UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Non-starch polysaccharide composition influences the energy value of grains and grain co-products fed to pigs

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Take Home Message

- **Grains and grain co-products contain a large NSP substrate for NSP-degrading enzymes to target**
- **NSP composition plays an important role in determining the extent of fermentation of NSP**
- **NSP amount and composition influences the energy value of ingredients & diets**

Outline

- Introduction to fiber analysis
- Exp. 1 – Non-starch polysaccharide analysis
- Exp. 2 – In vitro digestibility of NSP
- Exp. 3 – Energy digestibility
- Conclusions

Fiber Analysis

Soluble Hemicellulose

Insoluble Hemicellulose

Cellulose

Lignin

Crude fiber

ADF

NDF

S-DF

I-DF

S-NSP

I-NCP

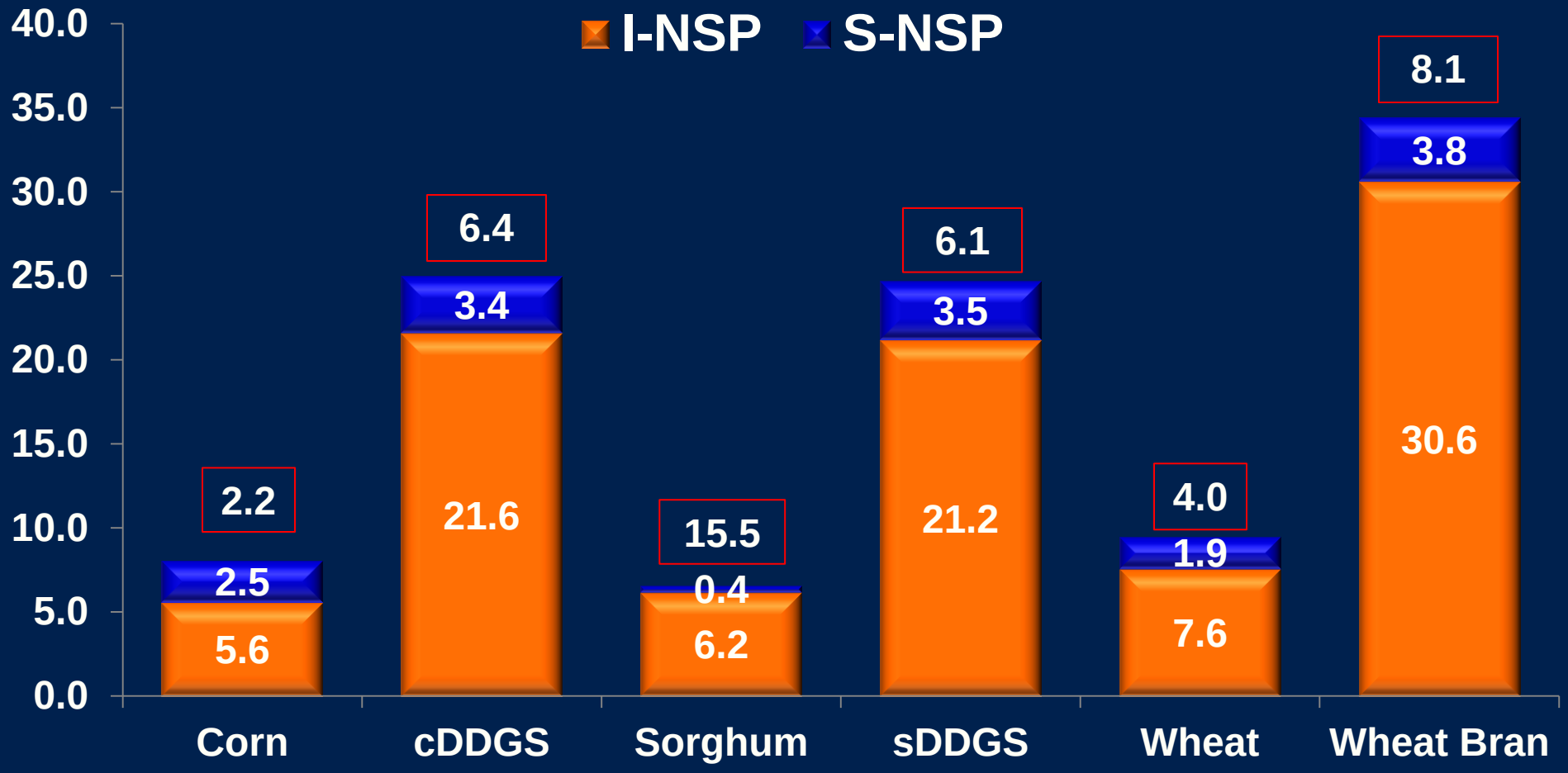
Cellulose

Klason lignin

Ingredients

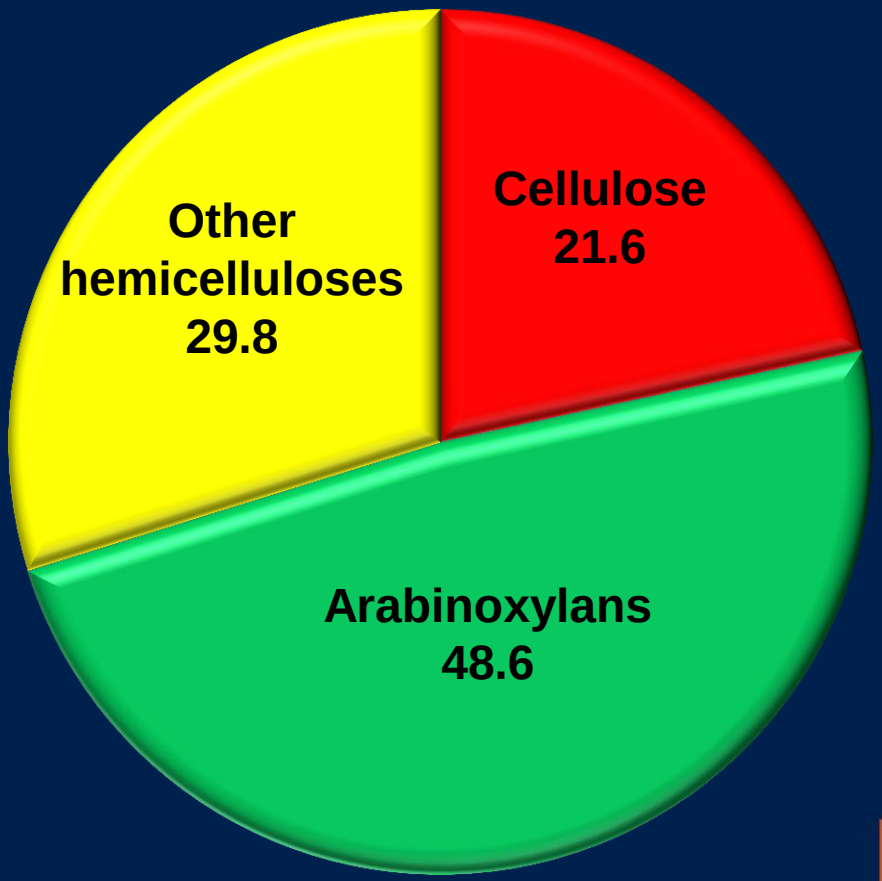
- Corn
  - Distillers dried grains with solubles (DDGS)
- Sorghum
  - Sorghum DDGS
- Wheat
  - Wheat bran

