Maximizing Protein Value: Impact of Enzyme on Poultry Cultivation

Ermin Magtagnob
Sr. Technical Services Specialist
Novus International

Feed Ingredients and Nutrients

- Feeds are mainly composed of:
  - Carbohydrates
  - **Proteins**
  - Fats
  - Minerals
  - Vitamins
  - Feed Additives







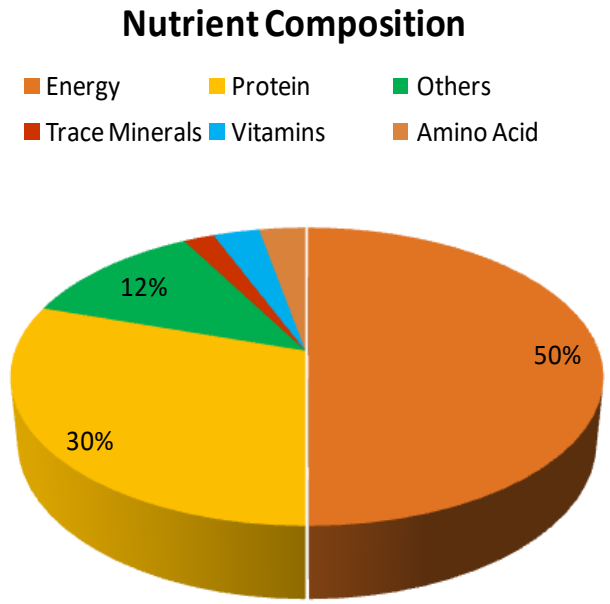


Protein as 2nd most expensive component of feed

Ingredients for STD14 / 002 — Broiler Ross Grower

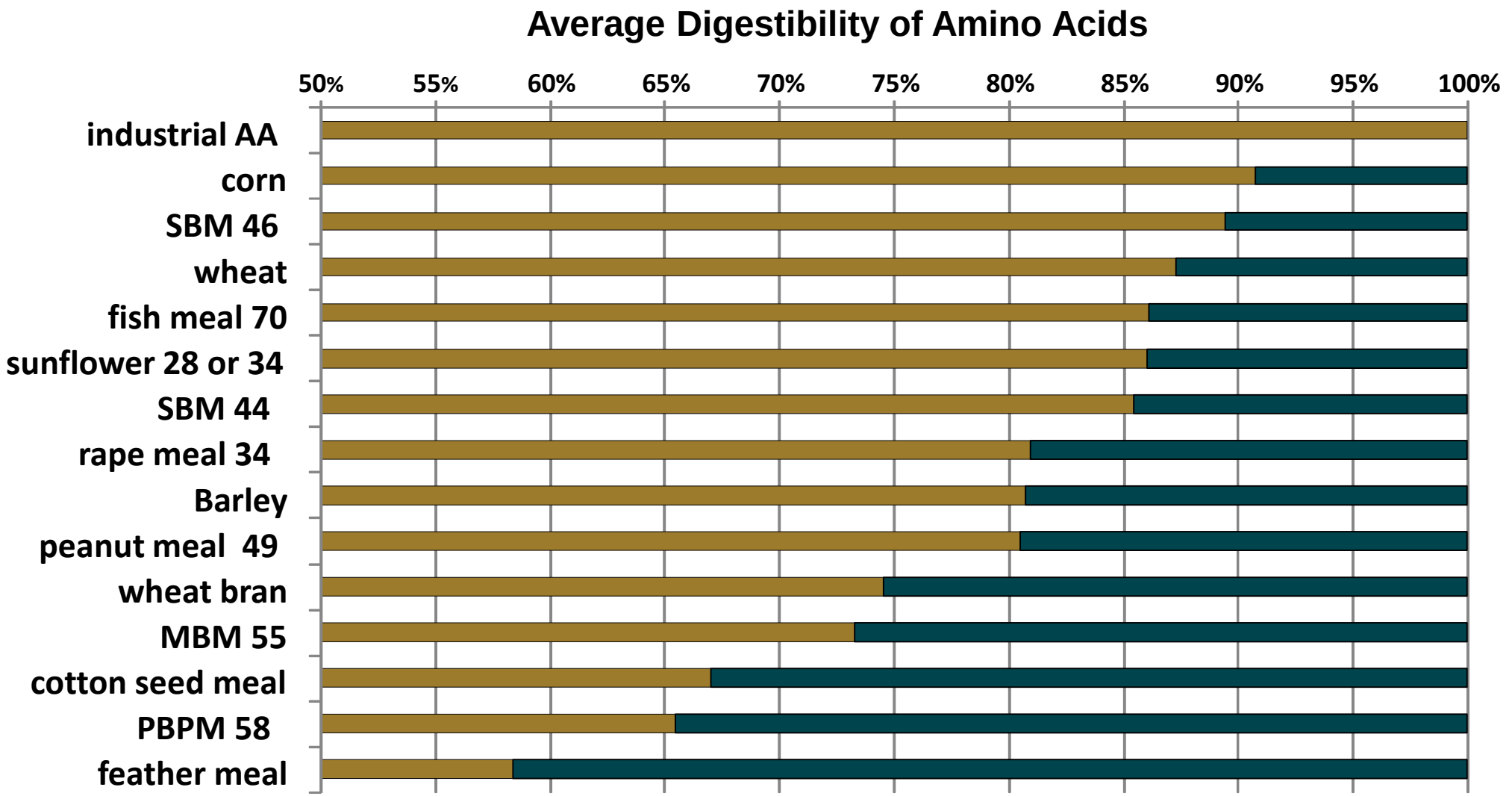
Code	Name	Solution Amount %	Price	*	Minimum	Maximum
1003	Corn	42.44	305.00			
3013	Soya bean meal 46	28.13	567.00			
2001	Rice bran	8.00	262.00			8.00
2006	Corn DDGs medium	8.00	319.00			8.00
3011	Full fat soya extruded	5.00	638.00		5.00	5.00
5001	Crude Palm oil	4.33	638.00			6.00
7003	Monocalcium phosphate	1.46	478.00			
7001	Calcium carbonate fine	1.19	21.00			
6003	MHA	0.38	2,400.00			0.50
7006	Salt	0.31	78.00			
6001	L-Lysine Cl	0.30	1,600.00			0.50
7005	Choline chloride 60%	0.19	2,100.00			
6006	L-Threonine	0.12	2,260.00			0.50
9002	Mineral poultry	0.10	535.00		0.10	0.10
9001	Vitamine poutry	0.05	6,350.00		0.05	0.05
6008	L-Valine	0.01	5,600.00			0.30
2007	Corn Gluten Meal 60%		900.00			3.00
4002	Meat and bone meal 50%		638.00			5.00

On a typical broiler feed, protein sources are around 30% inclusion to meet amino acid requirements.



