LA CUMBRE AVÍCOLA LATINOAMERICANA

INTERNATIONAL IPPE PRODUCTION & PROCESSING EXPO

How to Add Value to Oilseeds with High-Shear Dry Extrusion for Poultry

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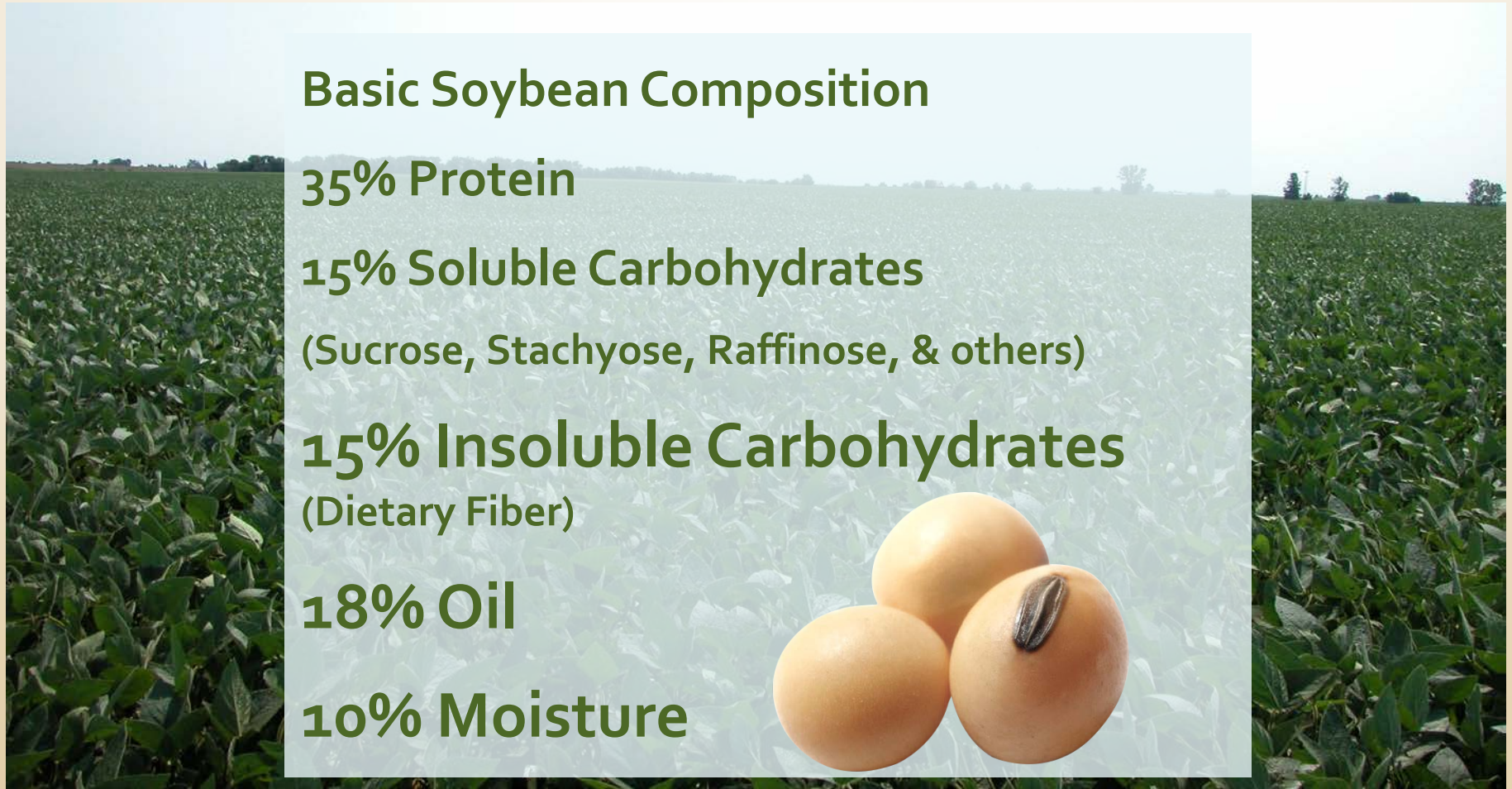
In collaboration with:

