The effects of two years of manure application on corn yield and soil salinity

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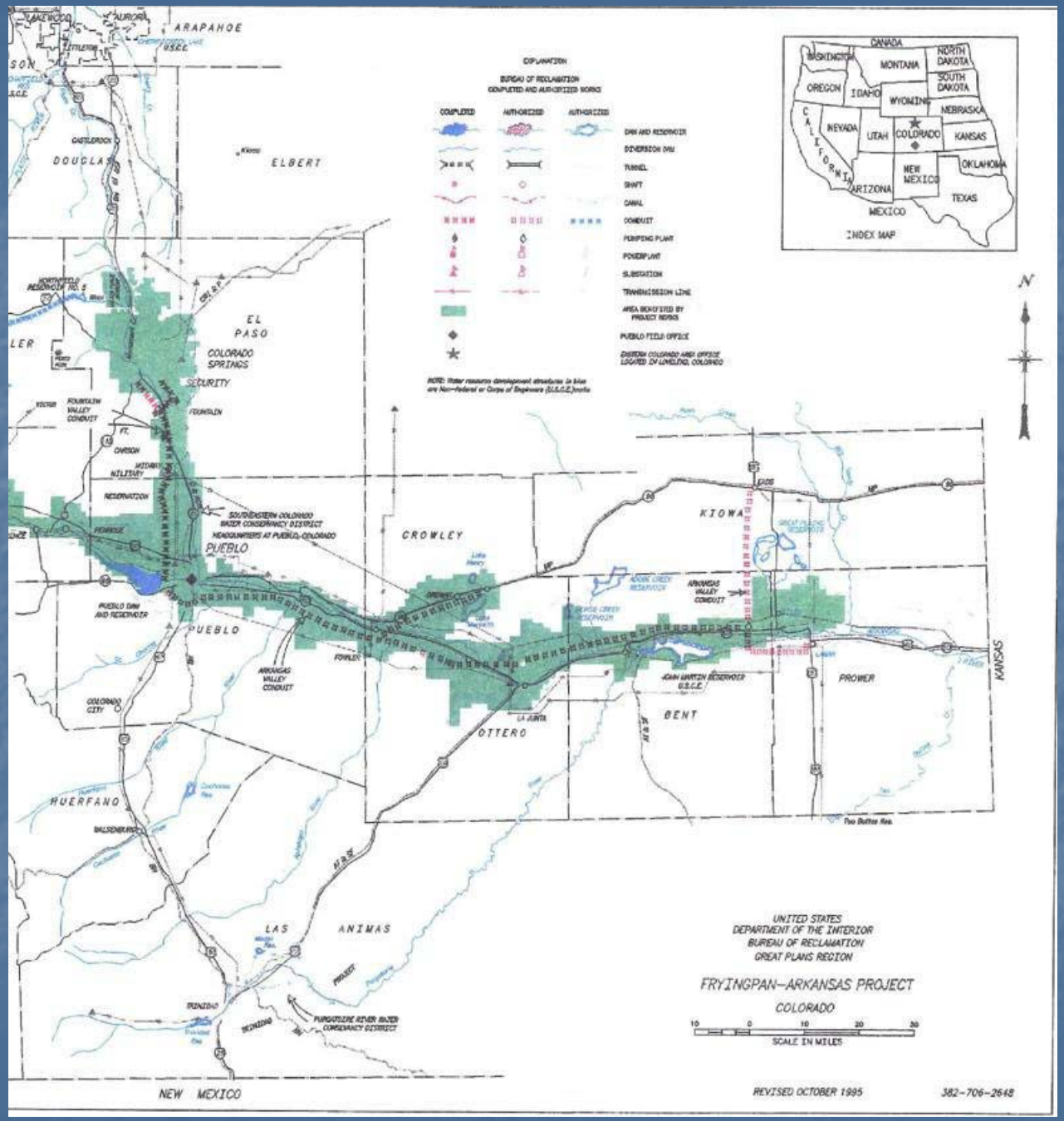
Acknowledgments