Poultry ME: 3000 kcal; Dig Lys: 1.15%; *Current Ingredient prices were converted from IDR to USD

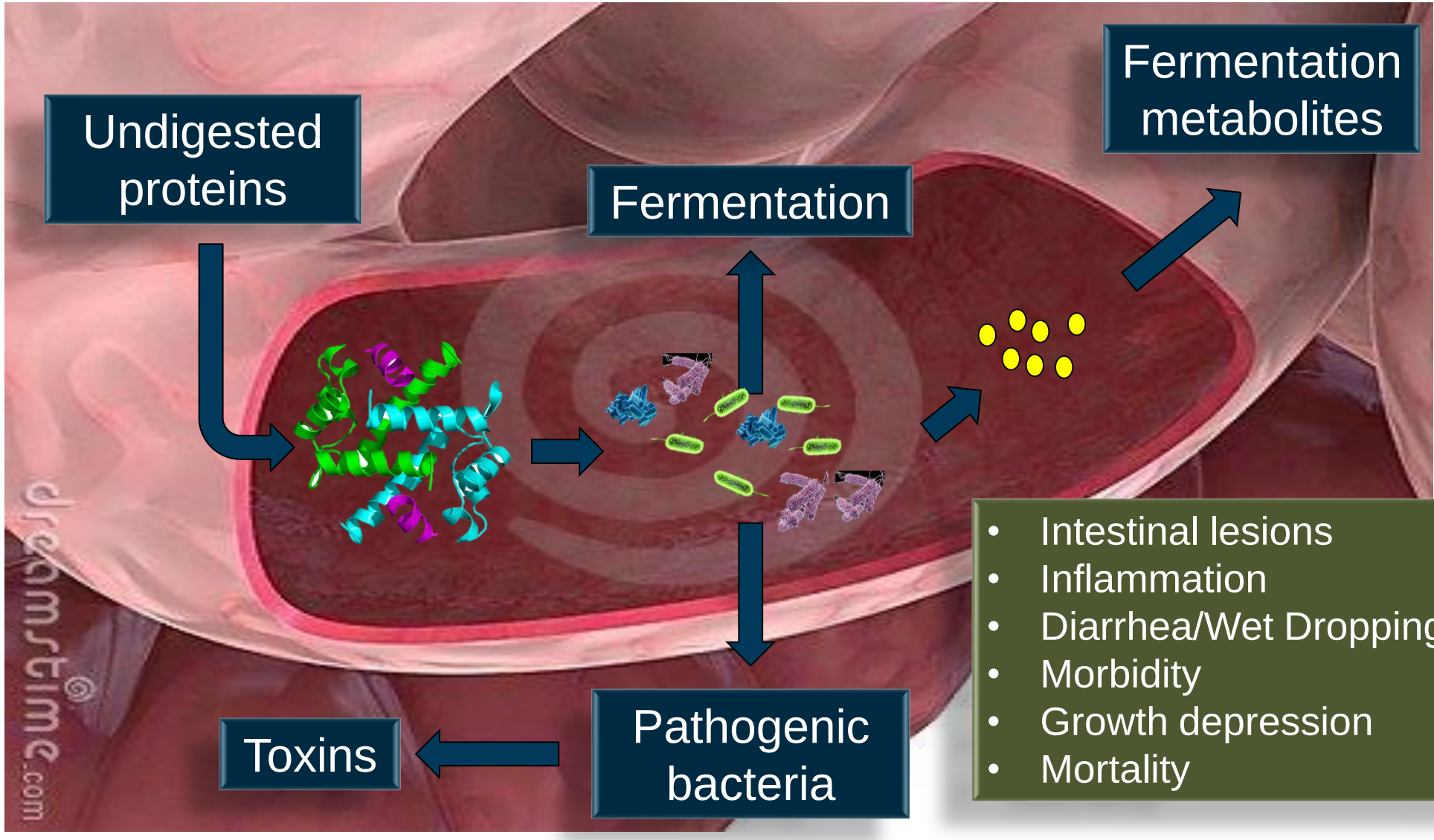
Challenge of Protein Sources in Relation to Digestibility



Based on INRA 2002 / Rhone Poulenc 1996

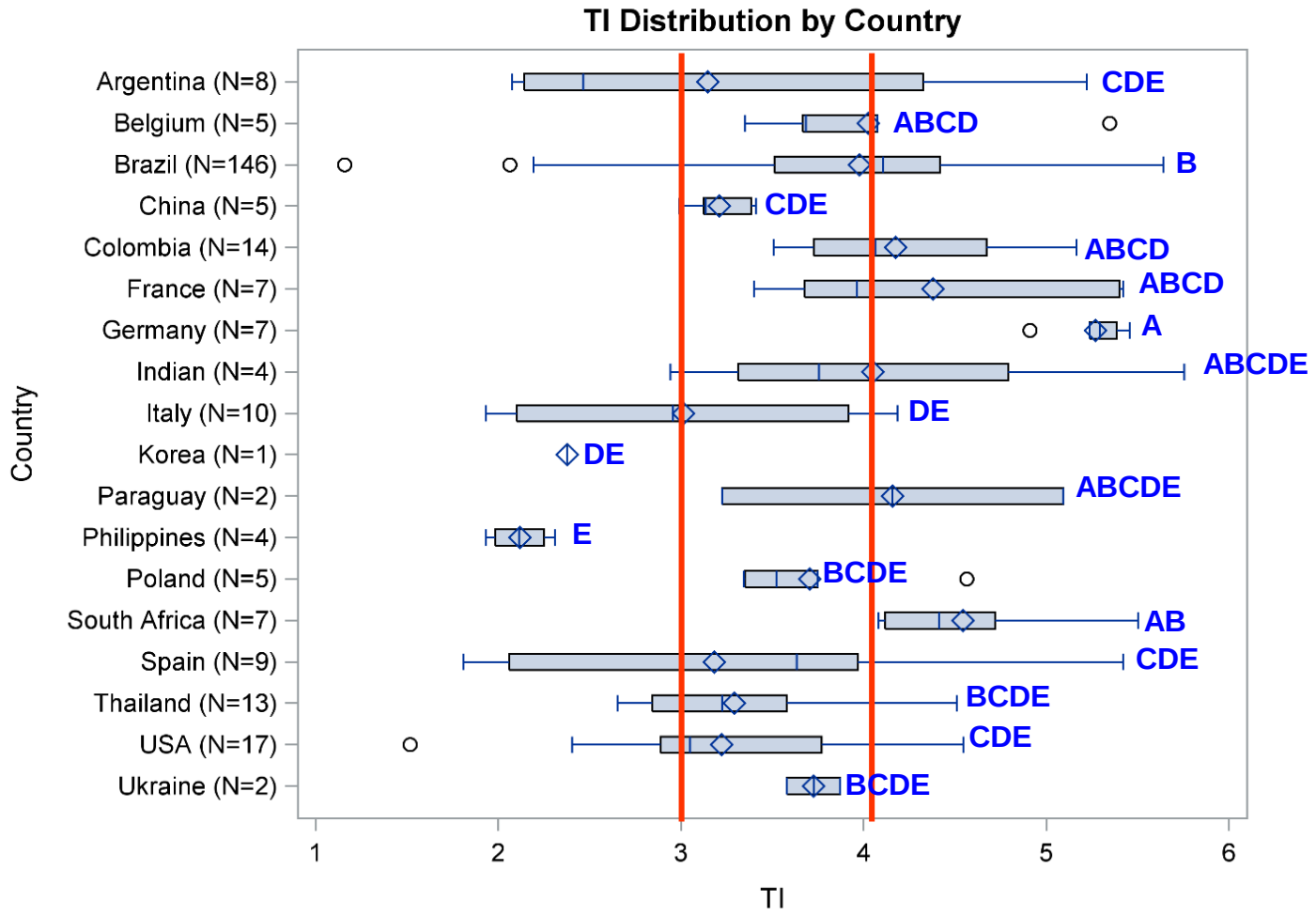
What is the negative effect of undigested protein in poultry?