INTERNATIONAL IPE POULTRY EXPO

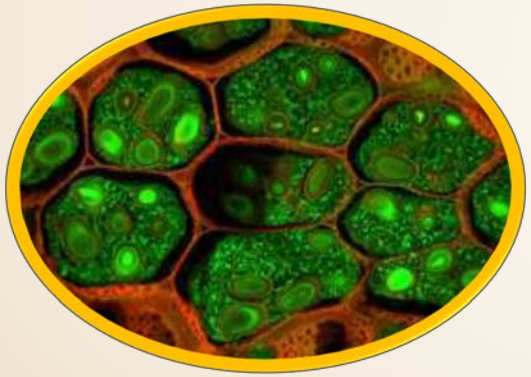
WATT GLOBAL MEDIA

ALA

Oilseeds Require Proper Processing For Use in Poultry Nutrition

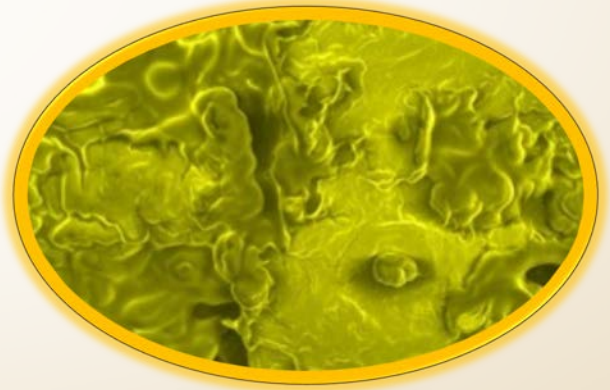


High-Shear Dry Extrusion For Proper Oilseed Processing



Raw soybean

Cell wall structure intact

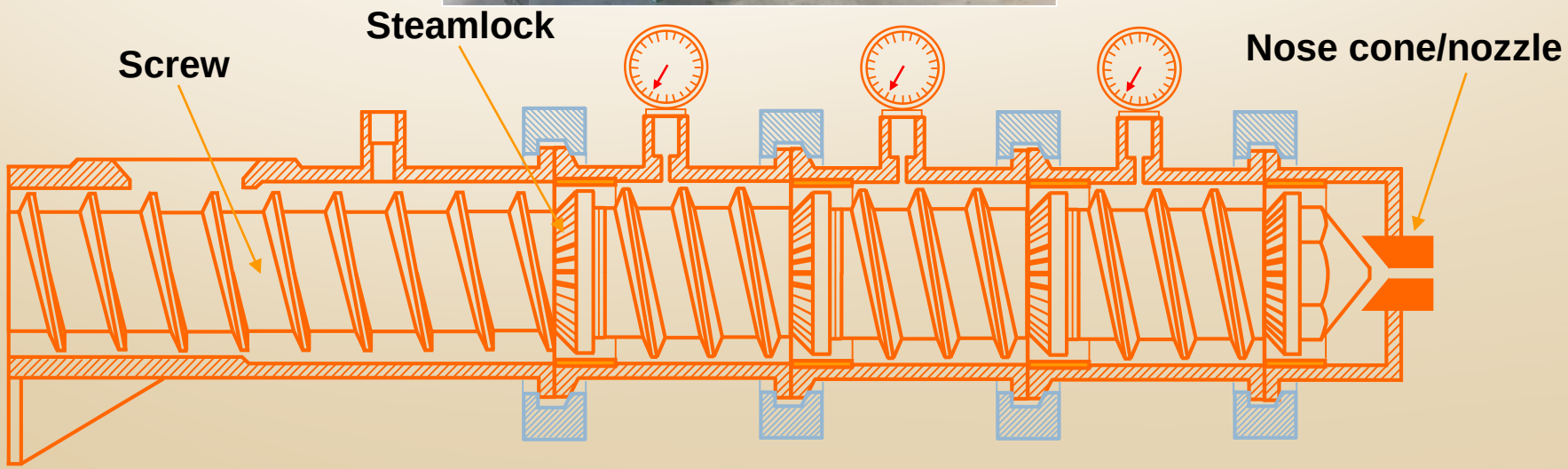


Extruded soy

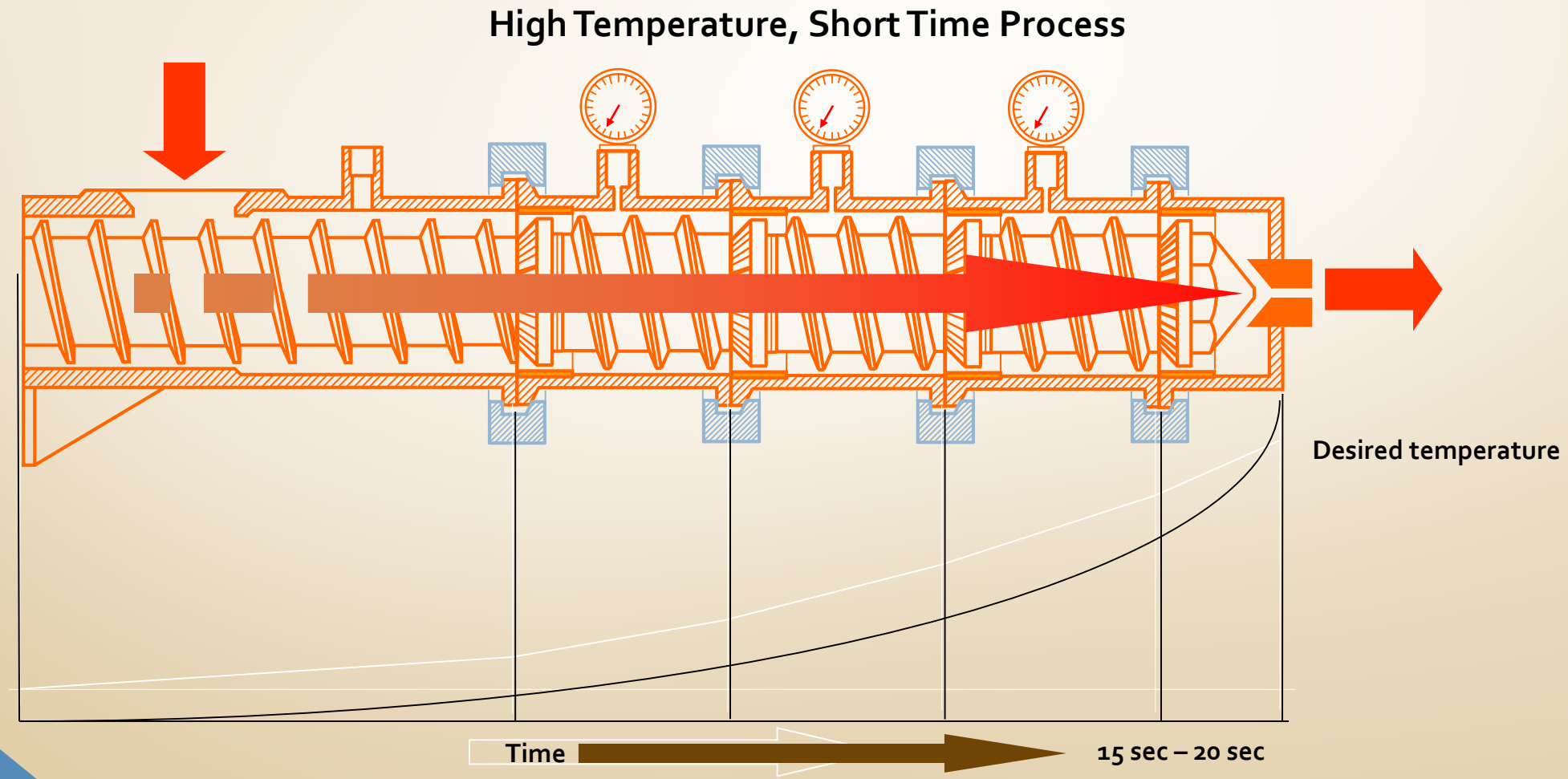