NSP (DM Basis), %

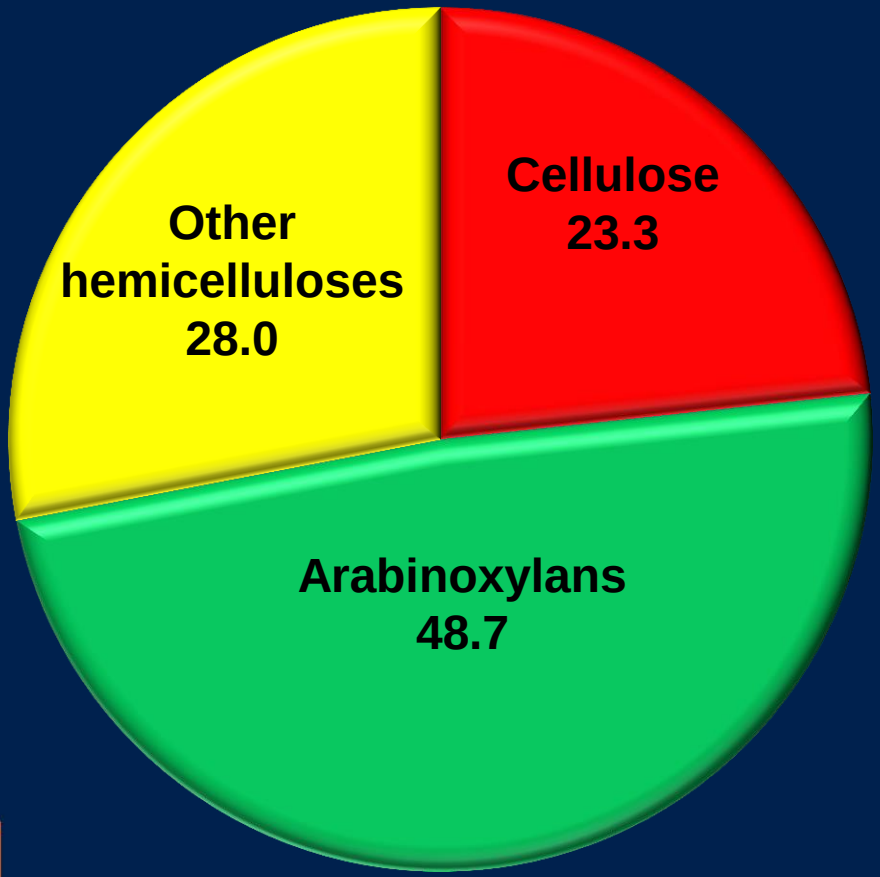

I-NSP
S-NSP
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
2.2
2.5
5.6
6.4
3.4
21.6
15.5
0.4
6.2
6.1
3.5
21.2
4.0
1.9
7.6
8.1
3.8
30.6
Corn
cDDGS
Sorghum
sDDGS
Wheat
Wheat Bran