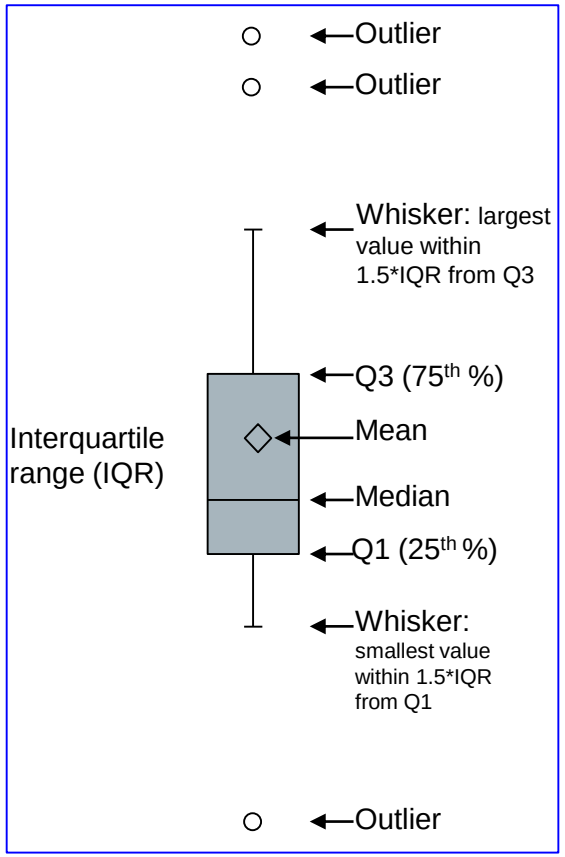
Challenge of Undigested Protein



Quality of Protein Source: Many SBMs Have High Trypsin Inhibitor Level

Traditional SBM





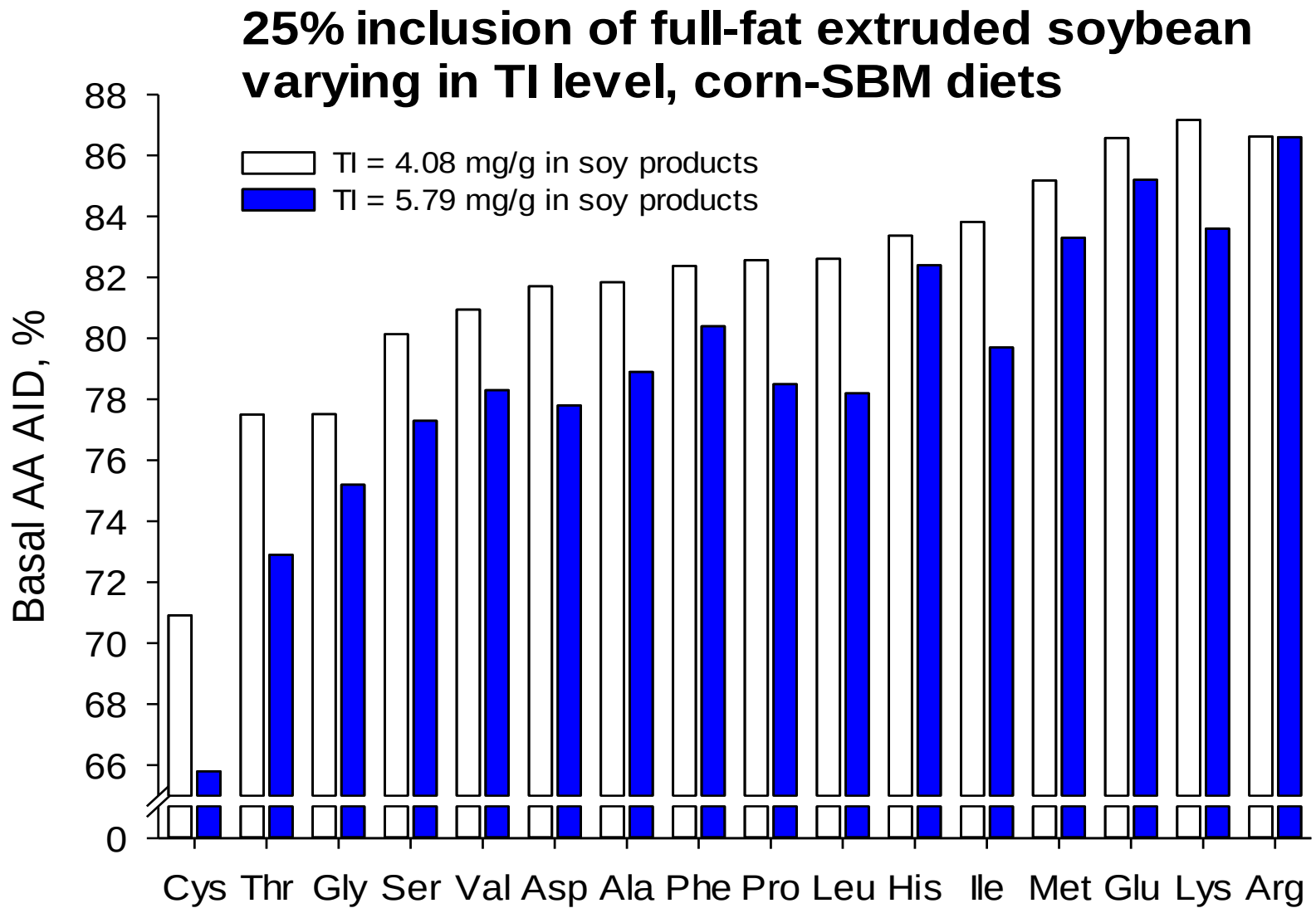
How poor quality Soy Bean Meal affect performance of broilers?

