



# Nutritional and Economic Value of Hybrid Rye

Becca Stokes, PhD  
Livestock Nutritionist  
July 18, 2019

SEEDING  
THE FUTURE  
SINCE 1856

KWS



# Outline



- **Introduction**
- **Hybrid rye as a commodity**
- **Hybrid rye for the producer**
- **The value of non-nutritive health benefits**
- **Conclusions**

- **Cost** – the leading consideration in selecting feed ingredients
- **Required Nutrients** – from maintenance, growth, reproduction
- **Nutritional Value** – allows cost comparison

## Objective of swine nutrition

“Provide each nutrient in both quantity and form that will precisely meet the pig’s requirements for growth, reproduction, milk production, and if necessary, maintenance, at the least possible cost.”

-Dr. Robert Easter



A photograph of a vast field of hybrid rye, with the plants in the foreground in sharp focus and the background blurred. The sky is bright and hazy, suggesting a sunny day. An orange rectangular box is overlaid on the right side of the image, containing the title text.

# **Hybrid Rye as a Commodity**

# Commodity Value of Hybrid Rye

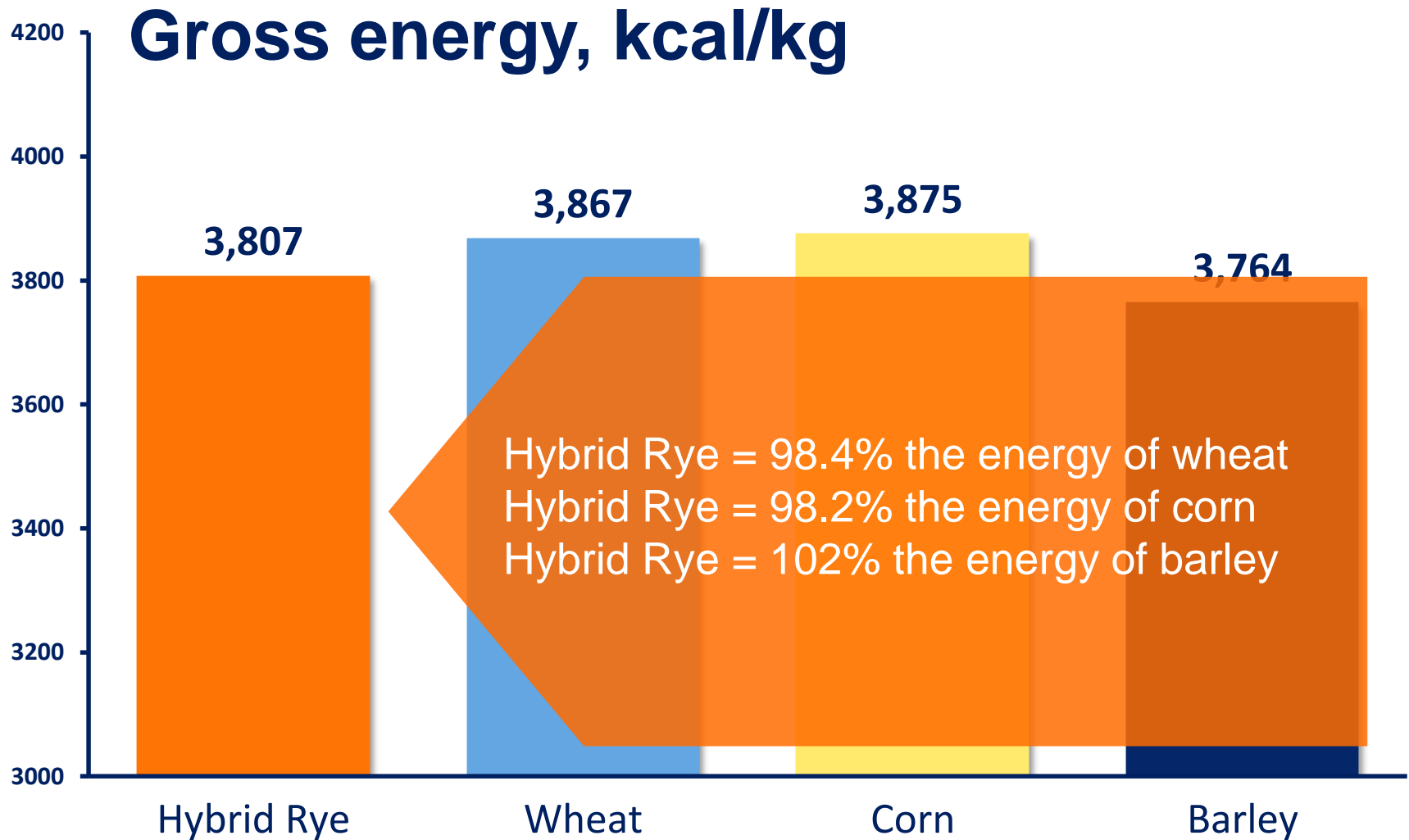


## ***Chemical Constituents vs. Biological Attributes***

- Actual feed analysis should be attained whenever possible
- Tabulated data are the next best source
  - Chemical constituents: energy, protein, fat, etc.



