NDSU Carrington Research Extension Center: **Review of selected weed management studies**

Greg Endres, Extension cropping systems specialist
701-652-5032; gregory.endres@ndsu.edu

EXTENDING KNOWLEDGE ›› CHANGING LIVES

NDSU | EXTENSION

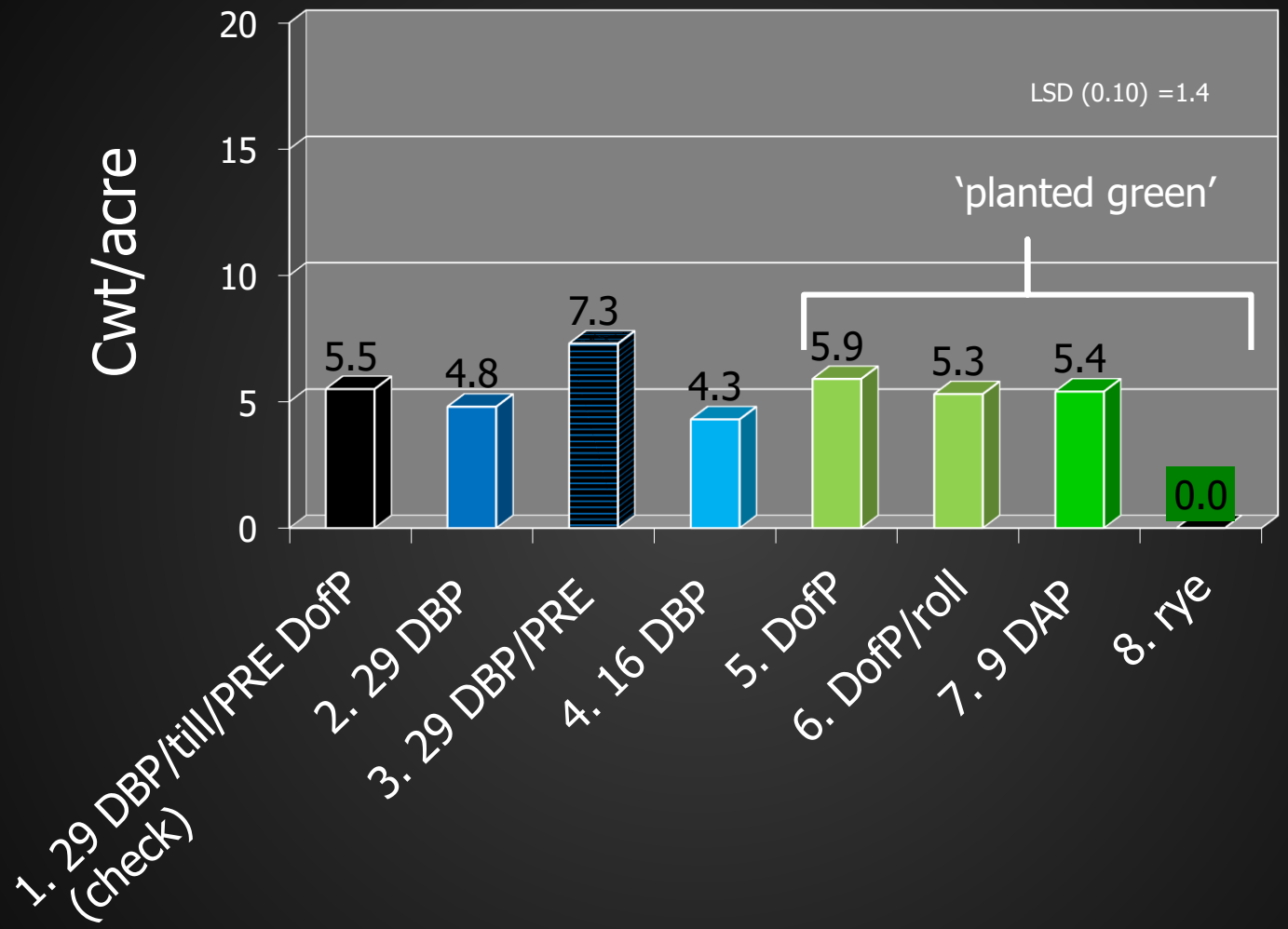
Presentation content

1. Winter rye as a cover crop with pinto bean: weed suppression
2. Winter rye planting dates and rates: weed suppression in soybean
3. Tolerance of broadleaf crops to preplant, low-rate dicamba for early season weed control

Winter rye cover crop preceding pinto bean, Carrington, 2017-21

Pinto bean yield?
Rye termination timing?
Weed control?

