

BUREAU OF INDIAN STANDARDS**DRAFT FOR COMMENTS ONLY**

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भारतीय मानक मसौदा
सुअर के लिए आहार — विशिष्टि
(आई एस 7472 का दूसरा पुनरीक्षण)

Draft Indian Standard
PIG FEEDS — SPECIFICATION
(Second Revision of IS 7472)

(ICS No. 65.120)

Animal Feeds and Nutrition Sectional
Committee, FAD 05

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FOREWORD

(Formal adoption clause would be added later)

Piggery development is making a rapid progress within the country. A large number of farms have been established where pig rearing and breeding has been undertaken on scientific lines. It is important that for the production of good quality pork at minimum cost, the pigs are properly fed so as to meet their nutritional requirements. To keep pace with the piggery development, the manufacture of compound pig feeds and their marketing has also commenced in the country. Therefore, with a view to enable the manufacturers to prepare pig feeds of known quality, this Indian Standard has been prepared.

This standard was first published in 1974 and revised in 1986. In the first revision, the requirement for moisture content was modified and the test methods for various requirements were aligned with IS 7874 (Part 1).

In this second revision, the standard has been updated considering latest technological developments and manufacturing practices. Following major changes have been made in this revision:

- a) Requirements for total protein and total fibre has been updated.
- b) Requirement for aflatoxin B1 has been introduced in the standard.
- c) Methods of tests prescribed for determination of various requirements have been updated.
- d) List of ingredients for pig feed has been updated based on the latest technological developments and current manufacturing practices

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2: 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard

PIG FEEDS — SPECIFICATION

(Second Revision)

1 SCOPE

1.1 This standard prescribes the requirements, and methods of sampling and test for pig feeds.

2 REFERENCES

The standards listed in Annex A contain provisions which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed in Annex A.

3 TYPES

3.1 Pig feeds shall be of the following three types:

- a) Pig Starter/Creep Feed - A ration to be fed up to 2 months of age when the litter is with sow,
- b) Pig Growth Meal - A ration to be fed from 2 months to 5 months of age, and
- c) Pig Finishing/Breeding Meal - A ration to be fed after 5 months of age or body weight over 35 kg

4 REQUIREMENTS

4.1 General - Pig feeds shall be in the form of pellets, cubes, crumbs or meal. The feeds shall be free from rancidity, musty odour, harmful constituents, such as dust, metallic pieces, adulterants, insect infestation and visible fungus growth.

4.2 Ingredients - The ingredients given in Annex B shall only be used for manufacturing pig feeds. Urea and other non-nitrogenous substances, except amino-acids, shall not be added to the product.

4.2.1 If antibiotics or other additives are incorporated into the feeds, these shall be declared on the label. The level of antibiotics added shall not exceed 100 parts per million.

NOTE- The manufacturer shall maintain record of addition of antibiotics wherever used.

4.3 The material shall also conform to the requirements prescribed in Table 1.

4.4 The minerals listed in Table 2 either from the natural sources or from any added sources shall be declared by the manufacturer after periodic testing, in proportions indicated against each.

4.5 Pig feeds shall contain the vitamins in quantity not less than the value shown against each as per Table 3 and shall be declared by the manufacturer.

5 PACKING AND MARKING

5.1 Packing - Pig feeds shall be packed in dry, clean and sound plain or polyethylene lined jute or laminated paper bags or HDPE bags. The mouth of each bag shall be either machine-stitched or rolled over and hand-stitched.