- Ardell Halvorson, USDA-ARS, Ft. Collins
- Michael Bartolo, CSU-AVRC


EXPLANATION
BUREAU OF RECLAMATION
COMPLETED AND AUTHORIZED WORKS
COMPLETED
AUTHORIZED
AUTHORIZED
DAM AND RESERVOIR
DIVERSION DAM
TUNNEL
SHAFT
CANAL
CONDUIT
PUMPING PLANT
POWERPLANT
SUBSTATION
TRANSMISSION LINE
AREA BENEFITED BY PROJECT WORKS
PUEBLO FIELD OFFICE
EASTERN COLORADO AREA OFFICE LOCATED IN LOVELAND, COLORADO
NOTE: Water resource development structures in blue are Non-Federal or Corps of Engineers (U.S.C.E.) works
INDEX MAP
CANADA
WASHINGTON
MONTANA
NORTH DAKOTA
SOUTH DAKOTA
OREGON
IDAHO
WYOMING
NEBRASKA
CALIFORNIA
NEVADA
UTAH
COLORADO
KANSAS
OKLAHOMA
NEW MEXICO
ARIZONA
TEXAS
MEXICO
ARAPAHOE
DOUGLAS
ELBERT
EL PASO
COLORADO SPRINGS
SECURITY
FOUNTAIN
FOUNTAIN VALLEY CONDUIT
FT. CARSON
MILITARY RESERVATION
SOUTHEASTERN COLORADO WATER CONSERVANCY DISTRICT
HEADQUARTERS AT PUEBLO, COLORADO
PUEBLO
PUEBLO DAM AND RESERVOIR
PUEBLO
ARKANSAS VALLEY CONDUIT
FOWLER
COLORADO CITY
CROWLEY
KIOWA
ARKANSAS VALLEY CONDUIT
JOHN MARTIN RESERVOIR U.S.C.E.
LA JUNTA
OTTERO
BENT
PROWER
KANSAS
HUERFANO
LAS ANIMAS
PURGATOIRE RIVER WATER CONSERVANCY DISTRICT
NEW MEXICO
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
GREAT PLAINS REGION
FRYINGPAN-ARKANSAS PROJECT
COLORADO
SCALE IN MILES
REVISED OCTOBER 1995
382-706-2648

RATIONALE

- [NO_3-N] in groundwater > 10 ppm
- High salt concentrations in the Ark Valley (300 to >6,900 ppm TDS)
- Leaching potential exacerbated by furrow irrigation
- Availability of manure & high cost of synthetic fertilizers

OBJECTIVE

- **Assess the residual effects of two consecutive years of N fertilizer and manure application under drip and furrow irrigation on:**
  - **Corn yield**
  - **Soil NO_3-N and P concentrations**
  - **Soil salinity**

MATERIALS & METHODS

- Drip vs. Furrow Irrigation
- Full vs. Deficit Irrigation
- N rates: 0, 60, 120, 180 lb N/a
- Manure rate: 0, 10, 20, 30 t/a
- 4 replications

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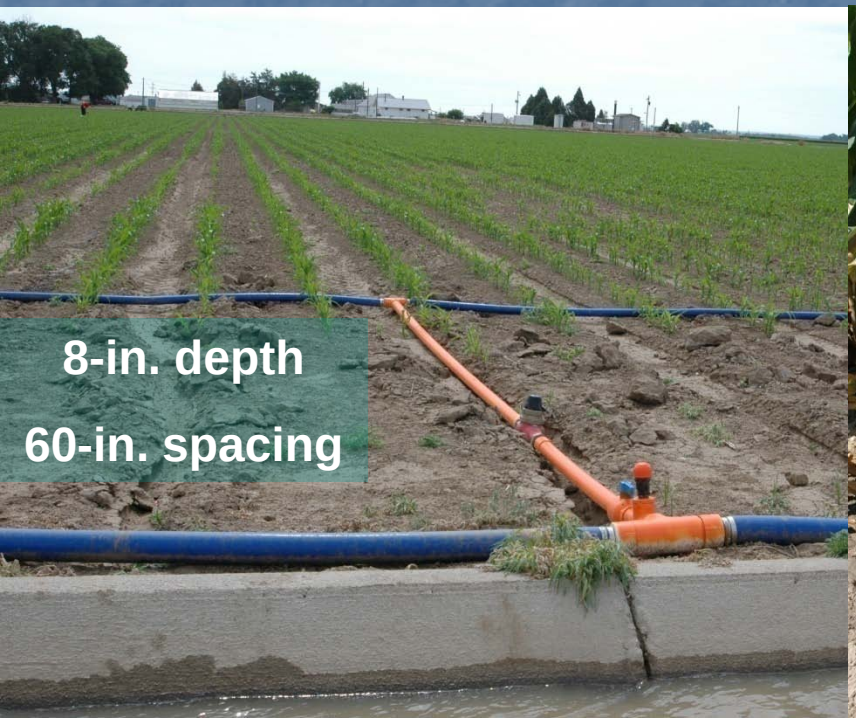