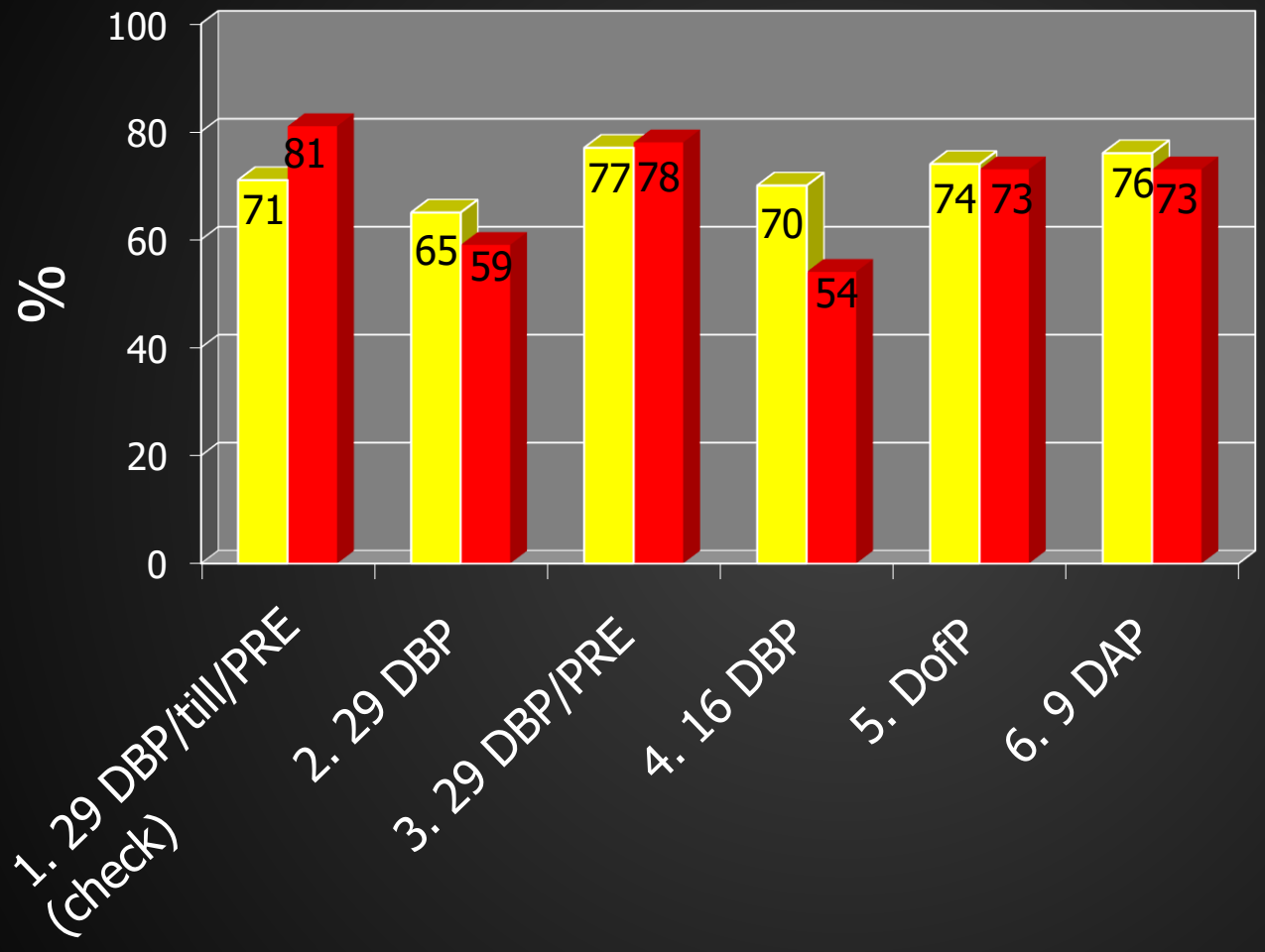
Pinto bean yield among rye termination treatments with glyphosate, Carrington, 2021*



