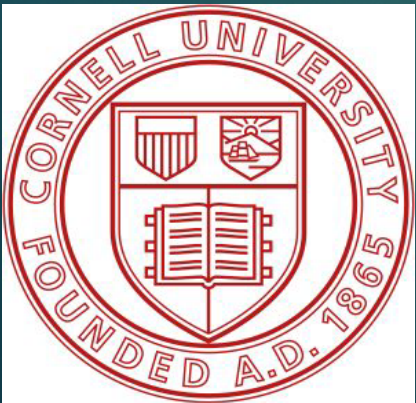


Selecting Corn Silage Hybrids

DR. L. E. CHASE

PROFESSOR EMERITUS – DAIRY NUTRITION

CORNELL UNIVERSITY



Background



Faculty member in charge of nutrition and forage management program.



600 milking cows, 1,400 crop acres.



CAFO herd.



About 70 fields.



New York requires nutrient management on a field basis.

Background

- 2

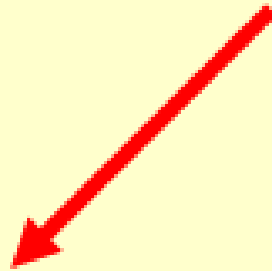
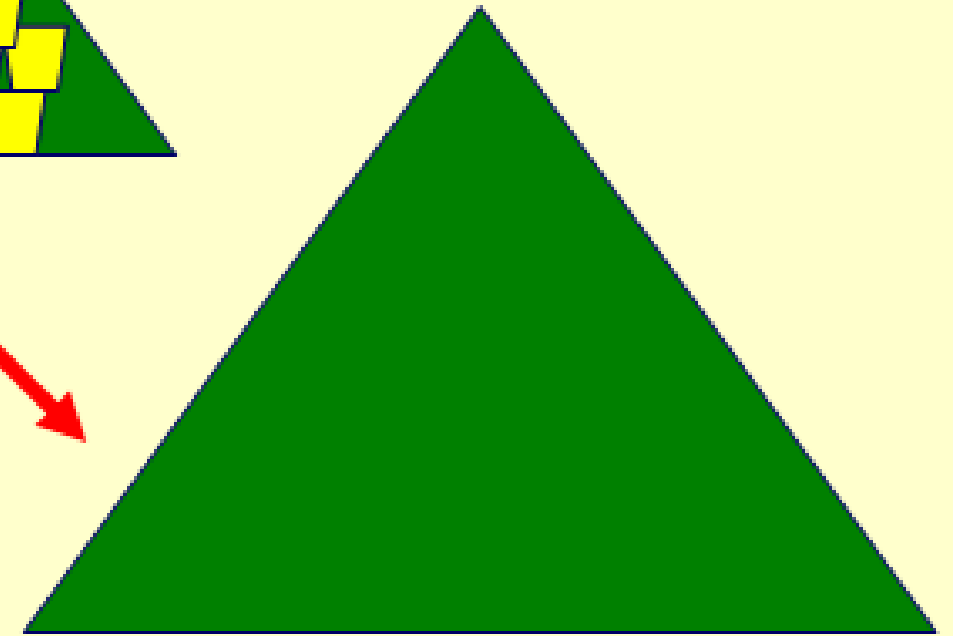
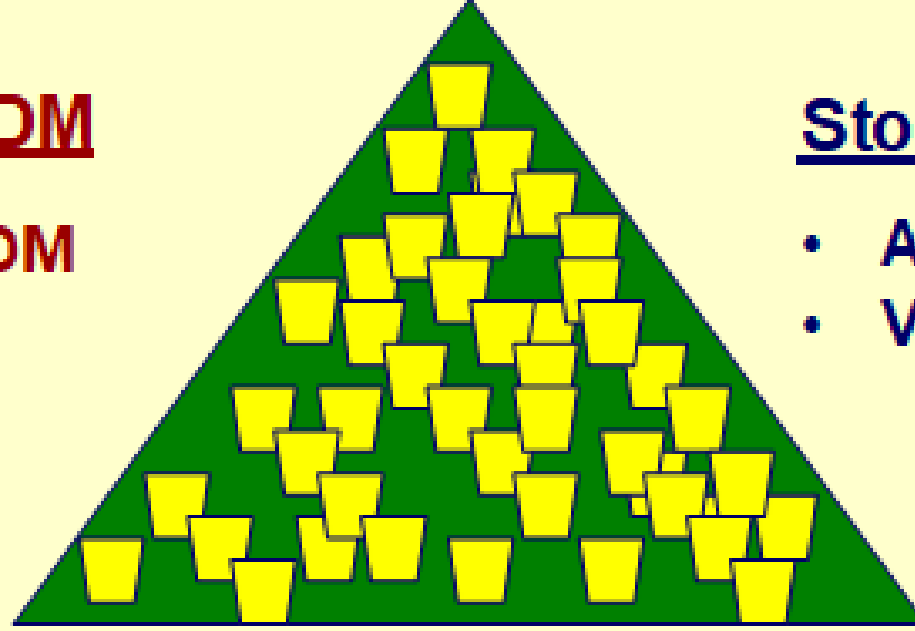
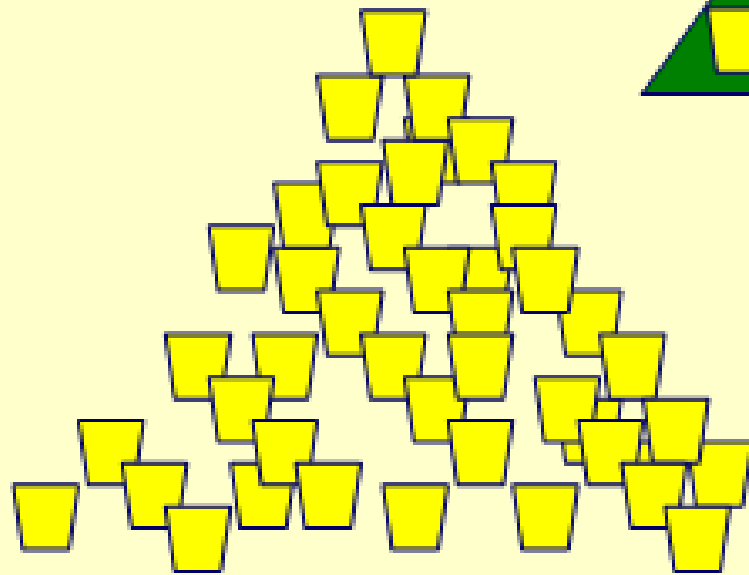
- ▶ Custom operators used for planting and harvesting.
- ▶ All trucks go over scales to get yields by field.
- ▶ Primary crops – Corn silage, alfalfa silage, grass hay.
- ▶ 11 bunker silos plus ag-bags (if needed).
- ▶ Forage samples taken at harvest.
- ▶ Range of soil types, fertility, drainage and slope.

