



CONSULTANTS

Service To The Feeds And Livestock Industries

**UNDERSTANDING AND
MANAGING SOME COMMON BY-
PRODUCTS IN ANIMAL FEEDS**

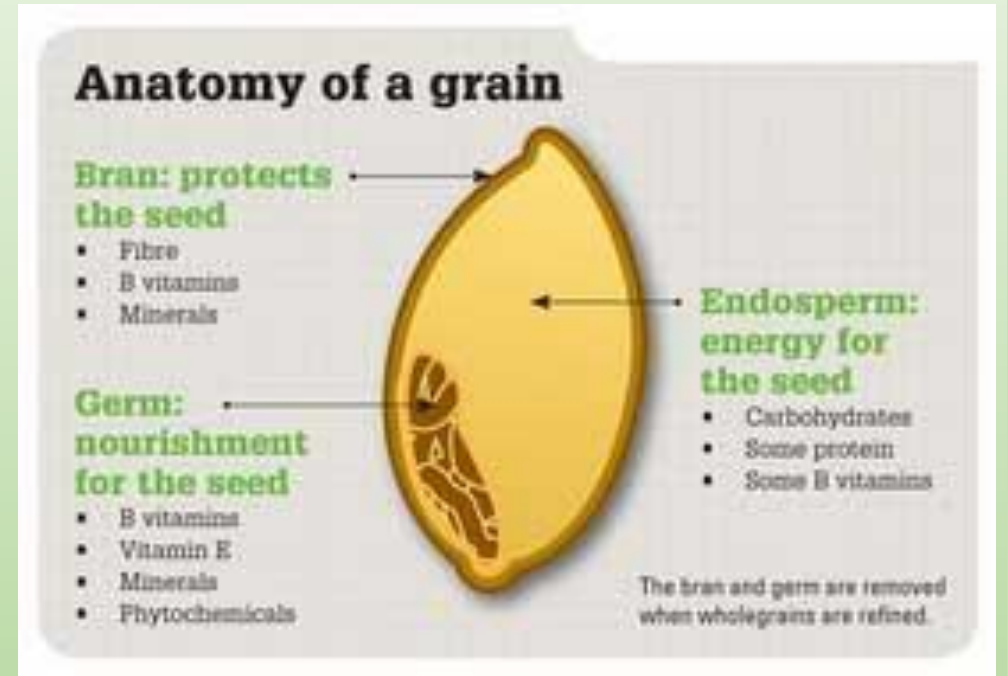
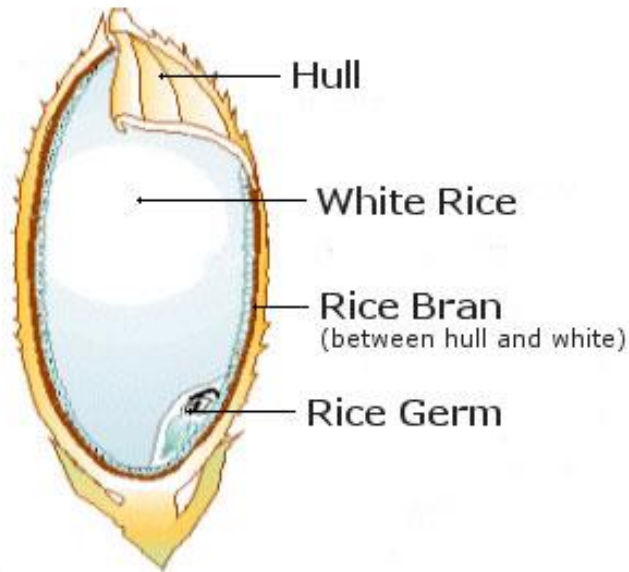
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Animal Nutritionist