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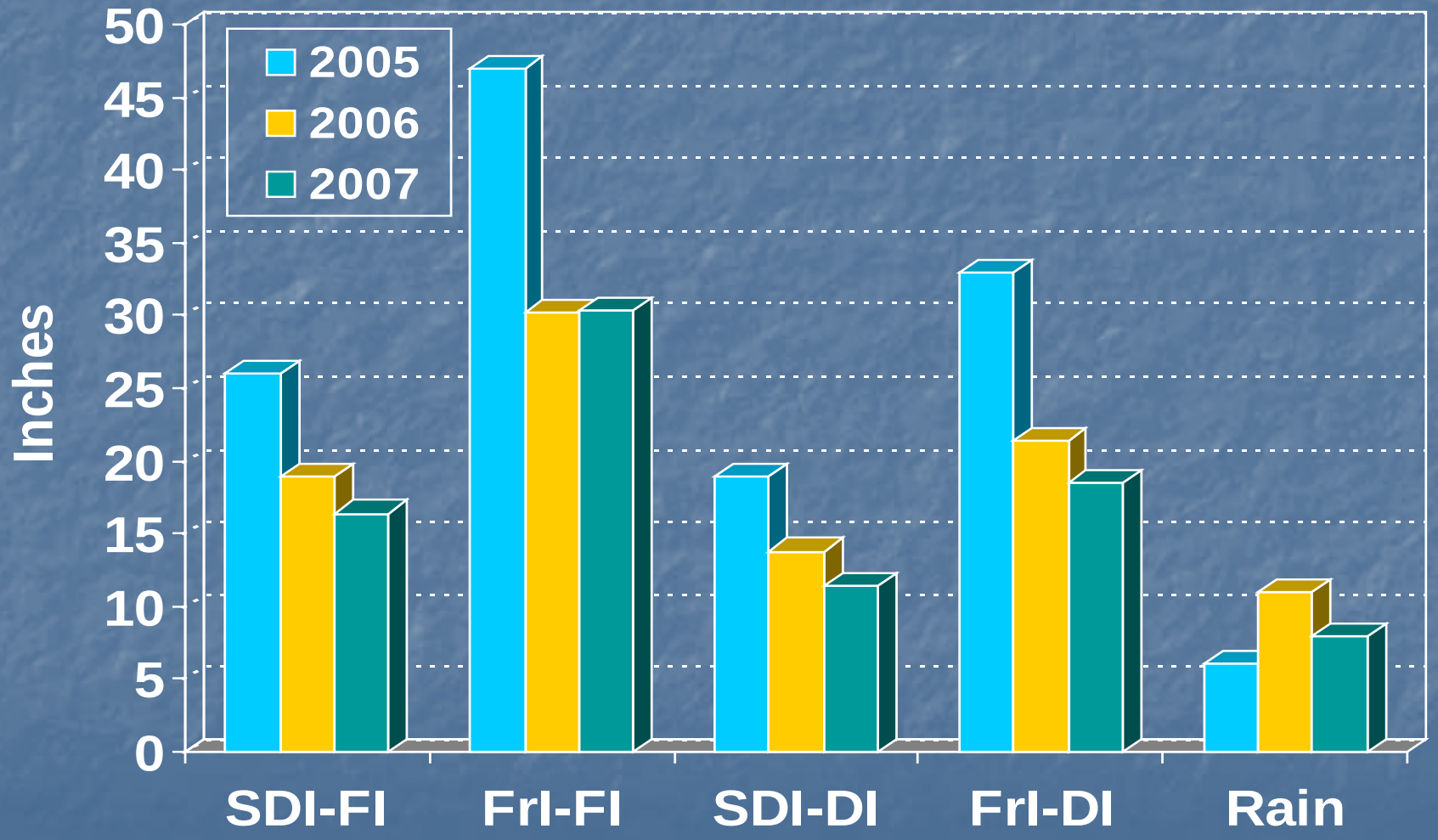
Precipitation Amounts (gross)