Grain ~40-45% of WPDM

- Avg. 30% starch in WPDM
- Variable grain:stover

Stover= ~55-60% of WPDM

- Avg. 42% NDF
- Variable stover:grain



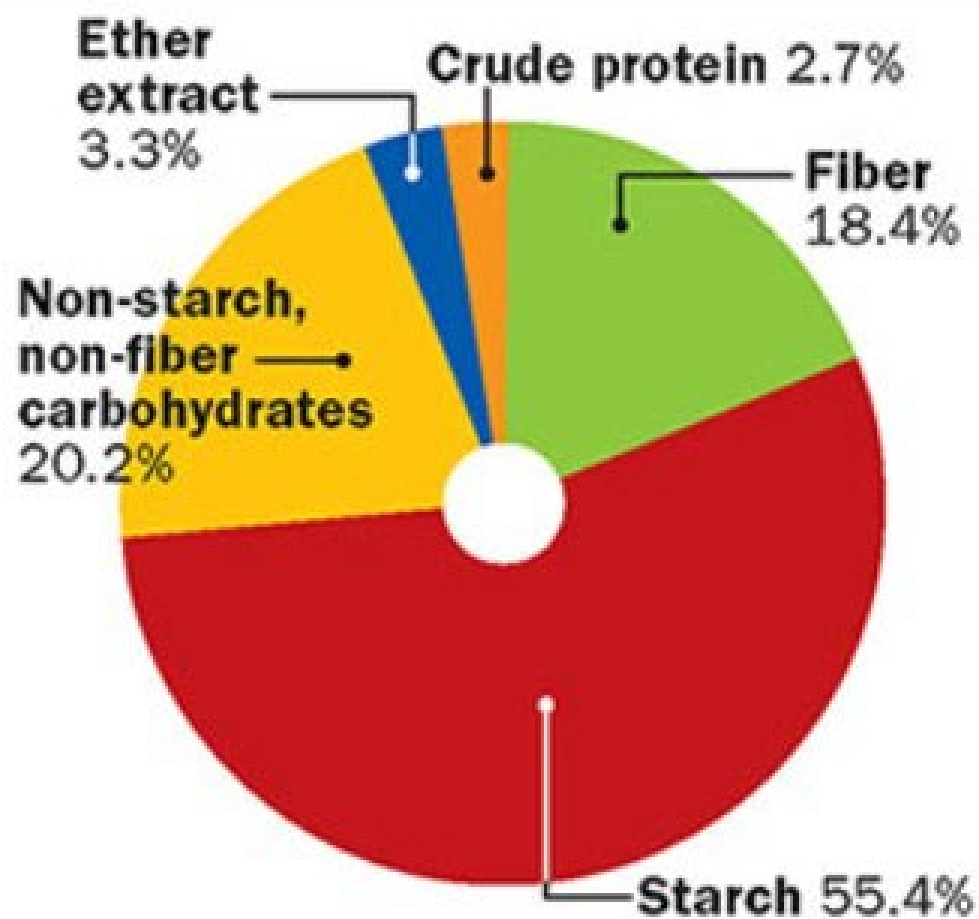
80 to 98% starch digestibility

- Kernel particle size
- Duration of silage fermentation

40 to 70% IVNDF

- Lignin/NDF
- Hybrid
- Maturity

Figure 1: Corn silage total digestible nutrient contributions



What Controls Corn Silage Yield and Quality?