How trypsin inhibitors in soy bean meal affect performance of swine and poultry?

- Trypsin inhibitors; a protein that mostly found in leguminous seeds and inhibit activity of trypsin in GIT
- Causes of hypertrophy of pancreas
- Reduces protein and amino acids digestibility (4-6%)
- Reduces energy utilization (3-4%)
- Increase mucus production (2%)
- Interfere normal gut microbiota
- Increase incidence of necrotic lesions
- Over all gut health implications

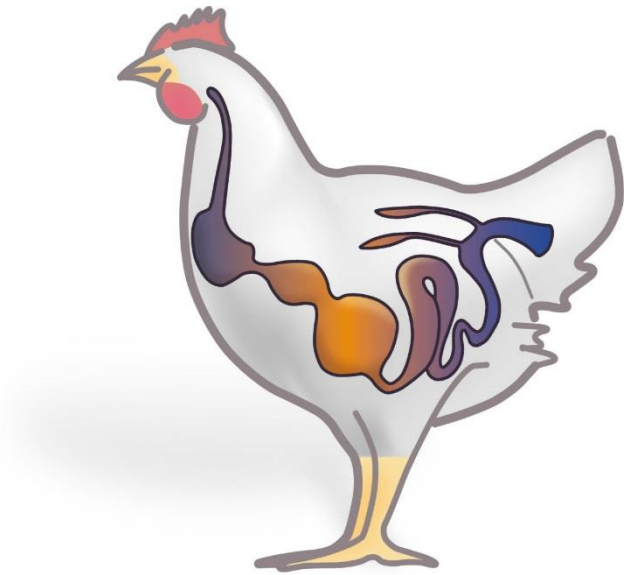
High Trypsin Inhibitors in SBM reduce amino acid digestibility

Higher TI values in soy products result in lower AA digestibility



Undigested Protein and Poor Quality SBM impacts Gut Health

The gut is responsible for the digestion and absorption of nutrients.

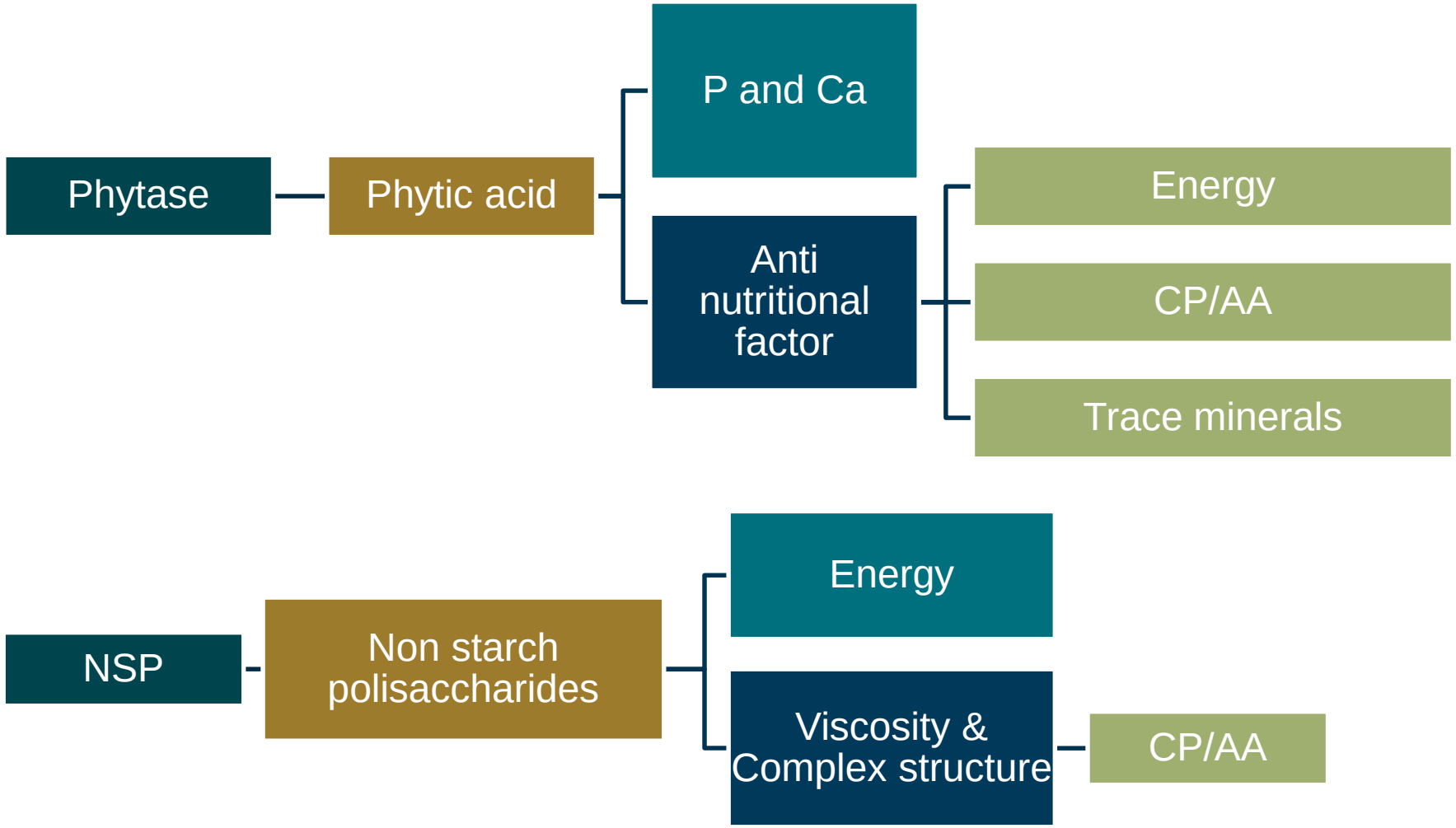


If gut function is impaired, digestion and absorption of feed will be reduced and bird performance and welfare will be compromised.

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What technology can be applied to mitigate the effect of undigested protein and poor quality SBM to maximize protein value?

