



Tikrit University  
College of Veterinary Medicine

# Lecture Title: Sampling and Preparation of Feed for Chemical Analysis

Subject name: Animal Nutrition

Subject year: Second Year

Lecturer name: Dr. Thamer Ahmed –

Dr. Ali Qaeas

Academic

Email: [thamer.a.k.@tu.edu.iq](mailto:thamer.a.k.@tu.edu.iq)

Please do not change font type and

## Lecture: Sampling and Preparation of Feed for Chemical Analysis

### Thirdly: Sampling for Feed Analysis

A **sample** is a portion of feedstuff that accurately represents the whole lot. It must be free from adulteration or contamination to provide reliable results about the true nutritive values.

It is preferable to **label each sample** with relevant details, such as feed type and chemical composition, on the packs, bags, or containers.

Feedstuffs stored on farms or sold in markets appear in various forms: sacks, grains, cubes, pellets, hay bales, straw heaps, green forages, field-grown plants, and liquid dietary substances. Each form requires a **specific sampling method** to ensure representativeness.

### Basic Requirements for Obtaining a Representative Sample

1. Sampling should be conducted in well-lit areas to allow recognition of morphological characteristics (e.g., homogeneity, storage conditions).
2. All necessary tools and equipment must be prepared in advance.
3. Sampling should be carried out by an authorized person to ensure consistency.
4. Sampling locations should be predetermined before the operation.

### Sampling Methods

#### Important Note:

Traditionally, about **10% of the feedstuff** was sampled to obtain a representative portion. However, **modern standards** (e.g., AOAC, FAO guidelines) recommend **specific sampling tables and standardized procedures** for each feed type and storage condition, rather than relying solely on the 10% rule.

#### 1. Grains, Cereals, and Seed Sacks

- Select samples from ~10% of the total sacks, or as recommended by official guidelines.
- From each selected sack, take portions from different depths and directions using a **sampling probe (trier)**.
- Combine into a **primary sample**.
- Spread on a clean surface, divide into quarters, and reduce to a **subsample (~1 kg)**.
- Store the subsample in **three airtight containers** for analysis.

#### 2. Pellets, Cubes, or Tablets

- Collect from different sacks and directions.
- Combine portions, mix well, and reduce to ~1 kg using the quartering method.

#### 3. Hay Bales

- Take samples from ~10% of the total bales (e.g., 1 out of 10).
- If fewer than 10 bales are available, sample from as many as possible.
- Collect from different sides and depths of each bale.

- Chop, mix, and reduce to a representative sample.

#### 4. Straw Heaps or Crop Residues

- Select ~10 random spots across the heap.
- Combine into a primary sample, then reduce as above.

#### 5. Green Forages in the Field

- Select 30–50 random spots across the field.
- Cut 3–5 plants per spot at ground level with a sharp tool.
- Keep the entire plant (stem + leaves) intact for the primary sample.
- Chop into 2–3 cm pieces.
- Mix thoroughly and take 100–200 g for moisture determination.

#### 6. Liquid Feedstuffs (e.g., Milk, Molasses)

- Mix thoroughly with a glass rod before sampling.
- Take a portion that represents at least **150 g of dry matter equivalent**.
- Preserve in sterile airtight containers.

#### Preservation of Milk Samples

- In the past, **mercuric chloride (2 mL/L)** was used for milk preservation.
- Due to its **high toxicity**, this method is no longer recommended.
- **Safer alternatives** include:
  - **Potassium dichromate**
  - **Bronopol**
  - **Azidiol**

These preservatives are widely used in modern laboratories.

#### Fourthly: Preparation of Samples for Analysis

1. **Remove impurities** (stones, sand, dust, debris).
2. **Grinding:**
  - Small grains → cereal mill.
  - Coarse grains → **Wiley mill** or ball mill (stainless steel).
  - Avoid overheating during grinding.
  - Sieve and regrind coarse fractions until homogeneous.
3. **Green forages:**
  - Dry at 60–70 °C for ~16 hours (overnight).
  - Grind and store in airtight glass containers.
4. **Meat and animal byproducts:**
  - Mince or pulverize using a blender or mortar.
  - Remove bones before grinding.

### Fifthly: Preservation of Samples before Analysis

Some feedstuffs are prone to spoilage due to **moisture changes, enzymatic activity, or microbial growth.**

#### Methods of Preservation

- **Preventing moisture changes:** Dry green forages, grind, and store in airtight containers.
- **Preventing enzymatic activity:** After grinding, add hot 95% ethanol. Neutralize with calcium carbonate. Heat in a water bath at 60 °C for 30 minutes, cool, and store at low temperature.
- **Preventing microbial growth:** Add preservatives such as **acetic acid** or **sodium benzoate** in adequate amounts.
- **Preserving milk samples:** Avoid mercuric chloride. Use modern alternatives such as **potassium dichromate, bronopol, or azidiol.**

#### Sampling Plan for Feed Materials & Forages (Codex/AOAC)

Type of Feed Material	Batch Size	Required No. of Incremental Samples	Minimum Primary Sample	Minimum Final Laboratory Sample
Bagged or barreled feed	up to 50 tons	2	2 kg	300 g
Feed > 50 tons	per 25 tons	—	1 kg per incremental	300 g
Compound feeds	all sizes	1	300 g	300 g
Premixes	all sizes	1	100 g	100 g
Feed additives (≤ 1 ton)	up to 1 ton	2	250 g	100 g
Feed additives (1–50 tons)	1–50 tons	2	1 kg	100 g
Feed additives (> 50 tons)	> 50 tons	per 25 tons	500 g per incremental	100 g
Bulk feed in silos or tanks	up to 50 tons	2	2 kg	600 g
Bulk feed in silos (> 50 tons)	≥ 50 or ≥ 500 tons	per 25–50 tons (depending on size)	1 kg per lot	600 g
Compound feed/premix/additives in silos	≤ 50 tons	2	2 kg	200 g
Forages (solid)	≤ 50 tons	≥ 5 samples	500 g	250 g
Forages (bulk, ≥ 50 tons)	> 50 tons	≥ 10 samples	500 g	250 g
Large transport consignments	up to 5000 tons	≥ 5 samples per 500 tons	≥ 1 kg per 500 tons	300 g

#### Notes:

- These tables follow **Codex Alimentarius / AOAC** international standards.