technoserve.org

TechnoServe
Business Solutions to Poverty™

Maximizing Coffee Washing Station Profits

Results from Field Experiments on Pulper Calibration, Cherry Ripeness, and Fermentation Techniques

In partnership with:

ARKENA
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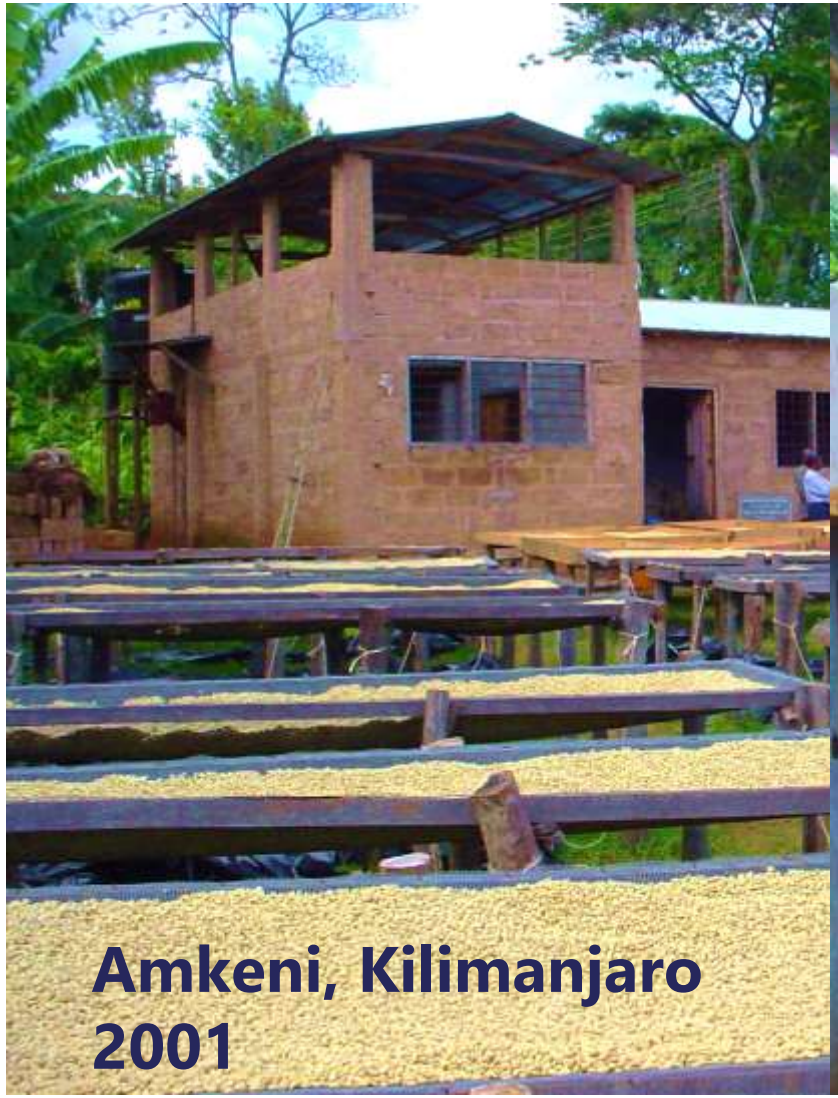
Coffee Market

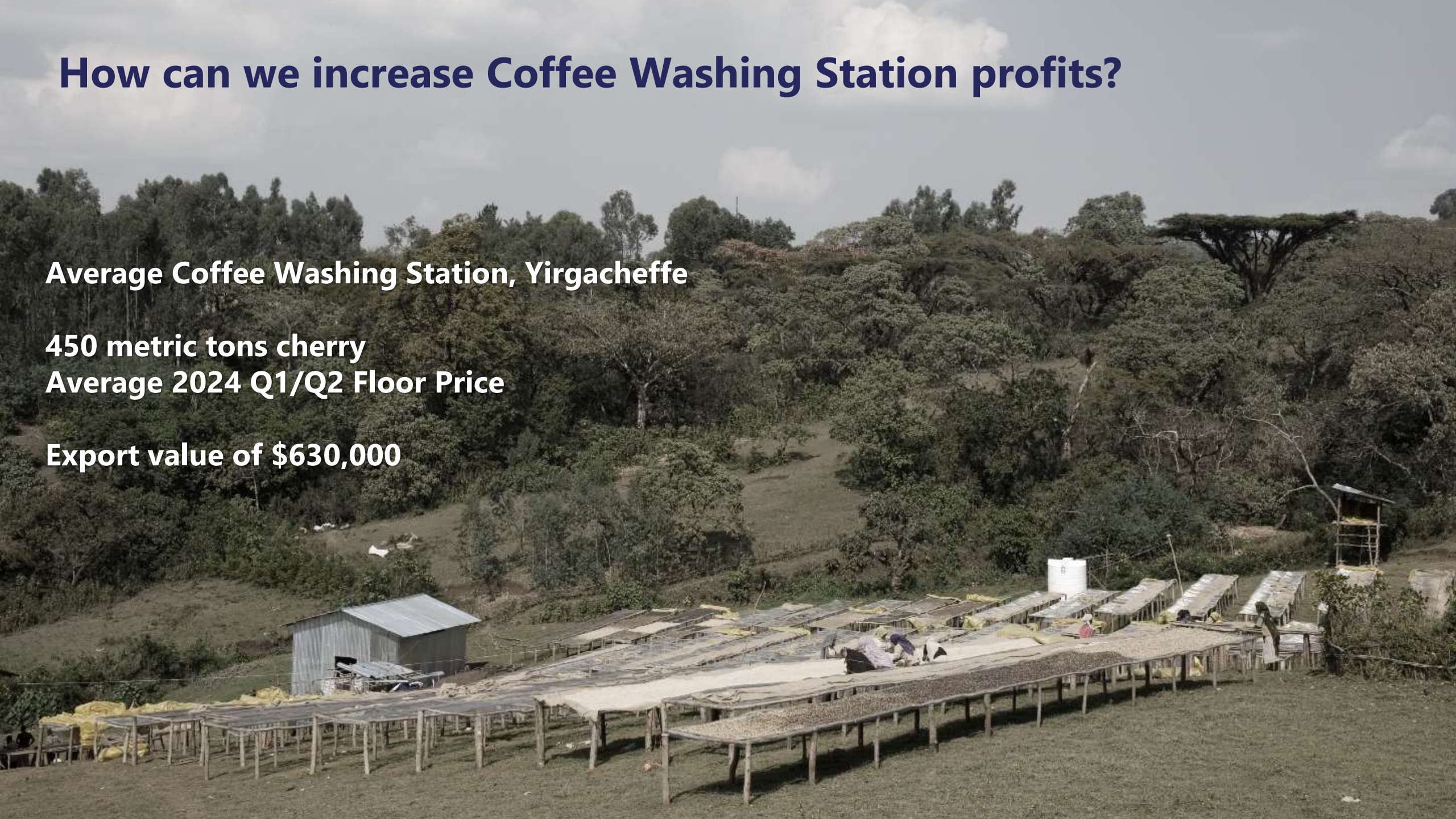
TechnoServe has advised hundreds of Coffee Washing Stations (CWS) across Eastern Africa since 2001



Amkeni, Kilimanjaro 2001

February 2025

How can we increase Coffee Washing Station profits?



