

Cereal by-products



Acceptance Guidelines for Raw Materials in a Feed Factory





Bakery by-product

General description

The by-product of bread manufacture, consisting of bread, cookies and other bakery products unfit for human consumption. Usually, its main component is wheat flour.

Other names: Bakery waste, stale bread, breadcrumbs.

General aspect

The colour of bakery by-product varies from light to dark brown. It must appear as a healthy and uniform powder, scentless of and absent of plastics and packaging waste or parts of the product in compact form.

Observation

The composition of bakery by-product varies depending on the supplier and the original raw material used. Upon delivery, it is highly recommended to analyse aspects such as smell, humidity, and the ash content. Due to its high capacity for oxidative rancidity of the lipid fraction and microbiological contamination, it is recommended to avoid long storage periods. Particular attention must be paid to potential adulterations to the flour such as talc or other minerals, used to enhance flowability and facilitate handling of the product. A representative sample should be stored for complementary analysis.

General controls and acceptance requirements

Parameter to analyse	When	Parameter to analyse	Values		
			Normal	Reclaims	Decline
Humidity (%)	Before Unloading	Basic	12		>14
Insects and plague			Absence		Presence
Temperature ¹ (°C)					>10
Ash (%)	Before Unloading	Basic	2-6%		>7%
Calcium (%)			0.10-0.20		>0.5
Chlorine (%)			0.9-1.2		>1.4
Sodium (%)			0.30-0.45		>0.7

¹respect environmental temperature.



Corn DDGS

General description

The corn dried distillers' grain is the main by-product of ethanol production from maize grain.

Other names: dried distiller's grains with soluble, maize DDGS, corn DDGS, maize distillers' grains, maize distiller's grains, corn distillers.

General aspect

The colour of corn DDGS varying from cream to dark brown. Commercial product is sold as powder or pellets. In both of cases, the product must present a characteristic fermentation smell, without any damp or musty, rancid or acidic odours.

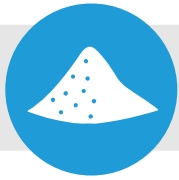
Observation

During reception, it is recommended to evaluate the colour, smell, and uniformity of each batch. For example, darker colour grain is considered an indication of badly preserved batches. In such cases, the batch may have suffered heat damage due to uncontrolled high temperatures and humidity, which could cause Maillard reaction and consequently reduce amino acid availability. Also, inadequate transportation and storage conditions affect oil quality, primarily detected by a foul smell. The product is easy to store, to grind and to granulate. To store a representative sample for complementary analysis.

General controls and acceptance requirements

Parameter to analyse	When	Parameter to analyse	Values		
			Normal	Reclaims	Decline
Humidity (%)	Before Unloading	Basic	11		>13
Colour			Yellowish brown		Dark brown
Temperature ¹ (°C)					>10
Protein (%)			27–28		Contract
Fiber (%)	After Unloading	Extended	8		
Fat (%)			>6		
Ash (%)			<3%		
Aflatoxins B (µg/kg)					>20

¹respect environmental temperature.



Wheat DDGS

General description

The by-product of alcohol (ethanol) manufacture, obtained from the distillery of wheat grains consisting of spent grains and steepwater soluble in variable proportions.

Other names: wheat DDGS, wheat distillers' grains, wheat distiller's grains.

General aspect

The characteristic colour of wheat DDGS is brown. Commercial product is sold as powder or pellets. In both of cases, the product must present a characteristic fermentation smell, scentless of moisture, and absence of rancid or acidic odour.

Observation

During reception, it is recommended to evaluate the colour, smell, and uniformity of each batch. For example, darker colour grain is considered an indication of badly preserved batches. In such cases, the batch may have suffered heat damage due to uncontrolled high temperatures and humidity, which could cause Maillard reaction and reduce acid availability. The product is easy to store and to grind. Due to the high fat and fibre contents, wheat DDGS could negatively affect pellet and pelleting performance. Batches exposed to high humidity and long storage periods tend to present mycotoxins problems. To store a representative sample for complementary analysis.

General controls and acceptance requirements

Parameter to analyse	When	Type of analysis	Values		
			Normal	Reclaims	Decline
Humidity (%)	Before Unloading	Basic	10		>13
Colour			Yellowish brown		Dark brown
Temperature ¹ (°C)			>10		
Protein (%)			27-28		Contract
Fiber (%)	After Unloading		7		
Fat (%)			>5		
Ash (%)			<7%		
Aflatoxins B (µg/kg)		Extended	>20		

¹respect environmental temperature.



Corn Gluten Feed

General description

The by-product of the manufacture of starch obtained from maize grain (*Zea mays L.*) by wet milling.

Other names: corn gluten, maize gluten feed.

General aspect

The colour of corn gluten feed varies from brown to dark brown depending on the heat treatment it received. Commercial product is sold as powder or pellets. In both of cases, the product must present a characteristic fermentation smell, scentless of moisture, and absence of rancid or acidic odour.

Observation

Corn gluten feed exhibits quality variation between batches based on the origin quality of the original corn grains used or in function of the production technology, the conditions of processing, transportation, and storage applied. During the reception, it is recommended to evaluate the colour of the product and the presence of insects. Pay attention to the humidity of the batches. The product results easy to store, and to grind. High inclusion during the granulate process could affect negatively pellet quality and pelleting performance. To store a representative sample for complementary analysis.

