



A Monthly e Magazine
ISSN:2583-2212
Dec 2023 3(12) 4280-4284

Popular Article

Quality Control of Feed and Feed Ingredients

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<https://doi.org/10.5281/zenodo.10447529>

Introduction

Feed alone contributes 65-75% of total expense in the farm so the efficiency of feed utilization in livestock and poultry and the development of feed industry of the country depend on feed quality.

Feed quality has been defined as “Any of the features that make something what it is” and “The degree of excellence which a thing possesses.” A quality feed would supply all nutrients in adequate quantity and high digestibility.

Quality control deals with in plant process measurement that ensure quality parameters are met during receiving, manufacturing and delivery.

The objective of quality control of feedstuffs is to ensure that a consumer should obtain feeds that are unadulterated, true to their nature and produce desired results. Quality control is the maintenance of quality at levels and tolerances acceptable to the buyer while minimizing the cost of processing.

Quality assurance deals with the policies, procedures and process control that yield a consistent product.

Regulation of Feed Quality

The quality control is regulated by a statutory body **Bureau of Indian Standards (BIS)**. It was established under BIS Act, 1986. Earlier, Indian standards Institute were regulating the quality control of various feed commodities. The objectives of BIS are as follows:

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1. Harmonious development of the activities for standardization of various commodities.
2. Marking
3. Quality certification of goods
4. Attending to the connected methods

BIS has a subcommittee. The members of **Animal feeds sectional committee** are the eminent nutritionist taken from the:

1. Indian Council of Agricultural Research (ICAR) Institutes
2. State Agricultural Universities
3. Feed Industry
4. Government departments having specialization in Animal Nutrition
5. Feed Technologist concerned with Animal Husbandry Activities.

The objectives to constitute the sectional committees are:

1. To describe the feeds accurately.
2. To lay down standards on feed ingredients.
3. To lay down standards for compounded feed formulations and mineral mixtures for cattle, poultry, pigs, laboratory animals, etc.
4. BIS is responsible for publishing various methods of nutritional analysis and anti-nutritional factor present in feed as per BIS standard. The Government of India is empowered with registration act on the Agricultural produce (Grading and Marketing), known as '**AGMARK**' standards to fix quality standards and prescribe terms and conditions for using the seal, '**AGMARK**'.
5. **Adulteration**
6. It is defined as the admixture of a pure substance with some cheaper and low-quality substance. It is done intentionally usually to make money.
7. **Common adulterants of feed ingredients**

Feed Ingredient	Common Adulterants
Groundnut cake	Groundnut husk, urea, non-edible oil cakes
Mustard cake	<i>Argimona maxicana</i> seeds, fibrous feed ingredients, urea.
Soybean meal	Raw soya , urea
De oiled rice bran, wheat bran	Ground rice husk, saw dust



Fish meal	Common salt , urea, sand
Mineral mixture	Common salt, marble powder, sand, lime stone
Molasses	Water
Maize	Cob
Rice kani	Marble, grit

8. Quality Control of feed ingredients

9. **Ingredient Quality:** It may be of two types:

10. **Qualitative:** Includes physical characteristics (analyst's skills) such as color, texture, odor and taste, particle size (screen analysis), shape, adulteration, damage and deterioration, bulk density, storage pests, fecal material, hairs etc.

11. **Quantitative:** Includes chemical analysis such as moisture, crude protein, crude fibre, ether extract, nitrogen free extract, ash, acid insoluble ash (silica or sand), salts, free fatty acids, biogenic amines, urea and NPN, amino acids etc.

12. **Anti-nutritional factor:** These contaminated the feed. These are of following types:

Extrinsic (contaminants): Includes mycotoxins, weeds, insecticide, herbicide fungicides.

Intrinsic: includes allergins, lectins, phytoestrogens, glucosinolates (rape seed), saponins, tannins, ricin, sinapine, gossypol, (cotton seed cake), lipoxygenase, trypsin inhibitor, urea etc.

Evaluation of feeds and feed ingredients for quality testing:

1. Physical evaluation
2. Chemical evaluation

Physical evaluation

Colour Any change in the colour is indication of the maturity of the grain, storage conditions, presence of toxins, and contamination due to sand, possible use of insecticides / fungicides which give dull and dusty appearance.

Size Smaller the grain, lower will be the metabolizable energy (ME) value due to more proportion of coater hull.

Homogeneity The presence of contaminants like other grains, husk, broken grains, weed seeds, infected seeds is viewed.

Smell Musty odour indicates the beginning of fungal contamination or boring insects. To detect rancidity in oil-rich feed ingredients this is the best method. The odour of petroleum products is suggestive of excessive pesticide or fungicides.



Taste Each ingredient has a different taste, any change in the taste indicates the presence of mycotoxins. The bitter taste of rice polish indicates rancidity of fatty acids.

Touch Clumps can be detected by inserting a hand into the bag. Clumps may be formed due to high moisture content, improper storage, packing of fresh warm solvent extracted meal, which crumbles on the application of light pressure.

Sound Dry grains on pouring down or biting will produce the sound of spilling coins.

Chemical evaluation

Analysis the feed sample for proximate principals and other spot test to find out adulteration in the feed. Amount of acid insoluble ash is good guide of sand and other dirt particle. Some analytical test can be done for detection of mahua cake, argimone seed, castor cake, neem seed cake, animal versus plant protein, raw soya, toxin in feed can be analyzed by standard protocol as per **BIS**.

NGFA MODEL of quality control of feed manufacturing

The National Grain & Feed Association (NGFA) model “Feed Quality Assurance Program” (NGFA, 2002) contains six components:

1. Purchase and reception of ingredients: Supplier plant history is important. Regular analysis of feed samples received from supplier is important. File any deficiency claim possible to ensure more safety.
2. Process control
3. Personal: Productivity, Interest, Alertness
4. Equipment's: Application, installation, adjustment, operation, capacity, lubrication, maintenance
5. Procedures: Communication, identification, traceability, verification record, safety
6. Finished feed: Collect at least two samples/formula/week or one sample/batch. It gives the final report card of feed quality and milling operation. Ensure correct labelling of feed and make final review of samples
7. Feed shipment and delivery: Routine inspection of delivery truck and make the adequate documentation to trace the product from feed mill to delivery location.
8. Sanitation and pest / rodent control: Check for proper working of dust control equipment's, maintain safe clean working environment and residue of these also should be within the prescribed limit as per the Prevention of Food Adulteration (PFA) act.
9. Feed product investigation and recall immediate and effective investigation of customer complaints is very important.



HACCP (Hazard Analysis critical control point) is system to check in production chain HACCP is a management system in which food safety is addressed through the analysis and control of biological, chemical, and physical hazards from raw material production, procurement and handling, to manufacturing, distribution and consumption of the finished product.

Seven principles of HACCP are as follows:

- Principle 1: Conduct a hazard analysis.
- Principle 2: Determine the critical control points (CCPs).
- Principle 3: Establish critical limits (CL).
- Principle 4: Establish monitoring procedures.
- Principle 5: Establish corrective actions.
- Principle 6: Establish verification procedures.
- Principle 7: Establish record-keeping and documentation procedures.

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