Outline

- Finding a market need
- Defining a desirable meal characteristic
- Breeding a specialized soybean

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Leading Aquaculture Producing Countries

Countries	Production, metric tons (2006)
China	34,429,122
India	3,123,135
Viet Nam	1,657,727
Thailand	1,385,801
Indonesia	1,292,899
Bangladesh	892,049
Chile	802,410
Japan	733,891
Norway	708,780
Philippines	623,369
United States	~500,000

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Fish Meal

Capture fishery:

- herring, sardine, menhaden, anchovy etc.

Reasons for inclusion:

- Abundant
- Cheap on protein unit basis
- Very palatable
- Fish grow very fast

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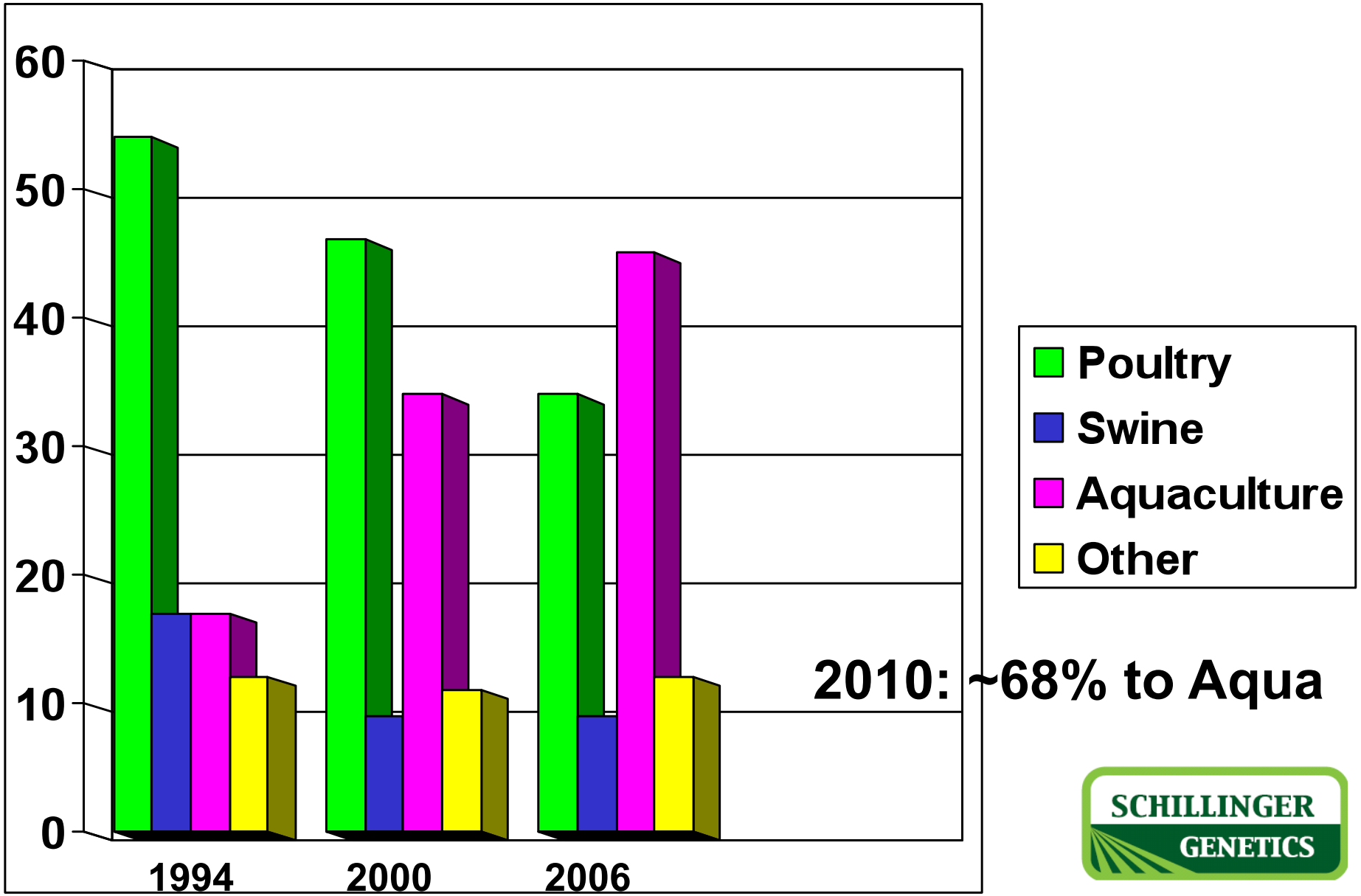
World fish meal use in livestock and fish feeds



