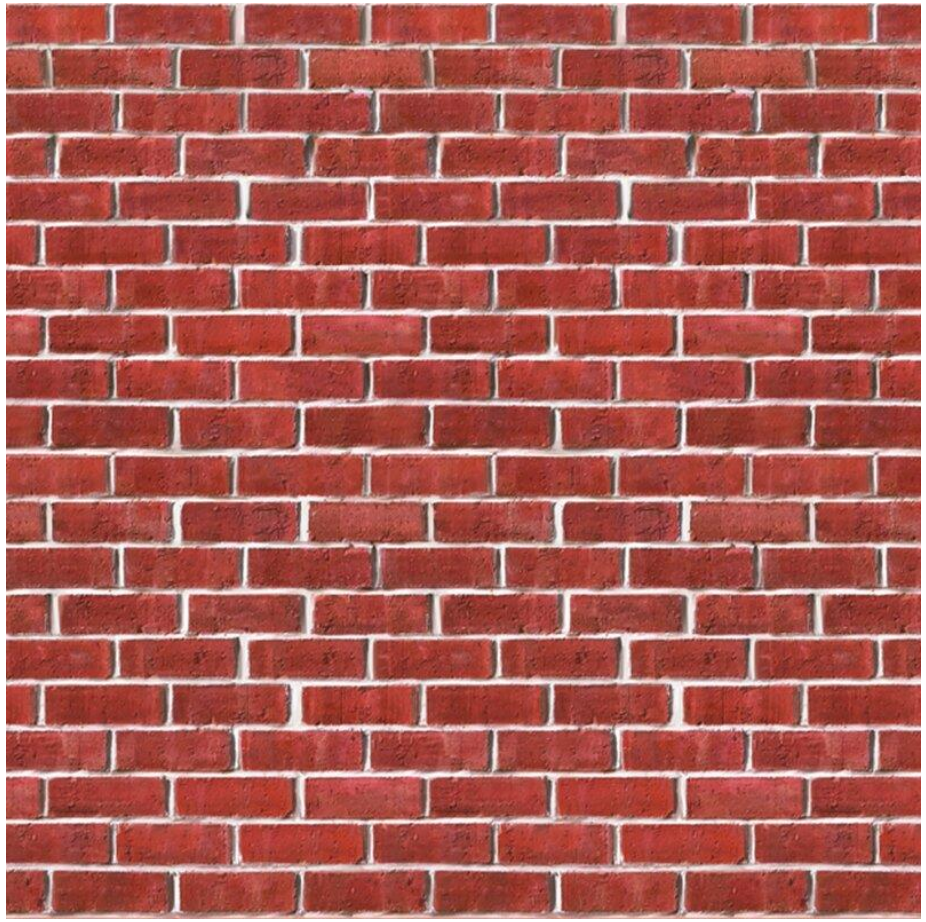
SALT TOPICS

- What's going on in the plant?
- What's going on in the soil?
- Soil/Water Testing!
- What is Research doing about it.....

WHAT'S GOING ON IN THE PLANT?

- **Osmotic Stresses** – moisture regulation issues within the plant, premature stomatal closure, heat stress symptoms/wilting, and slight leaf burning.
- **Ionic Stresses** – Na affecting cell division, severe stunting, leaf burning, cupped and leather like leaves, and severe water and nutrient uptake issues.

WHAT'S GOING ON IN THE SOIL?



- Healthy soil – negatively charged soil particles are supported by Ca2+ molecules.
- Salt Enters – Na+ enters the soil, smaller molecule size, displaces Ca and has a stronger bonding affinity.

SALT SOIL PROBLEMS

- **Sodicity** – Soil structure collapses, Na does not actually affect plant itself physiologically but competes for the available soil moisture better than the plants roots.
- **Salinity** – Ionic and osmotic affects on plants.
- **Alkalinity** – Soil structure degraded, limited water holding capacity, high pH.
- **Amendments** – Sulfur and Gypsum (costly and long term).

SOIL AND WATER TESTING-WHAT TO ASK FOR!