Weather – Environmental conditions.

Pest and disease.

N application.

Planting population.

Hybrid selection.

Previous crop.

Timing – Planting and harvest.

Hybrid Selection

- ▶ “ Hybrid selection is one of the most important management decisions influencing the economics of corn silage production”
- ▶ Dr. Mike Allen – Michigan State University

Selecting Hybrids - Challenges

Large number of companies and hybrids are available.

No industry standards for describing maturity ratings.

No database comparing hybrids for yield and quality.

Limited number of hybrids are in trials in the same environment.

Many new hybrids each year.

How Much Variation in the Same Environment?

- ▶ Preliminary 2021 Georgia irrigated corn silage (Tifton).
- ▶ 38 hybrids.
- ▶ 35% DM yields.
- ▶ Average = 31.6 tons.
- ▶ Range = 28.5 to 35.

2020 University of Florida Data

Parameter	Average	Low	High
Yield, t/acre	24.8	16.9	31.1
Milk/ton, lbs.	3379	3034	3723
NDF, %	45.2	38.8	54.1
NDFD, % of NDF	50.8	46.1	54.2
Starch, %	27	15.6	33.6

Corn Silage Quality Indicators for High-Producing Dairy Herds

Slide Credit: Dr. Randy Shaver, U. of Wisconsin

Parameter	Indicates Better Quality	n	Average \pm 1 STDEV
NDF (% DM)	↓	384,715	41 - 36
Lignin (% DM)	↓	344,134	3.3 - 2.6
uNDF ₂₄₀ (% NDF)	↓	81,418	27 - 24
NDFD ₃₀ (% NDF)	↑	170,634	54 - 60
TTNDFD (% NDF)	↑	27,954	41 - 46
Starch (% DM)	↑	347,759	32 - 39
Milk per ton	↑	136,056	3320 - 3683

Summary of combined multi-year, multi-lab (CVAS, DairyOne, RRL, DLL) data, except TTNDFD only from RRL

Importance of NDF Digestibility

- ▶ A 1 unit increase in NDFD =
 - +0.37 lbs. dry matter intake.
 - +0.5 lbs. milk.
 - +0.55 lbs. energy corrected milk.

- ▶ Oba and Allen, 1999

Southeast Corn Silage Composition

Item	Average	- 1 SD	+ 1 SD
CP, % of DM	8.03	7.04	9.02
NDF, %	30.7	35.2	44.2
30- hour NDFD, % of NDF	55.1	51.1	59.2
Starch, % of DM	33.5	27.5	39.8
7-hour Starch Dig., % of starch	72.4	66.7	78.2

3910 samples from 1/1/20 to 9/30/21, Cumberland Valley Analytical Services

What Does This Mean?

- ▶ The difference between 51 and 59% NDFD is about:
 - 3 lbs. of dry matter intake.
 - 4 lbs. of milk.
 - 4.4 lbs. of energy corrected milk.
- ▶ There are still many samples $< 51\%$ and $> 59\%$ NDFD.

