



Chemical Status: Food and Feed Ingredients

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الحالة الكيميائية: مكونات الأغذية والأعلاف

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Chemical Status: Food and Feed Ingredients

Opening message is that Ingredient
Technology has become a complex
complicated field Beyond the
Perception of an Average Consumer

Sources of Ingredients

- Food and Feed Ingredients are produced from any conventional source as well as new sources:
 - Mineral Source
 - Plants
 - Microorganisms
 - Animals

Sources of Ingredients

MINERAL SOURCE OR INGREDIENTS FROM EARTH

- Common salt, Sodium Chloride from Salt mines, Lakes and Sea
- Phosphates
- Petroleum Products, FD&C Colors

Sources of Ingredients

PLANT SOURCE OF INGREDIENTS

- Conventional ingredients such as Flour and Sugar
- Ingredients from alcohol
- Ingredients from the Sea, such as Agar
Agar, Carrageenan
- Biotechnology, Soy Flour, Canola Oil

Sources of Ingredients

INGREDIENTS OF MICROBIAL ORIGIN

- Yeast and Yeast Powders
- Microbial Cultures
- Enzymes
- Preservatives
- GMO or Fermentation Products

Sources of Ingredients

INGREDIENTS OF ANIMAL ORIGIN

Halal Slaughterhouse Ingredients

- Gelatin
- Beef Tallow
- Emulsifiers
- Enzymes
- Protein Powders and Bases

Sources of Ingredients

INGREDIENTS OF ANIMAL ORIGIN

Haram Slaughterhouse Ingredients

- Gelatin
- Lard
- Emulsifiers
- Enzymes
- Protein Powders and Bases

Sources of Ingredients

INGREDIENTS OF ANIMAL ORIGIN

- Fish gelatin and other ingredients
- Seafood Flavors
- Chondroitin sulfates
- Antifreeze proteins

Sources of Ingredients

INGREDIENTS OF ANIMAL ORIGIN

Dairy Ingredients

- NFDM Lactose, Calcium
- Cheeses, Whey, Whey Protein Isolates, Lactose, Caseinates
- Butter and Cheese Flavors

Sources of Ingredients

INGREDIENTS OF ANIMAL ORIGIN

- Egg Powders, Egg Whites, Egg Yellows
- Egg Albumens
- Enzyme Modified Egg Ingredients

Sources of Ingredients

INGREDIENTS OF ANIMAL ORIGIN

Ingredients from Insects

- Carmine, Cochanilla
- Lac, Shellac
- Honey
- Royal Jelly
- Bees Wax

Ingredients by Functionality

WHY DO WE USE INGREDIENTS?

- Nutrients
- Flavors/Flavorings
- Emulsifiers
- Texturizers
- Preservatives
- pH Modifiers

Major Ingredients of Halal Concern

- GELATIN is an animal ingredient, never from plants
- Porcine Gelatin from Pig Skins
- Bovine Gelatin from Cattle Hides
- Bovine Gelatin from Cattle Bones
- Fish Gelatin from Skins
- Halal Certified Gelatin Fish and Bovine

Major Ingredients of Halal Concern

- GELATIN Substitutes from Plants
- Agar-Agar from Sea Weed
- Carrageenan from Sea Weed
- Plant Gums, Guar, Tara, Acacia, Arabic
- Pectin
- CMC Carboxymethyl Cellulose
- Xanthan gum from Microorganisms

Major Ingredients of Halal Concern

- GELATIN versus PLANT GUMS
- Gelatin can be replaced by gums as a thickener and texture modifiers in yogurt, salad dressings, etc.
- Even Soft gel and 2 Piece Capsules
- NOT for Marshmallows
- NOT for Gummy Bears

Major Ingredients of Halal Concern

- Alcoholic Drinks and Alcohol
- Many alcoholic drinks like wine, beer, cognac, whiskey and brandy are used in the industry as flavoring ingredients
- Other ingredients from alcohol industry include fusel oil, essences, and many by-products.

Major Ingredients of Halal Concern

- Alcohol as an Ingredient is ubiquitous and unavoidable:
 - To Produce Vinegar
 - To Extract flavors like Vanilla
 - To Dissolve Citrus Oils
 - As a Carrier of Flavor Compounds
 - As a Sanitation Agent

Major Ingredients of Halal Concern

- Treating Alcohol as Impurity and monitoring the final amounts in the finished products like Ice Cream, Cakes, Soft Drinks to a level that can not be detected by Taste or other Sensory Tests. This Approach is Becoming more Acceptable.