Contents of cells liberated

- Plant cell walls ruptured
- Antinutritional factors deactivated
- Amino acid digestibility increased
- Energy availability increased
  - Higher quality nutrients
- Oil released for mechanical press
- Partially dehydrated

Events in High-Shear Dry Extruder Barrel



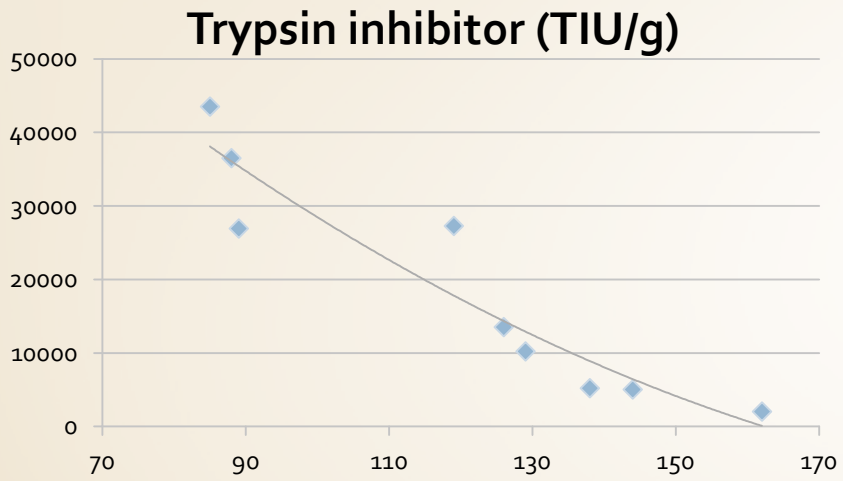
High-Shear Dry Extrusion – Quality Nutrition