% NSP as a % of T-NSP

Corn, 8.1% T-NSP

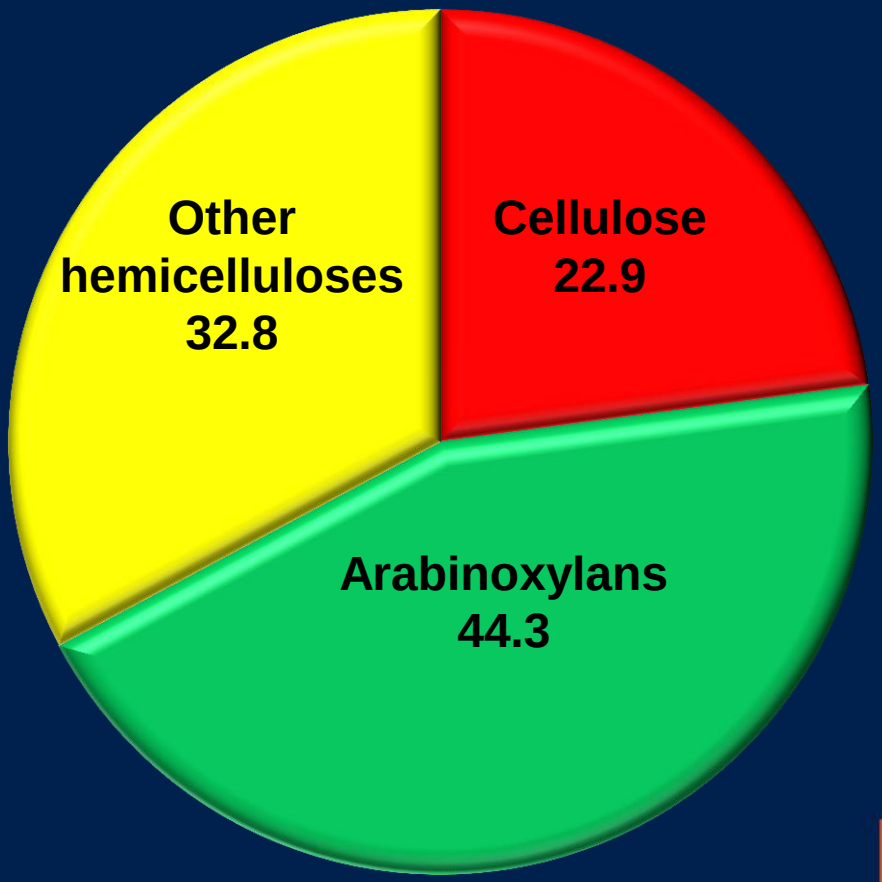


Corn DDGS, 25.0% T-NSP

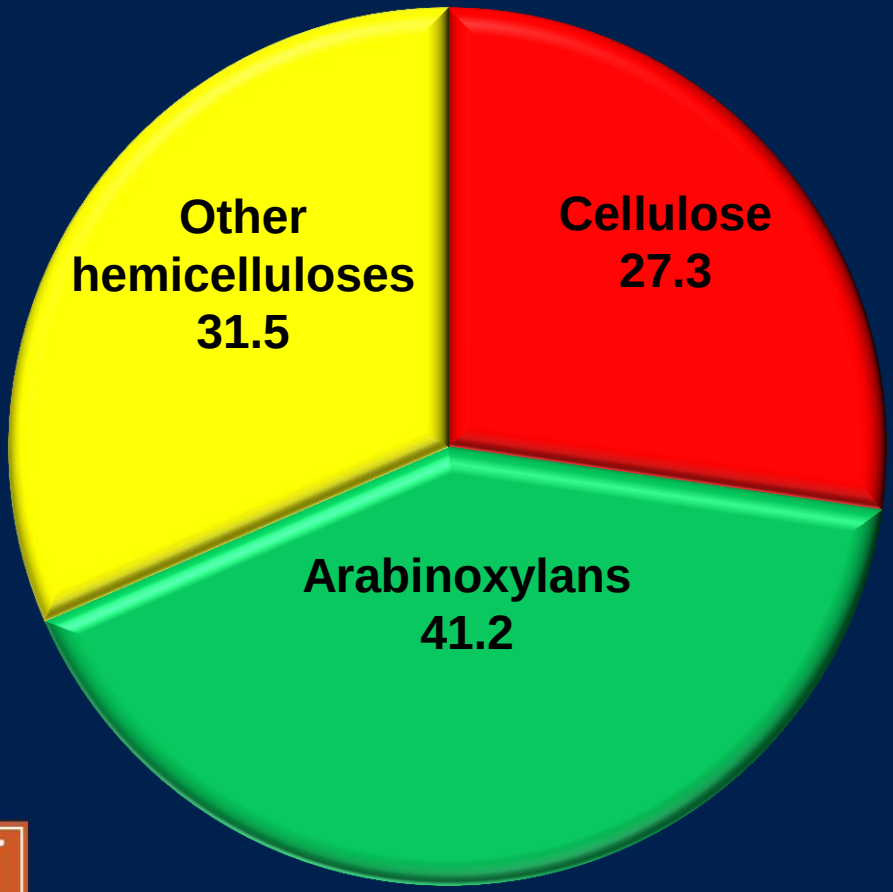


% NSP as a % of T-NSP

Sorghum, 6.6% T-NSP