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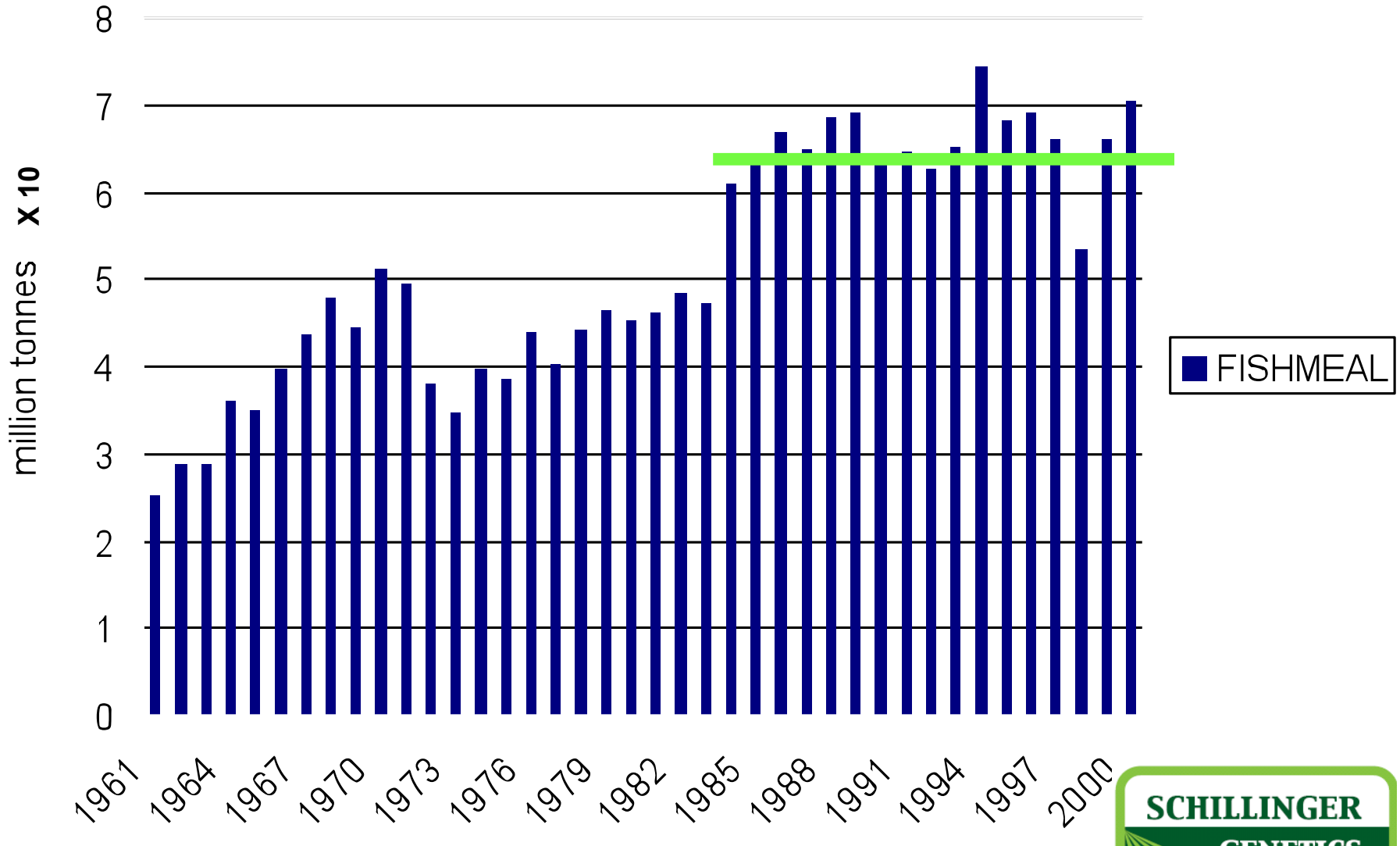
Annual fish meal production from 1961 to 2000