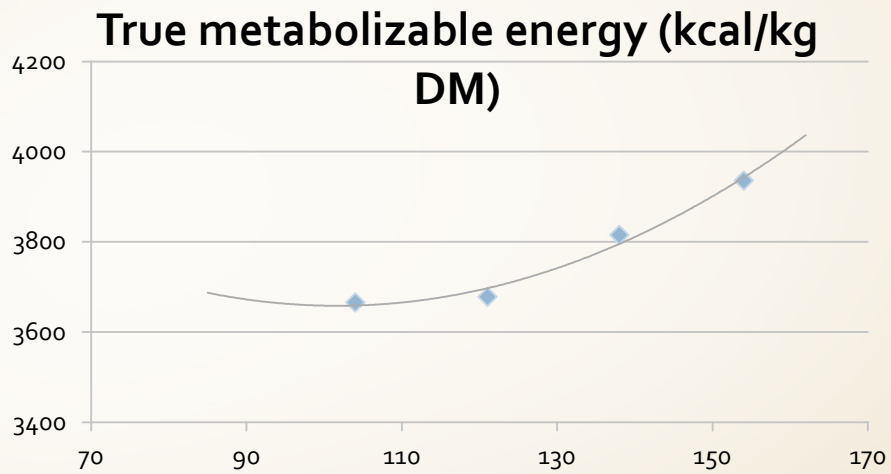


Mechanical Oil Pressing – Reduce Residual Oil in Oilseed Meals

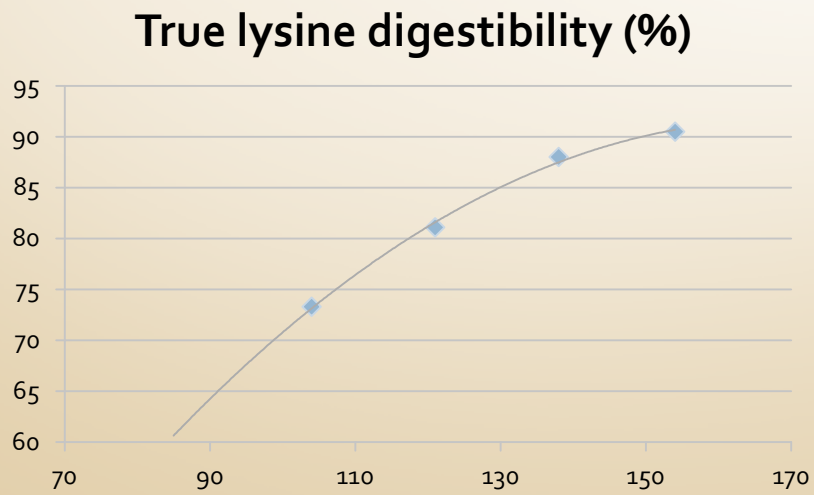
- 43-47% protein, 6-8% residual oil, 94-95% DM
- Lower residual oil in meal better for formulation vs. full-fat
- Highly-available protein and residual oil (energy)
- Soy oil natural stabilizers/properties

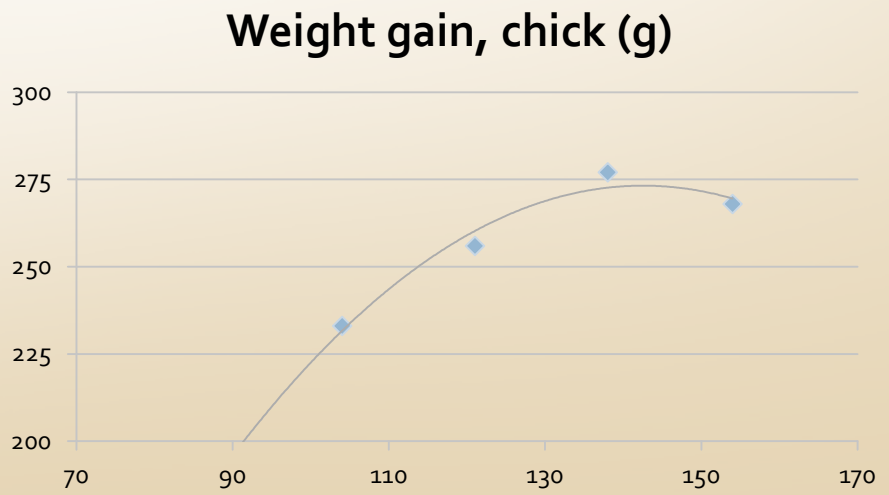
Quality Controls – High-Shear Dry Extrusion





Extruder Temperature (°C)





Trypsin inhibitor data from Crowe et al., 2001

True metabolizable energy, true lysine digestibility, and weight gain data from Zhang et al., 1993

High-Shear Dry Extruded/Pressed Soy Meal

True amino acid digestibilities (%) in broilers	Extruded/Pressed (>160C)	Key Advantages	Solvent – Hi Pro SBM commodity
Threonine	87.9	+2	85.9
Cysteine	83.4	+5.7	77.8
Valine	89.1		88.4
Methionine	90.6		91.2
Isoleucine	92.2		90.8
Leucine	91.9	+1.7	90.2
Phenylalanine	93.4		91.3
Lysine	88.7	+1.2	87.5
Histidine	89.3		87.2
Arginine	94.5		91.6
Tryptophan	97.1	+1	96.1
Mean (all amino acids):	***90.9***	***+1.7***	***89.2***

Dr. Carl Parsons, 2016, Univ. of Illinois

Recent reference analyses, Dr. Parsons' Lab

High-Shear Dry Extruded/Pressed Soy Meal

True metabolizable energy in broilers	Extruded/Pressed (>160C)	Key Advantages	Solvent – Hi-Pro SBM commodity
TMEn (energy, kcal/kg DM)	3,385	+589	2,796
Dry matter (%)	96.6	+7.5	89.1

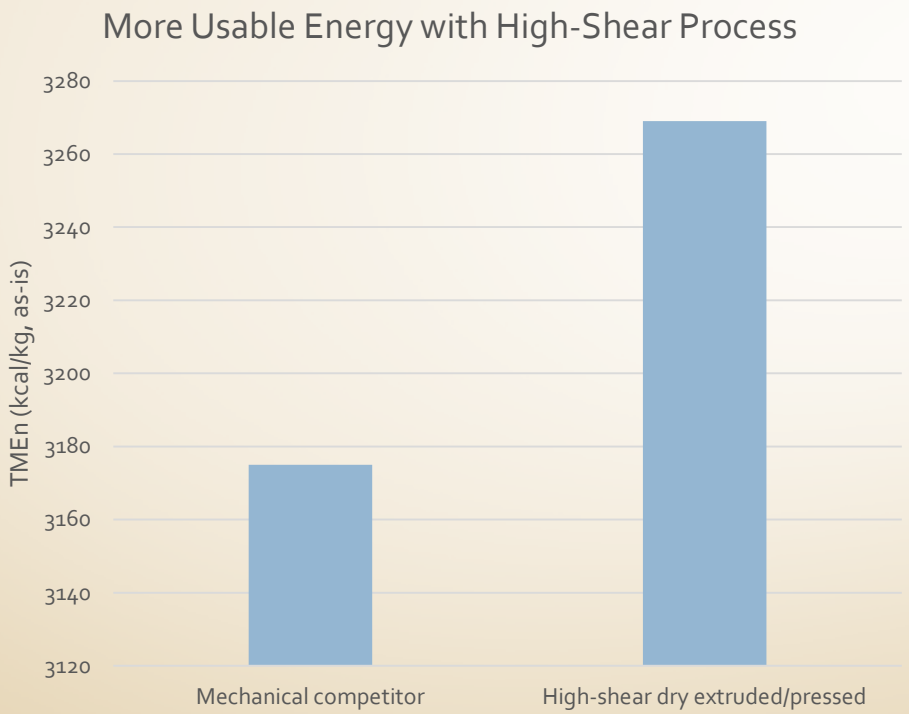
Dr. Carl Parsons, 2016, Univ. of Illinois