Table 1 Requirements for pig feeds

(Clause 4.3 & 7.1)

Sl. No.	Characteristic	Requirement			Method of Test, Ref to
		Pig Starter/ Creep Feed	Pig Growth Meal	Pig Finishing/ Breeding Meal	
(1)	(2)	(3)	(4)	(5)	(6)
i)	Moisture, percent by mass, <i>Max</i>	11.0	11.0	11.0	4 of IS 7874 (Part 1)
ii)	Crude protein (N × 6.25), percent by mass, <i>Min</i>	20.0	18.0	18.0	IS/ISO 5983 (Part 1)* or IS 5983 (Part 2) or ISO 16634-1
iii)	Crude fat or ether extract, percent by mass, <i>Min</i>	2.0	2.0	2.0	IS/ISO 6492
iv)	Crude fibre, percent by mass, <i>Max</i>	6.0	8.0	12.0	IS/ISO 6865
v)	Total ash, percent by mass, <i>Max</i>	8.0	8.0	8.0	9 of IS 7874 (Part 1)
vi)	Acid insoluble ash, percent by mass, <i>Max</i>	4.0	4.0	4.0	Annex A of IS 1712 or IS 14826*
vii)	Metabolizable energy (k cal/kg), <i>Min</i>	3360	3170	3170	Annex C
viii)	Aflatoxin B ₁ (ppb), <i>Max</i>	20.0	20.0	20.0	IS/ISO 14718* or IS 18143 or AOAC 2003.02

NOTES

1. The values specified for requirements (ii) to (viii) are on moisture free basis.
2. In case of dispute, the test methods given above and wherever indicated by '*' shall be the referee method.
3. Annex C for determination of metabolizable energy (ME) is given for guidance only. The manufacturer shall maintain record of calculated values of ME.

Table 2 Requirements for pig feeds to be declared*(Clause 4.4 & 7.1)*

Sl. No.	Characteristic	Requirement			Method of Test, Ref to
		Pig Starter/ Finishing/ Creep Feed Breeding Meal	Pig Growth Meal	Pig	
(1)	(2)	(3)	(4)	(5)	(6)
i)	Calcium (Ca), percent by mass, <i>Min</i>	0.6	0.6	0.6	IS 13433 (Part 1) or IS 15121* or EN 15621
ii)	Available Phosphorous, percent by mass, <i>Min</i>	0.6	0.4	0.5	Annex F of IS 1374
iii)	Iron (as Fe), mg/kg, <i>Min</i>	100	90	80	IS 15121* or EN 15621
iv)	Copper, mg/kg, <i>Min</i>	8	6	6	IS 15121* or EN 15621
v)	Manganese, mg/kg, <i>Min</i>	30	30	20	IS 15121* or EN 15621
vi)	Zinc, mg/kg, <i>Min</i>	50	50	50	IS 15121* or EN 15621
vii)	Common salt (as NaCl), percent by mass, <i>Max</i>	0.5	0.5	0.5	4 of IS 7874 (Part 2)

NOTE – The values specified for requirements (i) to (vii) are on moisture free basis.

Table 3 Requirements for pig feeds*(Clause 4.5)*

Sl. No.	Characteristic	Requirement		
		Pig Starter/ Creep Feed	Pig Growth Meal	Pig Finishing/ Breeding Meal
(1)	(2)	(3)	(4)	(5)
i)	Niacin, mg/kg, <i>Min</i>	17	14	10
ii)	Pantothenic acid, mg/kg, <i>Min</i>	11	10	10
iii)	Riboflavin, mg/kg, <i>Min</i>	3	2.4	2.2
iv)	Vitamin B ₁₂ activity, µg/kg, <i>Min</i>	15	11	11
v)	Vitamin A, IU/kg, <i>Min</i>	1700	1300	1300
vi)	Vitamin D, IU/kg, <i>Min</i>	190	180	130

5.2 Marking

5.2.1 Each bag shall be indelibly and legibly marked to give the following information:

- a) Name and type of the material;
- b) Name and address of the manufacturer;
- c) Quantity of antibiotics or other additives, if added (*see 4.2.1*);
- d) Net mass in kg;
- e) Batch or code number;
- f) Declaration (*see Table 2, and clauses 4.2 and 4.5*);
- g) Best before date in month & year format;
- h) Quantity of vitamins added (*see 4.5*); and
- j) Any other requirements as specified under the *Legal Metrology (Packaged Commodities) Rules, 2011*

5.2.2. BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act, 2016* and the Rules and Regulations framed thereunder, and the products may be marked with the standard mark.

