# Oilseed Press Evaluations: Preliminary Results



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Oilseed Producers Meeting March 19, 2013

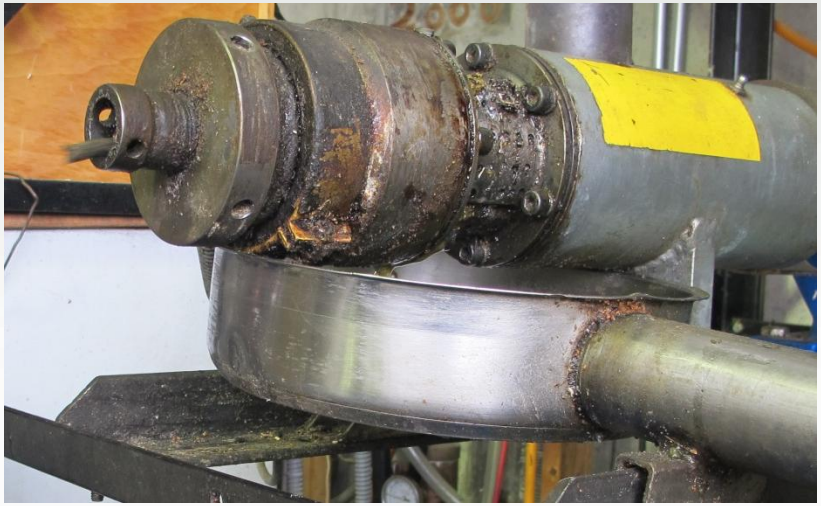
NW CROPS & SOILS PROGRAM

UNIVERSITY OF VERMONT EXTENSION

CULTIVATING HEALTHY COMMUNITIES

# Objective:

- To establish a protocol and evaluate different press designs used in the Northeast
  - Examine different presses