Average Coffee Washing Station, Yirgacheffe

450 metric tons cherry
Average 2024 Q1/Q2 Floor Price

Export value of $630,000

Cherry receipt

Pulping

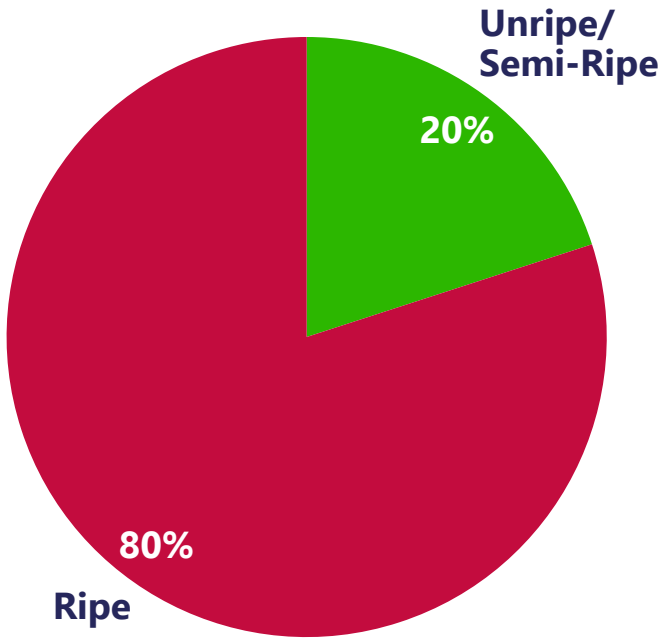
Mucilage removal

Washing

Drying

Improving Cherry Ripeness Increases Bean Size and Weight

Average Cherry Ripeness
Three CWS, 2020



Unripe/Low Ripe Beans are:

- **13% Smaller**
- **19% Lighter**
- **Lower Quality**

$10,500 per CWS increased income from increased bean size if proportion of unripe/semi-ripe cherries reduced to 5%

Does Improved Cherry Ripeness Increase Bean Quality?

2023 Cherry Ripeness Experiment

Three Experimental Sites:

Dilla: <1,600m
Wonago: 1,700 – 1,800m
Gedeb: >1,900m

Created ripeness lots:

100% ripe
90% ripe / 10% unripe
80% ripe / 20% unripe
70% ripe / 30% unripe
60% ripe / 40% unripe

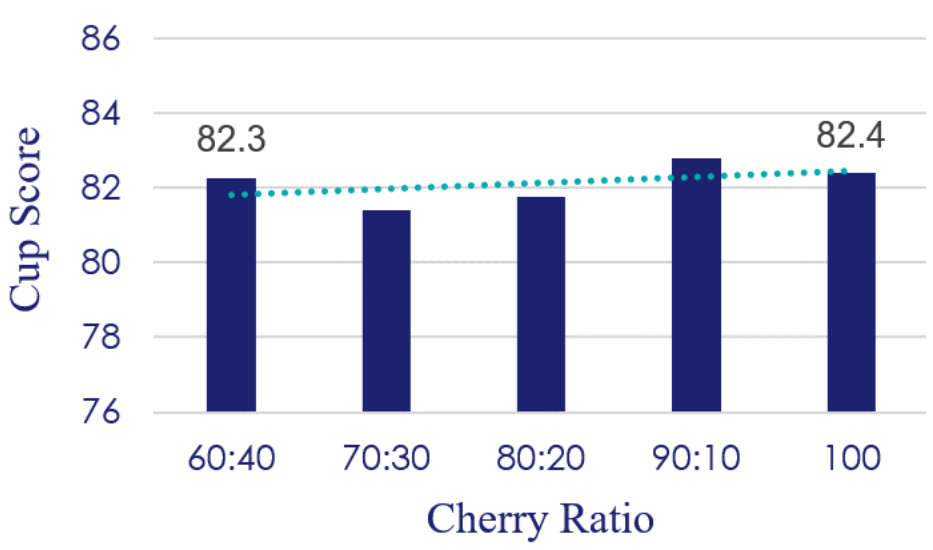
+150 unique lots:

10 batches of cherry
x 5 ripeness lots
@ 3 experimental sites

Improving Cherry Ripeness Increases Bean Quality

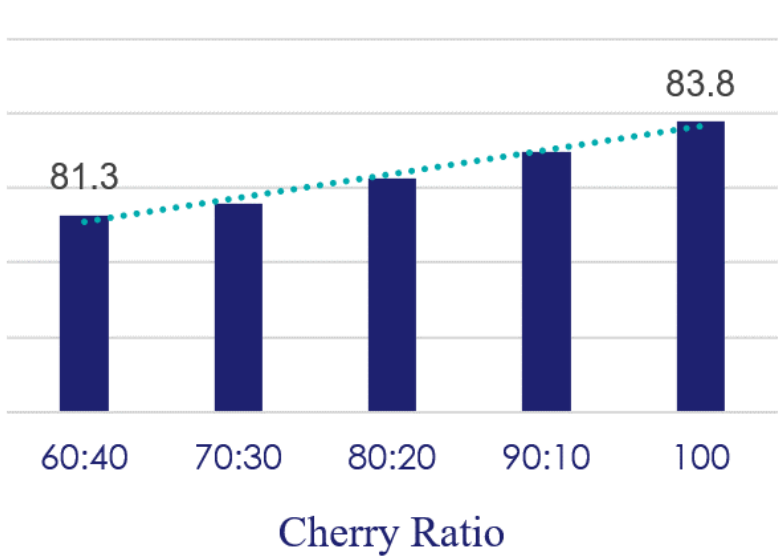
2023 Cherry Ripeness Experiment: Cupping Results

Low Elevation: <1,600m



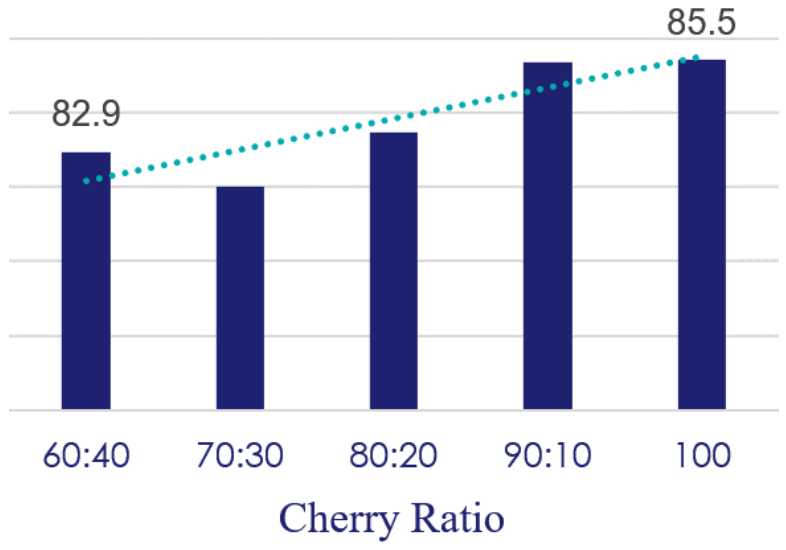
Each 10% increase in cherry ripeness increased cup score by **+0.16-point** equivalent to **$0.05/lb**