- Talk to your lab before submitting samples, do they actually perform the **Sodium Paste Extraction Test**???
- Most do not – Research example + experiences with several agronomists.
- Send in soil and water samples – we need to identify the source and severity of the salt issue to make management decisions.
- Request a complete analysis with micro-nutrients, soluble salts, Na, Cl, CEC, Total Bases, ESP, SAR, and Ece.

SALINITY MEASURES

- **ESP** = Exchangeable Sodium Percent
  - 5% ESP begin to see yield reduction
  - 10% ESP alfalfa is not the best choice
- **SAR** = Sodium Absorption Ratio (used mostly for water samples)
  - Ratio of Na to Ca and Mg
  - SAR < 6 for no adverse affects on plant growth
- **Ece** = Electrical Conductivity (more important in water samples)
  - 8-13 dS/m see a 50% reduction in alfalfa germination/emergence

Northwest Agricultural Consultants
2545 West Falls
Kennewick, WA 99336
(509) 783-7450 Fax: (509) 783-5305

PAP-Accredited
NAPT
2012

FORAGE GENETICS INTERNATIONAL
PO BOX 46
TOUCHET, WA 99360

SOIL
Client No.: 65427 Date Received: 09-08-2013
Report No.: 29424 Page: 8 of 17
3c8e8d-16630

Grower	Sampler	Field No.	Field Name	Crop Year	Crop	Yield Goal
Forage Genetics Int.	**John Dodd**	**Quad 2**	**Salt Naus. 2013**	**2013**	**Alfalfa**	**Max.**

Depth (ft.)	Available Inches	NO3-N lbs/acre	NH4-N lbs/acre	Sulfur ppm	pH	Soluble Salts (mmhos/cm)	Organic Matter Percent	P(bic) ppm	K(bic) ppm	P(ace) ppm	K(ace) ppm	Calcium (meq. per 100 grams)	Magnesium (meq. per 100 grams)	Sodium (meq. per 100 grams)	Eff.	Boron ppm	Zinc ppm	Manganese ppm	Iron ppm	Copper ppm	CEC (meq. per 100 grams)	% Base Sat.	Chloride lbs. per. acre	Bray 1P ppm	Total Bases (meq. per 100 grams)
1		140	10	11	9.0	0.75	1.80	87.0	818	193.0	364	15.10	3.79	5.04		1.77	1.33	5.1	11	0.9	17.2		241		26.02
Total	0.00	140	10																						