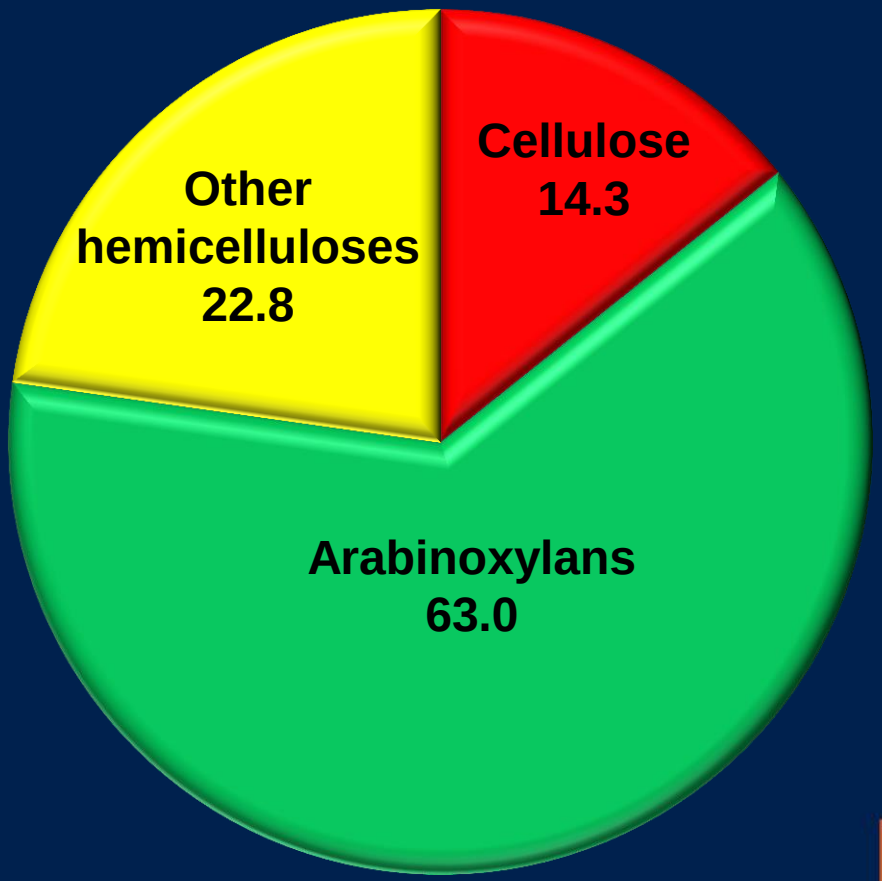


Sorghum DDGS, 24.7% T-NSP

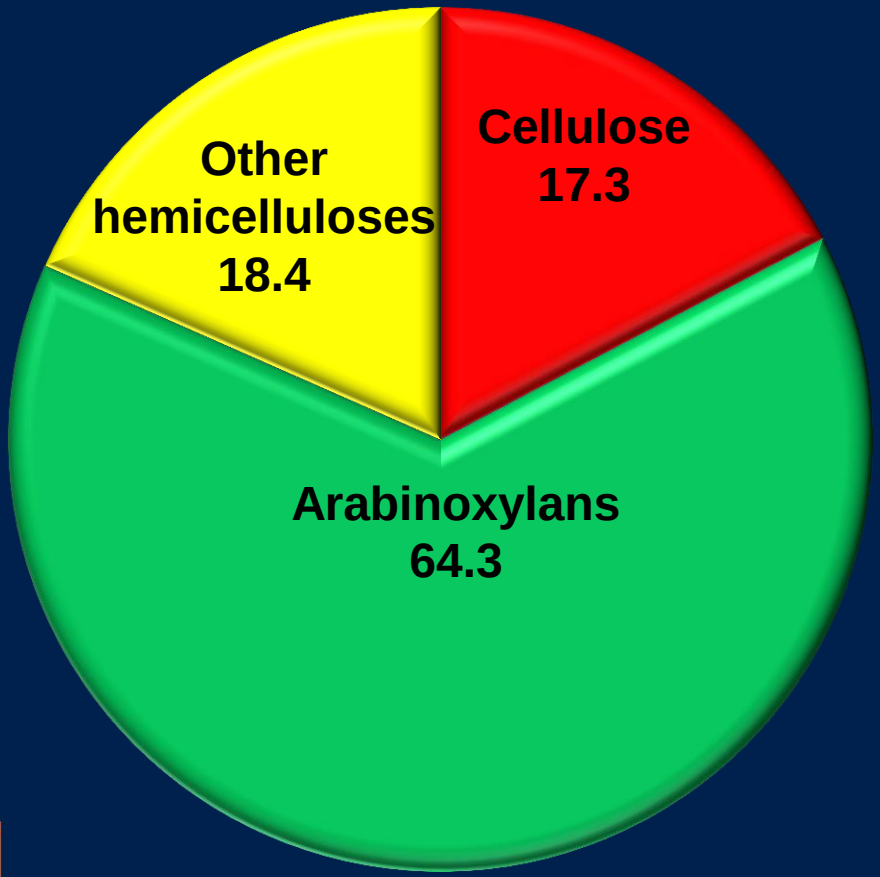


% NSP as a % of T-NSP

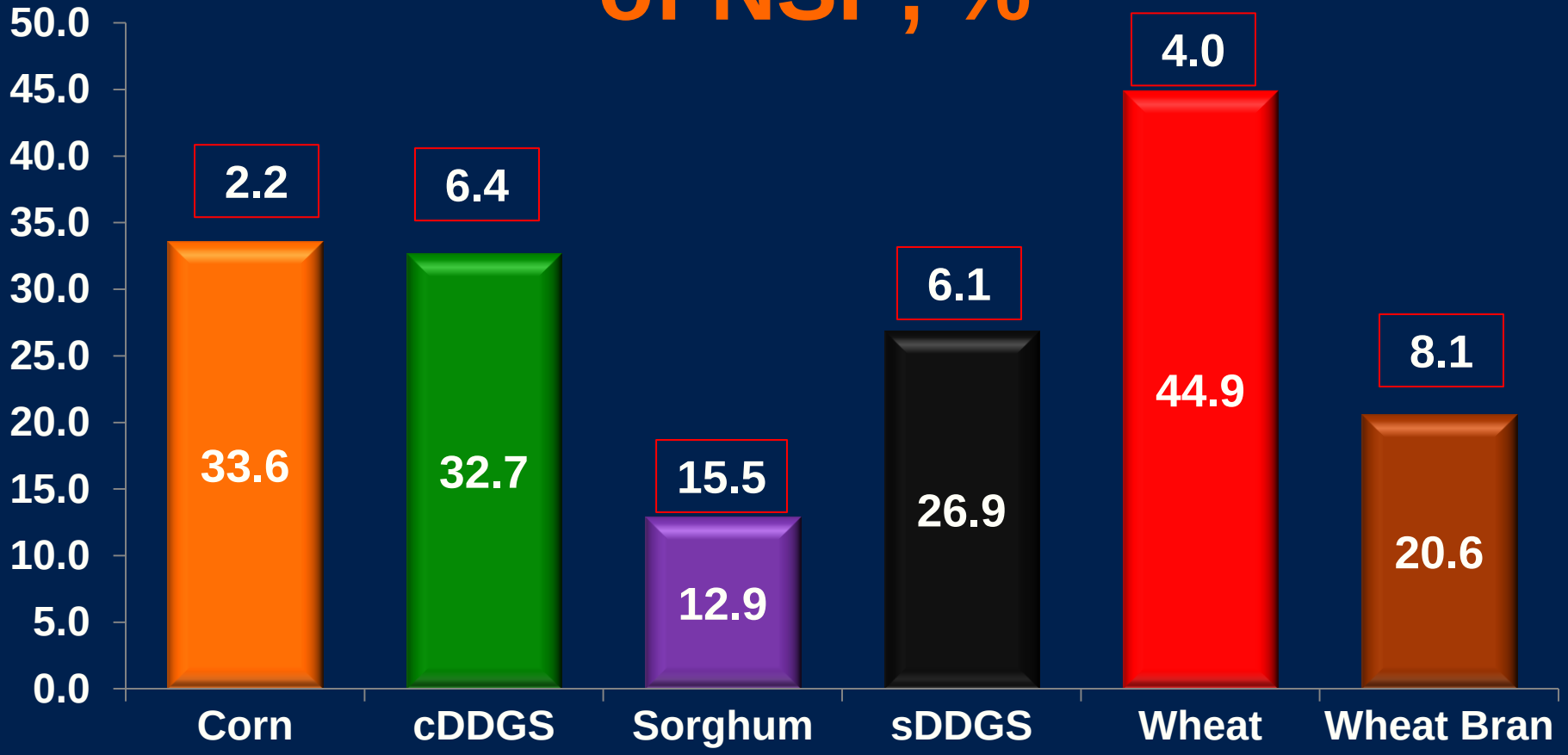
Wheat, 9.5% T-NSP



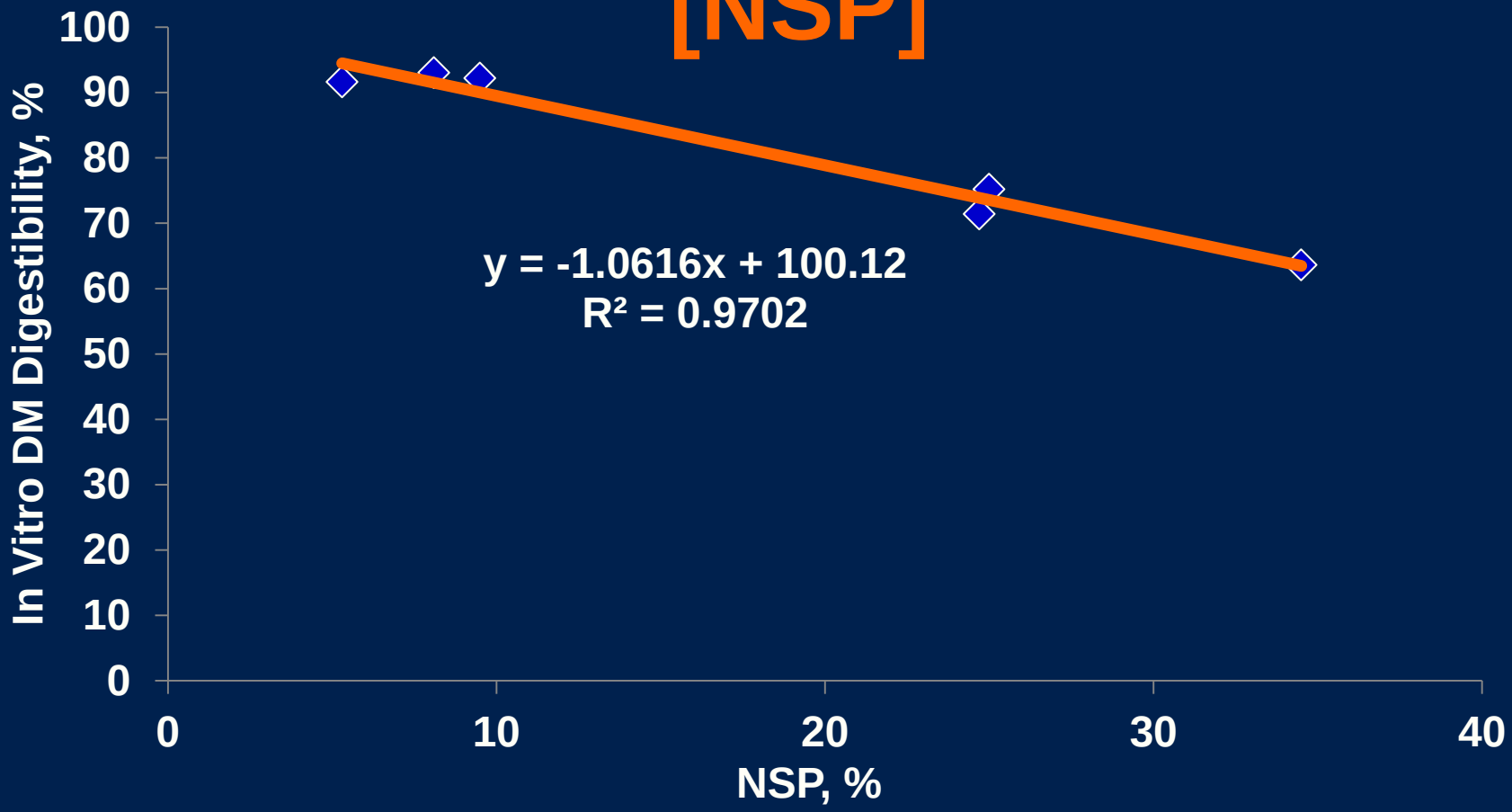