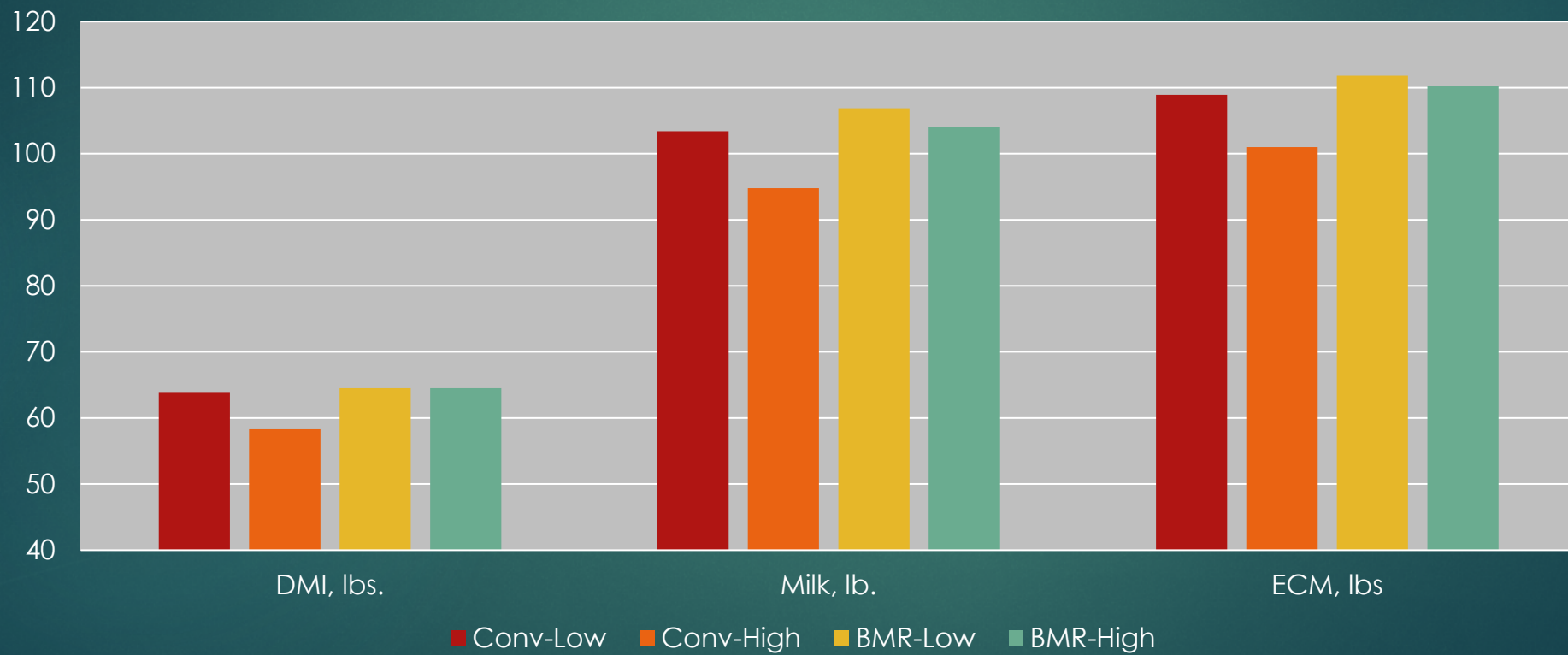
Miner Institute Trial

	Conv. CS	BMR CS
CP, %	7.2	7.9
NDF, %	36.1	34.8
NDFD, % of NDF	48.6	62.1
Starch, %	36	34.5