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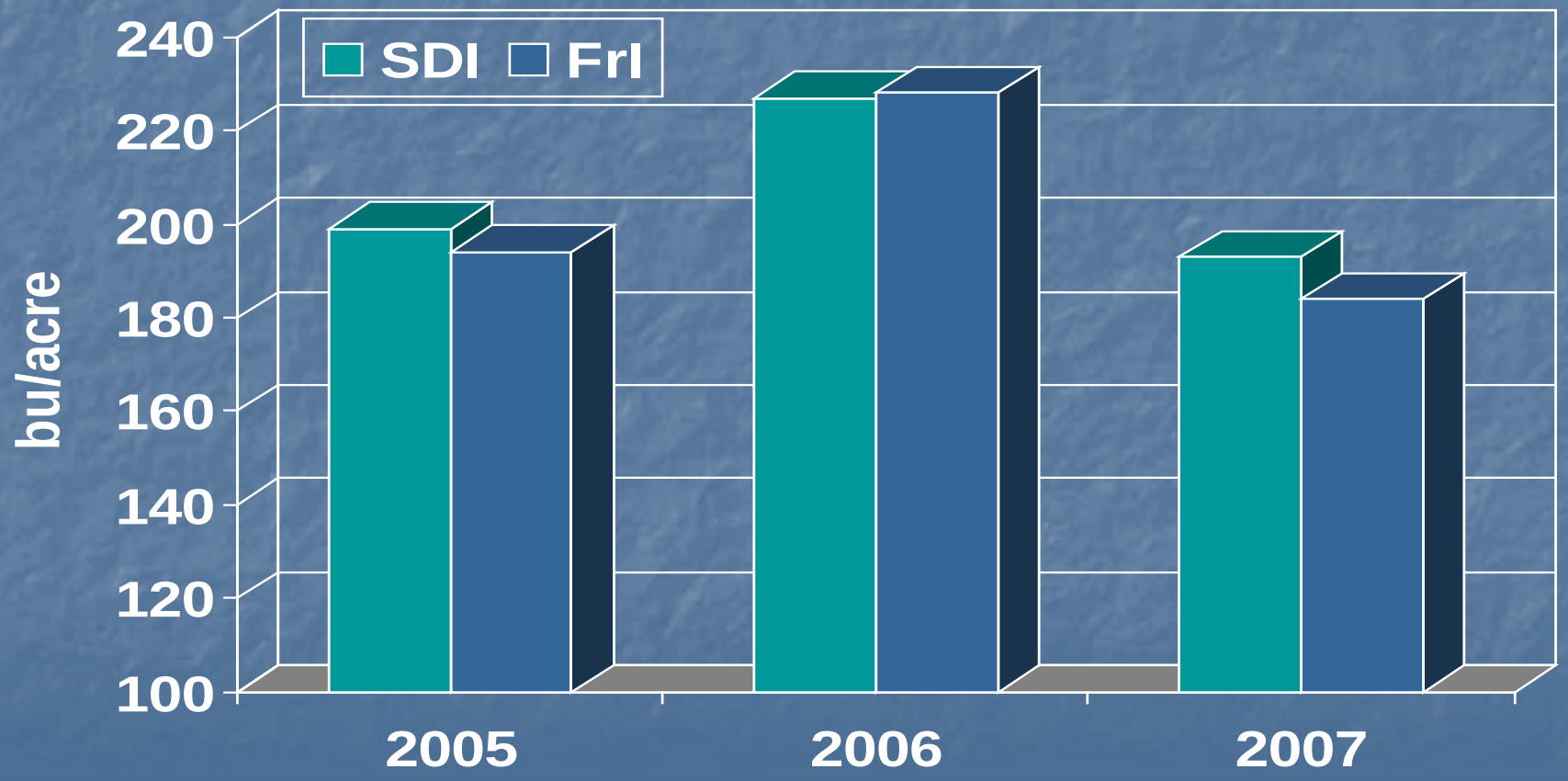
Corn Yield: Drip vs. Furrow Irrigation



