

Milling Formulas Used for SWQL Reports

Micro Milling

Grain Moisture Estimate

$$\text{Grain moisture} = 1.3429 * (\text{flour moisture}) / 4$$

Estimated Flour Yield Corrected to 15% Moisture

$$\text{Flour Yield}_{(15\%)} = \text{Flour Yield}_{(\text{as is})} - 1.61\% * (15\% - \text{Actual flour moisture})$$

Softness Equivalent (SE)

$$\text{SE}_{(\text{as is})} = [(\text{GW} - \text{Bran}) - \text{Mids}] / (\text{GW} - \text{Bran})$$

- SE = Softness Equivalent
- GW = Weight of grain milled
- Bran = Weight of milled product that remains above a 40 mesh screen
- Mids = Weight of mill product through a 40 mesh and remaining above a 94 mesh screen

Softness Equivalent at 15% grain moisture (SE_(15%))

$$\text{SE}_{(15\%)} = \text{SE}_{(\text{as is})} - 1.08\% * (15\% - \text{Actual flour moisture})$$

Flour yield adjustment¹

$$\text{Adjusted Flour Yield} = \text{Flour Yield}_{(15\%)} + 0.17 * (\text{Softness Equivalent}_{(15\%)} - 52\%)$$

Milling Quality Score (MQS)

$$\text{MQS} = \text{MF} + (5.0144 * \text{Adjusted Flour Yield}) - 292.6425$$

- MF = Allis Milling Score - (5.0144 * SAFY) - 292.6425
- Allis Milling Score = Mill score from Allis database for the quality standard designated for the group
- SAFY = Adjusted Flour Yield for the quality standard designated for the trial as measured in the trial being evaluated

Baking Quality Score (BQS)

$$\text{BQS} = \text{BF} + (33.3333 * \text{CS}) - 526.667$$

- BF = Allis Baking Score – SCS
- CS = Cookie Score = (-0.145 * Flour Protein) + (-0.07 * Sucrose SRC) + (0.049 * SE) + 21.9
- SCS = Standard Cookie Score – cookie score for the quality standard designated for the trial as measured in the trial being evaluated
- Allis Baking Score = Allis baking score for the quality standard as determined in the Allis Milling Database

Advanced Flour Milling

All formulas for Advanced milling are the same as Micro milling with the exception of Baking Quality Score.

Baking Quality Score (BQS)

$$\text{BQS} = (33.33333 * \text{Cookie Diameter}) - 526.667 + \text{BF}$$

- BF = Baking Factor = Allis Bake Score - (33.33333 * SCD) - 526.667
- Allis Baking Score = Allis baking score for the quality standard as determined in the Allis Milling Database
- SCD = Standard Cookie Diameter – cookie diameter for the quality standard designated for the trial as measured in the trial being evaluated

Allis-Chalmers Flour Milling

Recovery Weight

$$\text{Recovery Wt.} = \text{Bran Wt.} + \text{Red Dog Wt.} + \text{Shorts Wt.} + \text{Straight Grade Wt.}$$

Flour Yield

$$\text{Flour yield} = \text{Straight Grade Wt.} / \text{Recovery Wt.}$$

Endosperm Separation Index (ESI)

$$\text{ESI} = [(\text{Bran Wt.} + \text{Red Dog Wt.} + \text{Shorts Wt.}) / \text{Recovery Wt}] - 17.^2$$

Friability

$$\text{Friability} = (\text{Summed weight of material milled by } 2^{\text{nd}} \text{ to } 6^{\text{th}} \text{ Break and } 1^{\text{st}} \text{ to } 7^{\text{th}} \text{ Reduction}) / \text{Weight of straight grade flour}$$

Allis Softness Equivalent (Allis SE)

$$\text{Allis SE} = \text{Break Flour \%} + 21\%$$

Allis Milling Score

$$\text{Allis milling score} = 33.3 - [80 - \text{Allis straight grade flour yield}] * 3.7 \\ + 33.6 + [(6 - \text{ESI}) * 2.8] + 33 - [32 - \text{Friability}] * 3.3$$

Allis Baking Score

$$\text{Allis Baking Score} = (33.33333 * \text{Cookie Diameter}) - 526.66$$

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1. On the small Quad Mill, coarser type soft wheat samples will appear to mill better than they should and conversely, softer type soft wheat samples will have suppressed “as is” flour yields. When compared to soft wheat samples with lower softness equivalents, wheat samples with higher softness equivalents typically require greater break roll milling to completely separate endosperm from bran. Micro milling adjustments were developed by Lonnie Andrews with Patrick Finney and Charles Gaines. Additional details are included in the Standard Operating Procedures for the Soft Wheat Quality Laboratory.
 2. In practice the recovery weight is estimated at 98% of milled weight