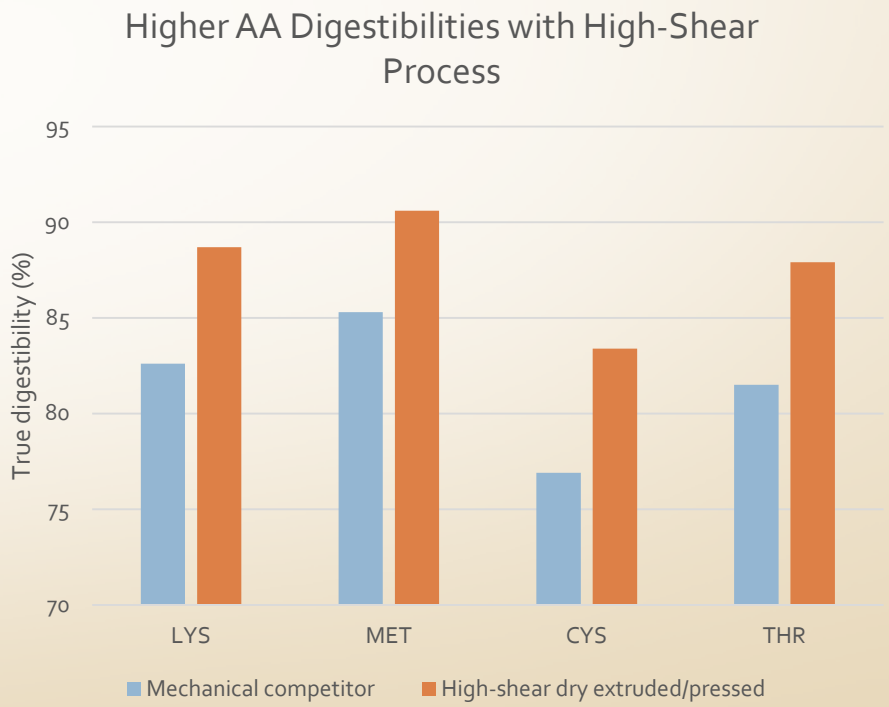
Recent reference analyses, Dr. Parsons' Lab

Energy advantage is due to:

- Greater residual oil in meal (7% vs. 1%)
- Greater ME from high-shear process vs. others in the market
- Thorough rupturing of plant cell walls

