

SOP No: SOP-MILL-005	SOP Description: Mass Calculation of Head Rice Yield and Other Rice Fractions
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SOP-MILL-005: Mass Calculation of Head Rice Yield and Other Rice Fractions

Scope:

Head Rice Yield (HRY) is one of the most important parameters in determining the economic and processing value of a rice crop. It is defined as the mass percentage of rough rice kernels that are at least three-quarters their original kernel length after milling. Yield of other rice fractions produced during the milling process are also relevant with regard to research or commercialized co-product industries.

Principle:

Throughout the milling process, rough rice is processed into several different fractions, including brown, milled and head rice, by separating various components of the seed from the kernel: Rough rice becomes brown rice as hulls are removed; milling removes the bran from brown rice, resulting in milled rice; milled rice may be separated into head rice and broken kernels. Each of these fractions may be weighed and expressed as a percentage of the original rough rice weight.

Equations:

1. **HRY** is calculated as follows:

$$\text{HRY} = \frac{\text{Mass}_{\text{Head Rice}}}{\text{Mass}_{\text{Rough Rice}}} \times 100$$

Where: Head Rice = all kernels that are at least three-quarters of their original length after milling; Rough Rice = all kernels in sample, prior to dehulling.

2. **Milled Rice Yield (MRY)** is calculated as follows:

$$\text{MRY} = \frac{\text{Mass}_{\text{Milled Rice}}}{\text{Mass}_{\text{Rough Rice}}} \times 100$$

Where: Milled Rice = all kernels in a sample, including head rice and broken, after milling (removal of bran); Rough Rice = all kernels in sample, prior to dehulling.

3. **Brown Rice Yield (BRY)** is calculated as follows:

$$\text{BRY} = \frac{\text{Mass}_{\text{Brown Rice}}}{\text{Mass}_{\text{Rough Rice}}} \times 100$$

Where: Brown Rice = fraction of a rough rice sample remaining after hulls are removed. Rough Rice = all kernels in sample, prior to dehulling.

NOTES: It has been observed that 5-7% of kernels remain unhulled after dehulling with a roller distance of 0.019". These unhulled kernels are generally considered as part of the brown rice fraction, but may be manually separated, as dictated by further analysis requirements.

Other fractions, such as hulls or bran, may be calculated as a percentage of rough rice in the same manner.

Materials:

Rough rice sample of known weight (150 g standard)

Scale

Various processing equipment: dehuller, mill, blower, shaker table and supporting accessories

Procedure:

1. Record weight of rough rice sample.
2. Process sample as appropriate.
3. Weigh each resulting fraction, taring out the weight of each container on the scale, as necessary.
4. Enter values into equations 1-3, as appropriate.
5. Record results in a laboratory notebook.