Mid Elevation: 1,700-1,800m



Each 10% increase in cherry ripeness increased cup score by **+0.64-point** equivalent to **$0.19/lb**

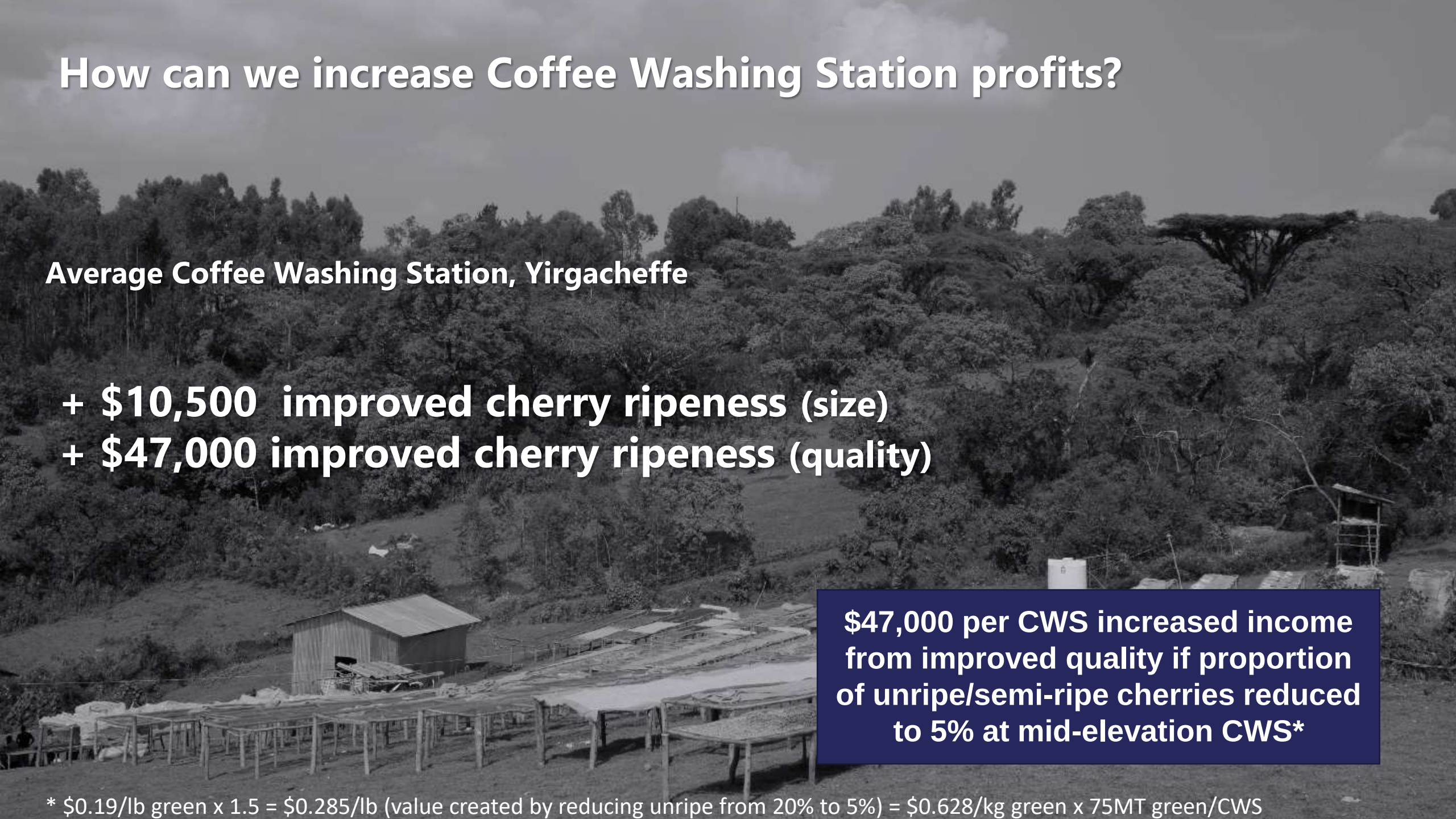
High Elevation: >1,900m



Each 10% increase in cherry ripeness increased cup score by **+0.84-point** equivalent to **$0.25/lb**

Note: Cup score value was established from past three years from the Specialty Coffee Transaction Guide 2025

How can we increase Coffee Washing Station profits?



Average Coffee Washing Station, Yirgacheffe

+ $10,500 improved cherry ripeness (size)
+ $47,000 improved cherry ripeness (quality)

$47,000 per CWS increased income from improved quality if proportion of unripe/semi-ripe cherries reduced to 5% at mid-elevation CWS*

* $0.19/lb green x 1.5 = $0.285/lb (value created by reducing unripe from 20% to 5%) = $0.628/kg green x 75MT green/CWS