High-Shear Dry Extruded/Pressed Soy Meal vs. Mechanical Competitor

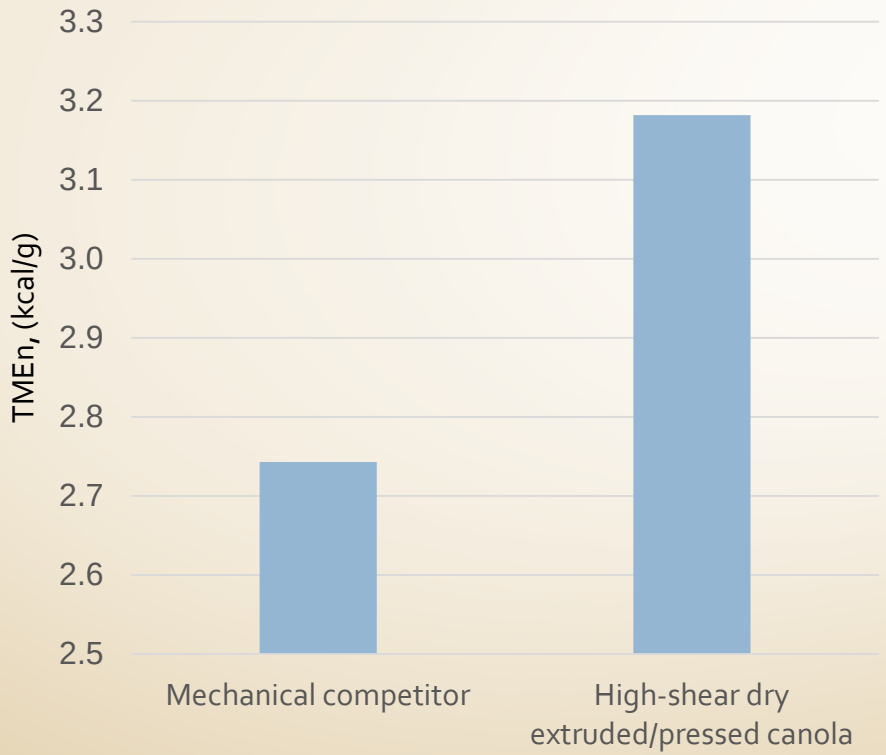


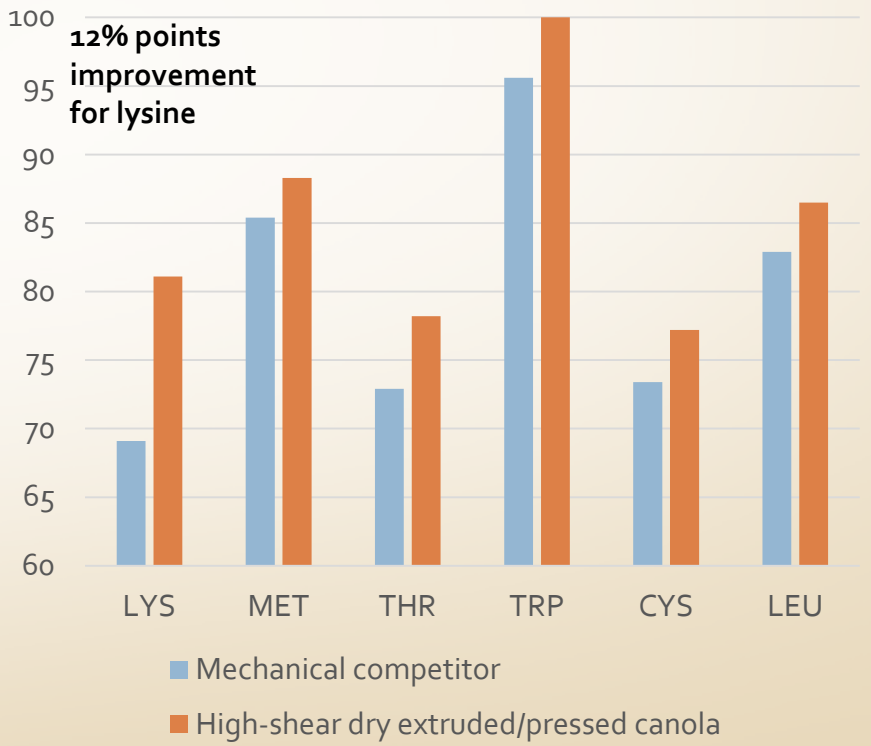


Parsons et al., 2019 Univ. of Illinois

Take away: Due to greater AA digestibility & TME, high-shear dry extruded/pressed soy meal is worth $62/ton more (added value) vs. meal from mechanical competitor when used in a typical broiler formulation

High-Shear Dry Extruded/Pressed Canola Meal vs. Mechanical Competitor





Parsons et al., 2016 Univ. of Illinois

Take aways: High-shear dry extruded/pressed canola meal saves 30 lbs. of oil, 3 lbs. of lysine and 0.2 lbs. of methionine per ton of broiler feed.
Thus, high-shear dry extruded/pressed canola meal has an added value of $26/ ton vs. competitive canola meal

High-Shear Dry Extruded/Pressed Canola Meal Formulations With Better Ingredients

Broiler Grower (*Example Only*)	Mechanical Competitor	High Shear-Press
Corn	55.7	57.4
High-shear dry extruded/pressed canola meal	0	39.0
Mechanical competitor canola meal	39.0	0
Limestone	1.1	1.1
Dicalcium phosphate	1.0	1.0
Salt	0.35	0.35
DL-methionine	0.04	0.03
L-lysine	0.31	0.16
Veg oil	1.5	0
Trace mineral premix	0.2	0.2
TOTAL	*100*	*100*

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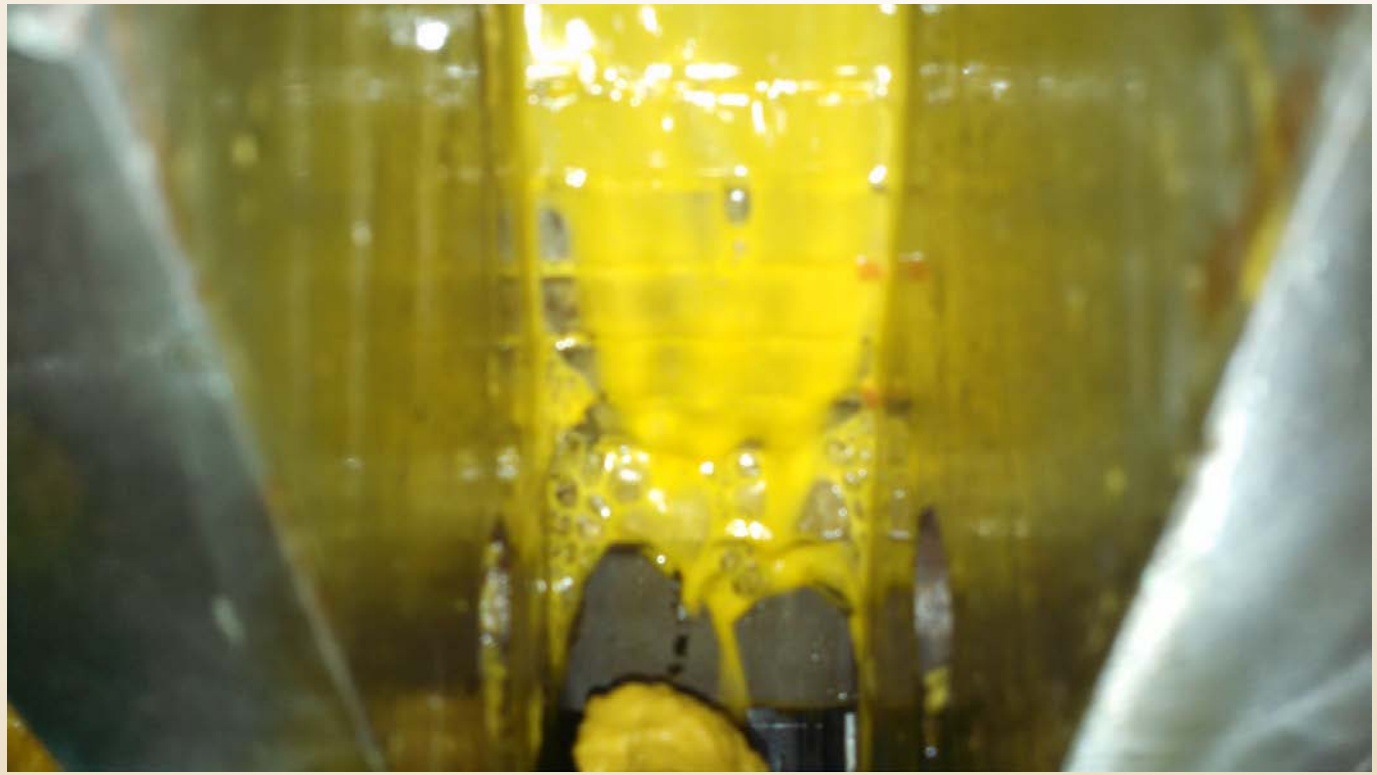
L-lysine	0.31	0.16
Veg oil	1.5	0
Trace mineral premix	0.2	0.2
TOTAL	*100*	*100*