  - Measure performance
  - Analyze quality of oil & meal



# Evaluating each press

- 3 CROPS
  - Canola
  - Soybean
  - Sunflower



- 3 METHODS
  - Method 1: Operator's preferred tuning
  - Method 2: Faster processing, Less net oil
  - Method 3: Slower processing, More net oil

- 3 PRESSES (so far)

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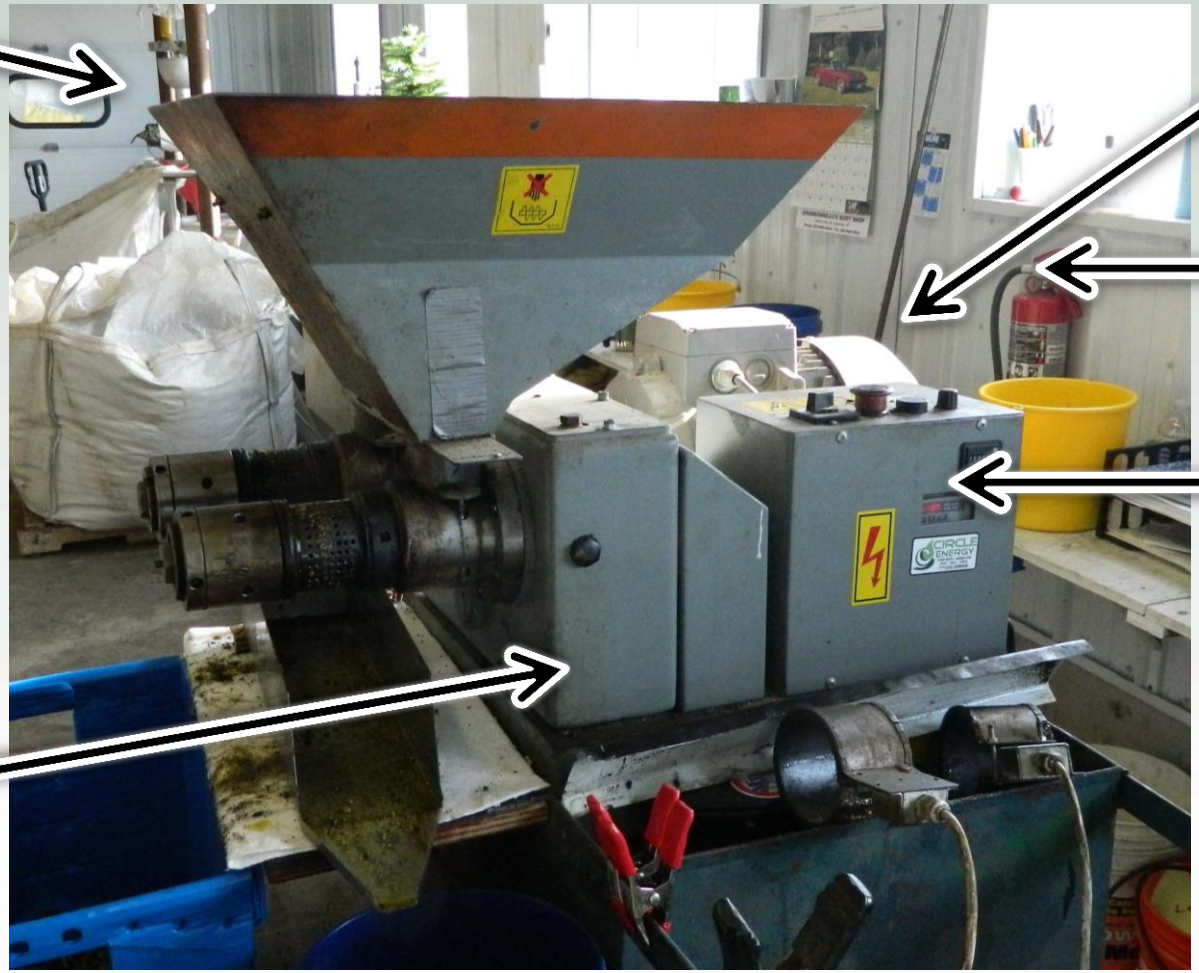
# Press Overview