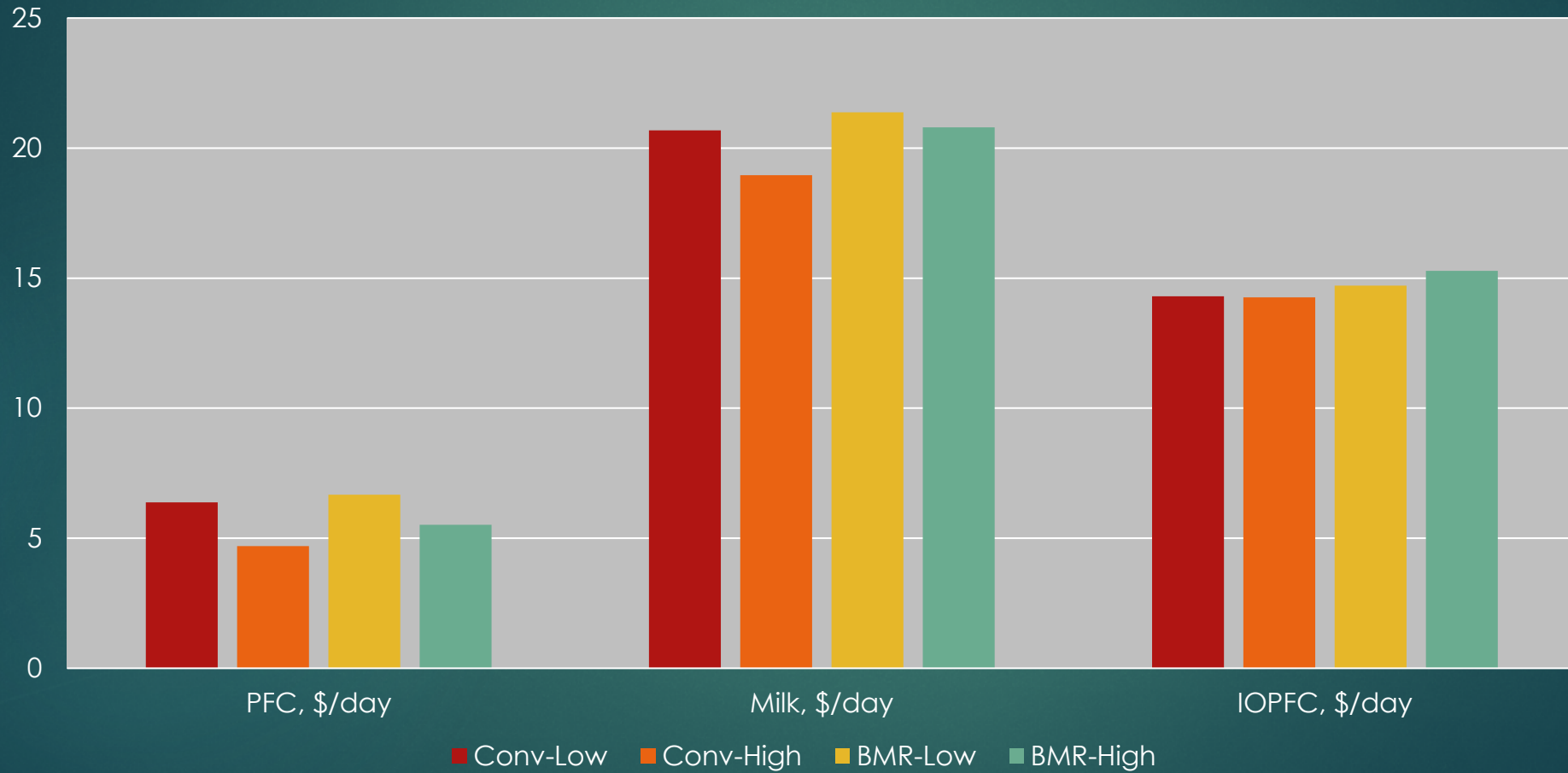
Miner Institute - 2

	Conv-Low	Conv-High	BMR-Low	BMR-High
Corn silage, % of DM	39	55	36	50
Hay crop sil., % of DM	13.3	13.3	13.3	13.3
CP, % of DM	17	17	16.7	16.7
NDF, % of DM	30.8	33.7	30.7	33.5
Starch, % of DM	28	21	28	24

