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ETHANOL

Comparative Assessment of the Chemical Composition of Zarnela Corn DDGS Based on Laboratory Results and Scientific Literature Data

Proximate Composition of Corn DDGS

Parameter	Result from an accredited laboratory report	Unit	Typical literature values for corn DDGS
Moisture	10.9	g/100 g (%)	8–12%
Dry matter	90.1	%	88–92%
Total solids	89.1	g/100 g	~88–92%
Crude protein	26.1–26.7	g/100 g (%)	26–30%
Total nitrogen	4.17	g/100 g	~4.1–4.8%
Crude fat	8.7–9.6	g/100 g (%)	8–12%
Crude ash	3.68–3.7	g/100 g (%)	3–5%
Crude carbohydrates	49.7	g/100 g	45–55%
Energy value	390	kcal/100 g	380–420 kcal/100 g
Energy value	1644	kJ/100 g	~1760 kJ/100 g

Fibre

Parameter	Result from an accredited laboratory report	Unit	Typical literature values for corn DDGS
NDF (neutral detergent fibre)	39.4	%	35–45%
ADF (acid detergent fibre)	12.6	%	10–16%
Crude fibre (dry matter basis)	4.77	% DM	4–9%

Amino Acid Profile

Amino acid	Result from an accredited laboratory report	Unit	Typical literature values for corn DDGS
Glutamic acid	4.52	g/100 g	4–5
Leucine	3.01	g/100 g	2.8–3.5

Proline	2.16	g/100 g	1.8–2.5
Alanine	1.96	g/100 g	1.6–2.1
Aspartic acid	1.75	g/100 g	1.6–2.0
Valine	1.28	g/100 g	1.1–1.4
Serine	1.27	g/100 g	1.0–1.3
Phenylalanine	1.21	g/100 g	1.0–1.4
Arginine	1.17	g/100 g	1.0–1.3
Threonine	0.998	g/100 g	0.9–1.2
Glycine	1.02	g/100 g	0.9–1.2
Isoleucine	0.864	g/100 g	0.8–1.1
Lysine	0.716–0.800	g/100 g	0.6–0.9
Tyrosine	1.01	g/100 g	0.8–1.2
Histidine	0.689	g/100 g	0.5–0.7
Methionine	0.563	g/100 g	0.5–0.7
Cysteine + cystine	0.504	g/100 g	0.4–0.6

Minerals and Trace Elements

Parameter	Result from an accredited laboratory report	Unit	Typical literature values for corn DDGS
Calcium (Ca)	385	mg/kg	200–800 mg/kg
Phosphorus (P)	5165	mg/kg	4000–9000 mg/kg
Iron (Fe)	64.9	mg/kg	40–120 mg/kg
Manganese (Mn)	11.7	mg/kg	8–20 mg/kg
Zinc (Zn)	36.3	mg/kg	20–80 mg/kg

Heavy Metals

Parameter	Result from an accredited laboratory report	Unit	Typical permissible levels (EU feed)
Mercury (Hg)	<0.010	mg/kg	≤0.1 mg/kg
Arsenic (As)	<0.050	mg/kg	≤2 mg/kg
Cadmium (Cd)	<0.020	mg/kg	≤1 mg/kg
Lead (Pb)	<0.10	mg/kg	≤10 mg/kg

Literature and Scientific Sources Used to Determine Typical Composition Values for Corn DDGS (Distillers Dried Grains with Solubles)

1. National Research Council (NRC) – Publishes a series of scientific monographs on animal nutrient requirements. These contain reference data on the composition

of feed materials, including DDGS. The most frequently used publications are *Nutrient Requirements of Swine* and *Nutrient Requirements of Dairy Cattle*.

2. Feedipedia – An international scientific feed database developed jointly by INRAE, CIRAD and the Food and Agriculture Organization (FAO). It provides compiled data on the chemical composition, amino acid profiles and nutritional characteristics of various feed materials.
3. U.S. Grains Council – Publishes specialised guides on the use of DDGS in animal feed, including the *DDGS User Handbook*. The data are based on analyses of numerous samples from the ethanol industry.
4. European Food Safety Authority (EFSA) – Uses and publishes scientific assessments and reference data on the composition and safety of feed materials.
5. CVB Feed Table – A Dutch scientific database containing detailed tables on the nutritional composition of feed materials, widely used in Europe for ration formulation.

Regulatory Framework

The following legislation is most commonly applied to the analysis of DDGS and other feed materials:

- Regulation (EC) No 152/2009 – Methods of sampling and analysis.
- Regulation (EC) No 767/2009 – Placing feed on the market and feed labelling.
- Regulation (EC) No 178/2002 – General food and feed safety legislation.
- Directive 2002/32/EC – Maximum levels of undesirable substances.
- Regulation (EC) No 1831/2003 – Feed hygiene.

The data in the “Result from an accredited laboratory report” column were taken from Analytical Report AR-26-WX-004212-01, dated 10 March 2026, issued by Eurofins Food and Environment Testing Bulgaria EOOD.

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