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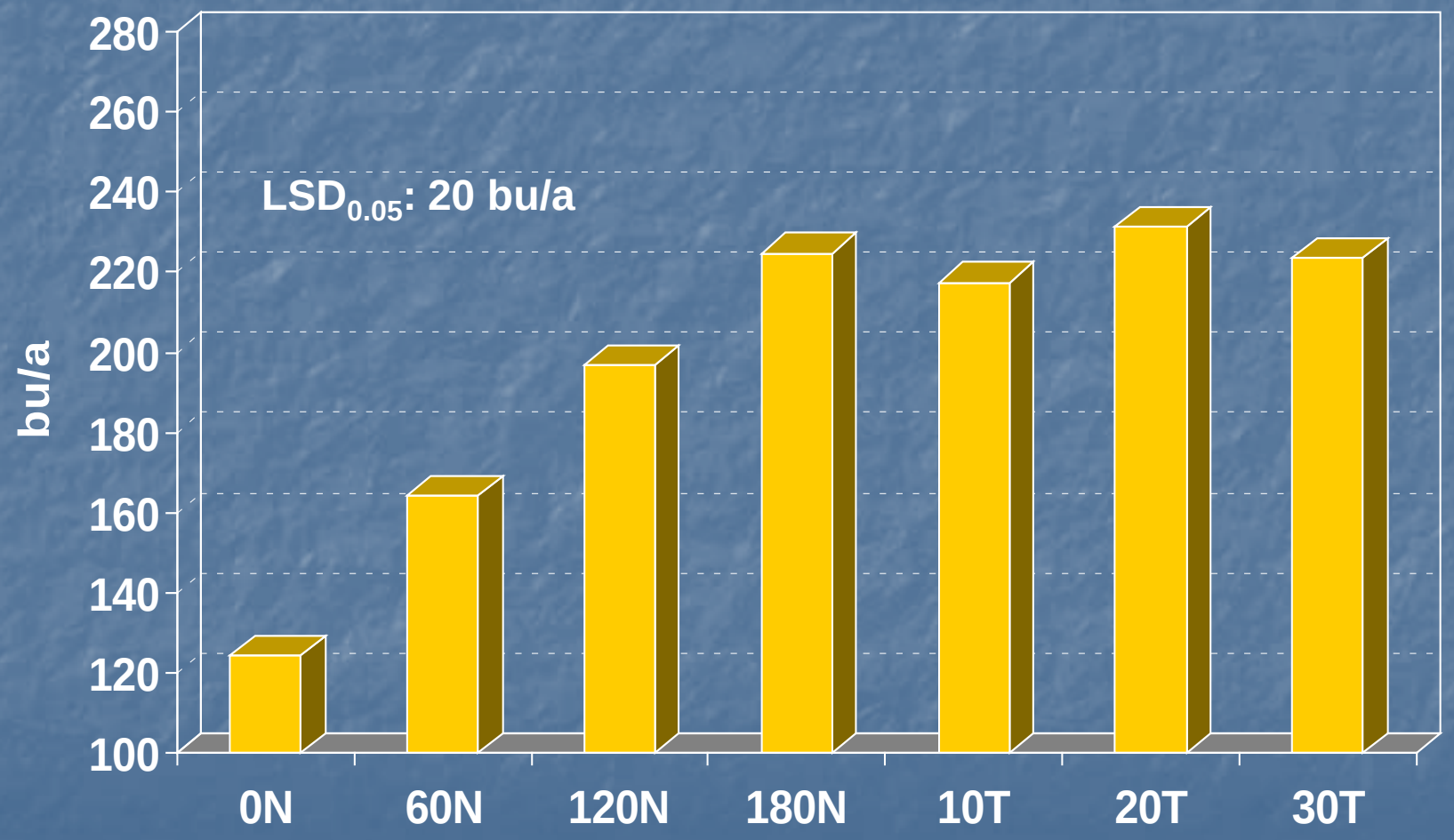
Fertilizer Application History

Cropping Season	Nitrogen Fertilizer	Manure
2005	YES (March'05)	YES (March'05)
2006	YES (March '06)	YES (Nov.'05)
2007	NO	NO

Corn yield as affected by N and manure rates in 2007



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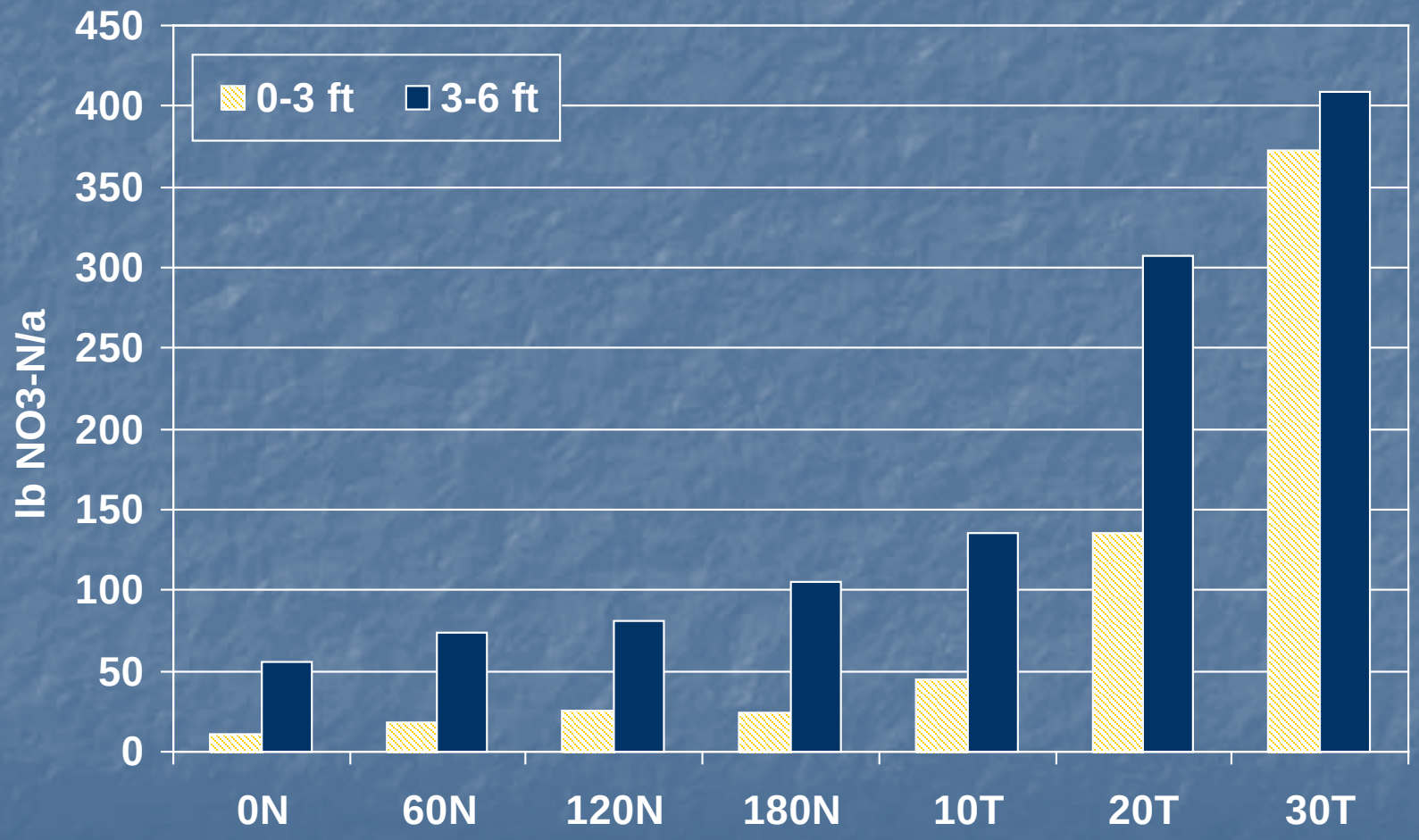
Soil Nitrate-N in the Fall of 2007



