Analysis of Gedeo Zone Wet Mills: Fermentation Impact on Wet Mill Operations and Cup Quality

USDA: FOOD FOR PROGRESS – REGROW YIRGA PROJECT

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Fermentation is a critical step in coffee processing that influences flavor development, cup quality, and overall market value. The fermentation trials conducted under the Regrow Yirga Project aimed to evaluate the impact of three fermentation methods (dry, submerged, and agitated). Trials were carried out at high and low-elevation sites in the Gedeo Zone, Ethiopia, to assess how fermentation type influences quality attributes, operational costs, and environmental impact.

CUP SCORE VARIABILITY

- No significant differences were observed in total cup scores across fermentation types, except at high elevations where **agitated fermentation** resulted in higher scores than submerged and dry methods.
- Certain sensory attributes, such as **body, acidity, aftertaste, and balance**, showed significant variation across fermentation types.

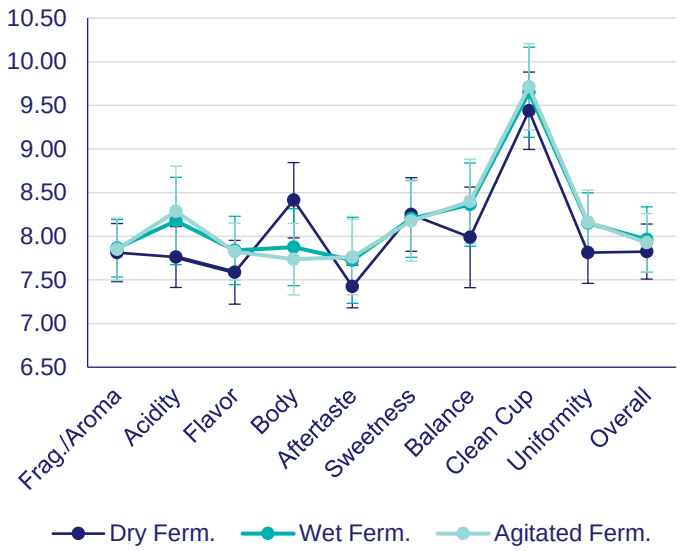

Figure 1: Cup attribute scores for different fermentation types at low-elevation site.

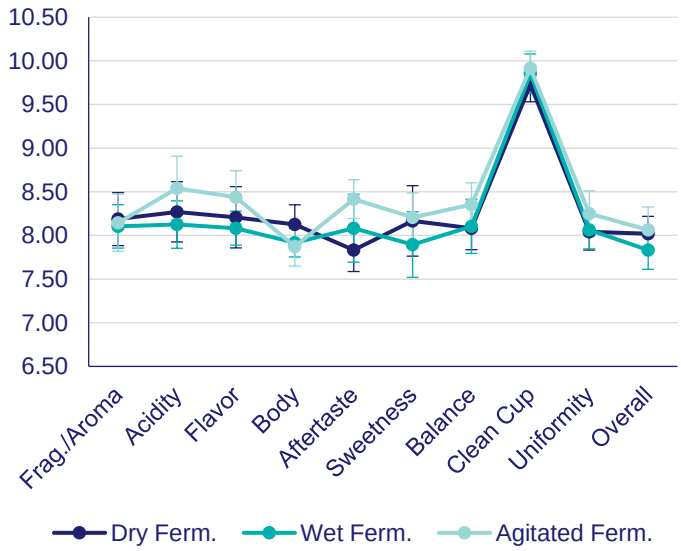

Figure 2: Cup attribute scores for different fermentation types at high-elevation site.

FERMENTATION TIME

- Contrary to expectations, fermentation times did not significantly differ across methods at any site.
- The assumption that dry fermentation would accelerate processing due to higher sugar concentrations and increased microbial activity was not supported, as nighttime cooling counteracted the higher daytime temperatures when water was not present to act as an insulator.

SENSORY IMPACTS BY FERMENTATION TYPE

- **Dry fermentation** consistently produced coffees with a higher **body score** but lower uniformity.
- **Agitated fermentation** at high elevations resulted in improved **acidity, aftertaste, and balance** scores.
- **Submerged fermentation** had more stable and uniform flavor profiles but did not outperform the other methods in total cup score.