# Commodity Value of Hybrid Rye



# Commodity Value of Hybrid Rye



## Chemical Constituents *vs.* *Biological Attributes*

- Response from swine fed hybrid rye
- The ability of an animal to derive useful nutrient value from feed

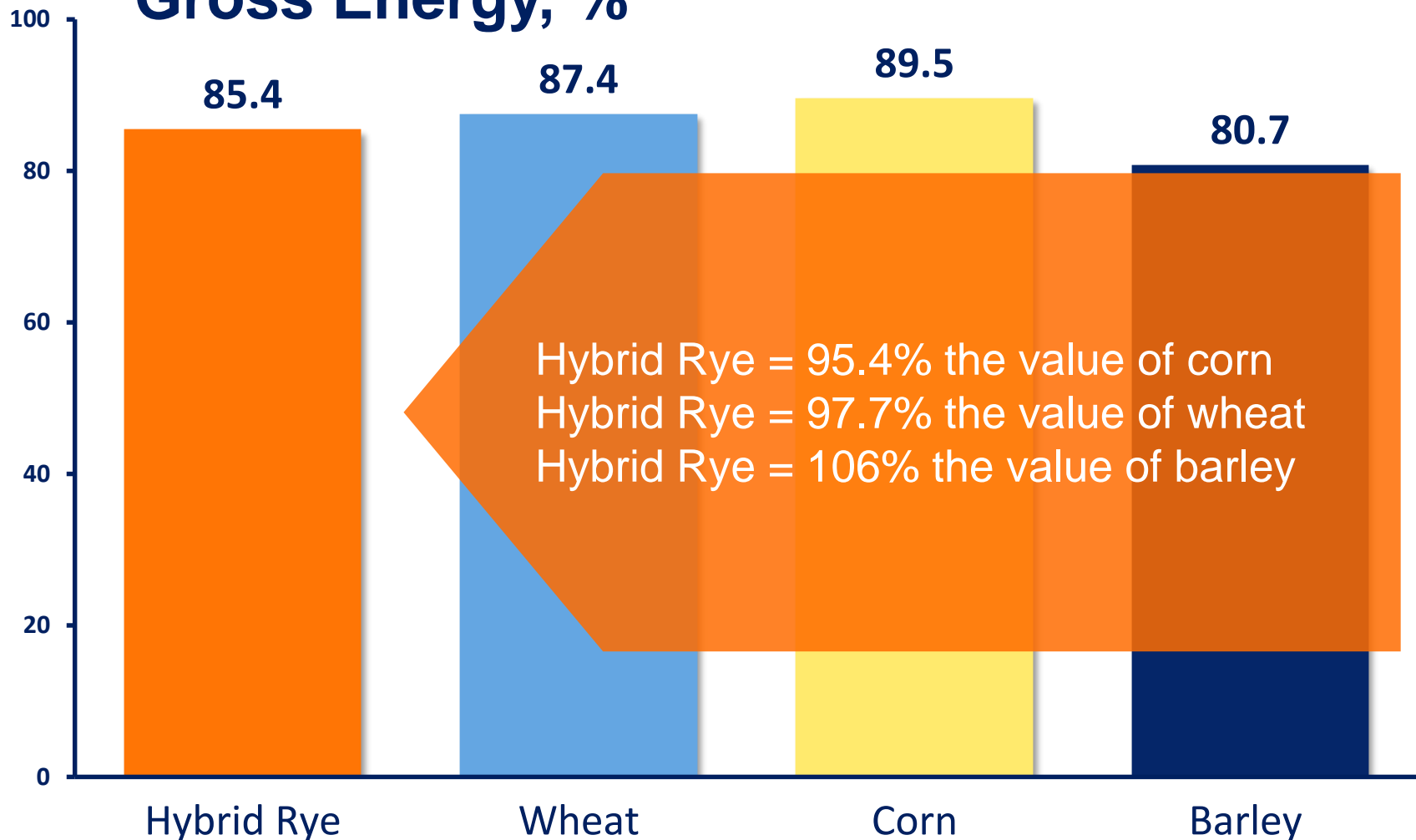




# Commodity Value of Hybrid Rye



## Apparent Total Tract Digestibility of Gross Energy, %





# Commodity Value of Hybrid Rye



## Concentrations of digestible AA, g/kg

	Bono (2017)	Corn
Crude Protein	81.3	68.0
Lysine	2.6	2.2
Methionine	1.3	1.3
Threonine	2.2	2.2
Tryptophan	0.6	0.5