Common Enzymes in Feed



Protease Enzyme: The Future Is Now



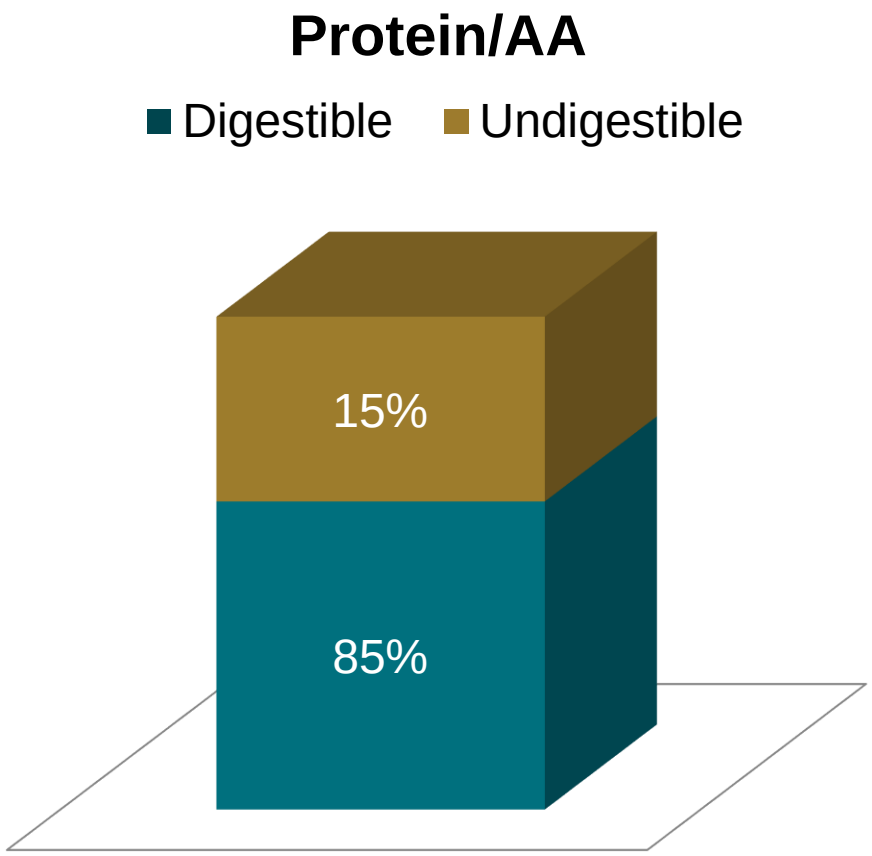
Background on Proteases

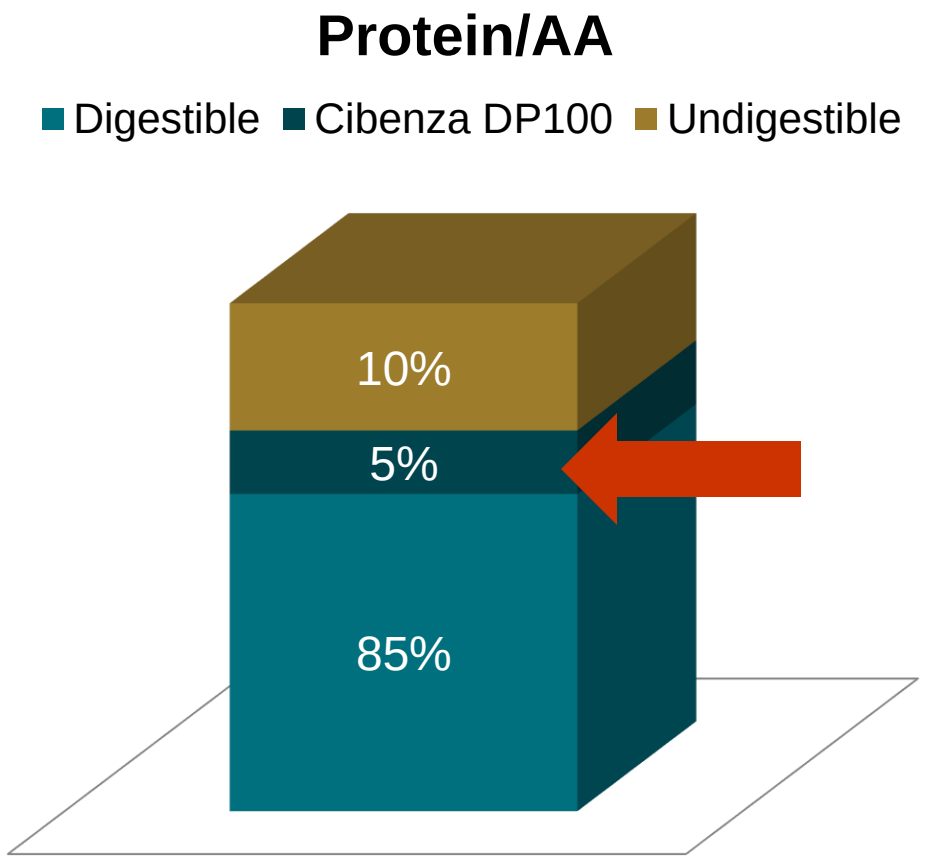
- Industrial enzyme market is about $2.5–3 billion per year
  - enzymes used in food processing ($800 million)
  - enzymes for animal feed ($400 million)
  - nonfood/feed enzyme applications ($1.4–1.7 billion)
- Proteases --- about 60% of the total enzyme market ($1.5–1.8 B/year)
- Alkaline Proteases: with approximately $1 billion per year (mostly use in detergent)

Examples of Alkaline Proteases	Cleavage site (C-terminal)
Chymotrypsin	Aromatic residues – Tyr, Trp, Phe
Trypsin	Basic residues – Lys, Arg

Comprehensive Biotechnology, 3rd edition, Volume 3, 2011
https://doi.org/10.1016/B978-0-444-64046-8.00187-7