6 SAMPLING

Representative samples of the material for ascertaining conformity to this standard shall be determined according to the method prescribed in Annex D of IS 2052.

7 TESTS

7.1 Tests shall be carried out as prescribed in col 6 Table 1 and Table 2.

7.2 Unless specified otherwise, pure chemicals and distilled water (*see IS 1070*) shall be employed in test.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the test results.

ANNEX A

(Clause 2)

LIST OF REFERRED STANDARDS

<i>IS No.</i>	<i>Title</i>
IS 253 : 2014	Specification for common salt (<i>fourth revision</i>)
IS 1014 : 2023	Bone meal , steamed — Specification (<i>first revision</i>)
IS 1070 : 2023	Reagent grade water — Specification (<i>fourth revision</i>)
IS 1162 : 2021	Cane molasses — Specification (<i>first revision</i>)
IS 1712 : 2022	Cottonseed oilcake as livestock feed ingredient — Specification (<i>third revision</i>)
IS 1374 : 2007	Poultry feeds — Specification (<i>fifth revision</i>)
IS 1932 : 2022	Mustard and rapeseed oilcake as livestock feed ingredient — Specification (<i>third revision</i>)
IS 1934 : 2016	Sesamum oilcake as livestock feed ingredient — Specification (<i>second revision</i>)
IS 2052 : 2023	Compounded feeds for cattle — Specification (<i>fifth revision</i>)
IS 2151 : 2022	Maize germ oilcake as livestock feed ingredient — Specification (<i>second revision</i>)
IS 2152 : 2013	Maize gluten as livestock feed ingredient — Specification (<i>second revision</i>)
IS 2153 : 2022	Maize bran as livestock feed ingredient — Specification (<i>second revision</i>)
IS 2154 : 2014	Coconut oilcake as livestock feed ingredient — Specification (<i>third revision</i>)
IS 2239 : 2022	Wheat bran as livestock feed ingredient — Specification (<i>second revision</i>)
IS 3160 : 2022	<i>Tur chuni</i> as livestock feed ingredient — Specification (<i>first revision</i>)
IS 3161 : 2022	Gram <i>chuni</i> as livestock feed ingredient — Specification (<i>first revision</i>)
IS 3441 : 2022	Solvent extracted groundnut oil cake as livestock feed ingredient — Specification (<i>second revision</i>)
IS 3592 :1985	Specification for solvent extracted decorticated cottonseed oilcake (meal) as livestock feed ingredient (<i>second revision</i>)
IS 3593 : 2022	Solvent extracted rice bran (De-oiled rice bran) as livestock feed — Specification (<i>third revision</i>)
IS 3648: 1975	Specification for rice bran as livestock feed (<i>first revision</i>)
IS 4193 : 2022	Guar meal as livestock feed ingredient — Specification (<i>second revision</i>)
IS 4370: 1983	Specification for fish meal as a livestock feed ingredient (<i>second revision</i>)
IS 5470 : 2002	Dicalcium phosphate, animal feed grade — Specification (<i>first revision</i>)
IS/ISO 5983 (Part 1): 2005	Animal feeding stuffs — Determination of nitrogen content and calculation of crude protein content Part 1 (Kjeldahl Method)