Estimated Nitrogen Release from Organic Matter

Estimated Total Nitrogen Available to Crop

Last Year's Crop

Fertilizer

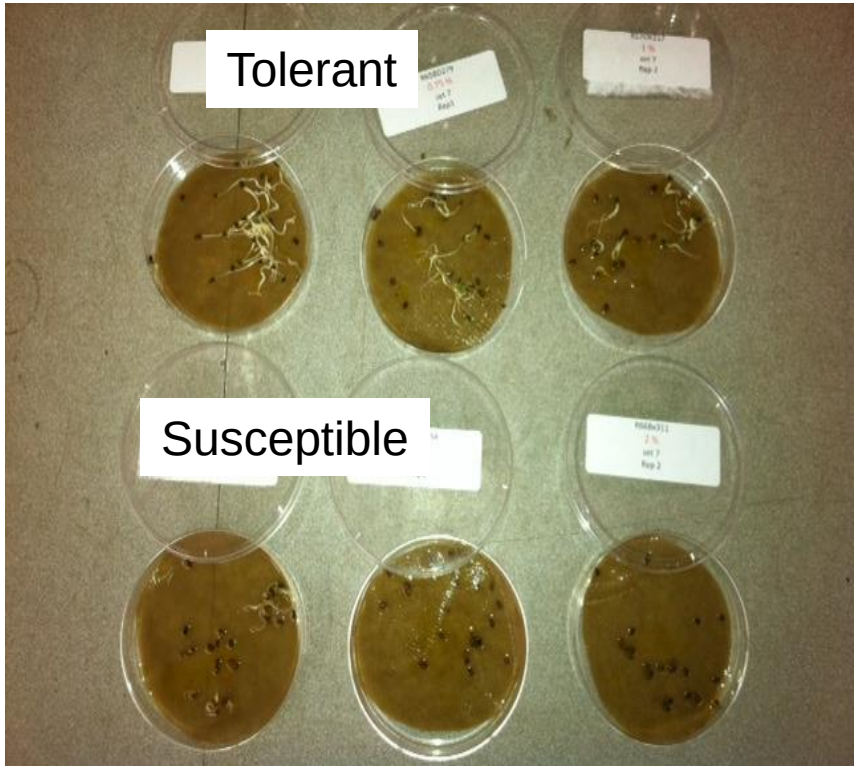
Comments

Exchangeable Sodium Percentage: 29.3%

Sodium Adsorption Ratio: 15.9

Greenhouse Assays for Salt

Salt Tolerance of Germinating Alfalfa Seeds



7 day test

Forage Production Under Salt Stress

~6 month test

http://www.naaic.org/resource/stdtests.php

BREEDING FOR SALT TOLERANCE

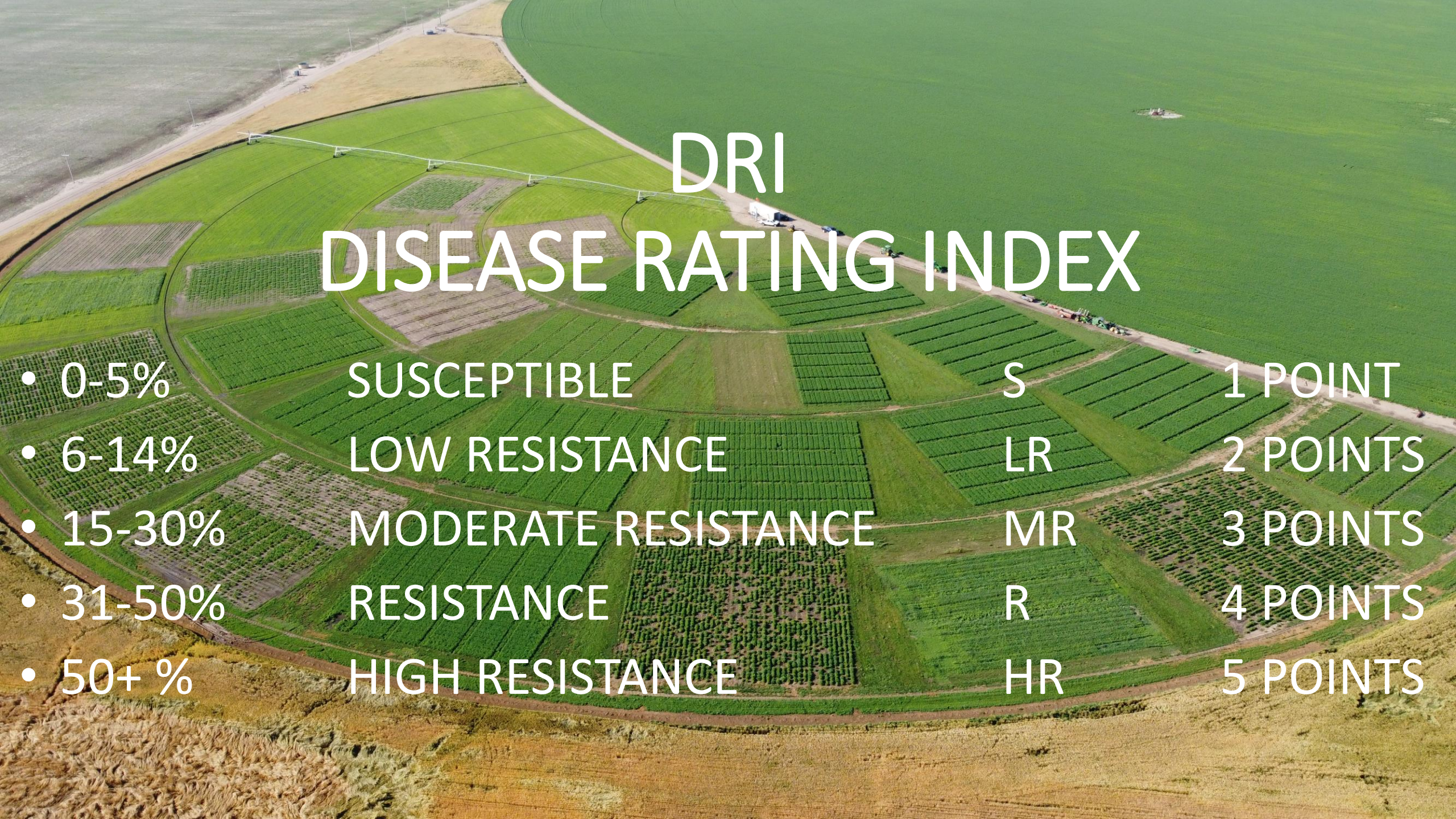
Greenhouse assays

Field trials

John Dodd
Forage Genetics Int.
jjdodd@foragegenetics.com
Office: 509-394-0202

ENHANCED MULTI-RACE DISEASE RESISTANCE

- **HIGH RESISTANCE TO APHANOMYCES MULTI RACE**
- **HIGH RESISTANCE TO ANTHRACNOSE RACES 1 & 5**



DRI
DISEASE RATING INDEX

• 0-5%	SUSCEPTIBLE	S	1 POINT
• 6-14%	LOW RESISTANCE	LR	2 POINTS
• 15-30%	MODERATE RESISTANCE	MR	3 POINTS
• 31-50%	RESISTANCE	R	4 POINTS
• 50+ %	HIGH RESISTANCE	HR	5 POINTS

DRI
DISEASE RATING INDEX

- HIGHEST APPROVED DRI IS 40/40

DRI
DISEASE RATING INDEX

- HR ANTHRACNOSE RACE 1
- HR PHYTOPHORA ROOT ROT
- HR APHANOMYCES RACE 2
- HR BACTERIAL WILT