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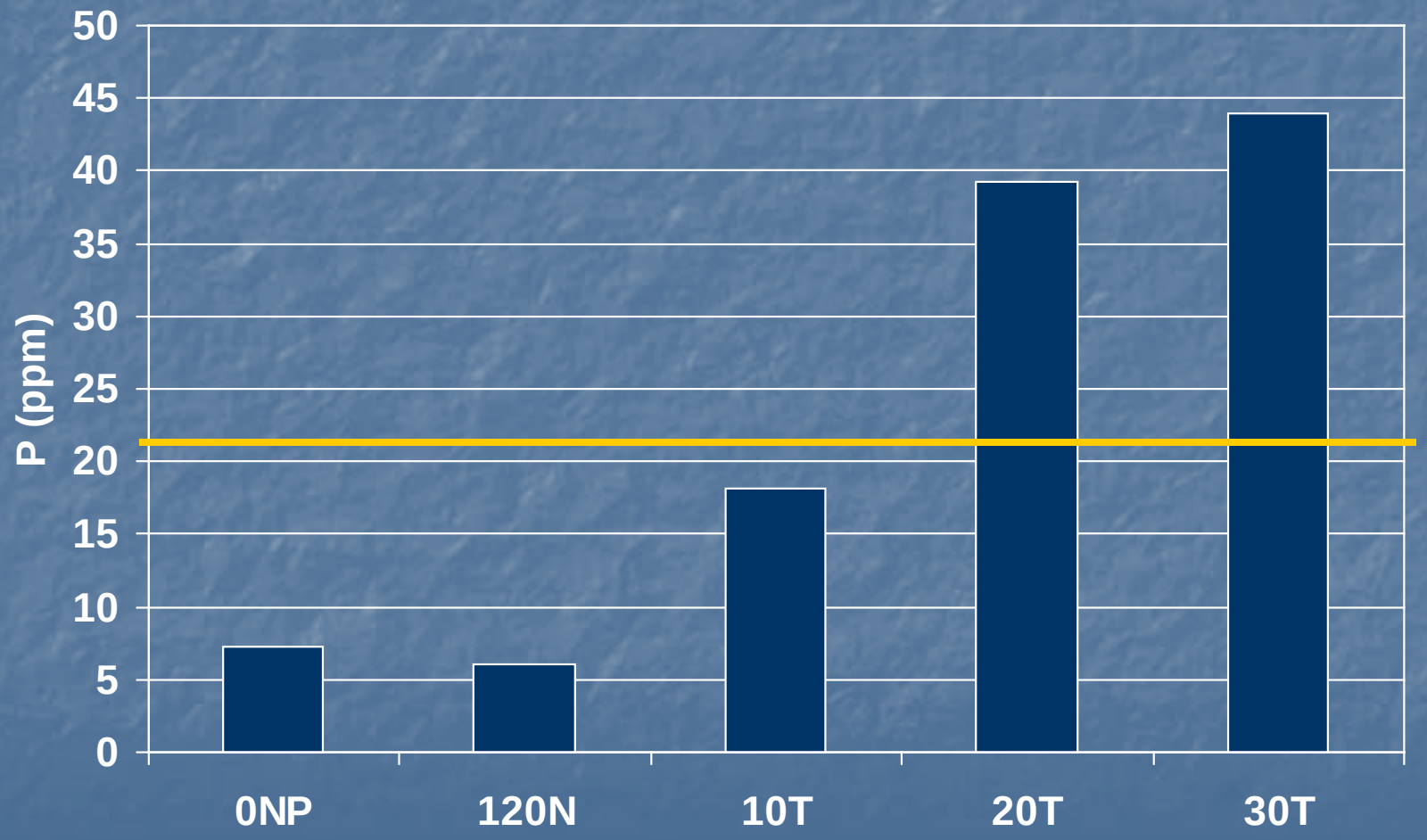
[Sodium-Bicarbonate P] in 0-1 ft of Soil in the Fall of 2007