IS 5983 (Part 2): 2021/ ISO 5983-2:2009	Animal feeding stuffs — Determination of nitrogen content and calculation of crude protein content Part 2 Block digestion and steam distillation method (<i>first revision</i>)
IS 6242 : 1985	Specification for solvent extracted undecorticated safflower oilcake as livestock feed ingredient (<i>first revision</i>)
IS/ISO 6492 : 1999	Animal feeding stuffs — Determination of fat content
IS/ISO 6865 : 2000	Animal feeding stuffs — Determination of crude fibre content — Method with intermediate filtration
IS 7874	Methods of tests for animal feeds and feeding stuffs
(Part 1) : 1975	Part 1 General methods
(Part 2): 1975	Part 2 Mineral and trace elements
IS 12829 : 1989	Mango seed kernels (solvent extracted) as livestock feed ingredient — Specification
IS 13433 (Part1) : 1992	Animal feeds and feeding stuffs — Determination of calcium part 1 Titrimetric method
IS/ISO 14718 : 1998	Animal feeding stuffs — Determination of Aflatoxin B ₁ content of mixed feeding stuffs — Method using high-performance liquid chromatography
IS 14826: 2021/ISO 5985: 2002	Animal feeding stuffs — Determination of ash insoluble in hydrochloric acid (<i>first revision</i>)
IS 15121 :2002 / ISO 6869:2000	Animal feeding stuffs — Determination of the contents of calcium, copper, iron, magnesium, manganese, potassium, sodium and zinc — Method using atomic absorption spectrometry
IS 18143 : 2023/ ISO 17375 : 2006	Animal feeding stuffs — Determination of aflatoxin B ₁
Doc: FAD 13 (22580) (Identical to : ISO 16634 (Part 1): 2008)	Food products — Determination of the total nitrogen content by combustion according to the dumas principle and calculation of the crude protein content — Part 1: Oilseeds and animal feeding stuffs
EN 15621:2012	Animal feeding stuffs — Determination of calcium, sodium, phosphorus, magnesium, potassium, sulphur, iron, zinc, copper, manganese and cobalt after pressure digestion by ICP-AES

ANNEX B

(Clause 4.2)

INGREDIENTS FOR PIG FEEDS

A-1 GRAIN AND SEEDS

- a) Bajra, Bajri (*Pennisetum typhoides*)
- b) Barley (*Hordeum vulgare*)
- c) Black gram (*Phaseolus mungo*)
- d) Broken Rice Paddy rice
- e) Chinna, Cheena (*Panicum miliaceum*)
- f) Kulthi or Horse gram (*Dolichos biflorus*)
- g) Jowar, Chola (*Sorghum vulgare*)
- h) Oats (*Avena sterilis*)
- j) Panwar (*Cassia tora*)
- k) Ragi (*Eleusine coracana*)
- m) Yellow maize
- n) Sawan (*Echinochloa colona*)

A-2 GRAIN BY-PRODUCTS

- a) Arhar chuni (*see IS 3160*)
- b) Black gram chuni
- c) Gram chuni (*see IS 3161*)
- d) Gram sievings
- e) Maize bran (*see IS 2153*), maize gluten and maize gluten feed (*see IS 2152*)
- f) Rice bran (*see IS 3648*) or solvent extracted rice bran (*see IS 3593*) and polishings
- g) Wheat bran (*see IS 2239*)

A-3 OILCAKES AND MEALS

- a) Copra cake, coconut cake (expeller-pressed or solvent extracted) (*see IS 2154*)
- b) Cottonseed oilcake (decorticated) (expeller-pressed or solvent extracted)-up to 5 percent by mass (*see IS 3592*)
- c) Groundnut oilcake (expeller-pressed or solvent extracted) (*see IS 3441*)

- d) Guar (*Cyamopsis tetragonoloba*) - up to 5 percent by mass (*see* IS 4193)
- e) Maize germ oilcake (*see* IS 2151)
- f) Mustard oilcake – up to 5 percent by mass (*see* IS 1932)
- g) Safflower (*Carthamus tinctorius*) cake (expeller-pressed or solvent extracted) (*see* IS 6242)
- h) Sesamum (*Sesamum indicum orientale*) cake (expeller-pressed or solvent extracted) (*see* IS 1934)

A-4 TUBERS AND ROOTS

- a) *Colocasia* stem and tubers
- b) Potato – after boiling only
- c) Sweet Potato – after boiling only
- d) Tapioca flour
- e) Tapioca silage

A-5 ANIMAL PRODUCTS

- a) Blood meal (*see* IS 1014)
- b) Fish meal (*see* IS 4370)
- c) Liver residue
- d) Meat meal and meat scrap