Protease Enzyme: The Future Is Now

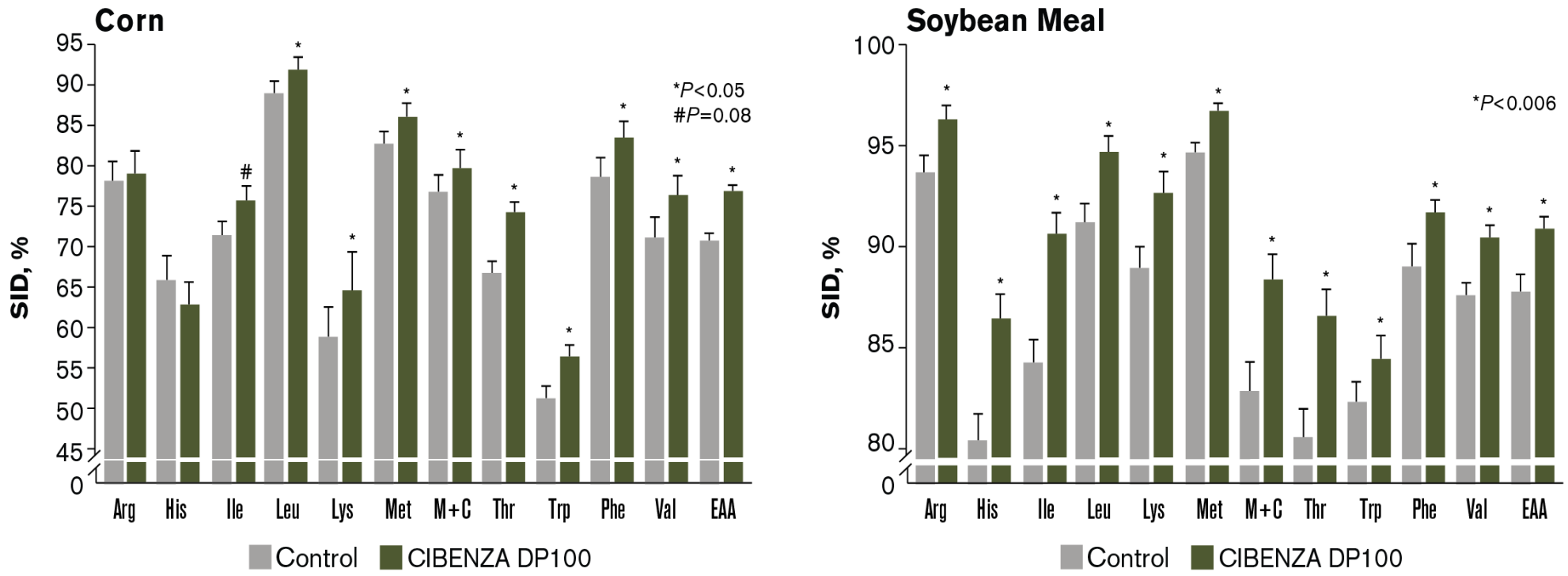




With increasing price of SBM, it is important to maximize the value of protein for poultry production.

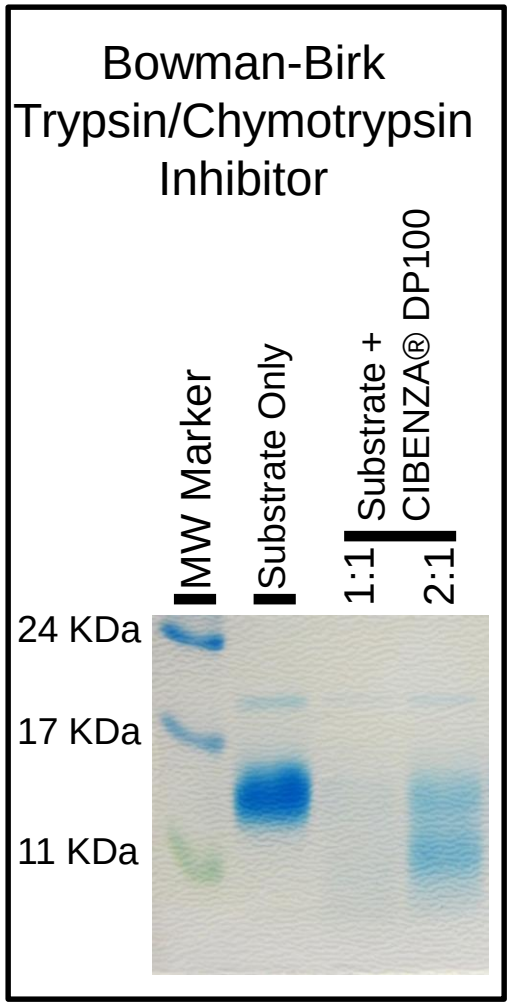
Protease Improve Digestion of Amino Acids

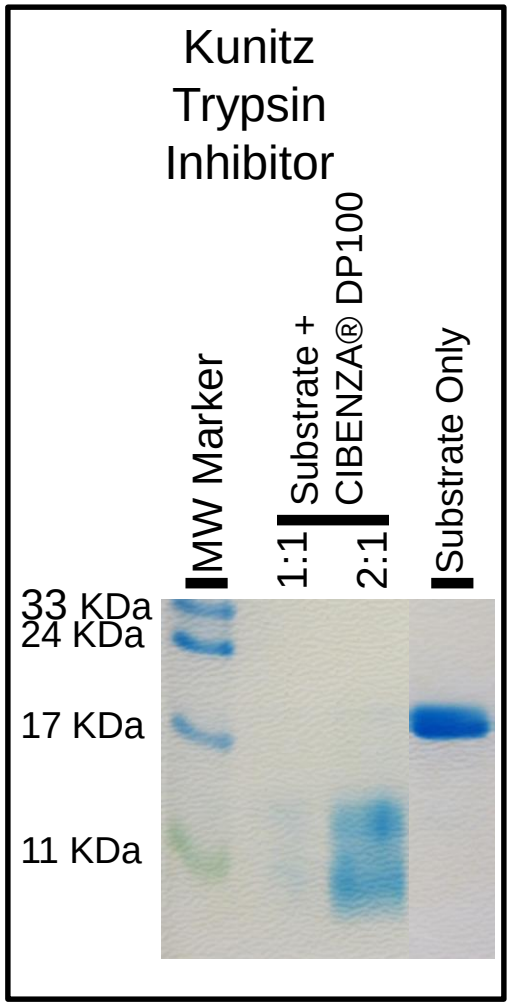
Figure 2. Increase in Digestibility of Corn and Soybean Meal with use of CIBENZA® DP100



Protease can increase dig. amino acids and energy of feedstuffs

Protease Cibenza DP100 digest the trypsin and chymotrypsin inhibitors in SBM





Proteases can support to address common problems during Early Broiler Stage



Immature digestive system and less secretion of digestive enzymes

Higher incidence of microbial fermentation in hind gut which leads to increase in pathogen production

Higher susceptibility to anti-nutritional factors and lower nutrient digestibility