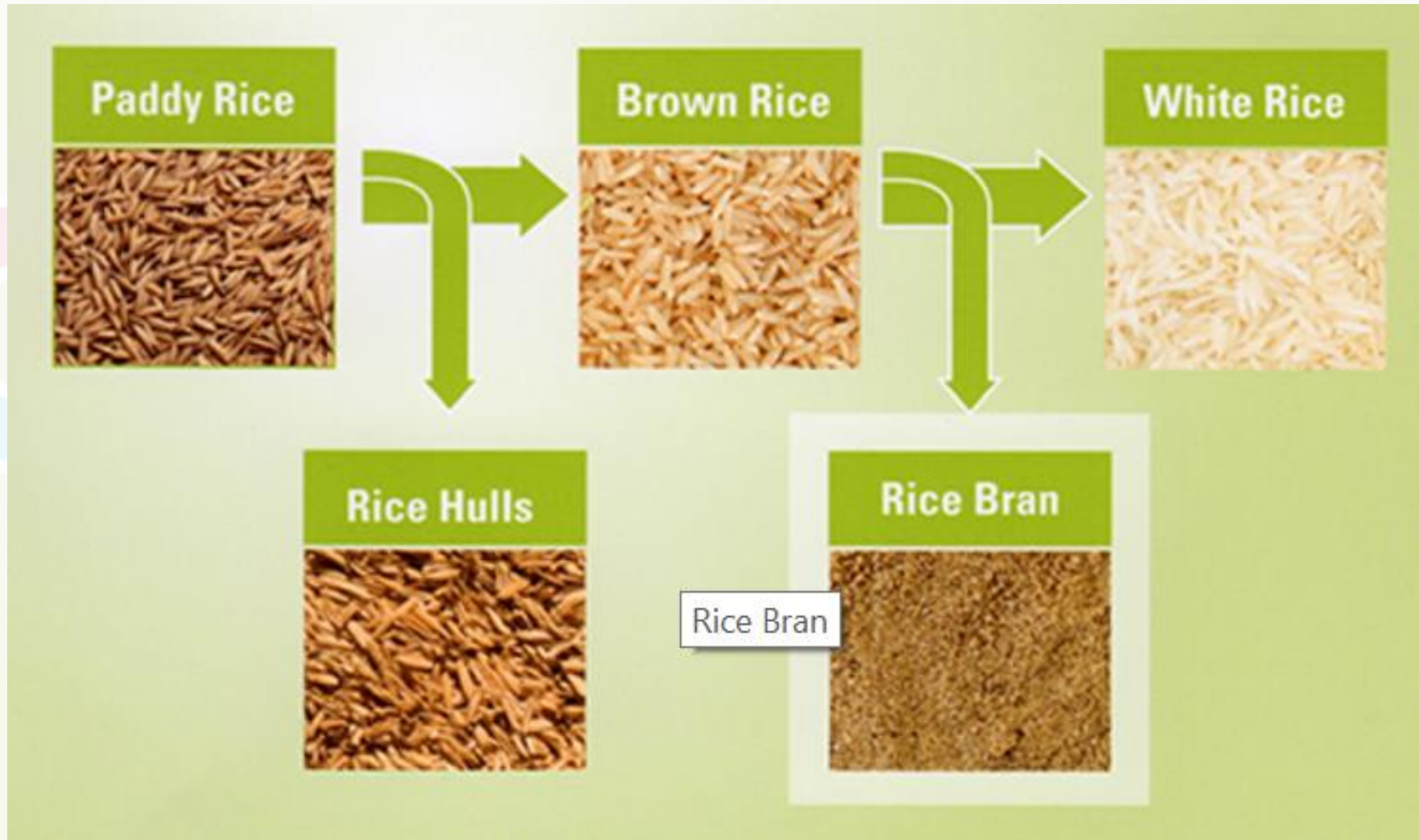
The Philippine Feed & Livestock Industry

- Philippine feed industry which produces approximately 12M MT of feeds annually is expected to grow at 3-4% from 2016-2018. (Philsan, 2016).
 - The drivers of growth are the rising population & economic growth. Both are pushing up meat & egg consumption.
- Our industry though considered corn-soy based relies on by-products from the food industry to be competitive.
- However, by-products maybe inconsistent in quality and seasonal in availability.
- The ability to understand and manage the use of these by-products will determine the competitiveness and profitability of any feed or livestock business.