General controls and acceptance requirements

Parameter to analyse	When	Type of analysis	Values		
			Normal	Reclaims	Decline
Humidity (%)	Before Unloading	Basic	12		>13
Colour			Brown		Dark brown
Insects			Absence		Presence
Temperature ¹ (°C)					>10
Protein (%)	After Unloading	Extended	19		<16
Fiber (%)			<10		>12
Starch (%)					
Fat (%)			2.6		

¹respect environmental temperature.



Corn Gluten Meal

General description

The by-product obtained from the wet-milling process of maize starch production (and occasionally ethanol). It consists principally of gluten obtained during the separation of starch.

Other names: maize gluten meal, corn gluten, maize gluten, gluten 60, prairie meal.

General aspect

The colour of corn gluten meal is yellow orange. Usually, the commercial product is sold as a powder without bran particles.

Observation

No additional quality controls beyond the ordinary are required during reception of corn gluten meal. It is recommended to evaluate the general aspect and its colour because batches that exhibit a darker brown colour could be submitted an incorrect heat treatment. Also, pay attention on the presence of agglomerate particles, high humidity, or foreign material. Product with a humidity of less than 12% does not pose any problem during storage. Like other maize products, corn gluten meal can be contaminated with mycotoxins. Its inclusion in the feed doesn't negatively affect mill performance or granulate process. To store a representative sample for complementary analysis.

General controls and acceptance requirements

Parameter to analyse	When	Type of analysis	Values		
			Normal	Reclaims	Decline
Humidity (%)	Before Unloading	Basic	11		>12
Colour			Yellow/Orange		Dark brown
Agglomerate particles			Absence		Presence
Temperature ¹ (°C)					>10
Protein (%)	After Unloading	Extended	>55		<52
Xanthophylls (ppm)			≥200		

¹respect environmental temperature.



Rice bran

General description

The by-product of the processing of rice grain (*Oryza sativa L.*), consisting of envelopes, germs, and fragments of endosperm. This product can be defatted or not.

Other names: Rice bran, full-fat rice bran (>5% oil), defatted rice bran (<5% oil), de-oiled rice bran, rice pollards, rice polishings, rice mill feed.

General aspect

The colour of rice bran is beige. Commercial product is sold as powder or pellets. In either form, product must present absence of rancidity smell, contaminations, pest, or presence of agglomerated particles.

Observation

Due to the high variability between lots of the rice bran, an accurate control of batches and suppliers is essential to categorize the product. Pay attention to the fibre content of the rice bran, to avoid adulteration with rice hulls. The oil content of rice bran can vary depending on its origin and can be prone to rancidity due to the high polyunsaturated oils and lipid content. Finally, the high content of fat could present a fluidity problem in the feed factory and consequently, it is very important to determine the products oil content during quality control. Pay attention to storage conditions (time, temperature, and humidity) and avoid long storage durations. High humidity content can result in mycotoxin contamination and heating of product.

General controls and acceptance requirements

Parameter to analyse	When	Type of analysis	Values		
			Normal	Reclaims	Decline
Humidity (%)	Before Unloading	Basic	<10		>13
Insects			Absence		Presence
Agglom. particles			Absence		Presence
Hulls			Absence		Presence
Temperature ¹ (°C)					>10
Fiber ² (%)			<9 or <12		>10 or >13
Fat (%)			>15 or >3		<12 or <2
Oleic acidity (%)					>50

¹respect environmental temperature.
²full fat rice bran and defatted rice bran, respectively.



Wheat bran

General description

The by-product of wheat flour production obtained by milling of wheat grains, mainly formed from the fragments of the grain integument.

Other name: Wheat bran, fine wheat bran, coarse wheat bran, coarse wheat feed.

General aspect

The colour of wheat bran is light brown. Commercial product is sold as powder or pellets. In either form, the product must be free from rancid odours, contaminations, insects or presence of agglomerated particles.

Observation

Due to the high variability between lots of wheat bran, an accurate control of batches and suppliers is essential to categorize the product. Pay attention to fungal and bacterial growth, as their presence could be due to the use of water during the production process. Consequently, strict quality control evaluating the moisture, temperature, and microbial contamination (particularly for Salmonella and Clostridium) of the product is recommend for each batch before delivery to the feed factory. Also, it is critical to monitor the fat for oxidative rancidity. Due to the very low density of wheat bran, high volume of the silos storage and mixer are required. The storage silos and mixer require a high volume to accommodate the product. is improved by the addition of wheat bran in the feed.

General controls and acceptance requirements

Parameter to analyse	When	Type of analysis	Values		
			Normal	Reclaims	Decline
Humidity (%)	Before Unloading	Basic	<12		>15
Insects			Absence		Presence
Agglom. particles			Absence		Presence
Smell					Rancid
Temperature ¹ (°C)					>10
Ash (%9)	After Unloading	Extended	<6		>7
Insoluble ash (%)			<0.5		>0.7
Calcium carbonate					Presence

¹respect environmental temperature.