Hybrid Rye = 100% the value of corn

# Commodity Value of Hybrid Rye



Price Estimate, \$/bu	Hybrid Rye Value
Feed Corn – \$4.75	<b>\$4.53</b> (95.4%)
Feed Wheat - \$6.00	<b>\$5.86</b> (97.7%)
Feed Barley – \$4.30	<b>\$4.56</b> (106%)

A wide-angle photograph of a lush green field of hybrid rye. The plants are in the foreground, slightly out of focus, and stretch towards a distant horizon. The sky is a soft, warm yellow, suggesting the sun is low on the horizon, creating a golden hour effect. The overall mood is peaceful and agricultural.

# Hybrid Rye for the Producer

# Hybrid Rye Production Budget Model



	Hybrid Feed Rye (CAD)	Feed Wheat (CAD)	Feed Barley (CAD)	Feed Corn (CAD)
Price estimate \$/bu	\$5.00	\$6.00	\$4.30	\$4.75
Yield, bu/acre	110	65	85	130
<b>Gross Profit/acre</b>	<b>\$550</b>	<b>\$390</b>	<b>\$365.50</b>	<b>\$617.50</b>
Seed	\$67.20	\$26.00	\$26.00	\$100.00
Seed treatment	\$0.00	\$6.00	\$6.00	\$6.00
Herbicides	\$8.00	\$22.00	\$22.00	\$12.00
Fungicides	\$0.00	\$18.00	\$18.00	\$0.00
Fertilizer	\$74.24	\$64.38	\$64.38	\$95.45
Other <small>(fuel, cleaning, drying, insurance)</small>	\$75.00	\$50.00	\$50.00	\$80.00
Fixed costs	\$100.00	\$100.00	\$100.00	\$130.00
<b>Total Costs/acre</b>	<b>\$324.44</b>	<b>\$286.38</b>	<b>\$286.38</b>	<b>\$423.45</b>
<b>Net \$/acre</b>	<b>\$225.56</b>	<b>\$103.62</b>	<b>\$117.30</b>	<b>\$194.05</b>



# Cost per Unit of Energy



	Hybrid Feed Rye (CAD)	Feed Wheat (CAD)	Feed Barley (CAD)	Feed Corn (CAD)
<b>Total Costs/acre</b>	<b>\$324.44</b>	<b>\$286.38</b>	<b>\$286.38</b>	<b>\$423.45</b>
<b>Kcal/acre</b>	10,637,249	6,840,763	7,354,510	12,795,841
<b>Cost/10,000 kcal</b>	<b>\$0.31</b>	<b>\$0.42</b>	<b>\$0.39</b>	<b>\$0.33</b>



# Hybrid Rye for the Producer – Benefits



- Crop Diversity
  - Diversified rotation
  - Improved soil health
  - Winter cover
- Labor and resource management
  - Summer manure application
- Market Flexibility



# Hybrid Rye for the Producer – Considerations



- Bin/Storage space
- Milling capabilities
- Grain % moisture at harvest



A photograph of a vast field of hybrid rye, with the plants in the foreground in sharp focus and the background blurred. The sky is bright and hazy, suggesting a sunny day. An orange rectangular box is overlaid on the right side of the image, containing the title text in white.