Wheat bran, 34.5% T-NSP



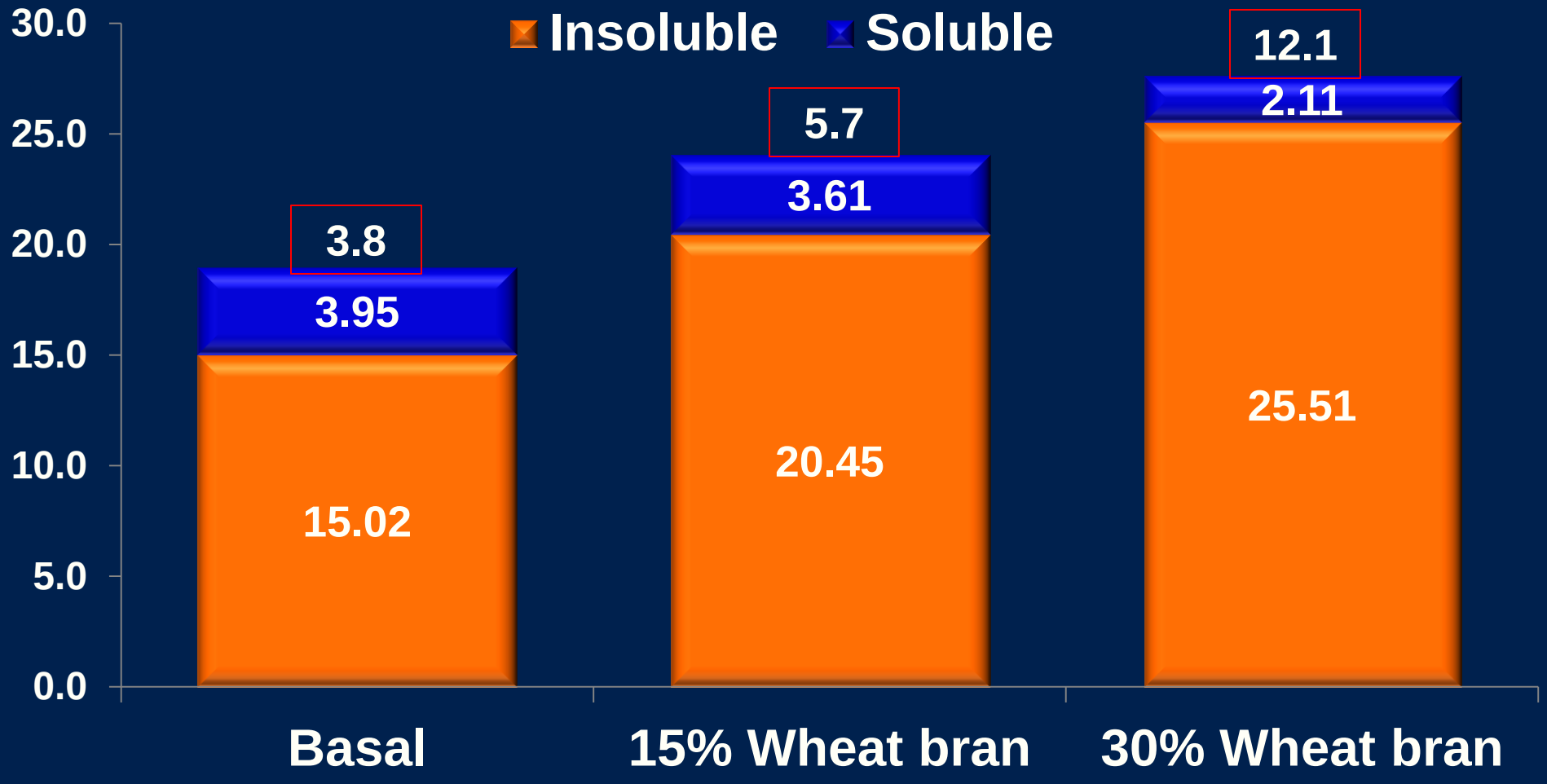
In Vitro Total Tract Digestibility of NSP, %



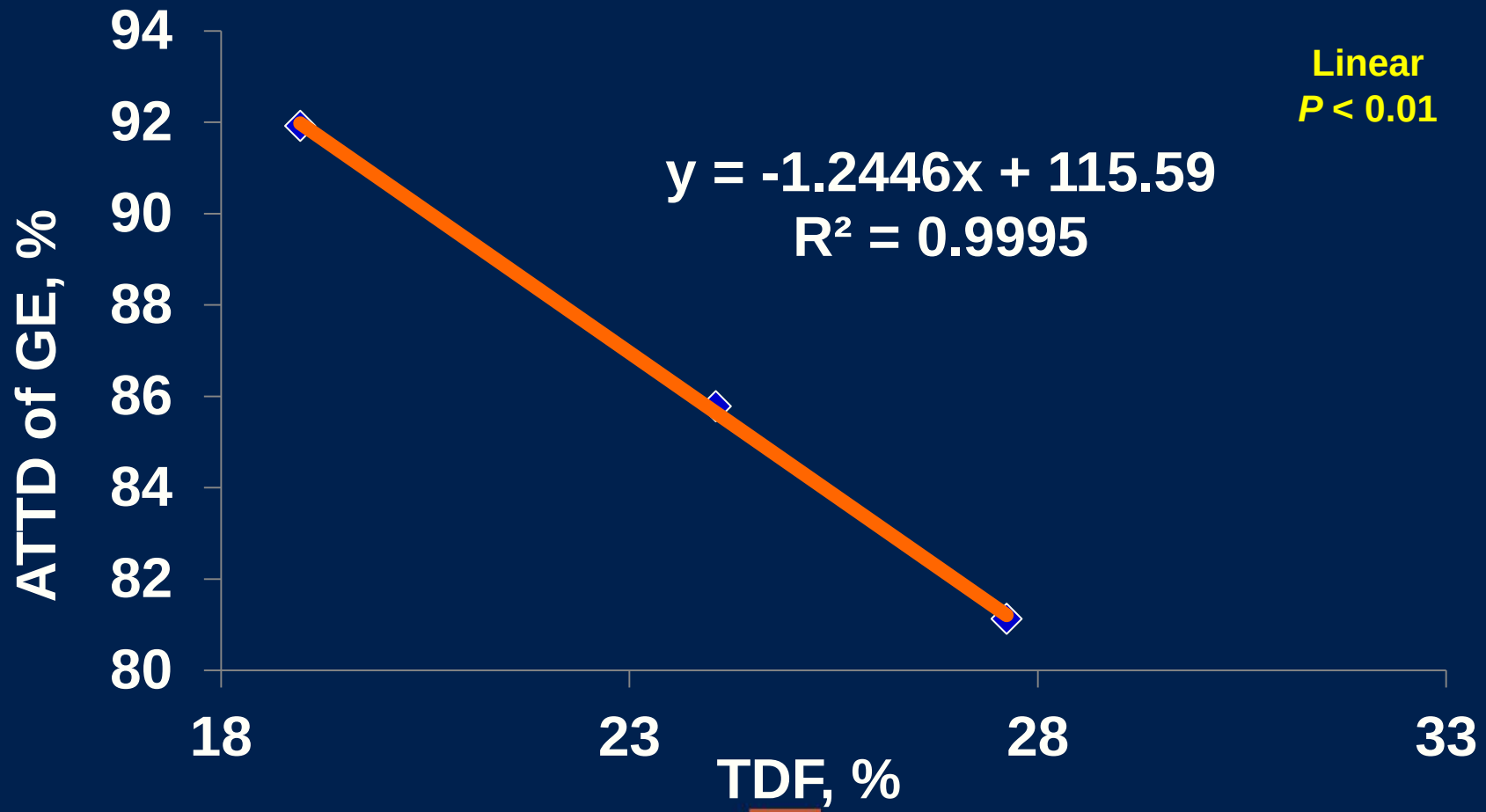
In Vitro DM Digestibility vs. [NSP]