Cherry receipt

Pulping

Mucilage removal

Washing

Drying

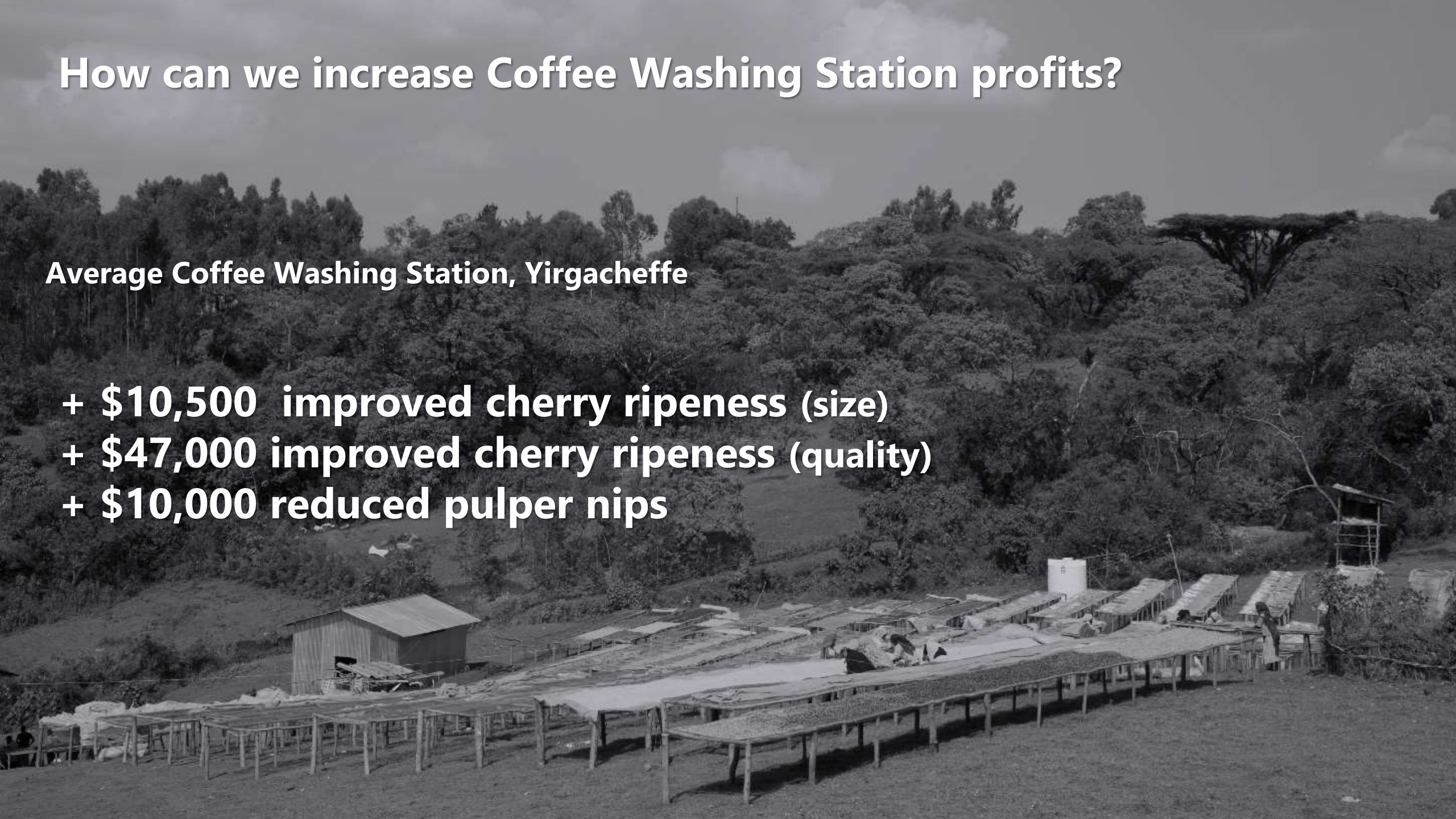
Improved Pulper Calibration Reduces Nipped Beans

Defects from Parchment Samples
60 Coffee Washing Stations, 2022

Broken/Nipped	2.9%
Slight Insect Damage	2.9%
Floater	2.3%
Sever Insect Damage	0.7%
Immature	0.5%
Shell	0.4%
Withered	0.3%
Partial Sour	0.1%
Faded	0.03%

$9,500 per CWS increased income if Broken/Nipped defects reduced to 0.5%

How can we increase Coffee Washing Station profits?



Average Coffee Washing Station, Yirgacheffe

+ $10,500 improved cherry ripeness (size)
+ $47,000 improved cherry ripeness (quality)
+ $10,000 reduced pulper nips

Cherry receipt

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Mucilage removal

Washing

Drying

Fermentation: Dry, Submerged or Agitated?

2022 Fermentation Experiments

Two Experimental Sites:

Dilla: **<1,600m (lowland)**
Gedeb: **>1,900m (highland)**

Three Fermentation Techniques tested:

- **Dry Fermentation**
- **Submerged Fermentation**
- **Agitated Fermentation**

33 Fermentation Samples:
Lowland: 7 trials of 3 fermentation techniques
Highland: 4 trials of 3 fermentation techniques

Fermentation Technique Has No Significant Impact on Quality

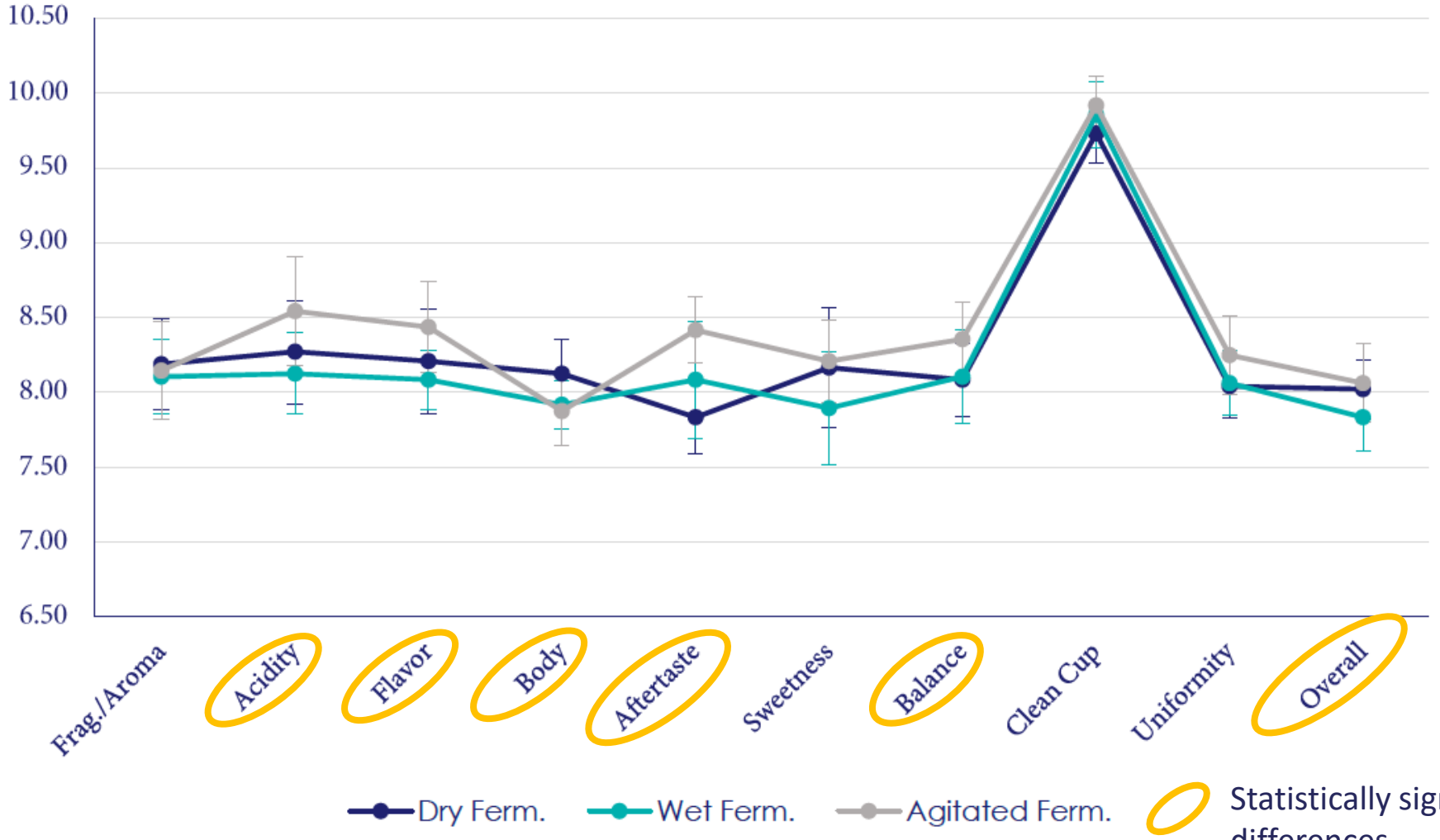
Cup Scores for Three Fermentation Techniques
Lowlands, 2022

There was no difference in overall cup score between the three fermentation techniques

Agitated Fermentation slightly improved Acidity, Balance and Uniformity while Dry Fermentation had slightly higher Body

Fermentation Technique Has No Significant Impact on Quality

Cup Scores for Three Fermentation Techniques
Highlands, 2022



Overall cup score was slightly better for Agitated and Dry Fermentation

Agitated Fermentation slightly improved Acidity, Flavor, Aftertaste and Balance while Dry Fermentation had slightly higher Body

Cherry receipt

Pulping

Mucilage removal

Washing

Drying

What Impact Do Demucilagers Have on Water Use and Coffee Quality?