Miner Institute - 3



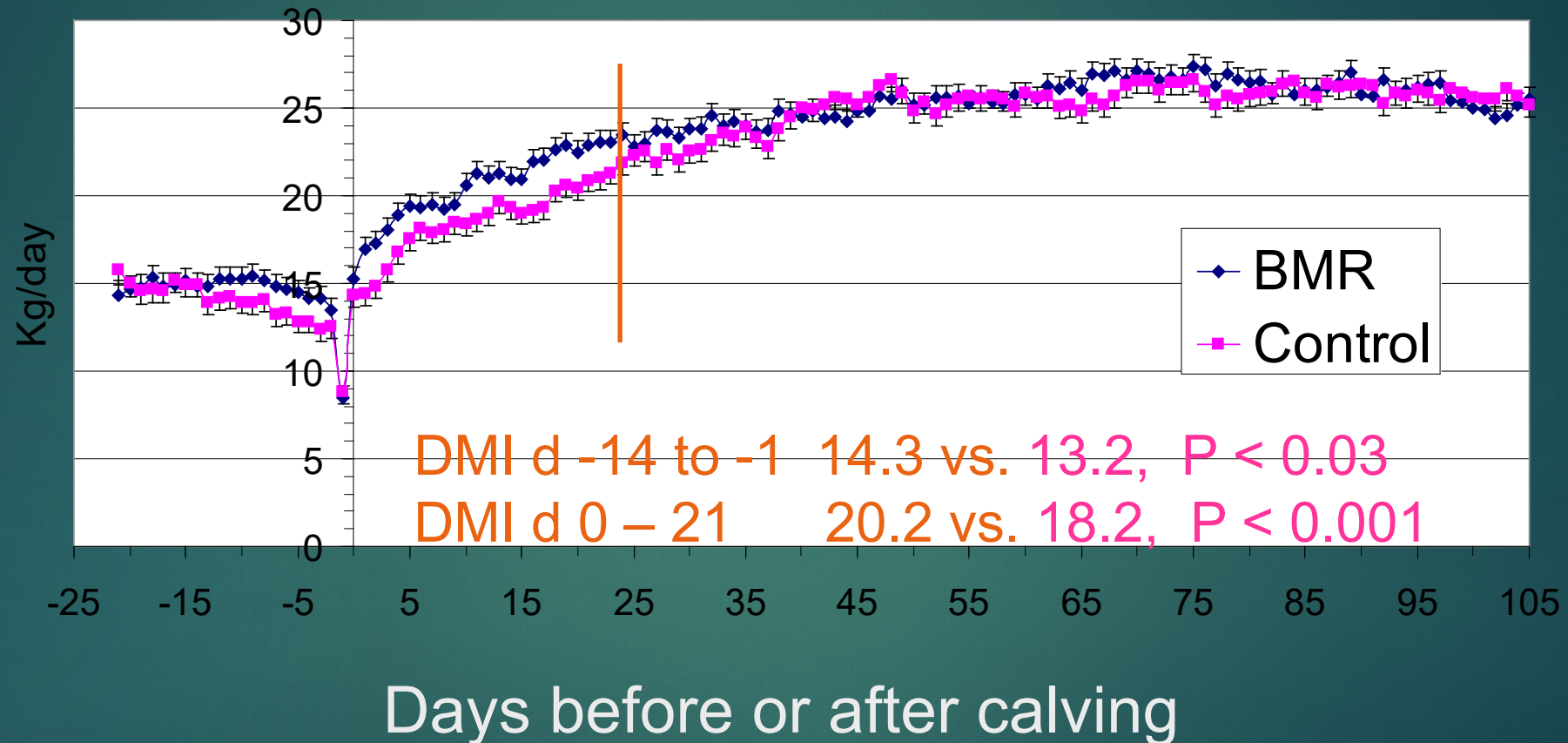
Miner Institute - 4



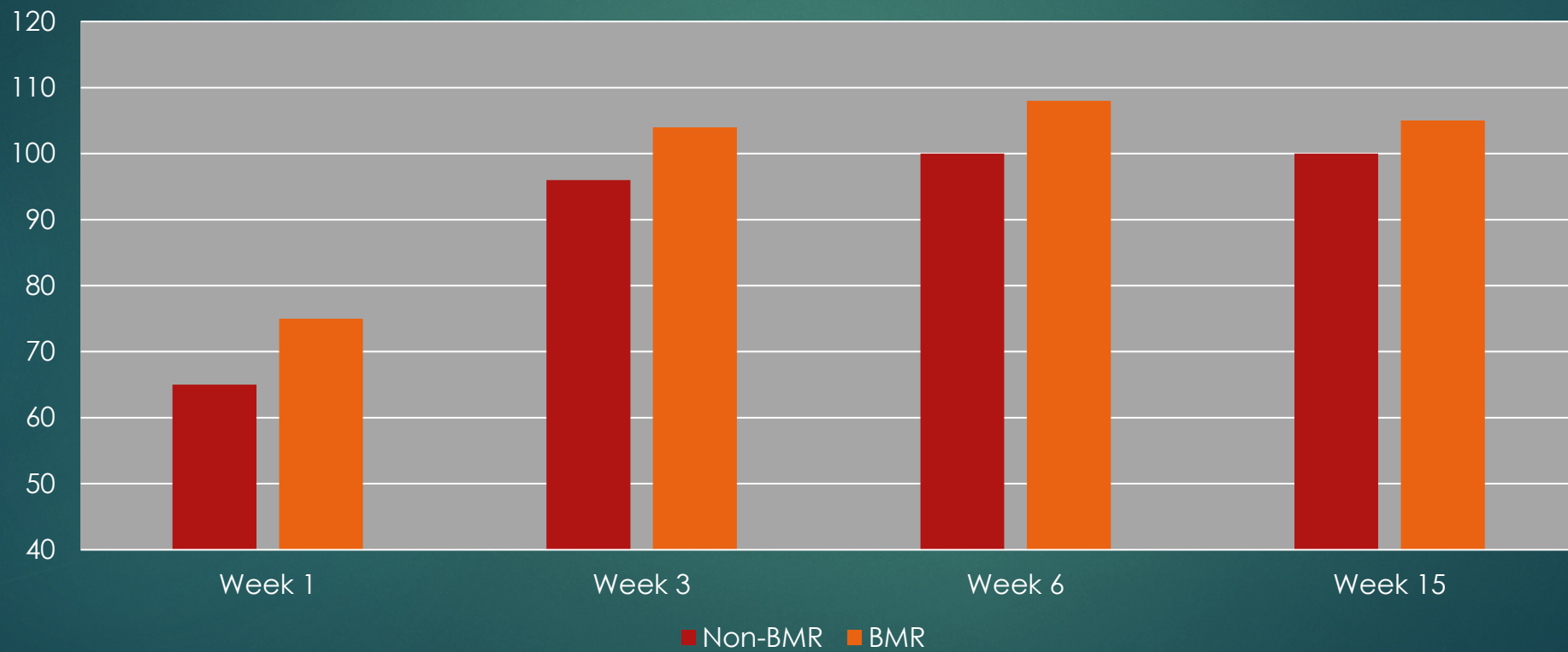
Cornell BMR Trial

- ▶ Will a high NDFD help DMI and milk in fresh cows?
- ▶ If fed for a short time, is there a carryover effect on milk?
- ▶ Used non-BMR and BMR corn silage.
- ▶ Diet was 40% corn silage and alfalfa silage,
- ▶ Fed for 3 weeks pre-calving and 4 weeks post-calving.
- ▶ All cows fed conventional corn silage after 4 weeks.

DMI of cows fed BMR or Conventional corn silage during the transition period



Milk Production



Enogen Corn Silage

- ▶ 2 University research trials.
- ▶ Penn State -
 - 48 cows averaging 79 DIM and 97 lbs. milk.
 - 10-week continuous trial
- ▶ Ohio State -
 - 15 cows, Latin square design.
 - More intensive trial in terms of measurements.