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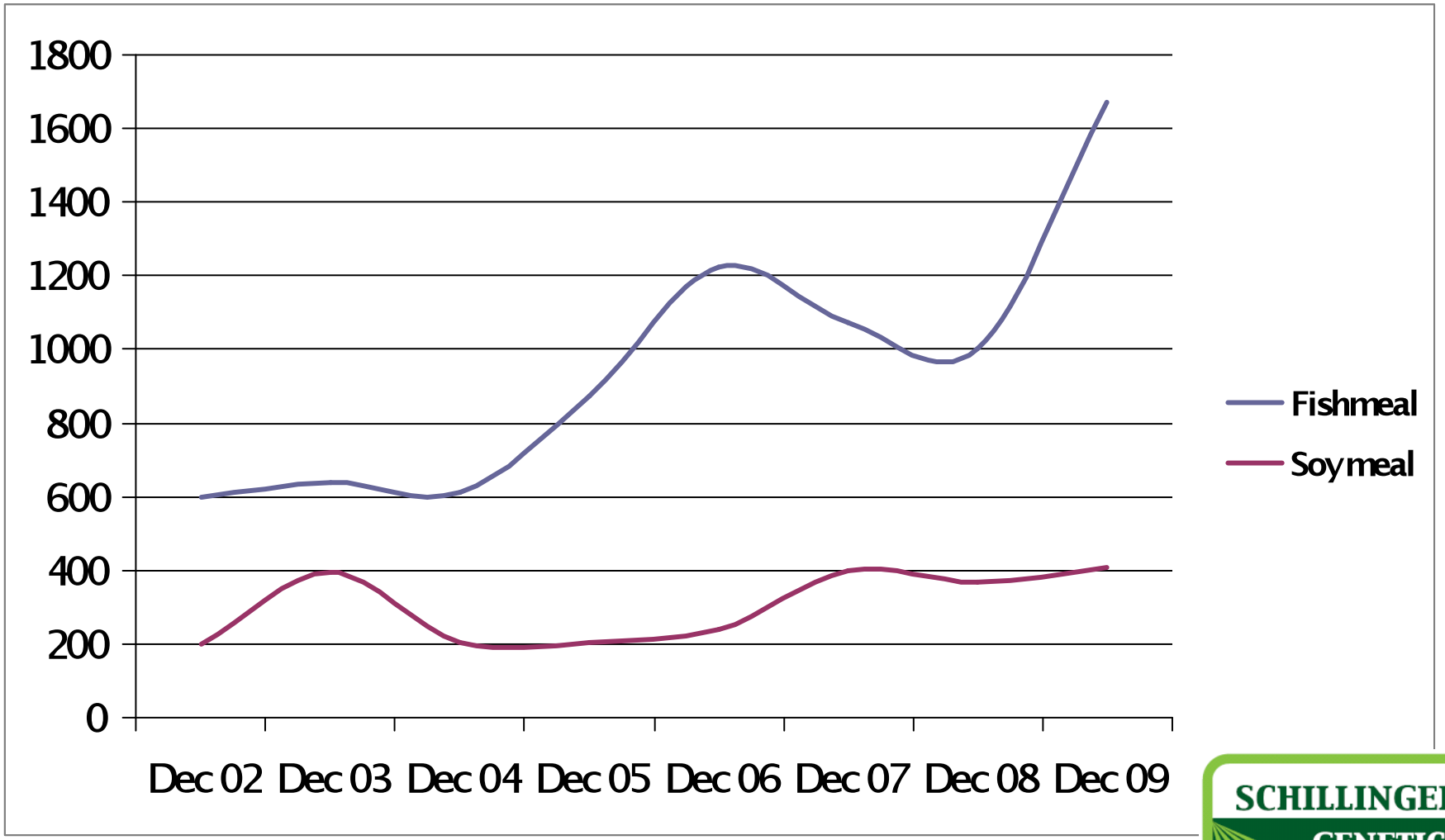
Fishmeal and Soymeal prices (USD/mt)