High-Shear Dry Extruded/Pressed Canola Meal Formulations With Better Ingredients

Broiler Grower (*Example Only*)	Mechanical Competitor	High Shear-Press
ME (kcal/kg)	3,050	3,070
CP (%)	19.1	19.3
Digestible Lys (%)	1.0	1.0
Digestible Met (%)	0.39	0.39
Fat (%)	8.1	6.7

Take aways: High-shear dry extruded/pressed canola meal saves 30 lbs. of oil, 3 lbs. of lysine and 0.2 lbs. of methionine per ton of broiler feed, ***but formulation targets are still achieved.***
Thus, high-shear dry extruded/pressed canola meal has an added value of $26/ ton vs. competitive canola meal

High-Shear Dry Extruded/Pressed Oils – High Quality Energy and Nutrients



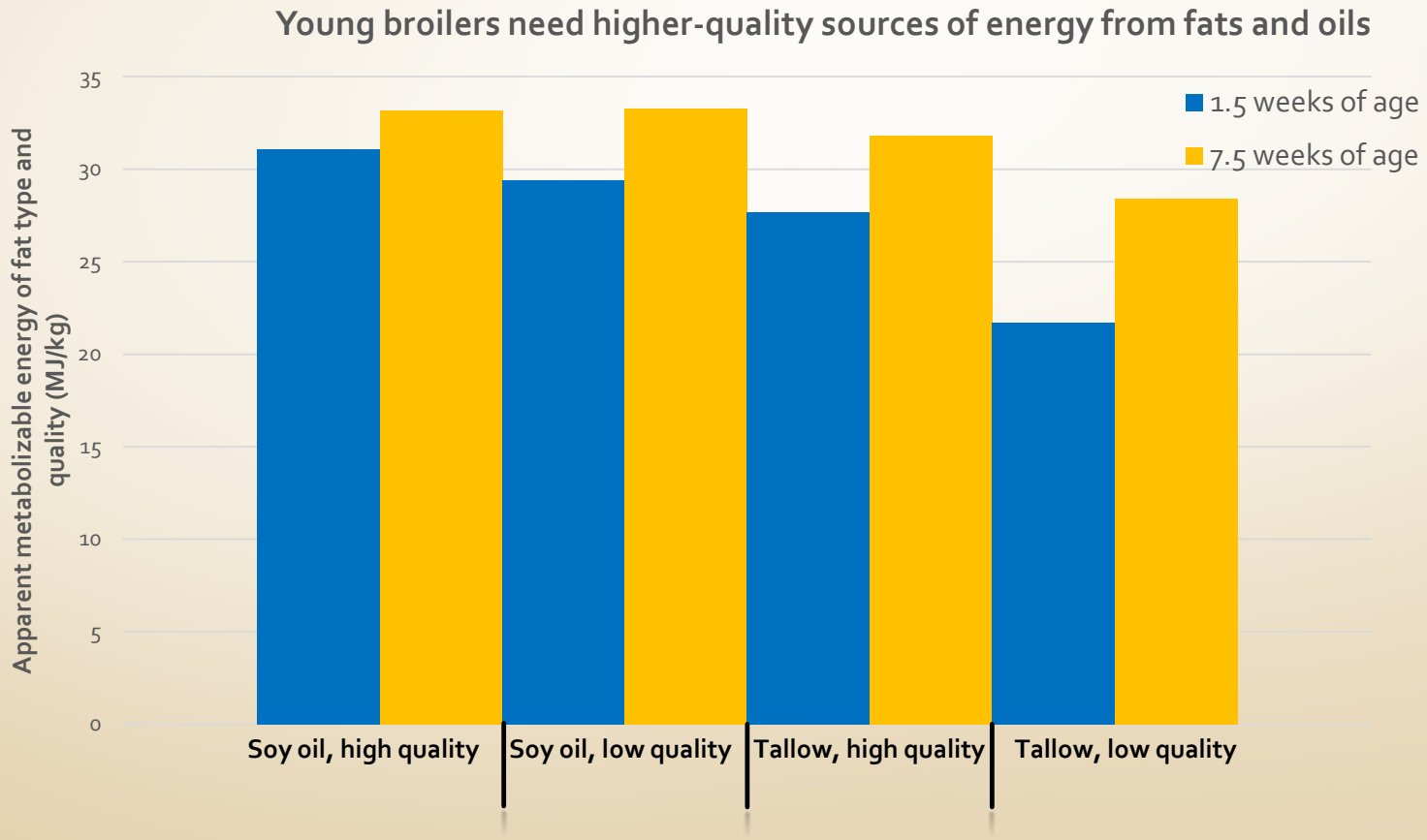
- Low moisture, low free fatty acids, higher quality indicators vs. oils from solvent-extraction and mechanical competitors
- Retains tocopherols (vitamin E) and choline vs. solvent-extracted oils
- Minimizes solids and impurities vs. mechanical competitors