2008 Demucilager Experiments (SPREAD, Rwanda)

Three pulpers:

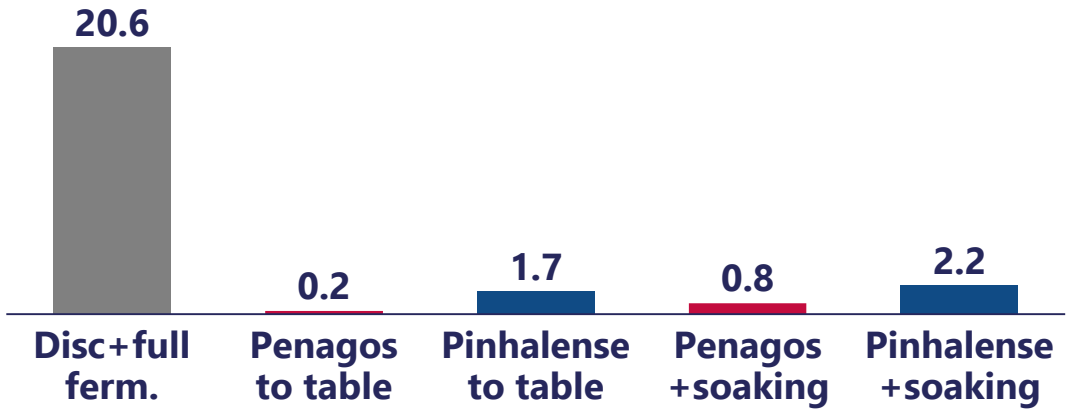
- **Naicof Single Disc Pulper**
- **Penagos UCBE-500M Eco-Pulper**
- **Pinhalense ECO-1SV Eco-Pulper**

Five treatments:

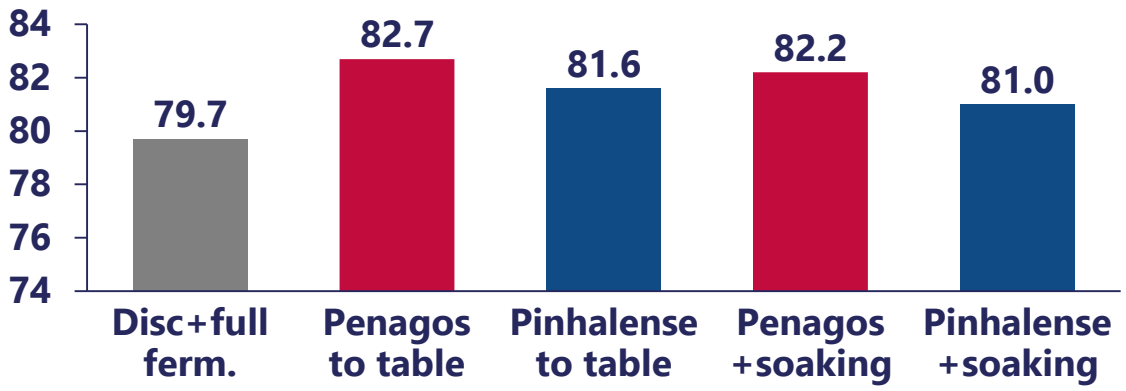
	Pulper	Mucilage Removal	Soaking
1	Disc Pulper	Full Fermentation	Yes
2	Penagos	Mechanical Demucilager	No
3	Pinhalense	Mechanical Demucilager	No
4	Penagos	Mechanical Demucilager	Overnight
5	Pinhalense	Mechanical Demucilager	Overnight

Demucilagers Reduce Water Use and Do Not Reduce Coffee Quality

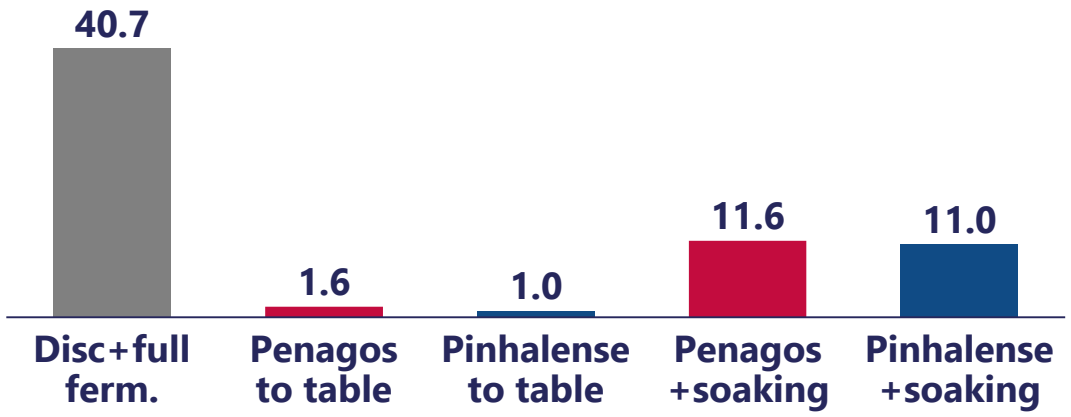
Water Usage (Litres/kg cherry)



Cupping Score (100)