Supporting trials for Protease Cibenza DP100 on Gut Health Benefits

- Modify gut microbiota, prevent dysbacteriosis
  - Reduce ileal *Clostridium perfringens*
    - F. Yan, J. Dibner, C. D. Knight, M. Vazquez-Anon, N. Odetallah, and S. Carter, 2011. Effect of dietary protein and protease supplementation on performance and gut health of broiler chicks. Abstract 57. PSA-AAAP Joint Annual Meeting, July 16-19, 2011, St. Louis, Missouri. Poult. Sci. 90 (E-Suppl. 1): 19
    - F. Yan, J. J. Dibner, C. D. Knight, and M. Vazquez, 2017. Effect of carbohydrase and protease on growth performance and gut health of young broilers fed diets containing rye, wheat, and feather meal. Poultry Science. 96: 817-828. http://dx.doi.org/10.3382/ps/pew300
  - Increase gut microbiota species diversity
    - F. Yan, J. Chen, J. Escobar, C. Foran, T. Wineman, C. Atwell, and M. Vazquez-Anon, 2016. Effect of protease on growth performance, intestinal morphology, gut barrier function, and gut microbiota of broilers. Abstract 0278. The XXV World's Poultry Congress, September 5-9, 2016. Beijing, China
  - Reduce ileum and colon E. coli
    - Taiwan study
  - Increase ceca lactic acid bacterial
    - Taiwan study
  - Decrease ceca VFA
    - Taiwan study
- Improve gut morphology: ↑ V/C ratio; better villus tip integrity
  - H. Wang, Y. Guo, and J. Shih, 2008. Effects of dietary supplementation of keratinase on growth performance, nitrogen retention and intestinal morphology of broiler chickens fed diets with soybean and cottonseed meals. Animal Feed Science and Technology, 140: 376–384
  - Effects of Xylanase and Protease on Gut Health and Growth Performance of Newly Hatched Broiler Chickens. HERCHLER, MARISSA M.S. thesis, North Carolina State University
- Improve barrier function, reduce acute phase protein
  - F. Yan, J. Dibner, C. D. Knight, M. Vazquez-Anon, N. Odetallah, and S. Carter, 2011. Effect of dietary protein and protease supplementation on performance and gut health of broiler chicks. Abstract 57. PSA-AAAP Joint Annual Meeting, July 16-19, 2011, St. Louis, Missouri. Poult. Sci. 90 (E-Suppl. 1): 19
- Reduce digesta viscosity
  - F. Yan Poultry Science paper above. Poultry Science. http://dx.doi.org/10.3382/ps/pew300
  - Effects of Xylanase and Protease on Gut Health and Growth Performance of Newly Hatched Broiler Chickens. HERCHLER, MARISSA M.S. thesis, North Carolina State University

Supporting trials for Protease Cibenza DP100 on Gut Health Benefits

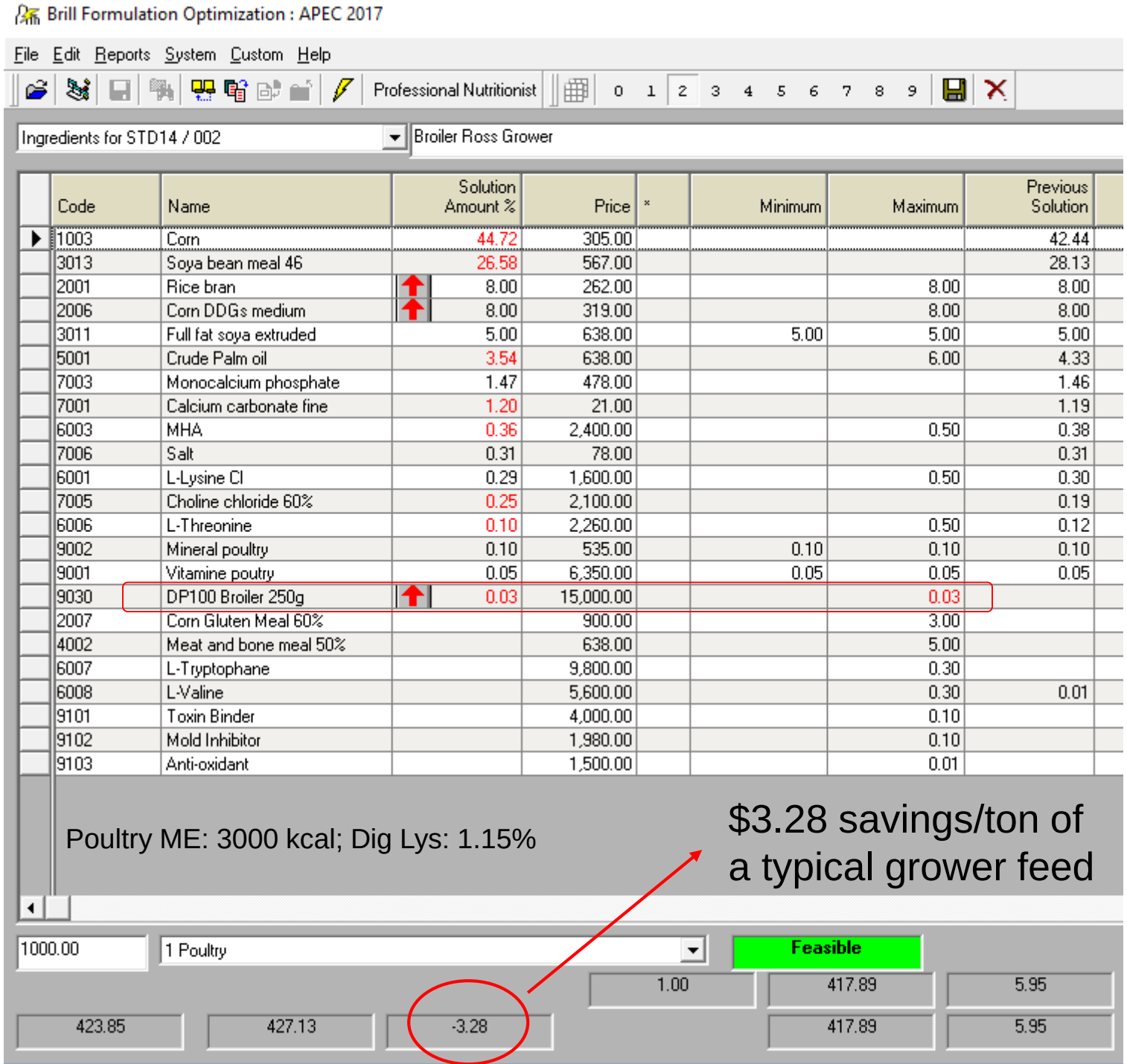
- Reduce inflammation - decrease IL-10, IL-1β
  - Effect of protease and bacitracin methylene disalicylate on growth performance, gut morphology, and gut barrier function of broilers. Abstract T162. International Poultry Scientific Forum , Atlanta Georgia January 25-26, 2016 (IL-1 β)
  - B00IFY016026 (IL-10)
- Alleviate oxidative stress -reduce serum and ileum MDA and ileum protein carbonyl
  - Effects of Xylanase and Protease on Gut Health and Growth Performance of Newly Hatched Broiler Chickens. HERCHLER, MARISSA M.S. thesis, North Carolina State University
- Decrease excreta and ceca ammonia
  - Taiwan study