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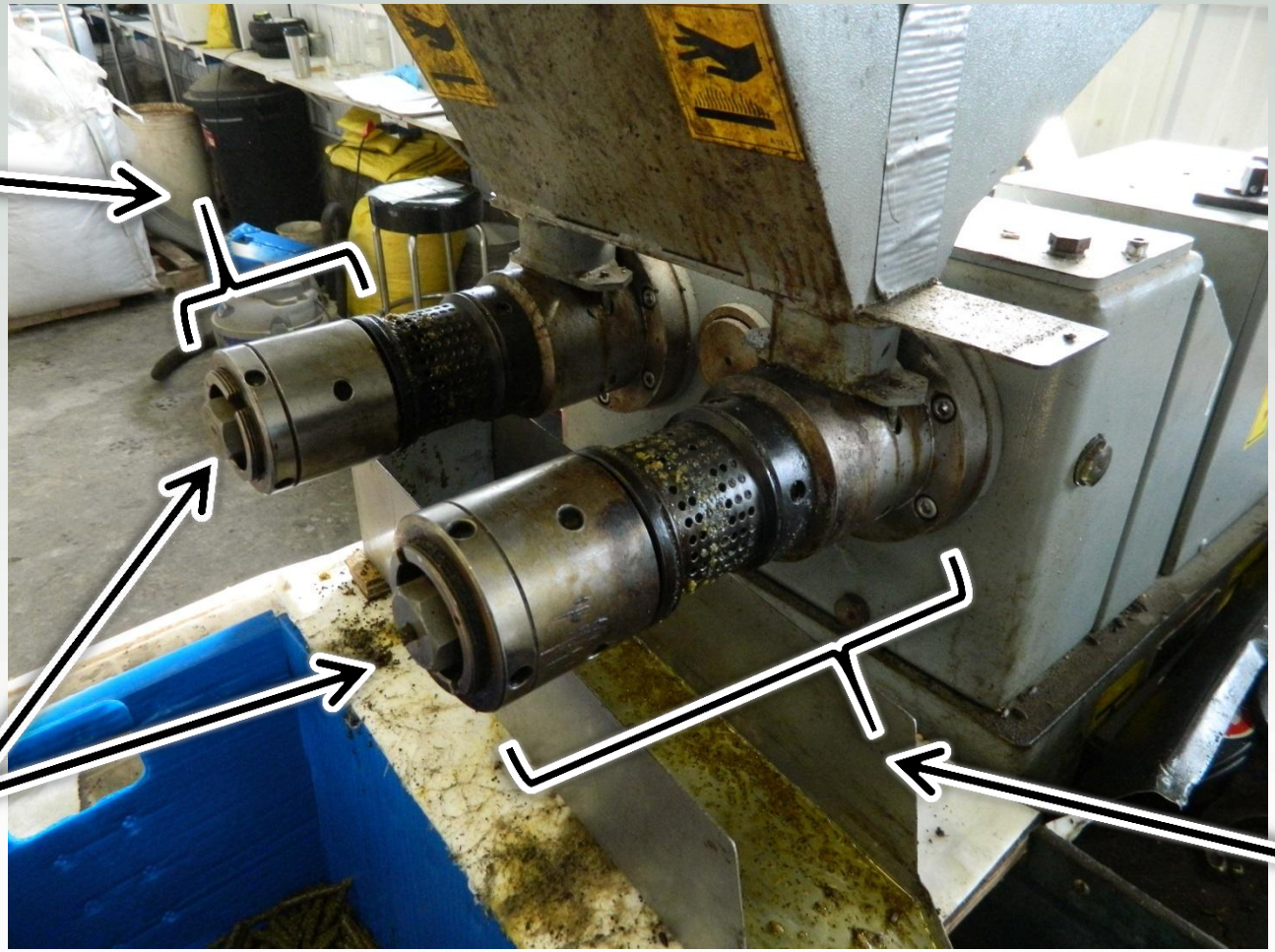
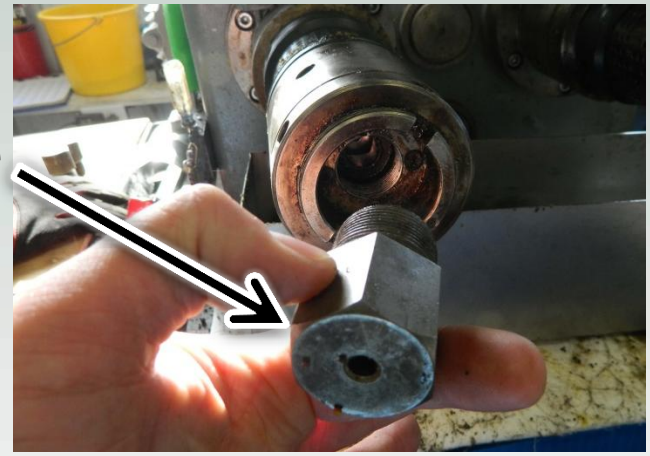
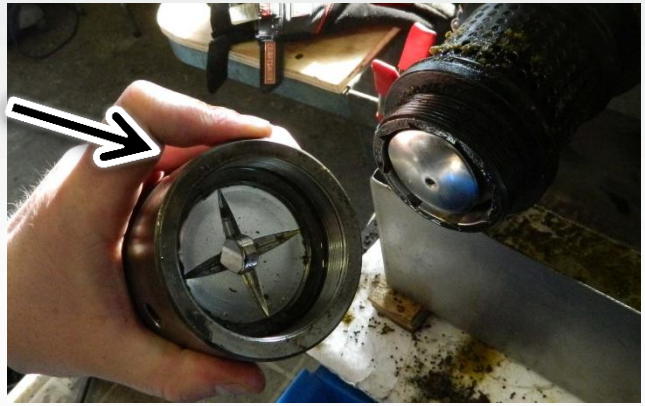


