

**United States Department of Agriculture
Food Safety and Inspection Service, Office of Public Health and Science**

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Title: Moisture Determination		
Revision .02	Replaces: .01	Effective: December 26, 2001

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A. INTRODUCTION

A weighed sample is heated, cooled, and then re-weighed. The weight loss is calculated as moisture content.

B. EQUIPMENT

Note: Equivalent apparatus may be substituted.

Apparatus

- a. Covered aluminum dishes - ≥ 50 mm diameter, ≤ 40 mm depth, containing a paddle.
- b. Mechanical convection oven - equipped with a booster heater.
- c. Robot Coupé® food processor - Robot Coupé® U.S.A., Inc., Jackson, MS 39236.
- d. Analytical balance - capable of weighing to 0.1 mg.
- e. Aluminum weighing paddles - L-shaped, approximately 25 mm long, 12.5 mm wide.

C. REAGENTS AND SOLUTIONS (Not Applicable)

D. STANDARDS (Not Applicable)

E. SAMPLE PREPARATION

All samples must be processed long enough to produce a homogenous blend of tissue but not so long as to become warm.

F. ANALYTICAL PROCEDURE

1. Accurately weigh sample (representing approximately 2 g of dry material) into an aluminum dish.
 - a. Weigh the sample as rapidly as possible to minimize loss of moisture.
 - b. The weight of the pan should include the paddle, which is used in spreading the sample across the bottom of the pan, thereby presenting a greater sample surface area, which is beneficial to moisture removal.
 - c. If the sample is relatively dry when received, a small quantity of distilled water may be added to the pan only after the sample weight is obtained. This quantity of water will be helpful in spreading the sample across the bottom of the pan, and will introduce no error since it will be evaporated when the sample is oven-dried.

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2. Dry, with cover removed, for 16 -18 hours at 100 - 102 °C, or for 4 hours ± 10 minutes at 125 ± 1 °C in a mechanical convection oven. All oven thermometers calibrated against a NIST thermometer.

Note: Do not overload the drying oven or sample may be insufficiently dried and give low results. Drying time will start when the original temperature has been reached. Use the oven's booster heater, if the oven is so equipped, to minimize this recovery time.

3. Remove moisture dishes from oven, cover dishes, let cool to room temperature and weigh the tin back.

G. CALCULATIONS

1. Procedure

$$\text{Percent} = \frac{100(B - C)}{A}$$

A = sample weight

B = weight of dish + sample prior to drying

C = weight of dish + sample after drying

Note: If laboratory is not air-conditioned, and humidity may present a problem, it is advisable to desiccate dishes prior to the initial and final weighings.

H. HAZARD ANALYSIS

1. Method Title - Moisture Determination
2. Required Protective Equipment - Safety glasses, laboratory coat, and heat-resistant gloves
3. Hazards
No unusual safety hazards in this method.
4. Disposal Procedures
Use good hygienic practices in disposing of dried meat samples.

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I. QUALITY ASSURANCE PLAN

1. Performance Standard

Analytical Range (%)	Repeatability Standard Deviation (STD)	Reproducibility STD
1	< 0.46 ²	< 0.65 ²

¹ Limit may vary due to sample and aliquot sizes and sample type.

² One standard deviation based on historical data.

The Measurement Uncertainty and Method Detection Limit should be recalculated yearly or whenever a change that affects method accuracy, precision, or sensitivity occurs.

2. Critical Control Points and Specifications

<i>Record</i>	<i>Acceptable Control</i>
a. Sample size	3 - 6 g (representing about 2 g dry material)
b. Dish size	≥ 50 mm diameter, ≤ 40 mm deep; with cover.
c. Oven temperature	101 ± 1 °C for 16 -18 hours or 125 ± 1 °C for 4 hours ± 10 minutes after oven reaches temperature; Mechanical convection, forced-air oven. Check temperature with calibrated thermometer. Calibrate against a NIST thermometer.
d. Oven loading	No dishes touching and not placed on solid tray; proper air circulation required.
e. Oven recovery	Return to temperature within 10 minutes from door closing. Check and keep record, once per quarter.
f. Calculation	Recheck

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3. Readiness To Perform
 - a. Familiarization
 - i. Phase I: Standards- Not Applicable.
 - ii. Phase II: Fortified samples- Random replicates of previously analyzed samples.
 - iii. Check samples for analyst accreditation.
 - (a) 36 check samples for initial analyst qualification.
 - (b) Samples provided by the FSIS Accredited Laboratory Program (ALP).
 - (c) Report analytical findings to ALP.
 - (d) Notification from ALP is required to commence official analysis.
 - b. Acceptability criteria.

Refer to section I. 1., Performance Standards
 4. Intralaboratory Check Samples
 - a. System, minimum contents.
 - i. Frequency: 1 per week, per analyst, if samples are analyzed
 - ii. Blind samples or random replicates chosen by supervisor or designee
 - iii. Records are maintained by analyst and reviewed by supervisor and Quality Assurance Manager.
 - b. Acceptability criteria.

Refer to section I. 1 Performance Standards

If unacceptable values are obtained, then:
 - i. Stop all official analyses for the analyst.
 - ii. Investigate and identify probable cause.
 - iii. Take corrective action.
5. Interlaboratory Check Sample Program
 - a. Frequency: 1 every other month.
 - b. Samples: Procured, prepared, and submitted by FSIS.
 - c. Report analytical findings to provider according to their specifications.
 - d. If unacceptable values are obtained, then:

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- i. Stop all official analyses for the analyst.
 - ii. Investigate and identify probable cause.
 - iii. Take corrective action.
- 6. Sample Acceptability and Stability
 - a. Matrix: Meat, poultry, and processed products
 - b. Condition upon receipt: Unspoiled and sealed from air
 - c. Sample storage:
 - i. Time and Condition:
24 months frozen or 1 - 3 weeks refrigerated.
- 7. Sample Set
A batch size of 1 – 20 samples. A QC sample will be run with each batch set.
- 8. Sensitivity
Method detection limit (MDL): 0.5 %
- J. WORKSHEET (Not Applicable)**
- K. APPENDIX**
- 1. Reference
Official Methods of Analysis of the Association of Official Analytical chemists, 15th Edition, 950.46.

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