Standard Operating Procedure (SOP): Laboratory Moisture Analysis in Grains

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1. Purpose

This document provides the standardized procedure for determining the moisture content of various grain samples, including but not limited to wheat, paddy, and corn, using the oven-drying method at 105°C as per ISO 712:2009 standards. This SOP aims to ensure accuracy, consistency, and regulatory compliance across all test runs.

2. Scope

This SOP is applicable to all Quality Control (QC) personnel at GPC laboratories involved in the testing of moisture content in grain products, both raw materials and finished goods. It also extends to contract labs following GPC quality protocols.

3. Responsibilities

- Lab Technicians: Execute the moisture test as described and ensure accurate documentation.

- QA Supervisor: Conduct audits of moisture tests and review results weekly.

- Maintenance Engineer: Ensure timely calibration and proper functioning of test equipment.

- Lab Manager: Ensure training of staff and enforcement of SOP compliance.

4. Materials and Equipment

- Hot air oven (settable to 105 ± 2°C)

- Analytical balance (0.001g sensitivity)

- Pre-dried aluminum crucibles

- Desiccator with fresh silica gel

- Forceps, gloves, PPE

- Grain grinder (if whole grains are used)

5. Definitions

Moisture Content: The percentage loss in weight due to drying, indicating water content in the grain sample.

W1: Weight of empty crucible

W2: Weight of crucible + wet sample

W3: Weight of crucible + dried sample

6. Procedure

6.1 Preparation:

- Ensure oven temperature has stabilized at 105°C.

- Clean and dry crucibles in advance. Cool and store in desiccator.

- Calibrate the balance before each testing session.

6.2 Sample Preparation:

- Grind grain to pass through a 1mm sieve.

- Mix thoroughly to ensure homogeneity.

6.3 Testing:

- Weigh crucible (W1) and record.

- Add ~5g of ground sample; weigh total (W2).

- Place in oven for 3 hours.

- Remove using forceps, cool in desiccator for 30 minutes.

- Weigh again (W3).

- Calculate moisture content using formula: ((W2 - W3)/(W2 - W1)) * 100

7. Quality Assurance & Control

- Weekly analysis of standard reference material (SRM) for moisture.

- Any deviation beyond ±0.5% must be flagged and re-analyzed.

- Maintain log of all failed test runs with root cause and CAPA if required.

- Participate in inter-lab comparison annually.

8. Documentation & Records

- All raw weights and calculations to be entered in ELN with timestamps.

- Batch moisture results must be reviewed and approved by supervisor before reporting.

- Retain hardcopies of test logs for 2 years or as per regulatory requirements.

9. Safety & Waste Disposal

- Always wear heat-resistant gloves and goggles.

- Never open oven door with bare hands.

- Dispose of residual grain waste in designated biohazard bins.

- Handle desiccant carefully and replace if saturated.

10. Training Requirements

- All lab personnel must be trained in this SOP before conducting unsupervised tests.

- Training record should be maintained and reviewed annually.

- Refresher training required if there are more than 2 testing deviations in a quarter.

11. References

- ISO 712:2009 – Cereal and cereal products — Determination of moisture content

- GPC QA Manual, Section 3: Moisture Testing

- Internal Document QC-Checklist-2025-A