Rice: The Staple Grain in Filipino Diets



Rice Processing



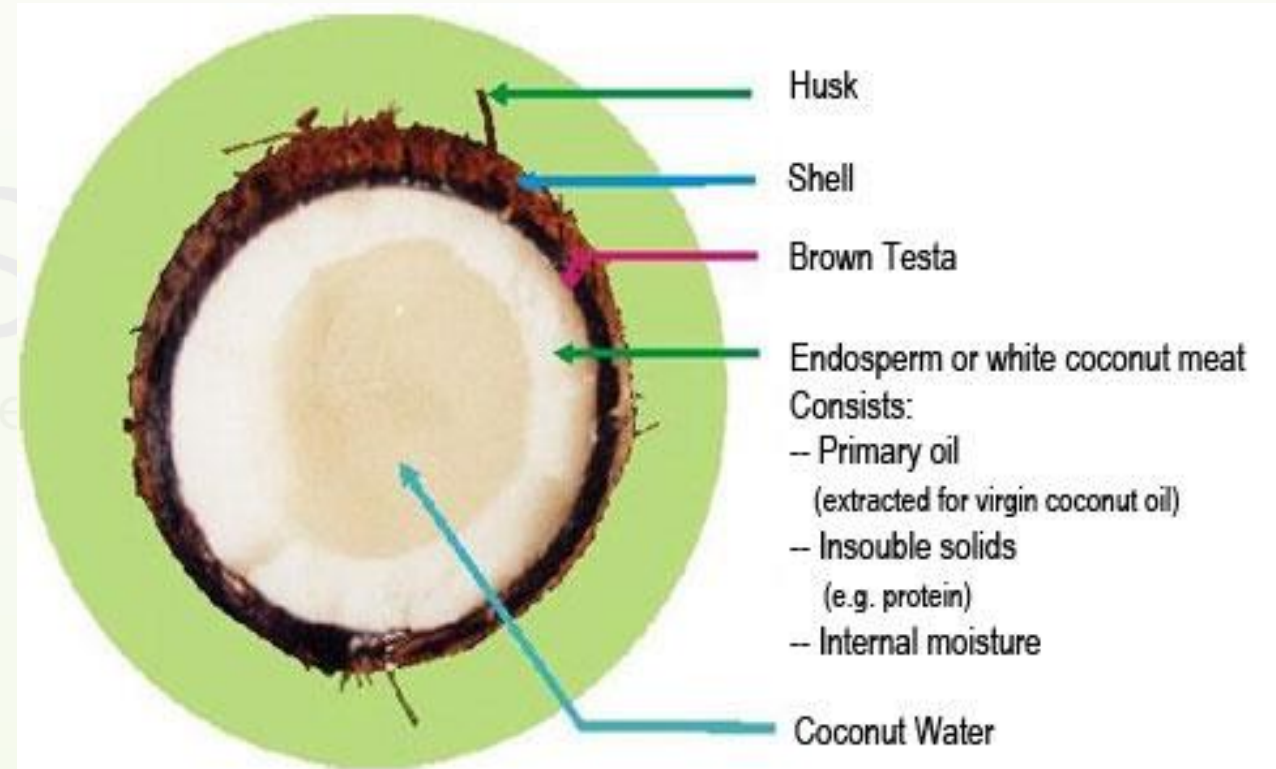
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Rice Bran: Most Common and used By-product