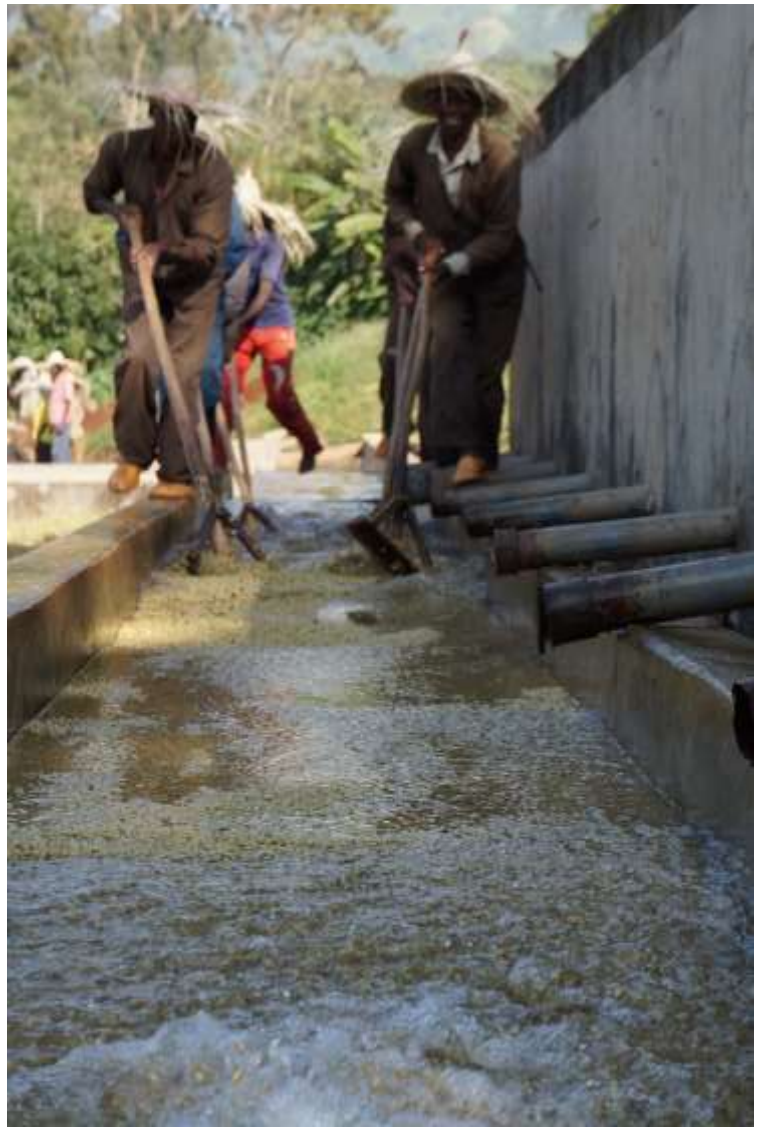


Processing Time (Hours/Metric Ton)



2 Million Litres Water per 100 metric tons cherry saved by switching from disc to mechanical demucilager and soaking

Do Demucilagers Lower Coffee Quality in Kenya?



2010 Demucilager Experiments (TechnoServe, Kenya)

Three pulpers:

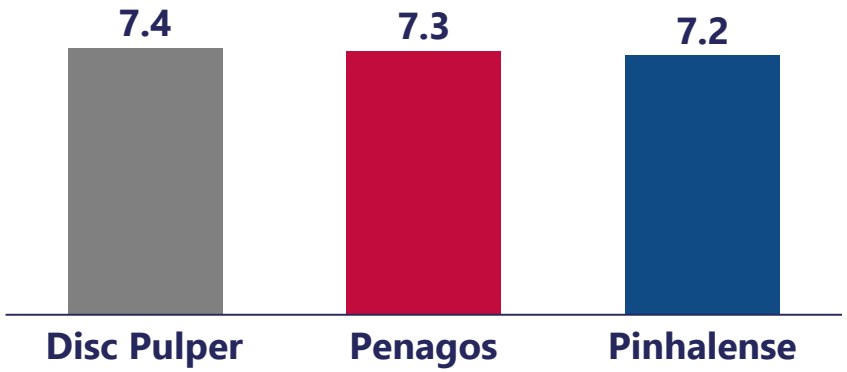
- **McKinnon 4-Disc pulper**
- **Penagos UCBE- 500**
- **Pinhalense Ecolflex 1T**

13 treatments replicated three times during season:

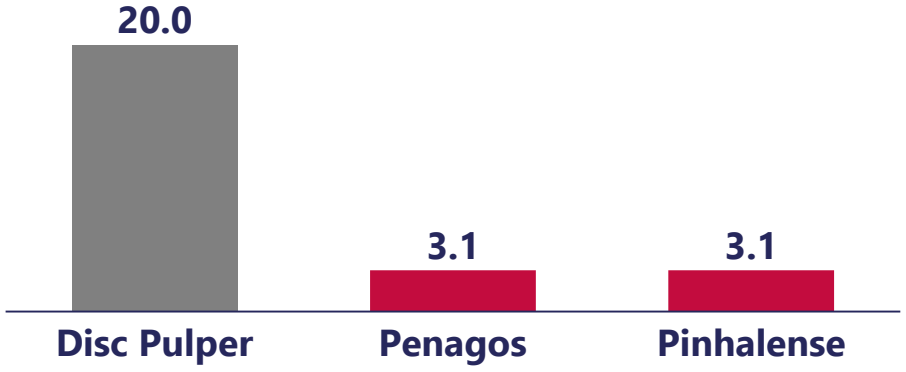
	Pulper	Mucilage Removal	Soaking
1	Disc Pulper	Full Fermentation	Yes
2	Penagos	Mechanical Demucilager	No soaking, 6hr soak, 12hr soak, 18hr soak, 24hr soak & 48hr soak
3	Pinhalense	Mechanical Demucilager	No soaking, 6hr soak, 12hr soak, 18hr soak, 24hr soak & 48hr soak

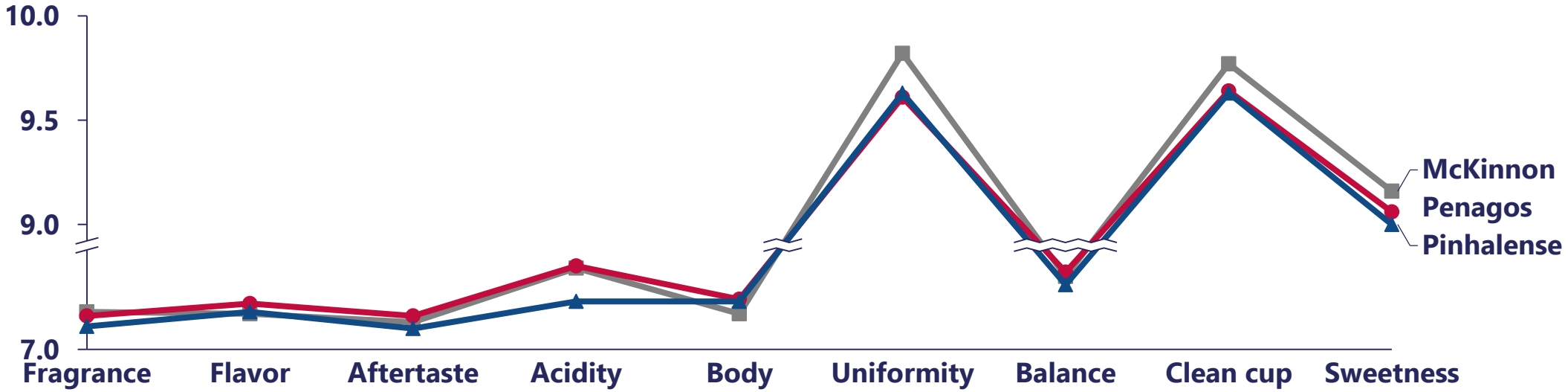
Demucilagers Made No Difference To Coffee Quality

Cupping Score (10)