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Ingredient Evaluation

1) Compositional analysis
   - Nutrients; protein, energy, amino acids, fatty acids, etc.
   - Anti-nutrients; evolved in protective or developmental roles

2) Palatability
   - Effect on feed intake

3) Digestibility
   - Apparent Digestibility Coefficients

4) Functionality
   - durability, expansion, oil absorption, water stability

5) Growth
   - gain, FCR, fecal prod. product quality
   - laboratory, pilot scale, 3rd party, production scale

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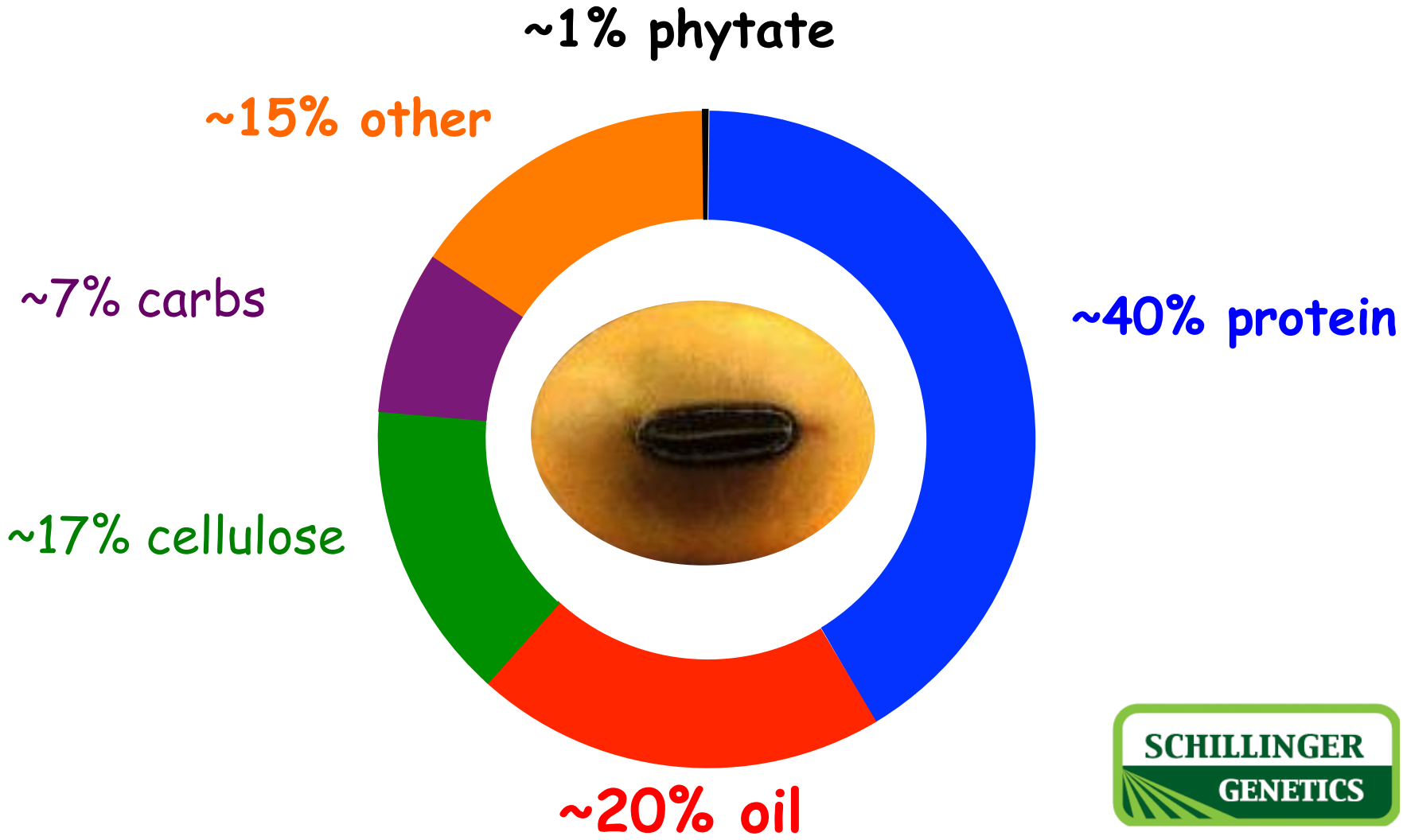
Soybean Seed Composition