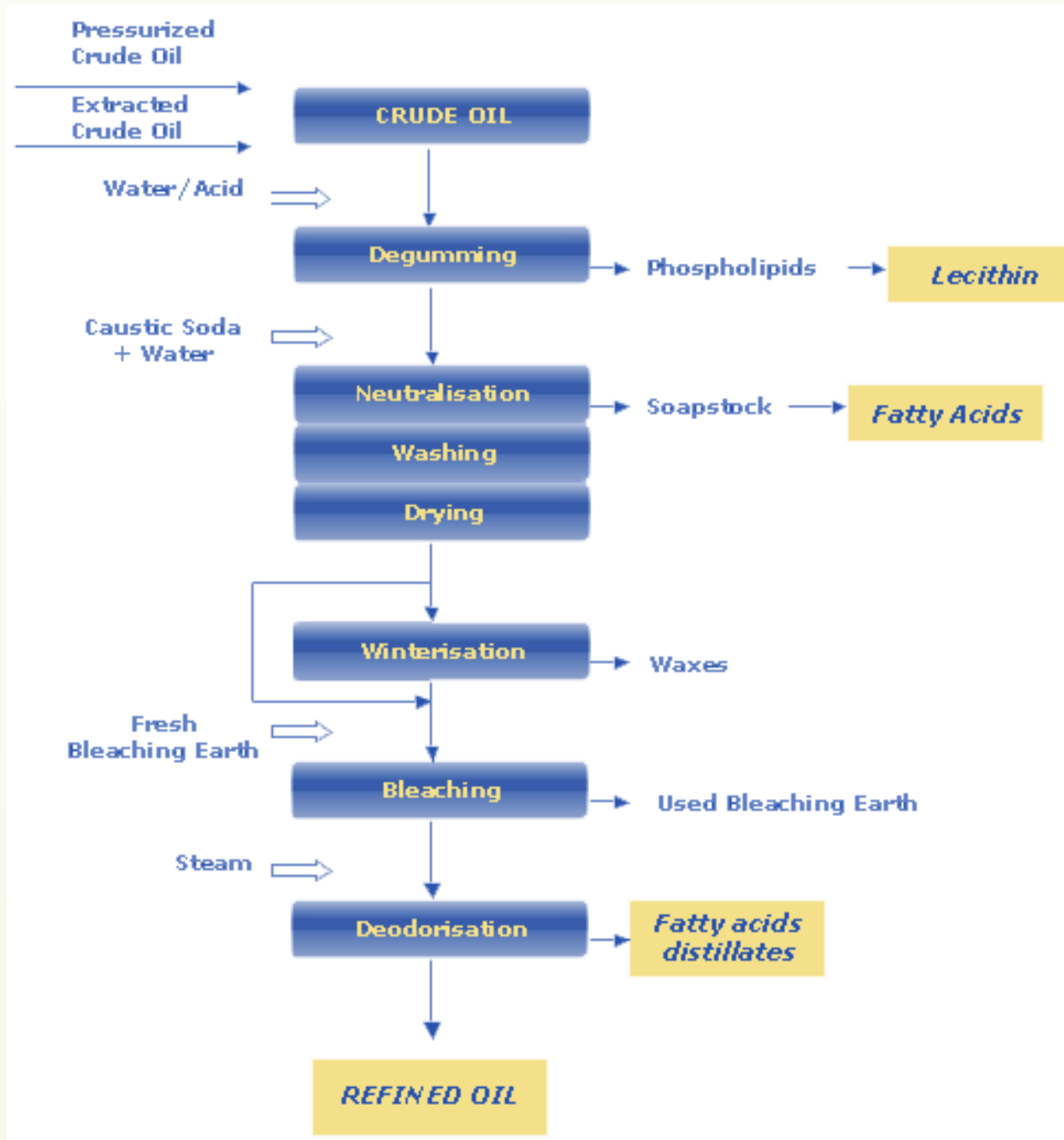


- Composed of a mixture of rice polishings (high in fat) and bran (high in fiber). May also contain some traces of broken rice.
- Due to the high fat, it is very susceptible to oxidation. Can be stabilized with ethoxyquin or by heat treatment (extrusion @ 130°C).
- **Constraints:** High in phytic acid, prone to oxidation, molds & mycotoxins. Often adulterated with ground hulls and/or calcium carbonate/bentonites, etc.

Coconut: Tree of Life



Coconut Processing for Oil



Soapstock or Acid Oil



Fatty Acid Distillate



C.Coco Oil



RBD Coco Oil



Virgin Coconut Oil

Physical & Chemical Specifications of Coconut Oils used in Animal Feeds

Specifications	Units	Crude Coco Oil	C. Fatty Acid Distillate Oil	Soapstock/Acid Oil
Color		Clear Light Yellow	Light Brown to Brown	Dark Brown to Black
Odor		Coconut flavor	Acidic	Very Acidic
Physical State		Liquid	Liquid	Liquid
Moisture	%	1 max	1 max	2 max
Impurities	%	0.50 max	1 max	2 max
Unsaponifiable Matter	%	0.30 max	3 max	3 max
Free Fatty Acids (as Lauric)	%	3 max	60 min	60 min
Total Fat	%	98 min	95 min	93 min
Peroxide Value	Meq/kg	2 max	5 max	5 max
Iodine Value	g/100g	7 - 12	7 - 12	7 - 12