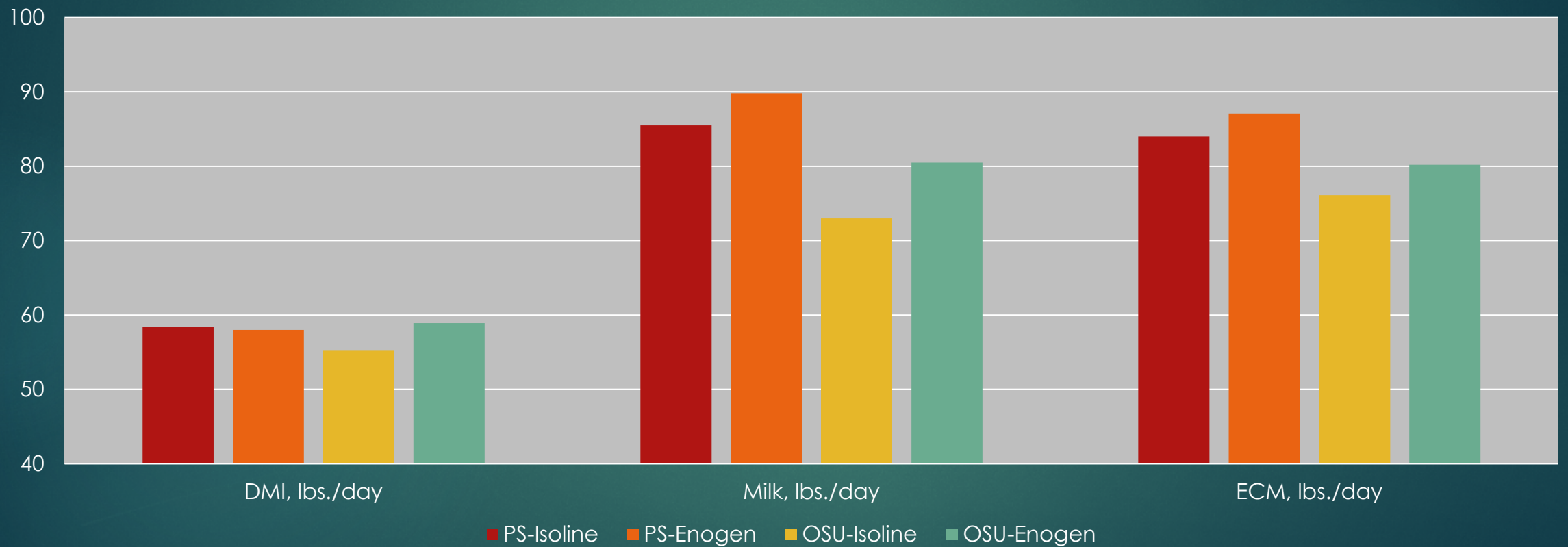
Diets Fed

- ▶ Penn State -
 - Isoline and Enogen corn silage.
 - 40% corn silage and 15% alfalfa haylage.
 - 16.6 % CP, 33.7% NDF, 24 -25% starch.
- ▶ Ohio State -
 - Isoline and Enogen corn silage.
 - 50-51% corn silage and 3.6% alfalfa silage.
 - 18.35% corn (isoline), 17,9% corn (Enogen)
- ▶ - 15.7 % CP, 31.4 & 31.8% starch, 31.7 & 30.7% NDF

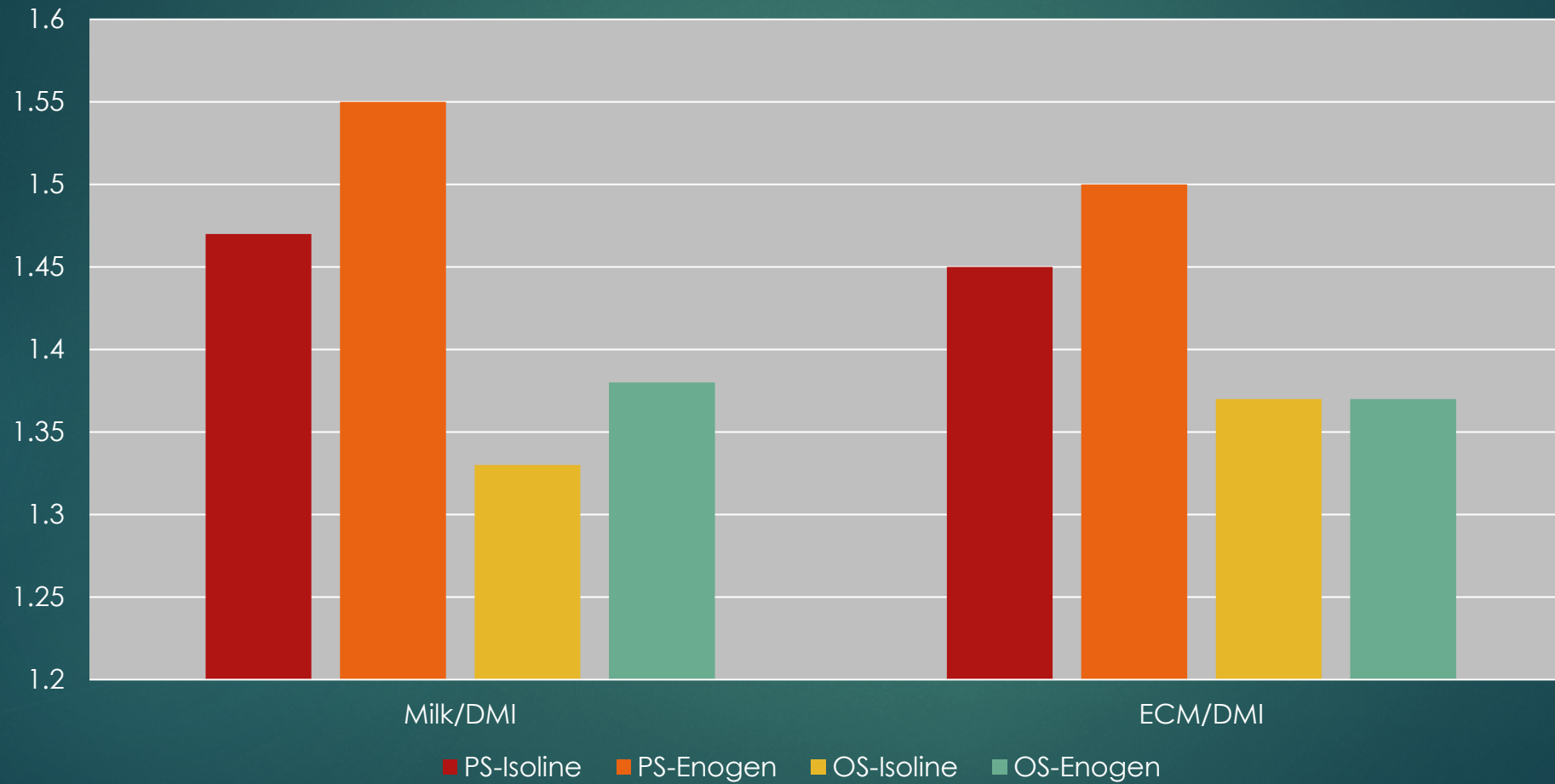
Corn Silage Nutrient Composition – Penn State