- **Aside from scientific research and studies, numerous field trials and testimonials supporting the improvement in growth performance and uniformity of the flock with the use of protease Cibenza DP100.**

The value of all enzymes is …



…To have a more profitable business



Formulation Savings using Protease Cibenza DP100 – Reducing Feed Cost

- Use of matrix values (based on improving protein digestibility studies)
- Can maximize use of alternative ingredients (+ 2-3% more of less digestible ingredients)

Unique Protease Feed Enzymes

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CIBENZA® DP100

Broad spectrum serine protease from *Bacillus licheniformis*

600,000 IU/g protease activity

Intrinsically heat-stable

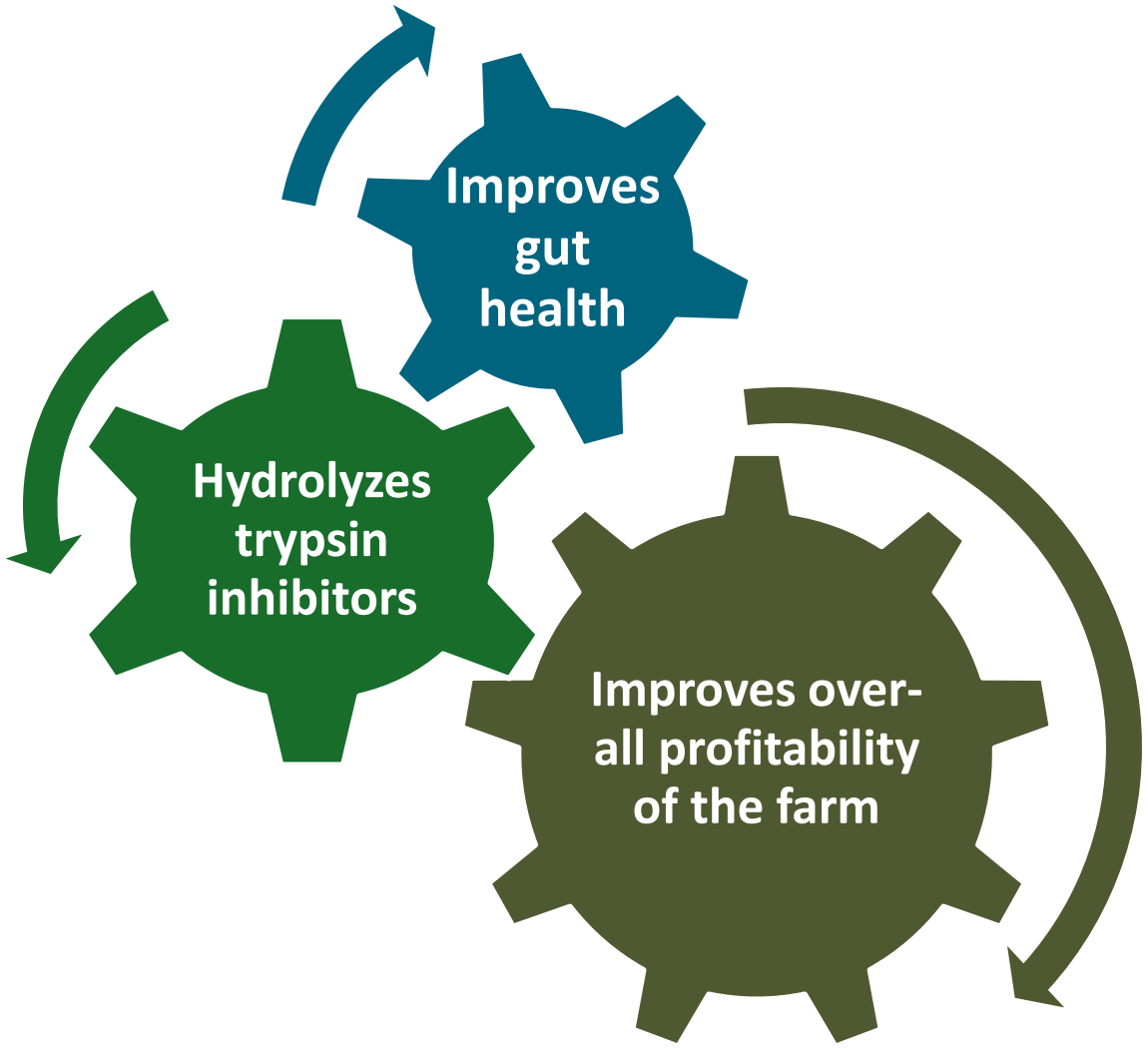
Complements endogenous enzymes

Provides healthy gut for young animals

Effective in hydrolyzing:

- Protein from both plant and animal origin
- Anti-nutritional factors (i.e. trypsin inhibitor)

Benefits of Protease CIBENZA DP100



- **Balances gut microbiota**
  - Improves gut morphology
  - Reduces C. perfringens population in the gut
  - Reduces anti-inflammatory response in birds
- **Improves over-all profitability**
  - Formulation savings
  - Flexibility in use of alternative ingredients

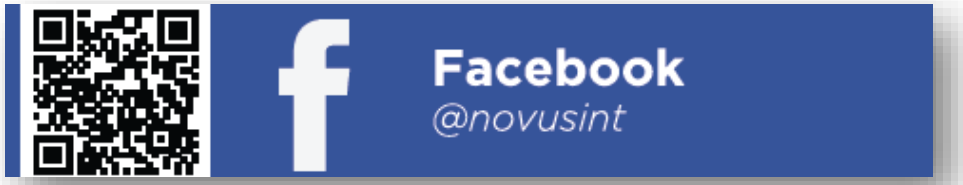
Message

- Poor soy bean meal quality may affect performance of poultry production.
- Undigested Protein can have negative impact on growth performance of flock.
- Technology and years of research on protease can help reduce the impact of high ingredient prices on poultry cultivation.
- Use of Protease: #TheFutureIsNow.

Connect with us









Ermin.Magtagnob@novusint.com


Thank You
Obrigado
Merci
Kiitos
Gracias
Asante
Vinaka
Matondo
Khob Khun
Maake
Kia Ora
Salamat
Mamana
Welalin
Matondo
Grazie
Spasibo
Dank Je
Cam on ban
Arigato
Matur Nuwun
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Terima Kasih
Dhanyavaad
Chokrane
Mochchakkeram
Ua Tsaug Rau Koj
Raith Maith Agat
Nisringrazzjak