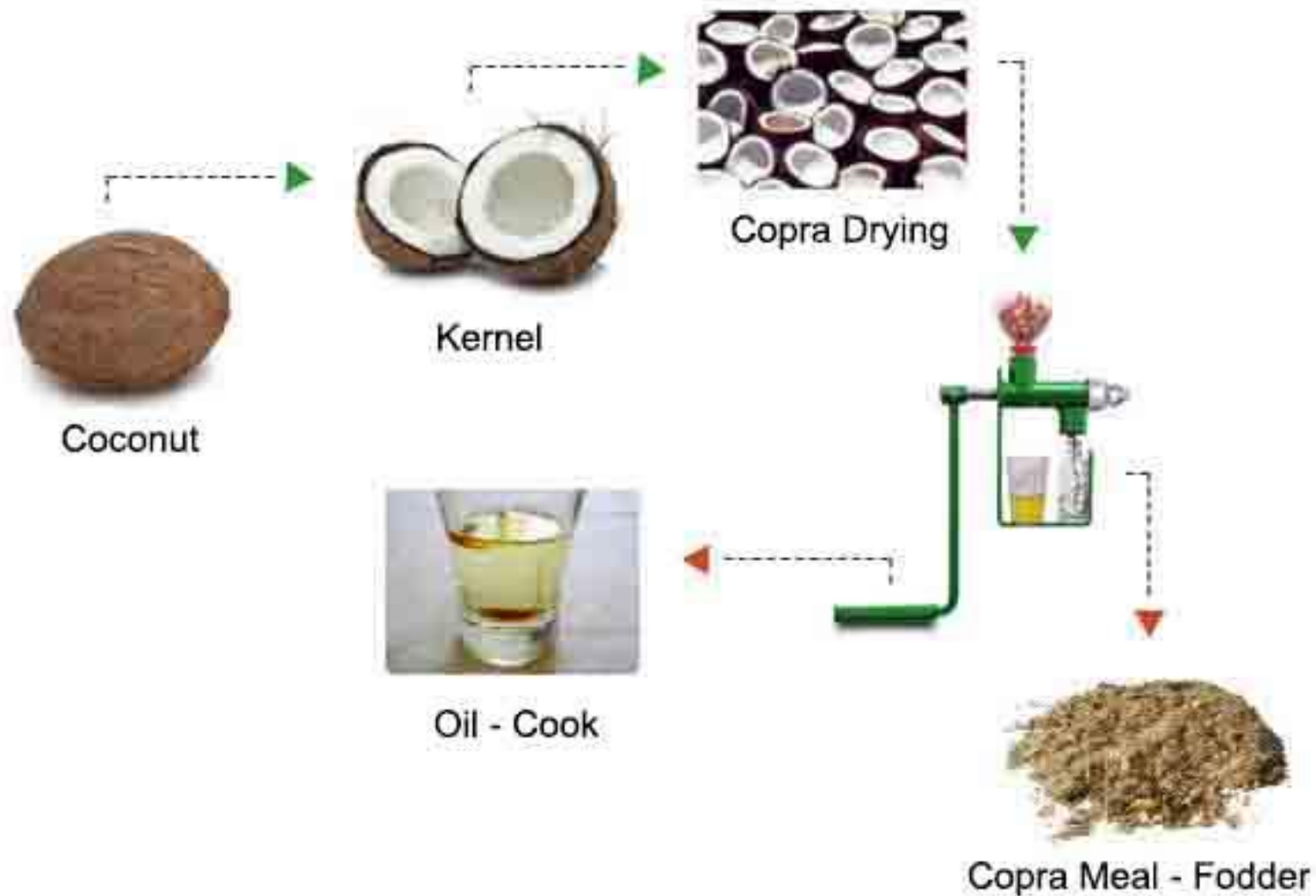
Factors Affecting Fat ME Values in Poultry

(Lesson & Summers, 1997)

TABLE 2.19 Factors affecting fat ME values		
		Relative fat ME
i) Bird age:	28d+	100%
	7-28d	95%
	1-7d	88% (especially for saturates)
ii) Free Fatty acids:	0 - 10%	102%
	10 - 20%	100%
	20 - 30%	96%
	30%+	92% (especially for saturates)
iii) Inclusion level	1%	110%
	2%	100%
	3%	98%
	4%	96%
	5%+	94%
iv) Calcium level	<1%	100%
	>1%	96% (especially for birds <56d age)

Coconut Processing

Procedure



TS
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Coconut By-Products for Animal Feeds



White Copra



Copra Cake



Copra Pellets



Copra Meal

By-product from the processing of coconut into coconut oil.