*Rye stand Apr 17=350,000 plants/A. DBP=days before planting; DofP=day of planting; DAP=days after planting. Glyphosate=Roundup Powermax at 28.4 fl oz/A; PRE=Spartan Elite at 20 fl oz/A. 'ND Palomino' direct planted in 30" rows on **June 2**. POST herbicides applied across trial on June 28 and July 19.

July 6, 2021 (34 DAP and 8 DAA POST Raptor+cleth trial app)

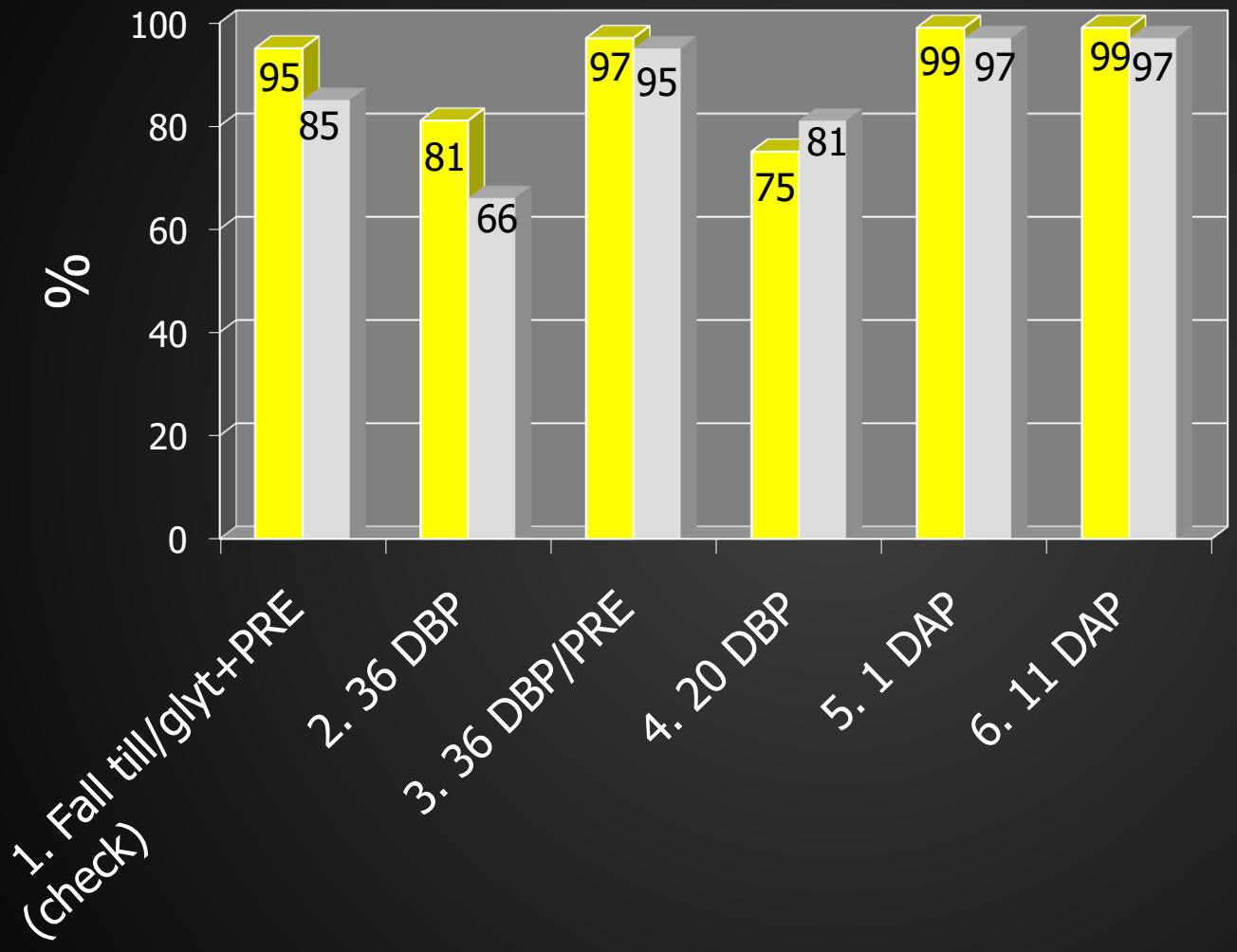
Weed control[1] in pinto bean among rye termination treatments with glyphosate, Carrington, 2021