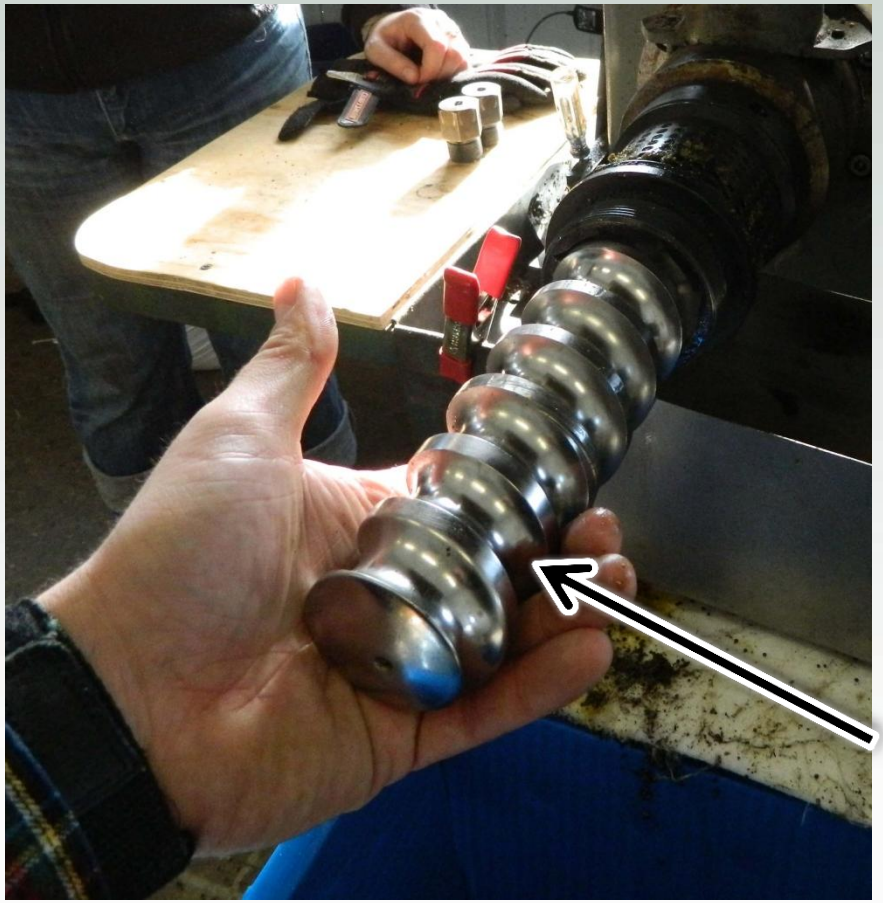
# Press Overview

Nozzle



Collar



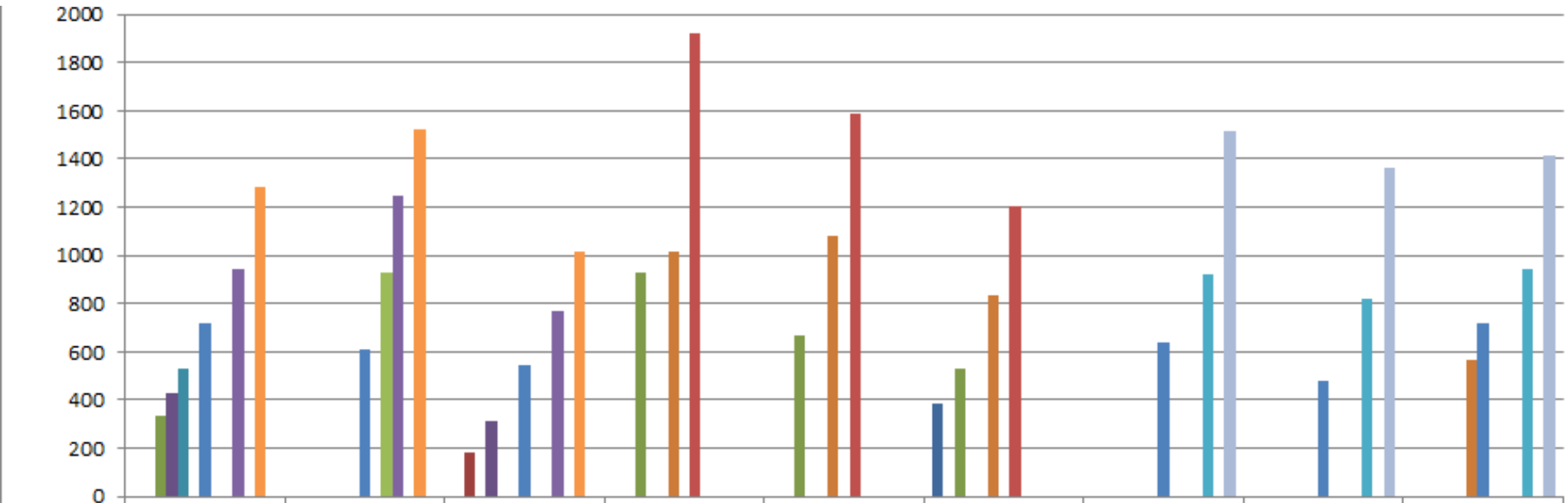


Screw

# Evaluation

- Set-up press
  - Screw type, nozzle size & speed
- Press a set amount of oil (0.5 lb)
  - Timed
- Measure temperatures
- Collect oil and meal
  - weight of oil + weight of meal
    = weight of seed pressed
- Samples for analysis