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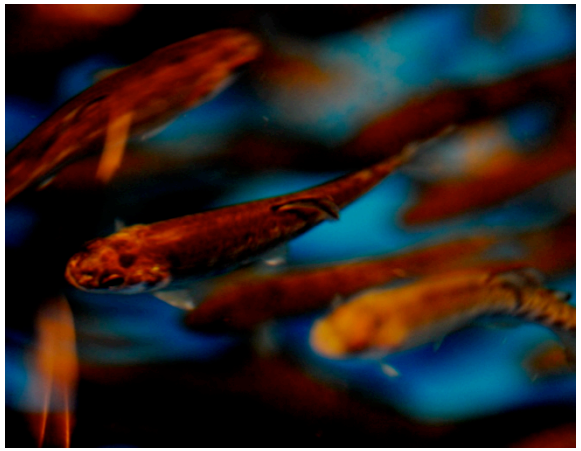
Carbohydrates and Nutrition



Digestion of raffinose and stachyose by micro-organisms in the gut leads to flatulence, diarrhea and poor weight gain…and gastricenteritis.

Gastricenteritis

Healthy intestines

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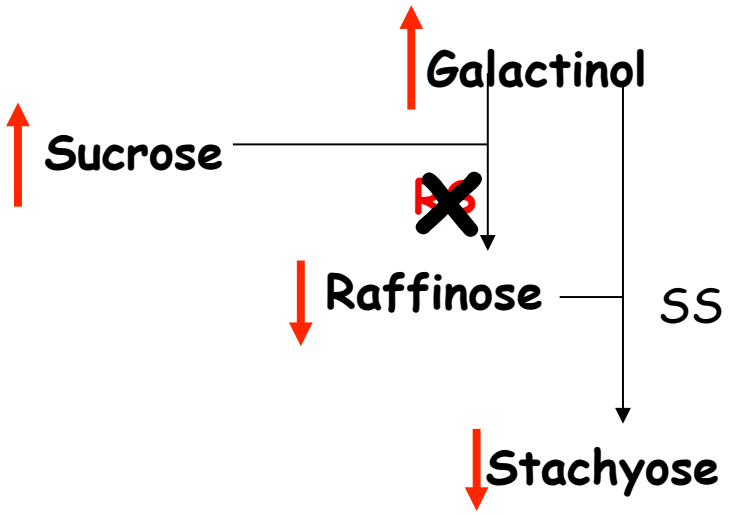
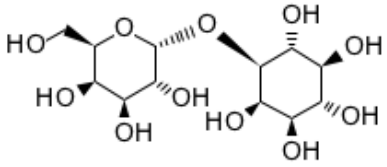
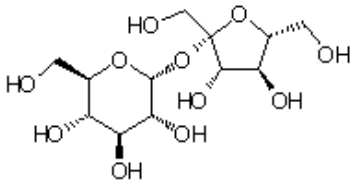
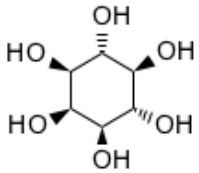
Biochemical Pathway for Raffinose, and Stachyose Production