Item	Isoline	Enogen
CP, % of DM	8.1	7.6
NDF, % of DM	37.5	36.7
NDFD-30, % of NDF	52.9	54.3
Starch, % of DM	33	36
7-hour starch dig., % of starch	82.3	80.7
WCS, % of DM	4.68	4.59

Dry Matter Intake and Milk Production



Feed Efficiency



Enogen Summary

- ▶ Significant differences for cows fed Enogen corn silage:
 - DMI was higher in the Ohio State study.
 - Actual milk was higher in both studies.
 - Actual feed efficiency was higher in both studies.
- ▶ Methane emission intensity (g/lb. milk) was lower in both studies.

What About Seed Corn Cost?

- ▶ Seed corn cost is about 10-15% of the total cost of producing corn silage and getting it into the silo.
- ▶ Wide range of seed corn prices (NY data for 2021):
 - \$200 per bag – conventional, no traits.
 - \$230-250 – Round up Ready plus insects.
 - \$280-320 – Triple tack or greater.
- ▶ - BMR at top end of triple stack price.

Seed Corn Cost

\$/bag	200	320
\$/acre (32,000 plants)	80	128
\$/ton, 20 tons	4	6.40
\$/ton, 24 tons	3.30	5.33
\$/cow/day, 50 lbs. CS	0.10	0.16
\$/cow/day, 50 lbs. CS	0.08	0.13

2 Types of Corn Silage Hybrids?

- ▶ Can we do better in meeting cow requirements and lower feed cost by using more than 1 type of corn silage hybrid?
- ▶ High NDFD and starch digestibility hybrid for fresh and high producing cows and pre-breeding heifers.
- ▶ Higher fiber, lower energy hybrid for dry cows, bred heifers and late lactation cows.

2 Types of Hybrids

- ▶ Advantages:
 - Better match cow requirements.
 - Lower forage cost.
- ▶ Disadvantages:
 - Need separate storage facilities.
 - Would have 2 bunkers open.
 - Can you feed fast enough to keep both faces fresh (especially in the summer)?
 - Feeder needs to keep track of which corn silage to which ration.

How Do You Select Silage Hybrids?

- ▶ 1. Define agronomic considerations:
 - Soil type, fertility, N application, drainage, slope and prior crop.
- ▶ 2. Maturity – Define the maturity rating for your farm. We use 95 – 110 day hybrids. This reduces the number of hybrids you need to select from.
- ▶ 3. Technology traits – What are the insect, pest and disease concerns in your area? What has been your experience with these?

Silage Hybrid Selection

- ▶ 4. Agronomic traits – Stress emergence, adaptability to high populations, drought tolerance standability.
- ▶ 5. Whole plant dry matter yield.
- ▶ 6. NDF and NDFD.
- ▶ 7. Starch content and starch digestibility.

Other Considerations

- ▶ Select multiple hybrids with varying maturity:
 - How long does it take to plant and harvest?
 - Widens the pollination window.
 - Lowers the risk of an individual hybrid on your total corn silage program.
 - Gives a longer window to harvest at the correct maturity.
- ▶ Would you breed all cows to the same bull?

Additional Thoughts

- ▶ It takes a team!
 - We usually have our agronomy consultant, herd nutrition person and seed corn representatives to go through the process since we will be making decisions on hybrids for 35-40 fields with varying characteristics.
- ▶ What other services does the seed company provide?
 - Crop planning and population guidance.
 - Any post-planting observations.
 - Whole plant dry matters for harvest planning?

Thanks!