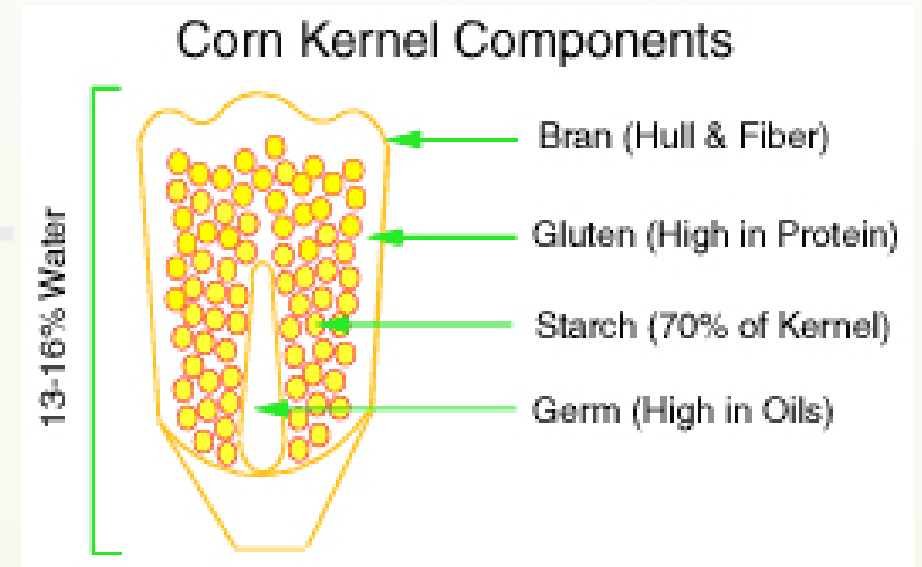
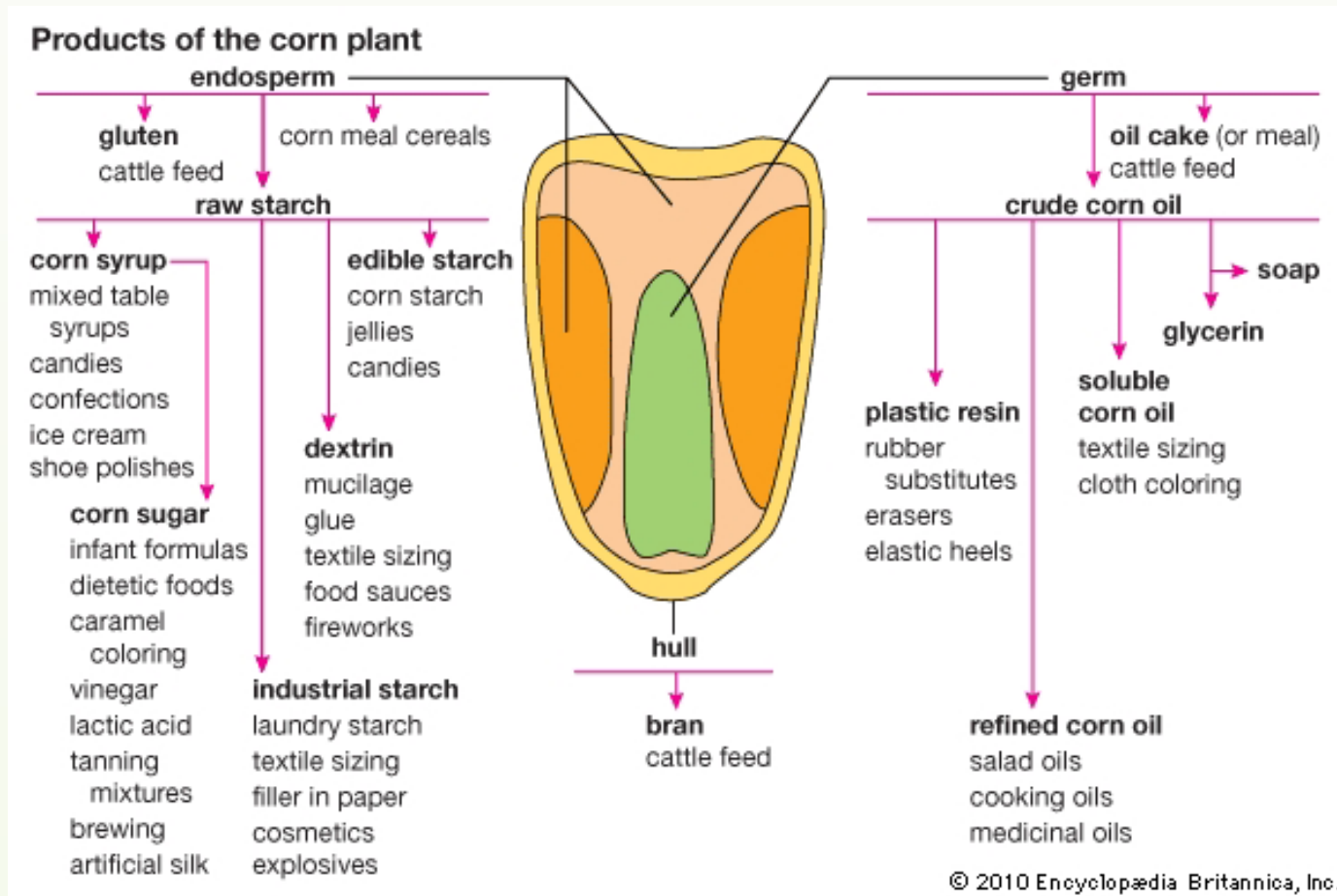
Process can be any of the ff:

- Cold, mechanical process to produce virgin coconut oil & white copra cake.
- Heat treated, mechanical process to produce crude coconut oil & copra cake.
- Heat treated, solvent extracted process to produce crude coconut oil & copra pellets.

