INTERNAL COOKING TEMPERATURE/COAGULATION

Contents

DETERMINATIVE METHOD

A. INTRODUCTION

1. Theory	Soluble proteins are extracted with a 0.9% saline (NaCl) solution and subjected to heat, causing a cloudiness or turbidity in the extract because of coagulated proteins. The temperature at which the first sign of cloudiness appears is the maximum internal cooking temperature. This procedure is empirical and must be followed as written.
2. Applicability	This procedure is applicable to both beef and pork products below 150° F that do not contain any organ meats or nonmeat proteins.

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B. EQUIPMENT

Apparatus

a. Gooch crucible.

b. Celite 545.

c. Buchner funnel.

d. Filtering flask with tubulation.

e. Filter paper—suitable for use in Buchner funnel.

f. Test tube—50 mL.

g. Water bath—consisting of 1 to 2 L beaker with a stirring apparatus and clamps or rack for holding test tubes.

h. Bunsen burner or equivalent.

i. Two identical thermometers.

j. 250 mL beaker.

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C. REAGENTS AND SOLUTIONS

Reagent and Solution List	0.9% saline (NaCl) solution: Dissolve 9.0 g of sodium chloride in 200 mL of H_2O. Make to 1 L, mix thoroughly.

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F. ANALYTICAL PROCEDURE

1. Determination

a. Weigh 50 g of ground sample into a 250 mL beaker.

b. Add 100 mL of saline (NaCl) solution; thoroughly mix and allow to stand for 20 min.

c. Filter the mixture through a filter paper on a Buchner funnel using vacuum.

d. Filter the filtrate a second time using a Gooch crucible and a coarse filter paper with a Celite 545 pad of appropriate thickness.

e. The second filtrate should be nearly clear; if not, repeat step d. NOTE: If filtrate is too clear, all protein may have been removed.

f. The filtrate is divided into two test tubes. One is the control, the other the test portion.

g. The test sample is clamped into position in the water bath and a thermometer is supended in the filtrate. A second thermometer is suspended in the water.

h. Apply heat to the water being careful to maintain a difference $\leq 1.5°$ F between the water temperature and the temperature of the filtrate.

i. The temperature at which the first sign of cloudiness appears compared to the control portion, is the maximum internal cooking temperature. Continue to heat up to 156° F. If a definite cloudiness does not appear, add ca. 1 mL 20% phosphotungstic acid to confirm presence of protein. If no cloudiness appears, start over.

NOTE: For rapid screening, the filtrate may be immersed in a water bath at 156° F. Those samples that appear to cloud may be removed and a fresh aliquot of the same samples treated to slower temperature rise to determine the maximum cooking temperature, is used.

2. Reference

USDA, Food Safety and Inspection Service, Chemistry Division, unpublished method.

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H. HAZARD ANALYSIS

1. Method Title	Determination of Internal Cooking Temperature (Coagulation).
2. Required Protective Equipment	Safety glasses, plastic gloves, lab coat.
3. Procedure Steps	No unusual safety hazards in this method.
4. Disposal Procedures	Good hygienic practice should be used in disposing of the meat that has been extracted.

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J. QUALITY ASSURANCE PLAN

1. Performance Standard

Procedure	*Analytical Range*	*Repeatability % CV*	*Reproducibility % CV*
Maximum Internal Temperature	< 150° F	(±3° F)	(±5° F)

2. Critical Control Points and Specifications

Record	*Acceptable Control*
Sample size	50.0 g ± 0.1 g.
Volume of saline solution	100 ± 1 mL.
Filter paper filtration	Must be done. Coarse paper may be used.
Gooch filter media	Must be Celite 545.
Heat apparatus	Hang tube containing meat extract so that surface of extract is below surface of water bath and tube is not touching side or bottom of water bath. Hang calibrated thermometers in the meat extract and the water bath so that they are not touching the tube or the beaker. Thermometers should be alike in divisions and temperature ranges. Entire bulb must be submerged.
Heating rate	Start at room temperature. Increase temperature at rate of 1.0-1.5° F per min, keeping both thermometers within 1.5° F of one another. Stir bath and extract to ensure equilibrium of temperature.
Maximum internal cooking temperature	Record thermometer reading on meat extract at *first* sign of cloudiness, *not* color change.
Reporting	See appropriate memoranda and directives. Rerun all noncomplying samples before reporting.

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J. QUALITY ASSURANCE PLAN (Continued)

3. Readiness To Perform

a. Familiarization.

i. Phase I: Standards—NA.

ii. Phase II: Replicates from previously analyzed samples.

iii. Phase III: Check samples for analyst accreditation.

b. Acceptability criteria.

See section J.1 above.

4. Intralaboratory Check Samples

a. System, minimum contents.

i. Frequency: 1 per week, not to exceed 20% of samples.

ii. Blind samples or random replicates chosen by supervisor after initial analysis.

iii. Records are to be maintained by analyst and reviewed by the supervisor and Laboratory QA Officer.

b. Acceptability criteria.

If unacceptable values are obtained, then:

i. Stop all official analyses for that analyst.

ii. Investigate and identify probable cause.

iii. Take corrective action.

iv. Repeat Phase III of section J.3 if cause was analyst-related.

5. Sample Acceptablility and Stability

a. Matrix: Beef or pork.

b. Sample receipt size, minimum: 1 lb.

c. Condition upon receipt: Frozen preferred, but evidence of ice crystals acceptable.

d. Sample storage:

i. Time: 3 months.

ii. Condition: 0° C.