A-6 GREENS

- a) Ankasa fodder (*Spilanthes acmella*)
- b) Berseem (*Trifolium alexandrinum*) leaf meal
- c) Hybrid napier
- d) Maize fodder
- e) Moringa leaves (*Moringa oleifera*)
- f) Lucerne (*Medicago sativa*) leaf meal
- g) Panwar (*Cassia tora*) leaf meal
- h) Dhaincha (*Sesbania grandiflora*) (dried)
- j) Spinach (dried)

A-7 MINERALS, VITAMINS AND SUPPLEMENTS

- a) Bone meal (steamed) (*see* IS 1014)
- b) Common salt (*see* IS 253)
- c) Dicalcium phosphate (fluorine content not to exceed 0.05 percent) (*see* IS 5470)

- d) Limestone
- e) Oyster shells
- f) Vitamins (mineral-stablized)

A-8 WASTE MATERIALS AND INDUSTRIAL BY-PRODUCTS

- a) Bakery waste - up to 50 % of energy sources
- b) Hotel waste, hatchery by-products, vegetable waste, rubber seed powder up to 10 % level,
- c) Banana flower, Banana stem, water hyacinth - up to 5 %,
- d) Azolla, Azar and Nahar seed powder - up to 15 % level
- e) Brewers' grains
- f) Dried yeast and yeast sludge
- g) Mango seed kernel (*see* IS 12829)
- h) Mahua flower residue
- j) Molasses (Khandsari type) (*see* IS 1162)
- k) Penicillin mycelium residue
- m) Dried silkworm pupae

ANNEX C

[Table 1, Item (vii)]

DETERMINATION OF METABOLIZABLE ENERGY (ME)

B-1 APPARATUS

B-1.1 Brooder - Battery or floor type.

B-1.2 Glass Bottles - Stoppered, wide-mouthed.

B-2 REAGENTS

B-2.1 Acetic Acid - 2 percent.

B-2.2 Sulphuric Acid - 5 percent.

B-3 PROCEDURE

B-3.1 Place 25 three-week old healthy chicks (white leghorn or Rhode Island Red) in a brooder and rear them on the experimental feed for 8 day acclimatization period. Then on the second day of the fifth week, give the chicks the requisite amount of accurately weighed experimental feed at a fixed hour in the morning. Simultaneously, spread the polyethylene sheets on the faeces trays for the collection of excreta. Collect a representative sample of feed for dry matter percentage and proximate analysis. Next day at the same hour collect the remaining feed and the faeces excreted and weigh them. A representative sample of the remaining feed is again collected for dry matter

percentage. The difference in dry mass of feed offered, and the remaining feed gives the amount of dry matter consumed during 24 hours. Collect the aliquots from excreta, after mixing it well, for dry matter and nitrogen estimation separately (one-twentieth and one-hundredth parts respectively) in wide mouthed and glass-stoppered bottles, and keep them in a refrigerator. For nitrogen estimation, samples in duplicate should be preserved in 5 percent sulphuric acid.

NOTE - The age of the birds during the collection period may vary from 5 to 10 weeks, but this does not affect the ME value significantly.

B-3.2 Repeat the same procedure on the next two alternate days and pool together the three-day samples of excreta for the analysis. For dry matter estimation, add about 10 ml of 2 percent acetic acid for every 50 g of the excreta and dry it in an oven at about 80°C till constant mass is obtained. Find out the total dry matter voided in three days.

B-3.3 Analyze the samples of feed and the excreta for their crude protein, ether extract, total ash and total carbohydrate content. Calculate on dry matter basis.

B-4 CALCULATION

B-4.1 Calculate gross calories in feed and excreta. The calorific values of crude protein, ether extract and total carbohydrates are 5.65, 9.40 and 4.15 Cal/g respectively.

$$\text{Metabolizable energy per kg} = (E \text{ diet} - E \text{ excreta} - N \times 8.22)$$

where

$E \text{ diet}$ = gross calories per g of feed (dry matter),

$E \text{ excreta}$ = gross calories in excreta per g of the feed (dry matter) consumed, and

N = nitrogen retention in g per g of feed (dry matter) consumed. This is obtained by subtracting total nitrogen excreted from the total nitrogen consumed per gram of the feed (dry matter).