# Capacity – Pounds of seed in 24 hours of operation (preliminary results)




| Screw Speed RPM | AgOil M70 | | | KernKraft KK40 | | | Taby 70 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Canola | Soy | Sunflower | Canola | Soy | Sunflower | Canola | Soy | Sunflower |
| 18 | | | | | | 382 | | | |
| 18.75 | | | 184 | | | | | | |
| 25 | 335 | | | 927 | 665 | 527 | | | |
| 31.25 | 427 | | 311 | | | | | | |
| 37.5 | 533 | | | | | | | | |
| 40 | | | | 1017 | 1081 | 835 | | | 565 |
| 50 | 716 | 609 | 545 | | | | 636 | 482 | 717 |
| 60 | | | | 1922 | 1588 | 1201 | | | |
| 62.5 | | 932 | | | | | | | |
| 75 | 943 | 1245 | 773 | | | | | | |
| 80 | | | | | | | 920 | 817 | 940 |
| 100 | 1284 | 1520 | 1018 | | | | | | |
| 120 | | | | | | | 1513 | 1361 | 1415 |

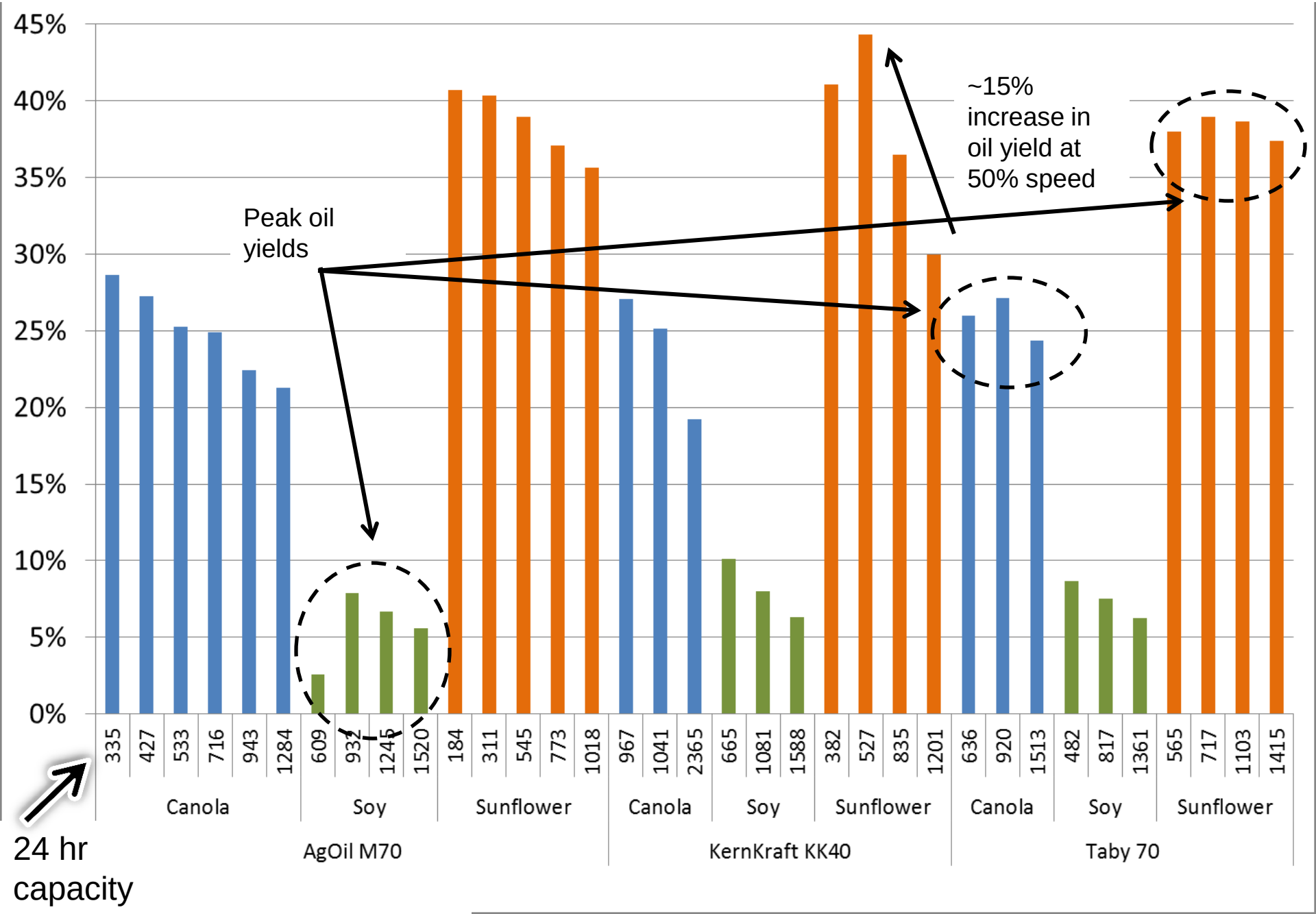
# Capacity

- No single number captures this
  - Seed / crop dependent
  - Drive speed dependent
  - Nozzle dependent
- High screw RPM = High seed through-put
- The “speed” indicator is usually Hz of the drive
  - Not screw speed in RPM



* Preliminary results

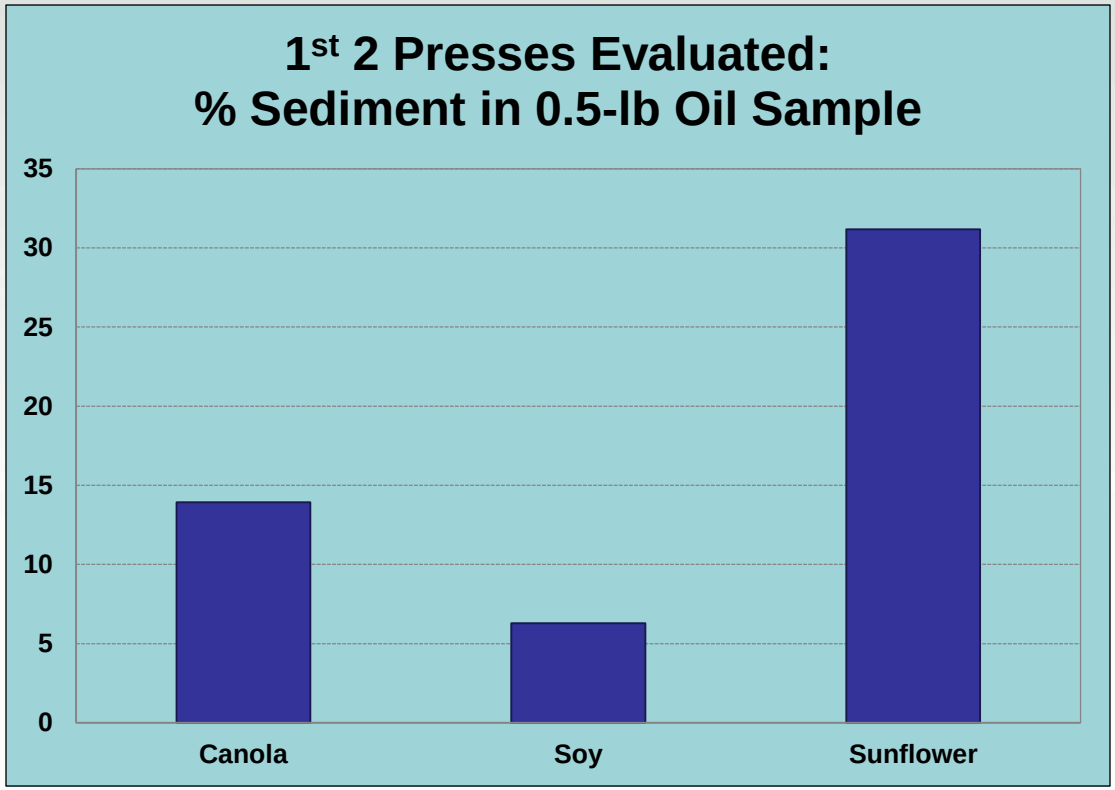
# “Net” Oil Yield (prior to settling) – preliminary results



# Oil quality


Samples sent to Dr. Ryan Elias at Penn State University for quality testing

- Gum content
- Free fatty acids / lipids
- Degumming
- Bleaching
- Stability
- Shelf life
- Color
- Tocopherols
- Trace metals