- HR ANTHRACNOSE RACE 5
- HR APHANOMYCES RACE 1
- HR VERTICLLIUM WILT
- HR FUSARIUM WILT

- DRI 40/40
- HR APHANOMYCES ENHANCED MULTI RACE (NOT INCLUDED IN DRI) = 45/45 IF INCLUDED IN DRI

ANTHRACNOSE RACE 5 PATENT APPROVAL FOR NATIVE TRAIT RESISTANCE

- IDENTIFIED IN THE EARLY 1970'S
- SIGNIFICANT FUNGAL DISEASE WITH MULTIPLE RACES & TYPES
- CAUSES STEM AND CROWN ROT
- LEADS TO DEFOLIATION AND CAN CAUSE YIELD LOSS UP TO 25-30%
- CAN APPEAR AT ANY TIME IN THE GROWING SEASON
- RACE 5 WAS IDENTIFIED IN 2014 FGI PATENT IN 2021
- DNA MARKERS CAN PREDICT WITH VERY HIGH ACCURACY PLANT GENETICS POSSESSING HIGH RESISTANCE TO RACE 5. PLANTS POSSESSING THIS MARKER ARE 102x LESS LIKELY TO BE RESISTANT THAN PLANTS WITHOUT THE MARKER.

ALFALFA
WHATS BEHIND CURTAIN 2022?

- THE FUTURE LOOKS BRIGHT FOR CONTINUED STRONG DEMAND
- THE POTENTIAL OF EXCELLENT PROFITABILITY IN ALFALFA HAY PRODUCTION LOOKS STRONG FOR 2022
- 2022 OFFERS THE POTENTIAL OF INCREASING YOUR ALFALFA ACRES TO OFFSET SOME FERTILITY COST AND TAKE ADVANTAGE OF EXCELLENT HAY PRICES
- WEATHER WILL CONTINUE TO PLAY A ROLE


THANKS
? QUESTIONS ?