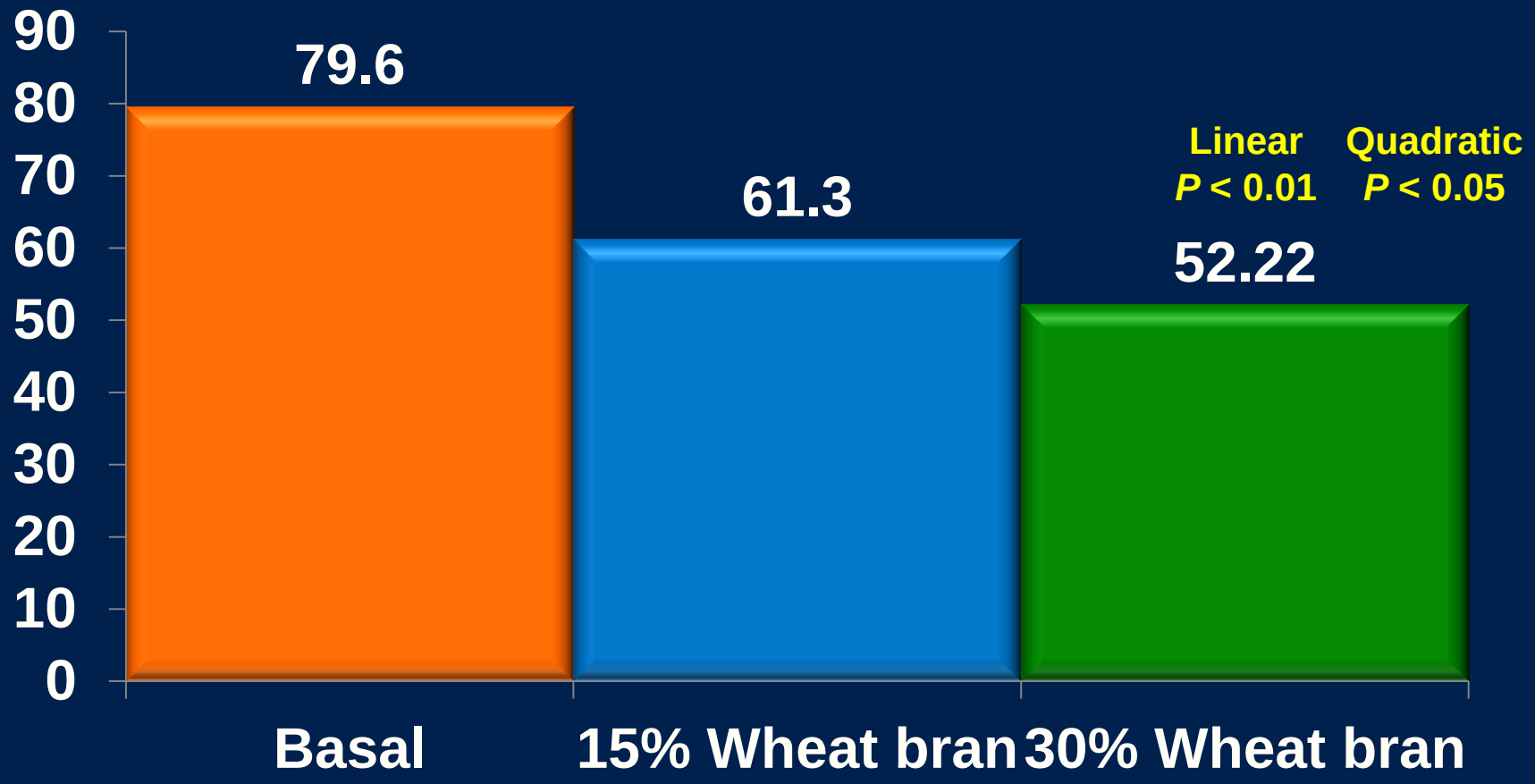
Total Dietary Fiber, %



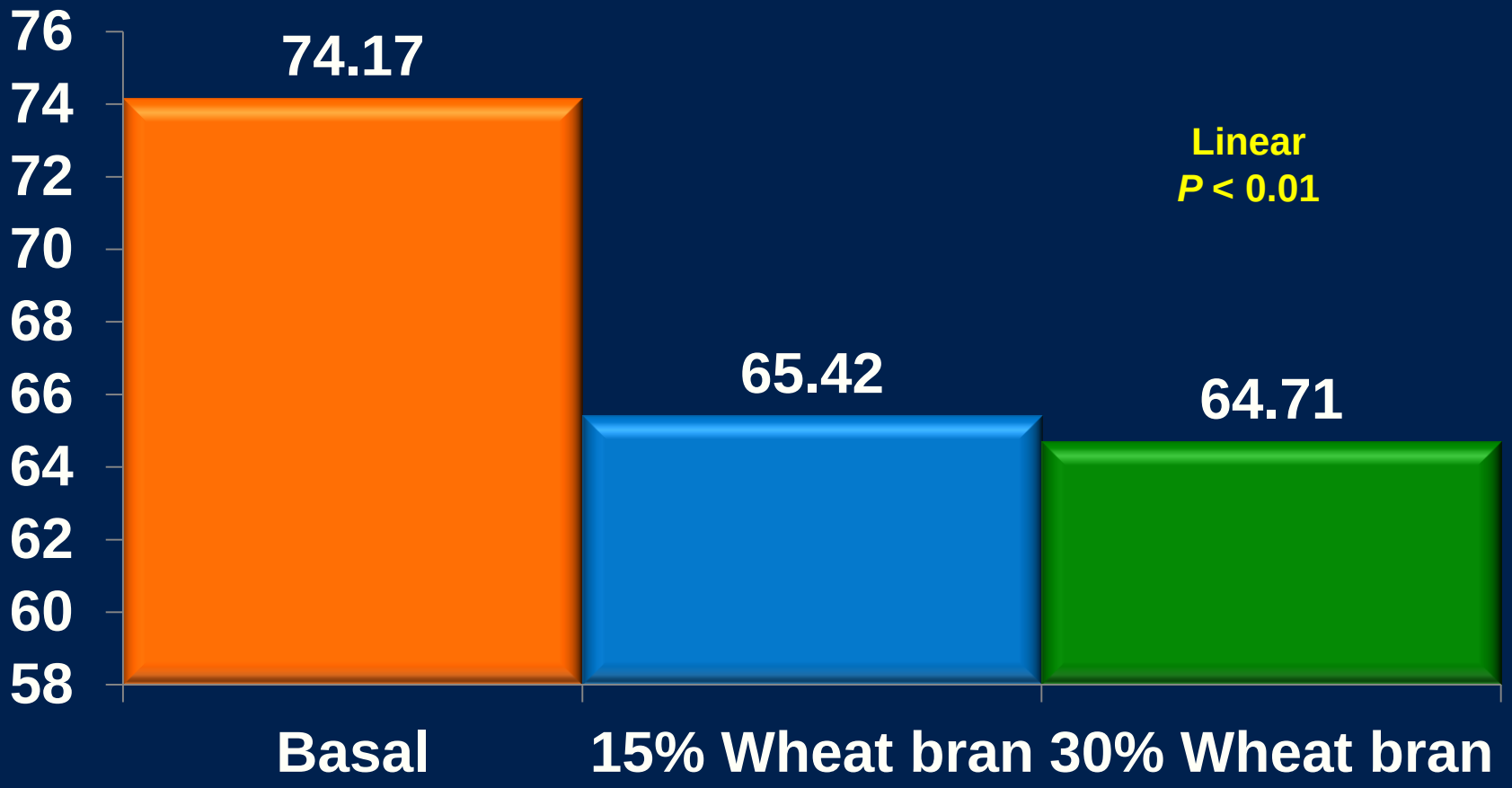
ATTD of GE vs. [TDF]