Major Ingredients of Halal Concern

- Substitutes for Ethyl Alcohol in the Industry:
 - Propylene Glycol as a Solvent
 - IPA Isopropyl Alcohol
 - Converting the Flavors into Powders or Emulsions

Major Ingredients of Halal Concern

- FLAVORS
 - Flavors are Complex, Mixtures from Potentially Thousands of Ingredients from any Source, Plants, Minerals, Microorganisms and Animals; Halal, Haram or questionable.
 - Major Concerns are Alcohol and Animal Ingredients, especially Haram Sources.

Food and Feed Ingredients

- The Halal concept may be looked at as a reference standard to control safety and quality of consumable materials from production to consumption. Consumable materials could range from food, drinks, cosmetics, medicine and personal care products for humans to feed for animals.

Feed Ingredients

- Conventional Feed Ingredients are still Corn, Soybeans, Fodder and Hay but to Increase the Productivity and Yields Un-conventional Ingredients have also been used, such as:
 - Protein Supplements from Slaughter house By-Products, and even Waste Water Solids.

Feed Ingredients

- Feed Ingredients and Supplements are Precisely Formulated, but their Health Aspects are of Concern Especially for Cattle because they are Herbivores in Comparison to Chickens which are Omnivores.

Feed Ingredients

- Did the animals raised for milk and meat, get feed formulated with protein supplements of Haram or Najs according to Shariah like rendered materials of pig origin, meats from dead animals as a leftover from slaughterhouses, filth of animal and waste.

Feed Ingredients

- If yes, the animals should be quarantined and given clean feed for a prescribed number of days, before their products are consumed.

Feed Ingredients

- Halal certifiers and regulatory bodies should make sure that such conditions are rectified in the country of origin. Considering the variations in regulations and their implementation both in exporting and importing countries, it is a daunting task to monitor feeding systems.

GMO FOODS

Biotechnology Products

GENERAL CONCEPTS

- Legislator of Halal and Haram is Allah alone
- Whatever is Halal, is good and whatever is Haram, should be avoided
- Haram is by Exception

Animal & Plant Breeding to Biotechnology

- Plant and animal breeding has been going on for centuries.
- Biotechnology is an extension of breeding: A targeted approach to producing crops, animals or microbes with new traits.
- We can make ingredients similar to conventional ones.

Rennet versus Chymosin

- Most of the cheeses are made with rennet and animal enzymes
- RENNET has been manufactured from calf stomachs filled with milk
- When rennet was in short supply, the industry started mixing trypsin from pigs to extend rennet

RENNET: Microbial or GMO

- About 1985, Pfizer developed an ingredients, registered as CHYMAX, through “recombinant gene technology by inserting calf rennet gene into bacteria.
- CHYMAX was a brand name for microbial chymosin or microbial rennet.

RENNET: Microbial or GMO

- Chymosin is the active enzyme in rennet which curdles the milk for making cheese.
- In 20 years, this microbial rennet has revolutionized the cheese industry that it accounts for more than 80 per cent of rennet used in USA.
- It has not only replaced calf rennet but also the substitute, porcine trypsin.

Techniques in Gene Transfer

- To produce CHYMAX the gene responsible for chymosin in rennet was identified and its sequence analyzed to individual base units.
- From this genetic blue print the gene was recombined from base units from plants and introduced into bacteria.
- Several generations of bacteria were grown to create a pure strain equipped with gene to produce this synthetic or microbial chymosin

GMO Ingredients

- Most of the ingredients produced through biotechnology go through a similar lengthy process using bacteria, yeast or mold.
- Citric acid, MSG, several flavor ingredients and enzymes are now manufactured through microbial production using this technology.

GMO Ingredients

- Many new plants have been modified to incorporate new characteristics.
- Flavor-Savor tomato
- Golden rice
- And more recently, several drought resistant plants.

GMO Ingredients

- GMO has helped the humanity at large and Muslims in particular
- If the genes are taken from non-Haram species, there should not be a problem.
- We recommend scientists not to use genes from Haram animals.

GMO, GMF and Halal

- GMO technology is quite safe. It is precise plant breeding.
- First such ingredient was chymosin rennet
- First product was tomato
- Both have been found to be safe

Challenges to Food Industry

- Lack of Common Halal Standard
- Lack of cooperation among major importing countries and regions
- Disparity in competencies of Halal certifiers
- Self serving Government Agencies

Challenges to Food Industry

- Differences in approved certifiers by different countries
- Acceptable product in one country is rejected in another
- Halal certifiers not recognizing each other's certificates
- Territorial restrictions not uniform

Acknowledgments

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Specifically

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