Yellow = gr and ye foxtail; LSD (0.10) = NS
Red = redroot and prostrate pigweed; LSD (0.10) = 11

[1]Visual evaluation 3 weeks after bean planting (prior to POST herbicide applied across trial for general weed control). DBP=days before planting; DofP=day of planting; DAP=days after planting. Glyphosate=Roundup Powermax at 28.4 fl oz/A; PRE=Spartan Elite at 20 fl oz/A. 'ND Palomino' direct planted in 30" rows on **June 2**.

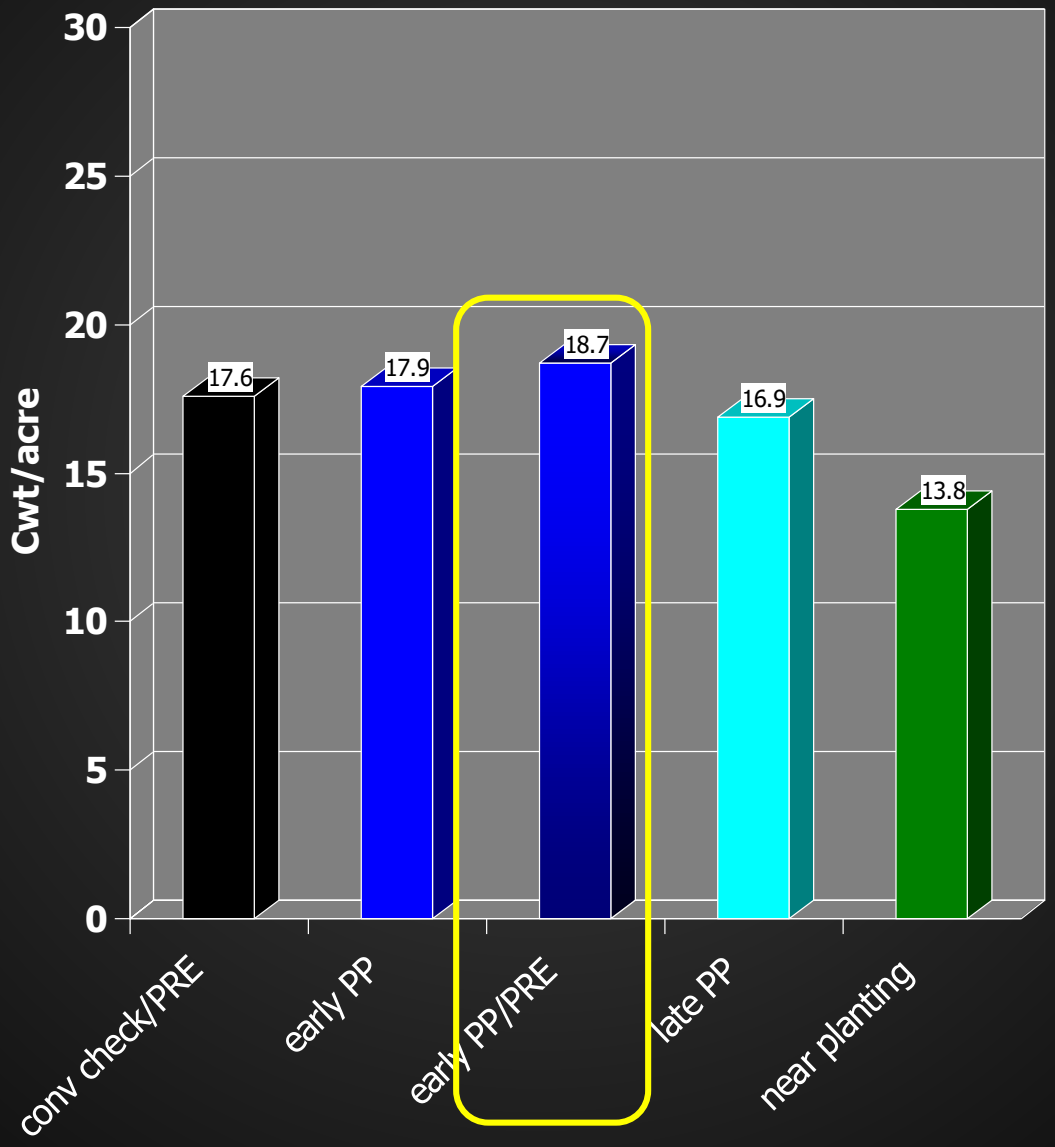
Weed control[1] in pinto bean among rye termination treatments with glyphosate, Carrington, 2020