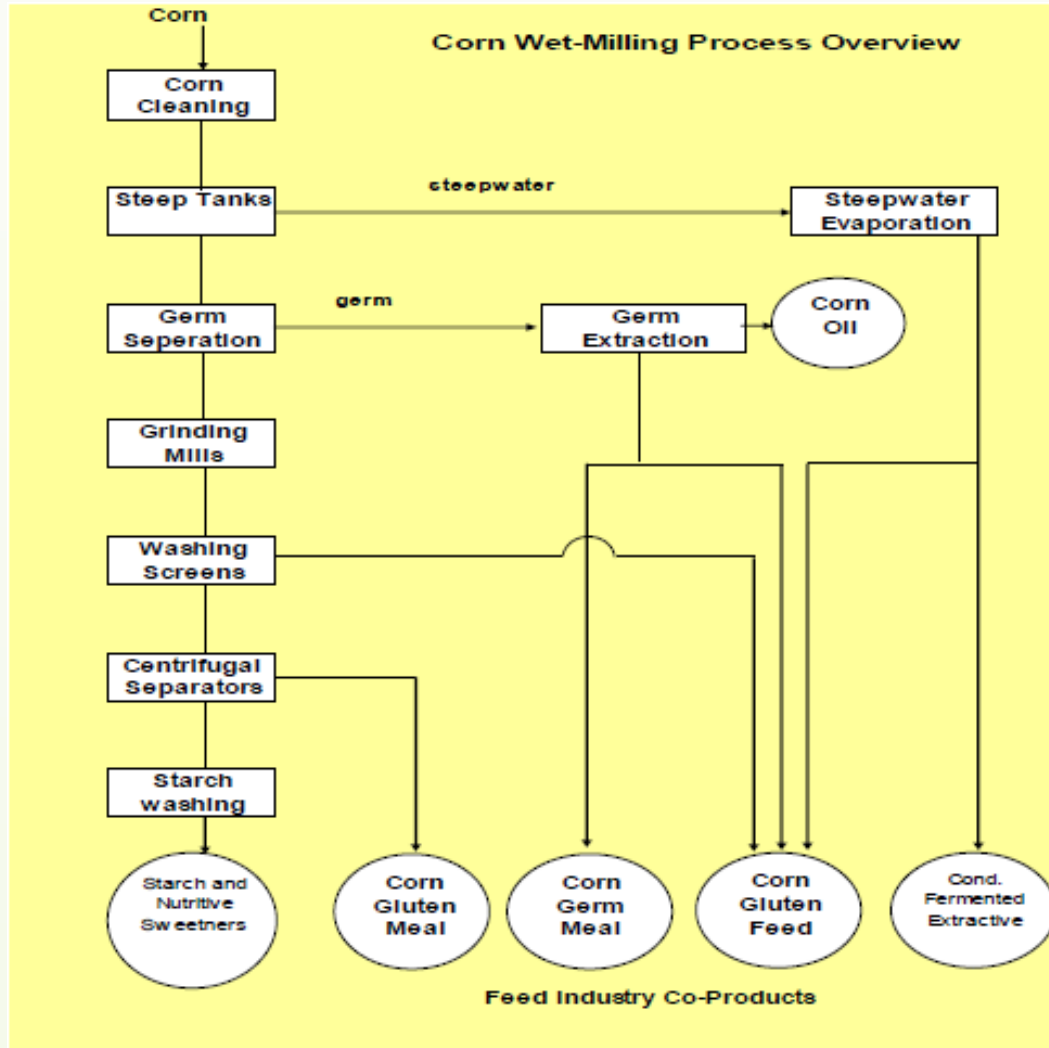
Constraints:

- Palatability issues, imbalanced amino acids, high fiber, NSP's, phytic acid & molds & mycotoxins.

Corn: The Gold Standard for Grains in Animal Feeds



Corn Wet Processing for Starch & its By-Products



Corn Gluten Meal



Corn Germ Meal



Corn Gluten Feed

Constraints of Using By-Products of Corn

- Corn Gluten Meal
 - Imbalance protein quality (low in lysine & tryptophan).
 - High costs
- Corn Germ Meal
 - Variable in protein (wet vs. dry process) & oil content (solvent vs. expeller process)
 - Prone to oxidation and rancidity
 - Prone to molds & mycotoxins during storage
 - High in phytic acid
- Corn Gluten Feed
 - Variable quality due to composition (bran, gluten, steeping liquids & germ)
 - Low feeding value to non-ruminants, poor palatability & digestibility
 - High in fiber
 - High in phytic acid