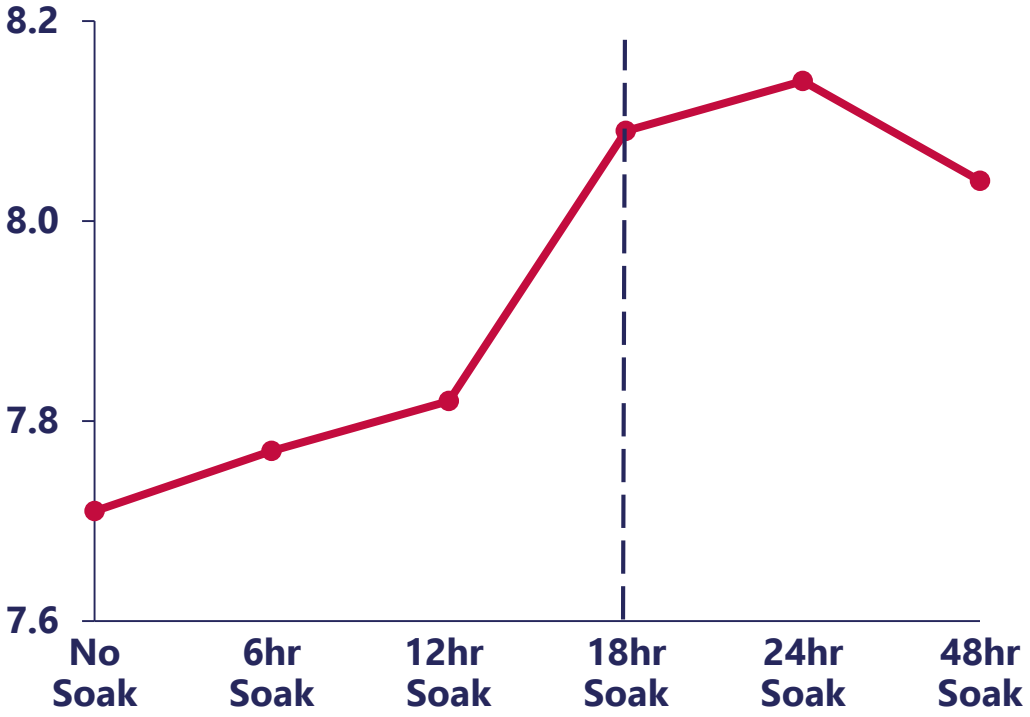
Water Usage (Litres/kg cherry)



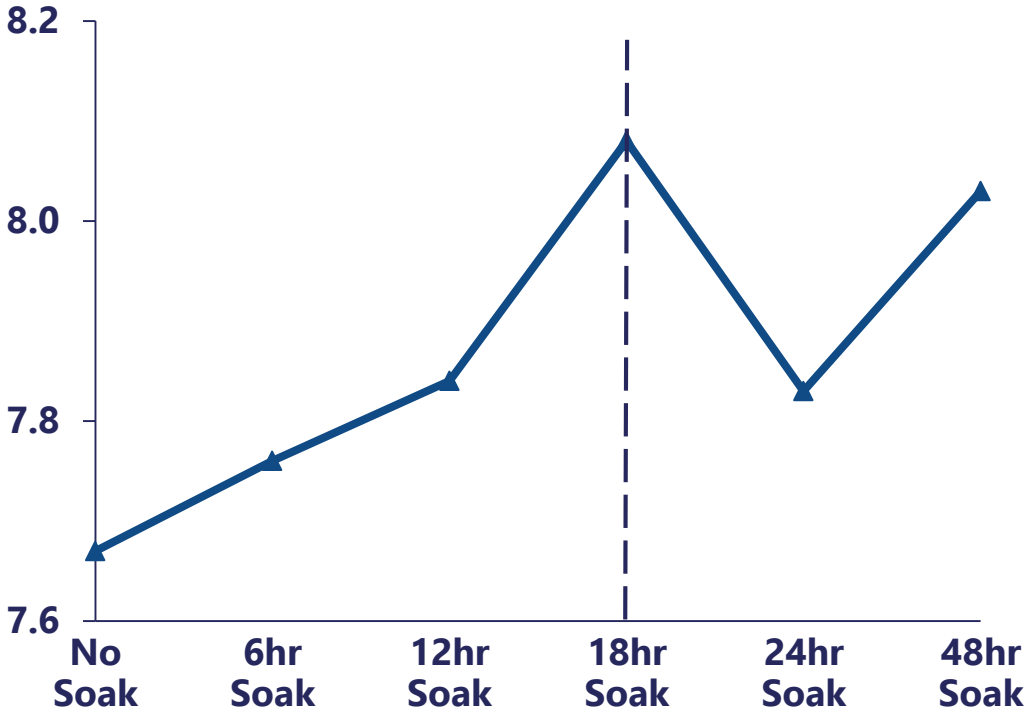


Soaking for 18 hours improved cupping score by 5% for both Penagos and Pinhalense pulpers

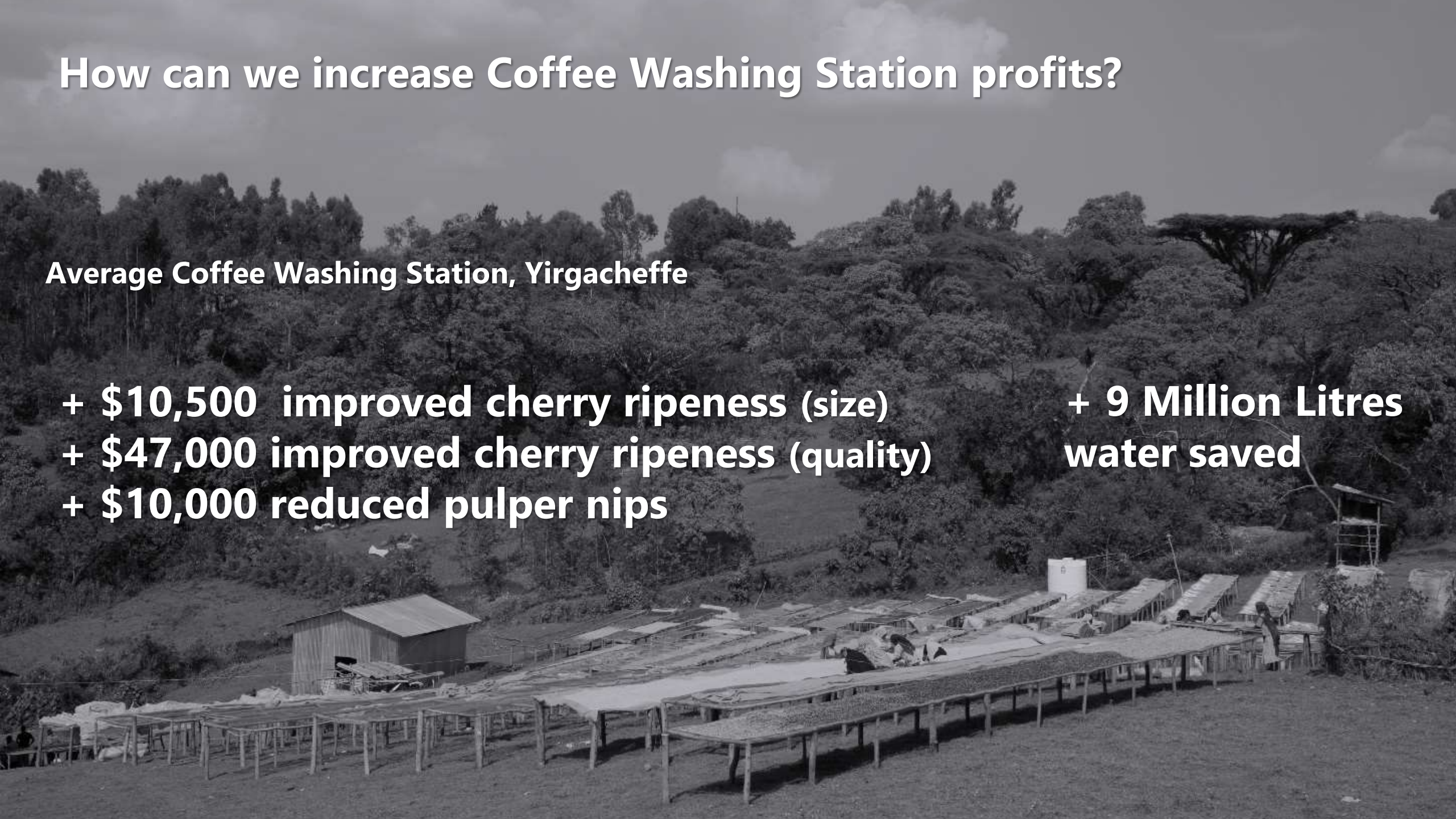
Cupping Score: Penagos
(10)