High-Shear Dry Extruded/Pressed vs. Pressed-Only Cottonseed Oil

High-shear dry extruded/pressed oils

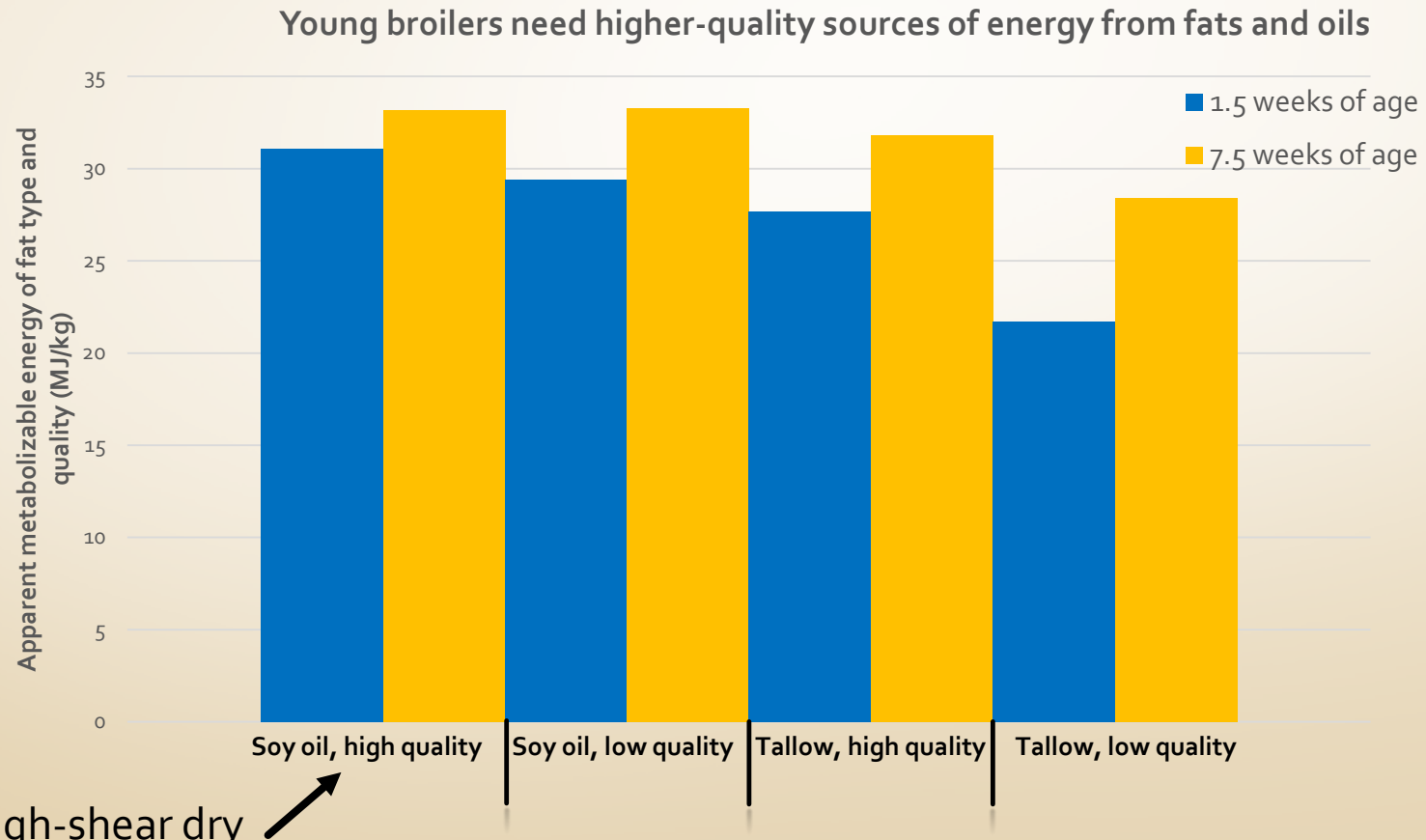
Heated/pressed oils

Oil Quality Varies Widely & Broiler Age Affects Usage



Wiseman et al., 1991

Oil Quality Varies Widely & Broiler Age Affects Usage



High-shear dry extruded/pressed oils

Wiseman et al., 1991

Conclusions

- Oilseeds are raw materials that require processing for optimal use in poultry diets
- The choice of process, and how well it's controlled, greatly affect the feeding values of meals and oils
- High-shear dry extrusion and oil pressing produce superior quality ingredients
- Formulating with better, higher-priced ingredients can reduce diet costs and boost poultry performance