Yellow = gr and ye foxtail;
LSD (0.10) = 6
Grey = common lambsquarters;
LSD (0.10) = 13

[1]Visual evaluation 3 weeks after bean planting (prior to POST herbicide applied across trial for general weed control). DBP=days before planting; DAP=days after planting. Glyphosate=Roundup Powermax at 28.4 fl oz/A; PRE=Spartan Elite at 20 fl oz/A. 'ND Palomino' direct planted in 30" rows on **June 4**.

Pinto bean yield with rye termination with glyphosate followed by PRE, Carrington, 2018-21 (4-year ave.)



What are appropriate winter rye planting dates and rates to achieve goals as a preplant cover crop with soybean?

North Dakota Soybean Council
Our World Is Growing

2 dates X 3 rates, Carrington, 2019-21

Rye plant stand: Ground cover, weed suppression, and impact on soybean

Weed suppression in soybean among winter rye planting dates and rates, Carrington, 2020[1]

Rye planting treatment		**Rye**		**Weed suppression** (May 28)	
	Rate	Plant density (May 8)		Foxtail	Kochia
Date	lb/A	plt/A	plt/ft^2	%	
Sept 26, 2019	25	338,650	8	52	55
	50	**796,800**	**18**	56	**79**
	75	**1,149,700**	**26**	**71**	**83**
Nov 1, 2019	25	162,200	4	10	0
	50	401,250	9	10	0
	75	591,950	14	16	0

[1]Rye (tillering to boot stages) terminated with glyphosate on May 29 (day of soybean planting = 'green-planted').

Foxtail suppression in soybean among winter rye planting dates and rates, Carrington, 2020-21[1] (2 year ave.)

Rye planting treatment		**Rye**		**Weed suppression** (mid-June)
	Rate	Plant density (first-half May)		Foxtail
Date	lb/A	plt/A	plt/ft^2	%
Sept 26, 2019 Sept 17, 2020	25	184,270	4	64
	50	436,120	10	58
	75	650,980	15	67
Nov 1, 2019 Oct 8, 2020	25	130,910	3	62
	50	332,960	8	66
	75	520,070	12	64

[1]Rye (tillering to boot stages) terminated with glyphosate near soybean planting date ('green-planted').

Summary: Rye cover crop planting dates and rates preceding soybean

- **Winter rye cover crop planting dates and rates**

  (Preliminary)

  - **Weed control**
    - Foxtail (2019 and 2021): similar among treatments
    - 2020 (foxtail and kochia): first date with 50-75 lb/A (>750,000 plt/A)
  - **Soybean plant development and seed yield**: similar among treatments

Summary of weed control with winter rye as preplant cover crop in soybean and pinto bean, Carrington REC, 2018-21

Weed	Control (%)[1]		Number of research trials
	Average	Range[2]	
Foxtail	**68**	**0-99**	**9**
Horseweed	31	22-40	1
Kochia	36	0-83	1
Common lambsquarters	72	66-97	1
Redroot and prostrate pigweed	69	54-81	1
Wild buckwheat	79	64-94	1

[1]Visual evaluation at soybean or pinto bean planting to one month after planting.
[2]Among all trial treatments with rye.