Corn DDGS: By-Product from the Processing of Ethanol

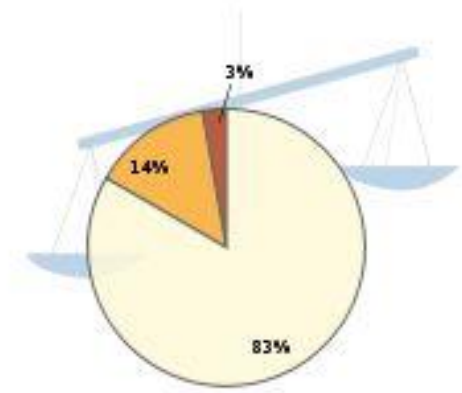
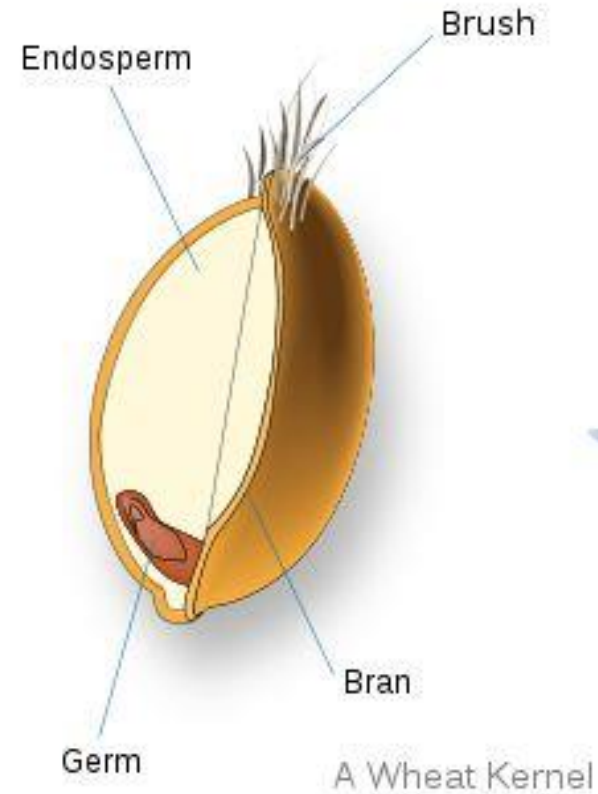


Good source of energy, pigments and other nutrients including phosphorus.

Constraints:

- Very variable in quality, high in fiber, imbalanced amino acids, high in mycotoxins.

Wheat and its Components



Composition by Weight

	Carb./g	Protein/g	Fat/g	Fiber/g	Iron (% daily req.)	Others
Bran	63	16	3	43	59	vitamin Bs
Endosperm	79	7	0	4	7	
Germ	52	23	10	14	35	vitamin Bs omega-3/6 lipids

Nutritional Value (per 100g)

Wheat & its By-Products



Flour milling by-products. Good source of bulk, high water holding capacity & good for pelleting feeds.

Constraints:

- High fiber content & NSP's, variable in quality as it is lumped as wheat pollard, maybe mixture of both soft and hard wheat by-products.
- High in phytic acid.
- Prone to molds and mycotoxins.

Scrap Noodles & Bakery By-Products



Composed of rejects and/or returns from food companies & stores due to the ff. reasons:

- damaged packaging material
- expired or near expiry
- manufacturing defects

Excellent source of nutrients especially energy

- High in fat (energy)
- Very digestible
- Low costs

Constraints:

- Variable & inconsistent in composition & quality, rancidity & oxidation, molds & mycotoxins.

Other By-Products

- Banana Meal
 - Rejects from the banana industry intended for export as fresh fruit.
 - Cooked banana chips, Street dried banana chips (w/ or w/out peels), Peeled banana chips, etc.
- Fish Meal
 - By-products of the tuna & sardines canning industries.
 - Quality highly depends on the size of fish, unused remaining trimmings & organs and processing technique. Meal may include most of the oil.
- Poultry By-Product Meal
 - Remains from the poultry dressing plants to include all offals & trimmings not recycled by the food industry. Feathers are usually included in this meal.
 - Processing is by cooking under pressure and heat. May or may not include the fat.
- Others

Summary

- There is no doubt of the value of by-products in animal feeds.
 - Contribute certain important nutrients (proteins, energy, vitamins, pigments, etc)
 - Acts as filler materials & reduces cost.
- In order to take advantage of these by-products, one has to understand their origin, individual peculiarities and limitations.
 - Poor digestibility – high in fiber
 - Poor palatability
 - Contains anti-nutritional factors – phytic acid, NSP's
 - Prone to molds and mycotoxins
 - Prone to oxidation and rancidity
- There are other by-products but are limited in use due to seasonal and/or regional availability.
- The use of by-products will reduce the costs of feeds.



THANK YOU VERY MUCH!!!



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