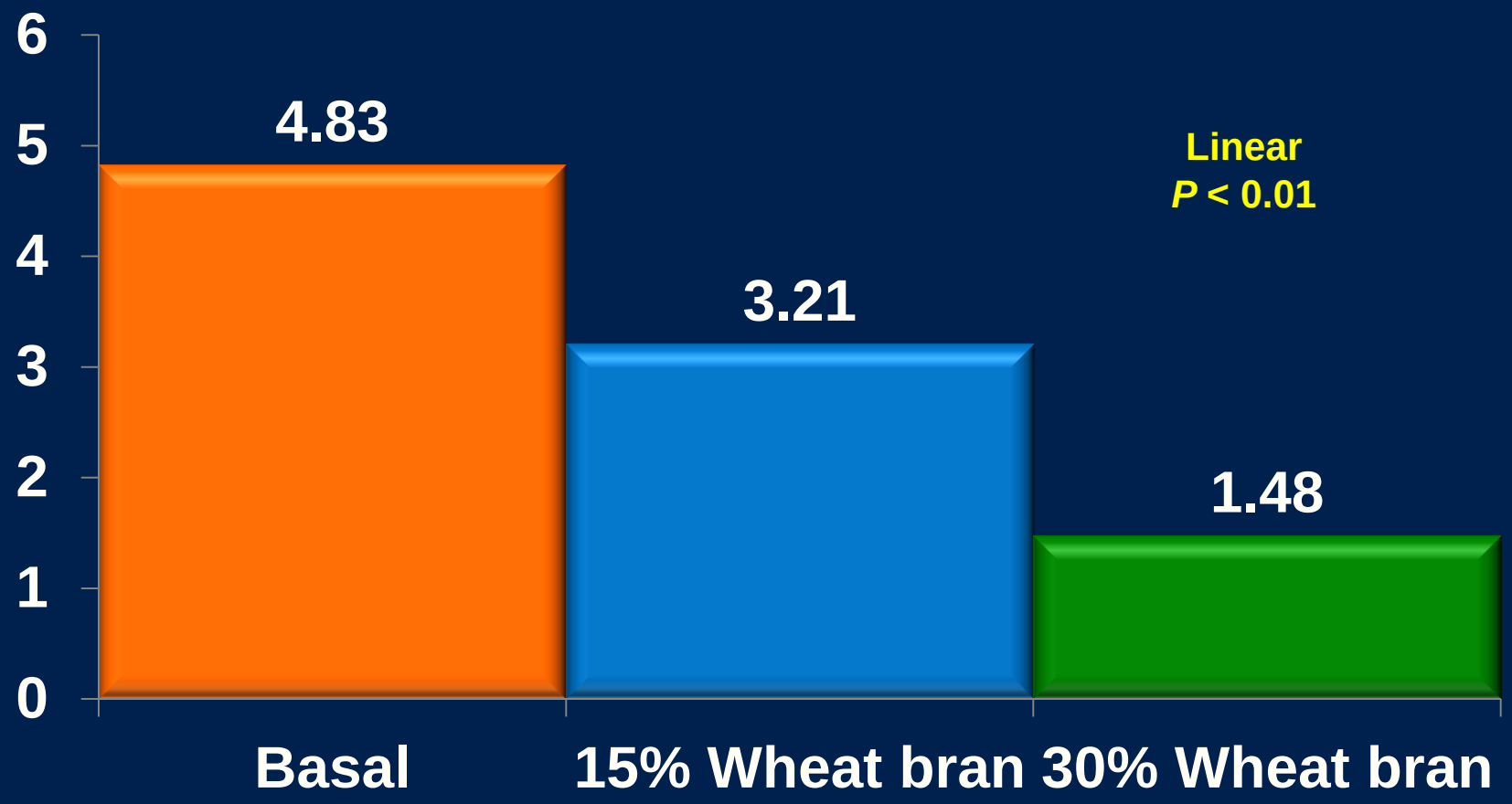
ATTD of ADF, %


90
80
70
60
50
40
30
20
10
0
79.6
61.3
52.22
Linear
P < 0.01
Quadratic
P < 0.05
Basal
15% Wheat bran
30% Wheat bran