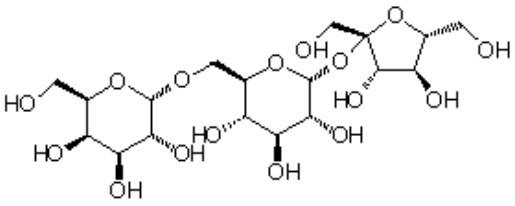



galactinol


sucrose

RS


myo-inositol


raffinose

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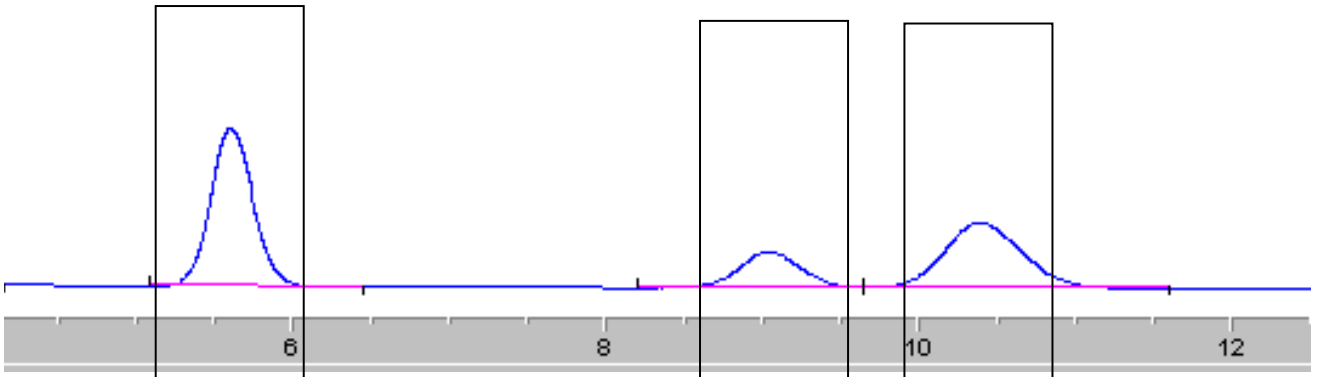
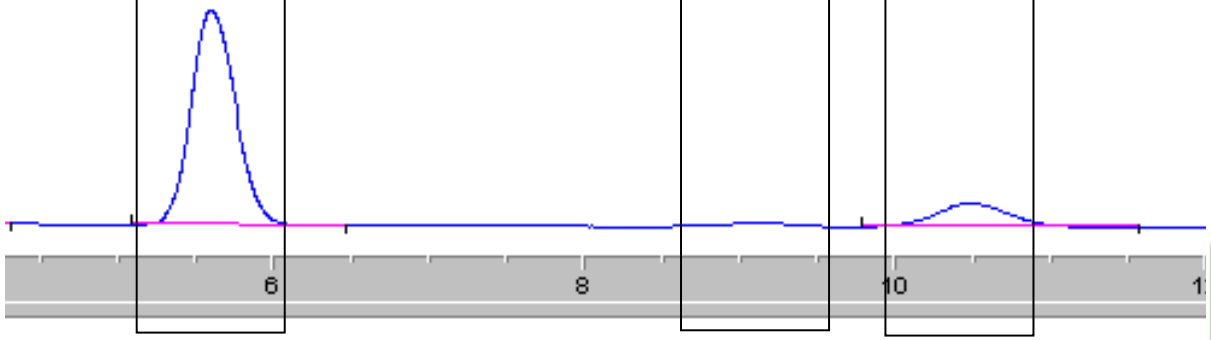
HPLC: Phenotypic Measurement

Average Soybean



Low RS soybean



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Soybean Breeding Strategy

- Utilize Molecular Markers targeted to RS genes

- Select plants/seed with favorable oligosaccharide phenotypes verified by HPLC

- Market soybeans with specialized traits for digestibility

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Questions and Discussion