Cupping Score: Pinhalense
(10)



How can we increase Coffee Washing Station profits?



Average Coffee Washing Station, Yirgacheffe

+ $10,500 improved cherry ripeness (size)
+ $47,000 improved cherry ripeness (quality)
+ $10,000 reduced pulper nips

+ 9 Million Litres water saved

Cherry receipt

Pulping

Mucilage removal

Washing

Drying

Over-Drying Results in Significant Financial Losses

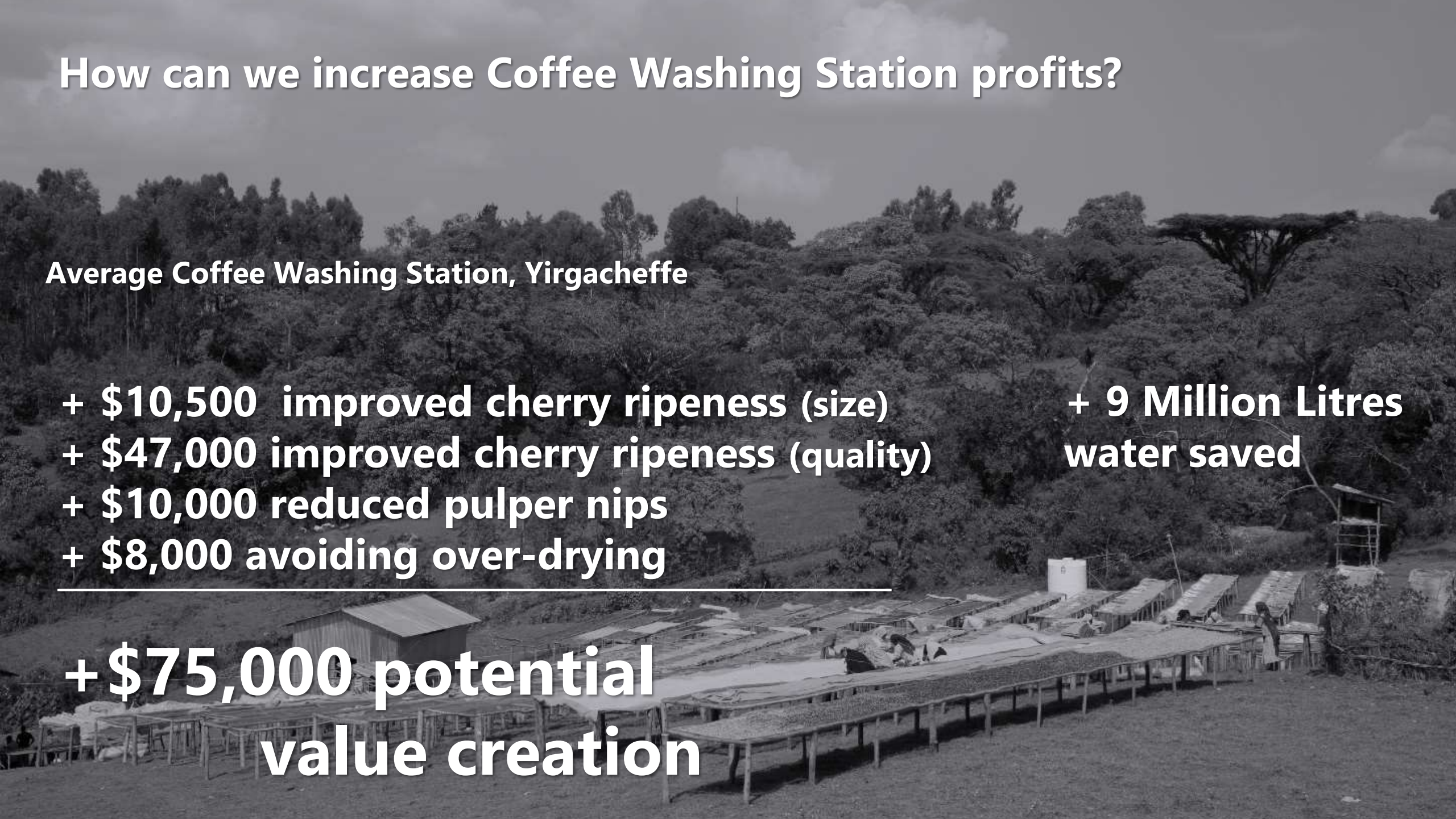
Moisture Content Analysis, 2022

SCA Recommended Moisture Content	Average Moisture Content (60 CWS, 2022)
10-12%	9.6%

Increasing Moisture Content from 9.6% to 11% is equivalent to adding one metric ton green coffee per Coffee Washing Station

$8,000 per CWS saved by avoiding over-drying

How can we increase Coffee Washing Station profits?



Average Coffee Washing Station, Yirgacheffe

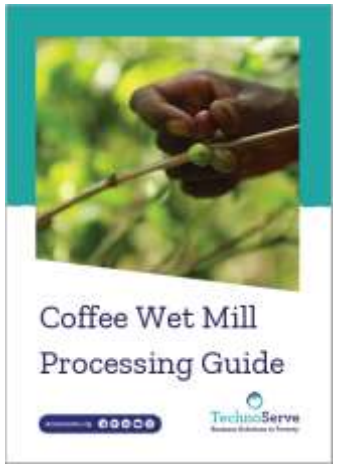
+ $10,500 improved cherry ripeness (size)
+ $47,000 improved cherry ripeness (quality)
+ $10,000 reduced pulper nips
+ $8,000 avoiding over-drying

+ 9 Million Litres water saved

+$75,000 potential value creation

Field Experiment Reports

CWS Processing Manual



CWS Apps (free for download)

GET IT ON Google Play

Cherie – Coffee Cherry Quality

TerraTrac

CPQI

CoopTrac

Download Apps, field experiment reports and TechnoServe's Wet Mill Processing Guide