Broadleaf Crop
Tolerance to
Preplant
Dicamba

Tolerance of broadleaf crops to preplant (PP) low-rate dicamba for early season weed control

- Limited number of PP burndown herbicides available for soybean, dry bean and sunflower that control herbicide-resistant broadleaf weeds, provide initial soil residual safe to crop, and are low cost.
  - Low rates of **dicamba** may fit this description but waiting periods between dicamba application and planting plus annual rainfall restrictions generally restrict use of the herbicide, due to *potential* crop injury.

Objective and Description of Research Study, 2021

- **Primary objective**
  - **Build a ND database that provides a reference for farmers and crop advisers to make decisions if considering use of this strategy.**

- **Locations**
  - **Carrington** (irrigated site) **and North Central (Minot) RECs, and Prosper**
- **Crops**
  - **Soybean** (non Xtend)**, pinto bean and sunflower**.
- **Treatments**
  - **untreated crop checks**
  - **PP dicamba** (Clarity or generic) **applied at 4 fl oz product/A** (first-half May)
    - **planting date <1 wk after dic app and no rain;**
    - **planting date >2 wk after dic app plus rainfall (irrigation) ≥1”**

Planting dates and water following dicamba application, ND, 2021

Location	Dicamba application date	First planting date	Total water (inches) from dic app	Second planting date	Total water (inches) from dic app
Carrington	May 13	May 19	0.08	June 1	2.16
Prosper	May 17	May 19	0	June 2	0.74
Minot	May 7	May 14	0	May 27	0.96

Soybean injury (June 14; Carrington): Dic app May 13; PFS '19B04' planted May 19

Preliminary SOYBEAN results, ND, 2021

- **Plant injury**
  - First planting date
    - Carrington: 14-43%
    - Prosper: 53-73%
    - Minot: 85-87%
  - Second planting date
    - Carrington: ≤5%
    - Prosper: 18-45%
    - Minot: 22-39%
- **Plant stand with first and second planting dates**
  - Carrington: no reduction
  - Prosper: reduced 38% and no reduction
  - Minot: reduced 68% and 27%

Pinto bean injury (June 14; Carrington): Dic app May 13; ‘ND Palomino’ planted May 19

Preliminary PINTO BEAN results, ND, 2021

- **Plant injury**
  - First planting date
    - Carrington: 28%
    - Prosper: 50-65%
    - Minot: 91-93%
  - Second planting date
    - Carrington: ≤7%
    - Prosper: 30-58%
    - Minot: 24-40%
- **Plant stand with first and second planting dates**
  - Carrington: no reduction
  - Prosper: reduced 35% and no reduction
  - Minot: reduced 73% and 19%

Preliminary SUNFLOWER results, ND, 2021

- **Plant injury** 0-5% at Carrington; ≤10% at Prosper; and 3-23% at Minot with both planting dates.

- **Plant stand** similar among trts at Carrington and Prosper; and reduced 9-12% at Minot.

Crop yield with PP low-rate dicamba, Carrington, 2021

Planting date	Herbicide	Crop		
		Soybean (bu/A)	**Pinto bean** (cwt/A)	**Sunflower** (cwt/A)
19-May	Untreated check	77.2	31.3	25.8
	dicamba	72.9	29.9	30.0
1-Jun	Untreated check	76.2	30.7	25.2
	dicamba	71.5	30.4	24.1
LSD (0.05)		NS	NS	NS

SUMMARY (preliminary): Tolerance of broadleaf crops to PP low-rate dicamba, ND, 2021

- Soybean and pinto bean generally had unacceptable plant injury (both planting dates) and stand reduction (first planting date)
- Sunflower had no or acceptable plant injury and stand reduction.
- All crop seed yield not impacted (Carrington)

- Study will continue in 2022
  - ND Soybean Council funding; Northarvest pending; NSA ?

Thank you for your attention.

Questions?

EXTENDING KNOWLEDGE ›› CHANGING LIVES

NDSU | EXTENSION