



United States  
Department of  
Agriculture

Grain Inspection,  
Packers and Stockyards  
Administration

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March 05, 2012

Reference # 247

TO: FGIS POLICY BULLETIN BOARD

FROM: Robert Lijewski, Director  
Field Management Division

SUBJECT: Milled Rice Iron Enrichment Testing

ORIGINATING OFFICE: Policies, Procedures, and Market Analysis Branch

**1. PURPOSE**

This memorandum provides instructions for performing iron enrichment testing on Milled rice using the GIPSA approved Prussian Blue Method.

**2. BACKGROUND**

Periodically, field offices and official agencies receive requests from applicants to test for the presence or absence of iron enrichment in Milled rice. The factor "enriched" is not provided for under the United States Standards for Milled Rice, but may be determined upon request.

Rice fortification premix formulas changed in the late 80's, but a reliable rapid test applicable to the new formula was not available. Alternate procedures were approved for official use, such as official personnel requesting the applicant's data regarding enrichment type and application rate coupled with "spot checks" of the mill's process. Additionally, official personnel detected enrichment through sensory evaluations such as visual examinations of the rice for distinct enrichment characteristics, or smelling the rice for unique enrichment odors.

In order to keep up with the current fortification formulas and to assure positive identification of enrichment in milled rice samples the Technical Services Division has evaluated and approved a new rapid test method for detecting the presence of iron enrichment. When an applicant states the rice is enriched, a statement, if known to be true, may be shown in the remarks section of the certificate.

**3. PROCEDURE**

Follow the instructions in Attachment 1 "Prussian Blue Method for Iron Enrichment in Milled Rice".

GIPSA-TSD will prepare kits with solutions and reference rice samples needed to conduct this test, for distribution to field locations. Field locations are responsible for procuring all other equipment needed for the test.

#### **4. FILING INSTRUCTIONS**

Retain a copy of this memo with Chapter 5 of the Rice Inspection Handbook until the handbook is revised to include new guidelines for testing enrichment in rice. Field office managers please provide a copy of this memorandum to the official agencies within your circuit that are responsible for the testing of enrichment in milled rice.

#### **5. QUESTIONS**

Direct any questions concerning this policy to Pat McCluskey, Policies, Procedures, and Market Analysis Branch, [Patrick.J.McCluskey@usda.gov](mailto:Patrick.J.McCluskey@usda.gov), (816) 659-8403 or Beverly Whalen, [Beverly.A.Whalen@usda.gov](mailto:Beverly.A.Whalen@usda.gov), (816) 659-8410, Policies, Procedures, and Market Analysis Branch. Direct any technical questions regarding the test to Rangan Chinnaswamy, Wheat Functionality Laboratory, [Rangan.Chinnaswamy@usda.gov](mailto:Rangan.Chinnaswamy@usda.gov), (816-891-0477).

## Attachment 1: Prussian Blue Method for Iron Enrichment in Milled Rice

### Materials

Reference Rice Samples: Un-enriched Milled Rice, Un-enriched Parboiled Milled Rice

Enriched Milled Rice, Enriched Parboiled Milled Rice (Provided by GIPSA-TSD)

Hydrochloric Acid (Provided by GIPSA-TSD)

Potassium Ferrocyanide (Provided by GIPSA-TSD)

Spot plates, porcelain

Timer

Plastic sample spoon (1/4 teaspoon)

Gloves

Figure 1 displays an example of a spot plate that is used for testing. The first well in the spot plate should contain the un-enriched rice reference sample, the middle well should contain the test sample, and the third well should contain the enriched rice reference sample.

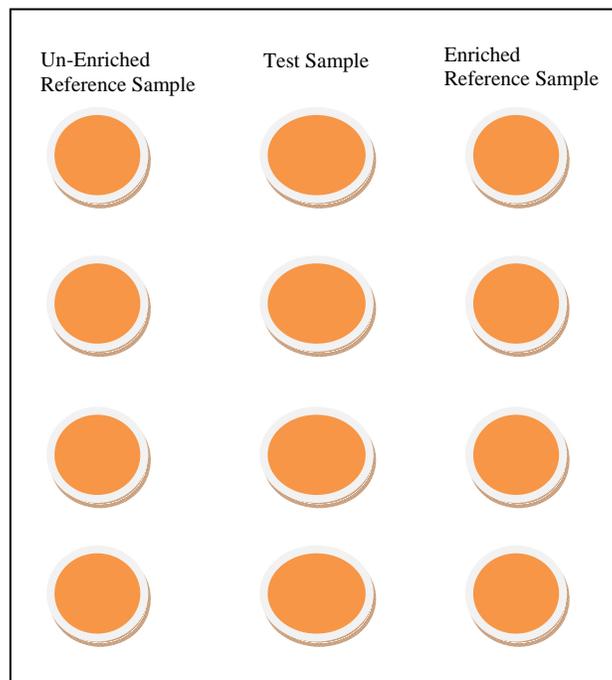


Figure 1. Spot Plate for Prussian Blue Method for Iron Enrichment in Rice

## **Procedure**

**Note:** A fume hood is not required for conducting this test; however ensure that you are in a well ventilated area.

1. Use the sample scoop (1/4 teaspoon) to transfer about 1 gram of the un-enriched rice reference sample to the first spot plate well. (left)
2. Use the sample scoop to transfer about 1 gram of the test sample to the middle spot plate well.
3. Use the sample scoop to transfer about 1 gram of the enriched rice reference sample to the third spot plate well. (right)
4. Wearing gloves, add three drops of the Hydrochloric Acid to each of the wells containing sample. Wait ten minutes and then add three drops of Potassium Ferrocyanide to each of the wells that were treated with Hydrochloric Acid solution.
5. Wait ten minutes for the color to develop.
6. Compare the color of the test sample to the color of the un-enriched and enriched rice reference samples.
7. Test samples containing enrichment should produce a blue color similar to that of the enriched rice reference samples and are considered positive.
8. Test samples that do not contain enrichment should produce color similar to that of the un-enriched reference sample and are considered negative.
9. Four test samples can be tested on a spot plate (with two reference samples per test sample).
10. After testing, discard rice in the spot plate wells and clean the spot plate.