# **Non-Nutritive Value of Hybrid Rye**



# Non-Nutritive Values of Hybrid Rye



**Swine Health**

**Intrinsic Phytase and  
Phosphorus**

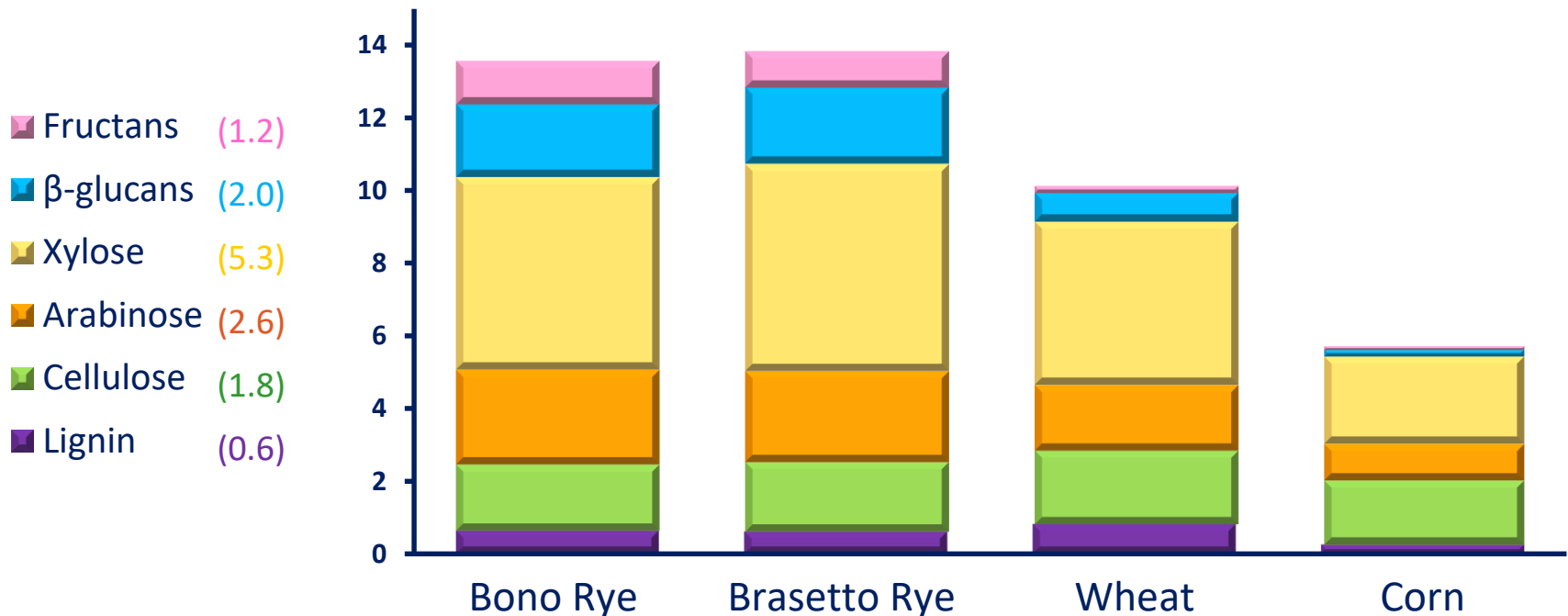
**Satiety and Behavior**



# Swine Health



- High in soluble fibers including arabinoxylans and fructans
  - Increased Butyrate production
- Improved gut health and mucosa
  - Decreased salmonella prevalence
  - Reduced antibiotic usage



# Swine Health – Cost Analysis



Head	% Death loss	Total loss (head)	Hog Price	Cost of Production	Margin	Total Profit (CAD)
1,000	4.5	45	\$202.51	\$181.16	\$21.35	\$20,389
100,000	4.5	4,500	\$202.51	\$181.16	\$21.35	\$2,038,925

<https://www.westernhogexchange.com/>

# Swine Health – Cost Analysis



Head	% Death loss	Total loss (head)	Hog Price	Cost of Production	Margin	Total Profit (CAD)
1,000	4.5	45	\$202.51	\$181.16	\$21.35	\$20,389
100,000	4.5	4,500	\$202.51	\$181.16	\$21.35	\$2,038,925
1,000	4	40	\$202.51	\$181.16	\$21.35	\$20,496
100,000	4	4,000	\$202.51	\$181.16	\$21.35	\$2,049,600

• Profit increase for 1,000 head operation = **\$106.75**

• Profit increase for 100,000 head operation = **\$10,675**



# Swine Health – Cost Analysis



By decreasing death loss 5% and by decreasing average cost of treatments only 5%....

- Total improved profit for 1,000 head operation = **\$226.75**
- Total improved profit for 100,000 head operation = **\$22,675**

# Intrinsic Phytase and Phosphorus

15

P

Phosphorus

30.974



# Satiety and Behavior

- Increased fiber = increased satiety
  - Digesta mass and slower passage rate
- More continuous levels of glucose and insulin
- Aggression, tail biting, belly rooting
- Group housing – Sows



# Conclusions



- The economic and nutritional value of hybrid rye looks different depending on your market system
- Cost of production and yield make this an attractive crop for the producer
- Nutritional parameters make hybrid rye a competitive cereal grain and energy source
- **Non-nutritive values of hybrid rye add huge value to this novel crop!**



# Questions?