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# Meal quality

Samples sent to Cumberland Valley Analytics for nutritional analysis

- Crude protein
- Free fatty acids / lipids
- Acid Detergent Fiber (ADF)
- Neutral Detergent Fiber (NDF)
- Digestible NDF (NDFD)
- Total Digestible Nutrients (TDN)
- Net Energy for Lactation ($NE_L$)
- Fat
- Starch
- Micronutrients


CUMBERLAND VALLEY ANALYTICAL SERVICES, INC. November 30, 2012
PO Box 669 Maugansville, MD 21767 301-790-1980 Sample No : 14020054

A N A L Y S I S R E S U L T S Type: BYPRODUCT

| | | | | | |
|---|---|---|---|---|---|
| Moisture | 13.2 | % | *Minerals* | | |
| Dry Matter | 86.8 | % | Ash | 5.8 | % DM |
| | | | Calcium | 0.40 | % DM |
| *Proteins* | | | Phosphorus | 1.03 | % DM |
| Crude Protein | 24.5 | % DM | Magnesium | 0.57 | % DM |
| Adjusted Protein | 24.5 | % DM | Potassium | 1.41 | % DM |
| Soluble Protein | 50.4 | % CP | Sulfur | 0.34 | % DM |
| Ammonia | | | Sodium | 0.010 | % DM |
| ADF Protein (bound protein) | 1.37 | % DM | Iron | 131 | PPM |
| NDF Protein | 1.7 | % DM | Manganese | 36 | PPM |
| Rumen Degr Protein | | | Zinc | 95 | PPM |
| Rumen Undgr Protein (Strep. G) | | | Copper | 30 | PPM |
| | | | Selenium | | |
| *Fibers* | | | Molybdenum | | |
| Acid Detergent Fiber | 25.9 | % DM | Nitrate Ion | | |
| Neutral Detergent Residue | 37.0 | % DM | Chloride Ion | 0.14 | % DM |
| Crude Fiber | | | DCAD (Meq/100gdm) | 11.3 | |
| Lignin | 13.60 | % DM | | | |
| Lignin / NDF Ratio | 36.7 | % NDF | *Energy / Indexes* | | |
| Soluble fiber | | | TDN | 82.5 | % DM |
| peNDF | | | Net Energy Lactation | 0.90 | Mcal/lb |
| NDF Digestibility, Invitro | | | Net Energy Maintenance | 0.91 | Mcal/lb |
| 12 hr digestibility | | | Net Energy Gain | 0.62 | Mcal/lb |
| 24 hr digestibility | | | Relative Feed Value (RFV) | | |
| 30 hr digestibility | | | Relative Feed Quality (RFQ) | | |
| 48 hr digestibility | | | Milk/ton | | |
| Indigestible NDF, Invitro 120 HR | | | NFC | 16.4 | % DM |
| NDF Dig. Rate (Kd) | | | Enzymatic NSC | | |
| | | | | | |
| *Non-Fibers, Structure, Utilization* | | | *Qualitative* | | |
| Digestible Dry Matter (fast) | | | pH | | |
| Sugar | 5.4 | % DM | Total VFA | | |
| Starch | 5.0 | % DM | Lactic acid | | |
| --Enzyme Available | | | --Lactic/TVFA | | |
| --Digestibility, 2 hr | | | Acetic acid | | |
| --Digestibility, 7 hr | | | Propionic acid | | |
| Fatty Acids, Total | | | Butyric acid | | |
| Crude Fat | 18.0 | % DM | Isobutyric acid | | |
| Acid hydrolysis fat | | | 1, 2 Propandiol | | |
| CS Processing Score | | | Titratable Acidity (meq NaOH) | | |
| Particle size > 0.75" | | | | | |
| ... 0.31" - 0.75" | | | Mold | | |
| ... < 0.31" | | | Yeast | | |

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# Other Observations

- Lots of variables / adjustments
- Main press differences
  - Cost
  - Capacity
  - Barrel length
  - Number of screw types
  - Collar / nozzle gap
- Hand-holding

# Summary & Next Steps

- Data review
- Additional presses:
  Keller, Komet, Oil Prince
- Oil and meal analyses
- Press manufacturer surveys
- Press owner / operator surveys