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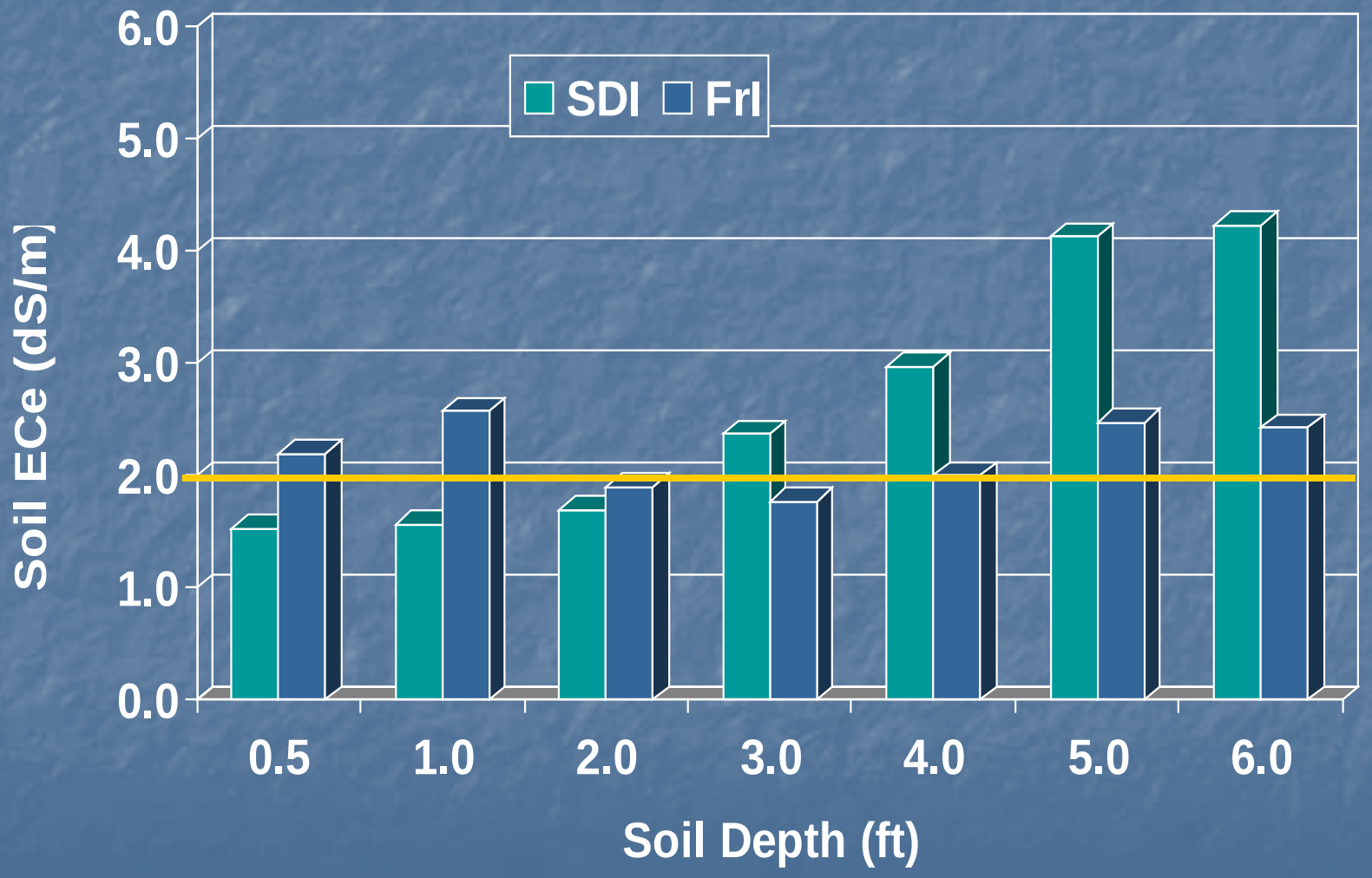
ECe of SDI and FrI in Nov'06