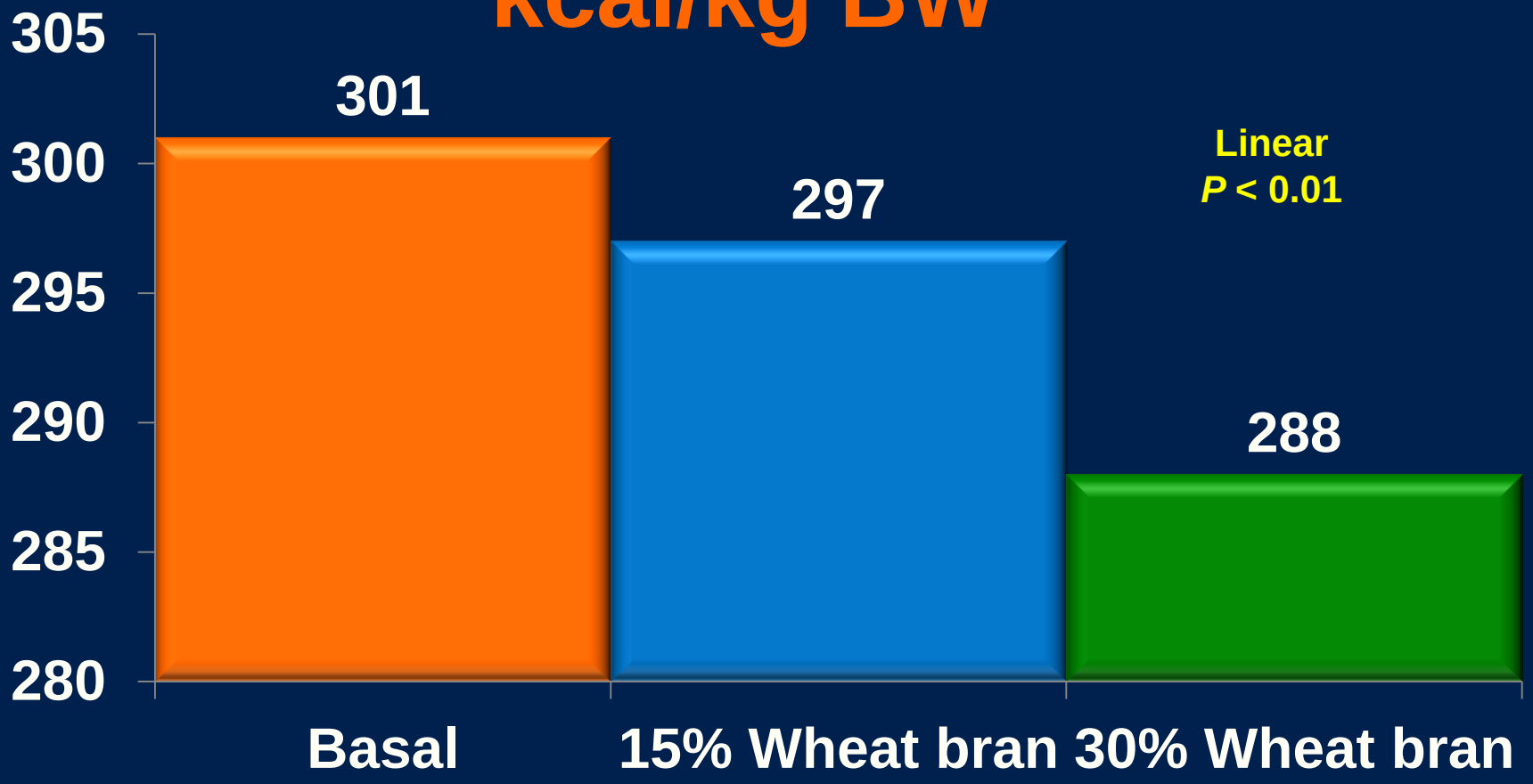
ATTD of NDF, %


76
74
72
70
68
66
64
62
60
58
74.17
65.42
64.71
Linear
P < 0.01
Basal
15% Wheat bran
30% Wheat bran

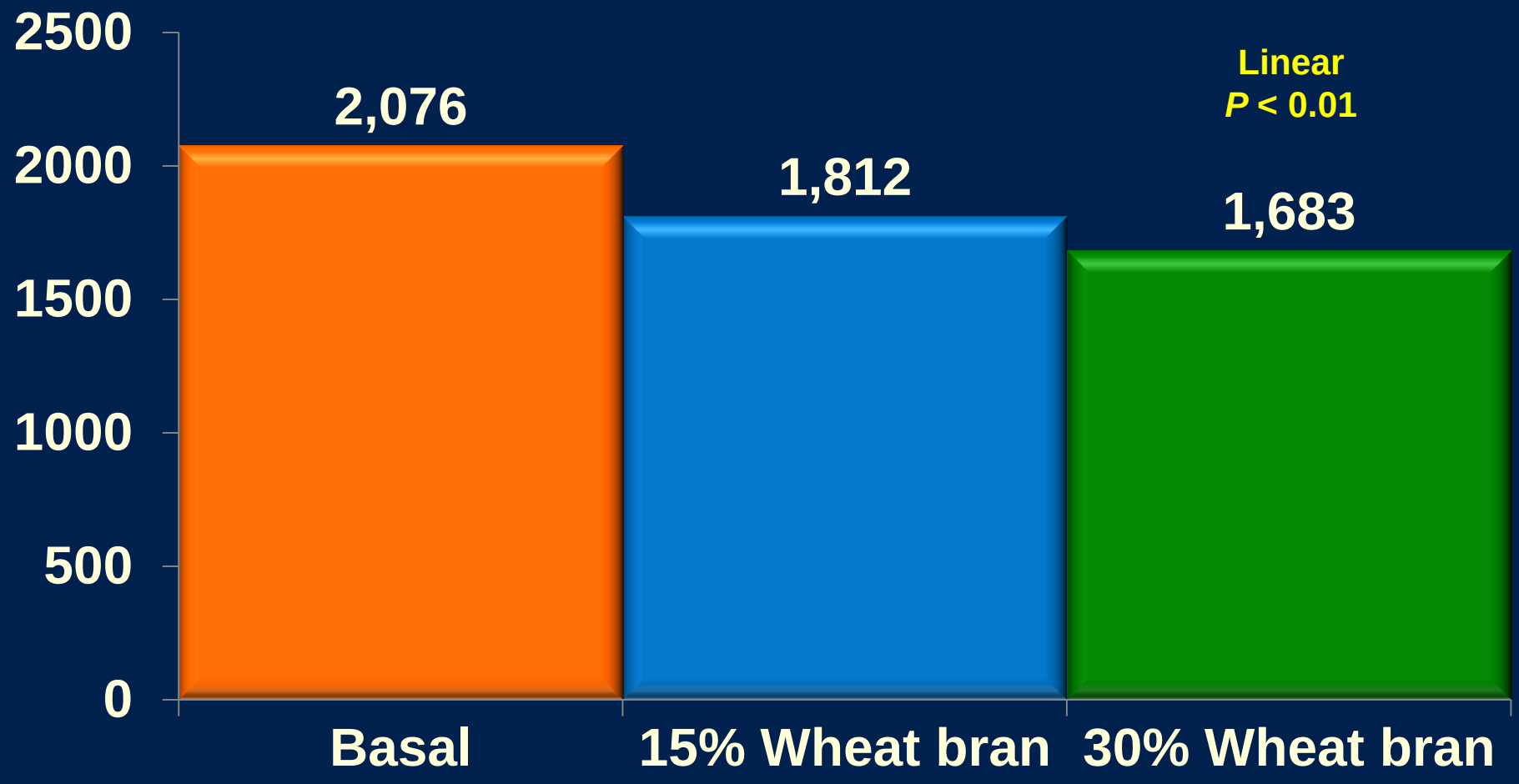
Methane Production, L/d



Daily Heat Production, kcal/kg $BW^{0.6}$



Dietary NE, kcal/kg DM



Conclusion

1. NSP composition is not affected by processing
2. In vitro NSP digestibility is influenced by I:S
3. In vitro DM digestibility & ATTD of GE are reduced by increased NSP and TDF
4. Methane and heat production are influenced by type and amount of NSP
5. All of which influence Net Energy

Thank You

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