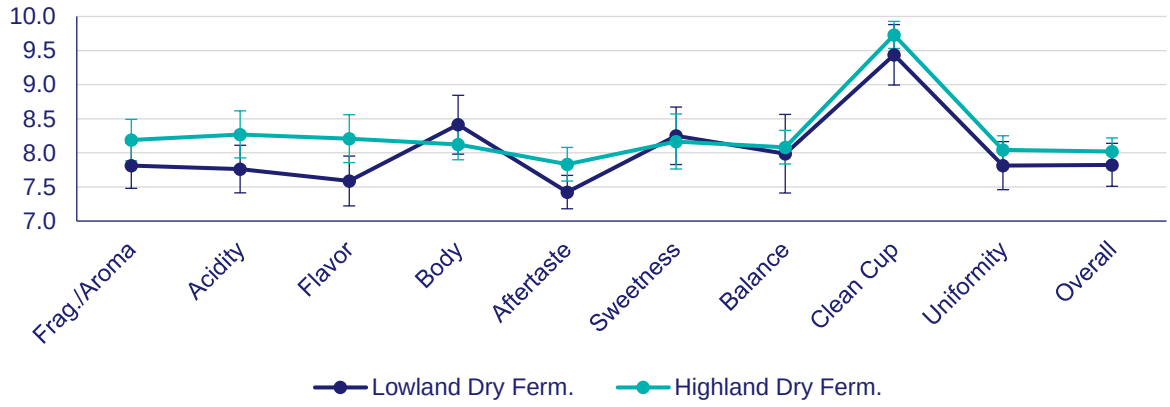

Figure 3: Cup attribute scores for dry fermentation at lowland and highland sites.

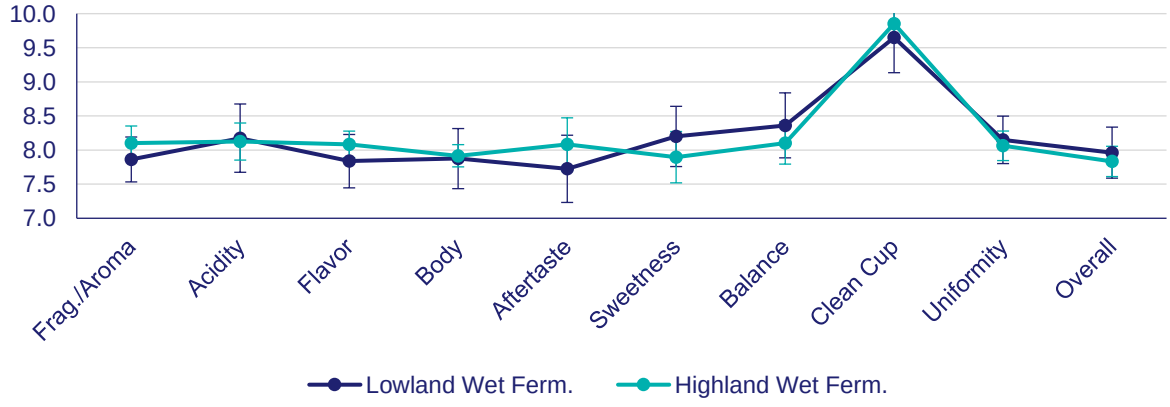

Figure 4: Cup attribute scores for wet fermentation at lowland and highland sites.

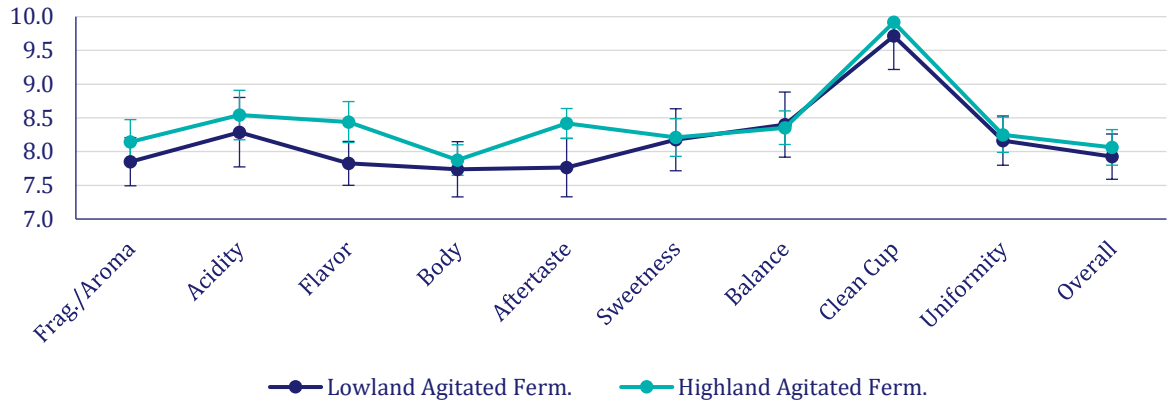

Figure 5: Cup attribute scores for agitated fermentation at lowland and highland sites.

OPERATIONAL AND ENVIRONMENTAL CONSIDERATIONS

- **Dry fermentation** offers cost savings by reducing water consumption and waste treatment needs.
- At lower elevations, dry fermentation **requires careful management** to prevent uneven fermentation.
- **Agitated fermentation** may be a viable strategy at high elevations for wet mills looking to enhance quality scores.