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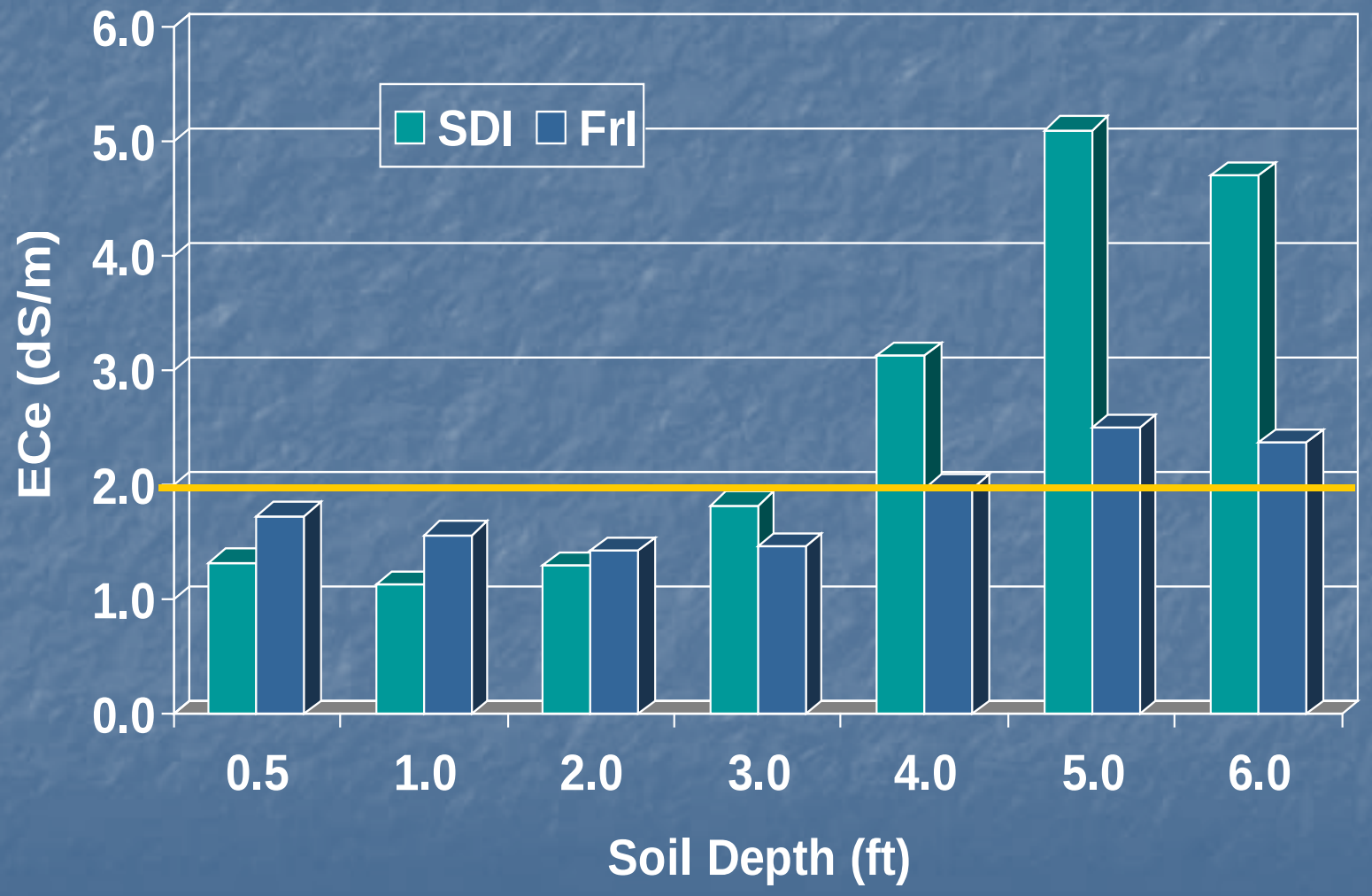
ECe of SDI and FrI in Oct'07



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CONCLUSIONS

- SDI = FrI with ~ 43% less water
- Increase in [NO_3-N] and [P] with manure
- Importance of soil testing
- Increase in [salt] with manure. Temporary!
- Challenges with SDI
  - Salt accumulation
  - Seed germination

Questions?

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