6. QUALITY CONTROL

6.1 Moisture meter

SYSTEMA COFFEE

QUALITY CONTROL
in production

– is a set of measures aimed at ensuring that products comply with standards and requirements.

Quality control directions:

1. Green bean (moisture meter, density)
2. Roasted coffee (colorimeter, weight loss, refractometer)
3. Profiling/development of reference profiles
4. Stability and compliance with standards
5. Storage of green beans
6. Working with feedback/complaints

PRINCIPLES

of quality control

Keeping a journal

GREEN COFFEE

- Moisture
- Density
- Storage conditions in the warehouse (temperature, humidity)

ROASTED COFFEE

- Weight loss
- Color
- Organoleptic analysis

QUALITY CONTROL

↘ Objective (quantitative)

- colorimeter
- refractometer
- weight loss

↘ Subjective

- organoleptic analysis (cupping, espresso)

MOISTURE METER

The main function is to measure the moisture content of green bean.

- Before buying a coffee lot
- After delivery of the lot to your warehouse
- Before you start profiling
- During the entire period of work with bean during operation

Moisture decreases as coffee is stored.

TYPES OF MOISTURE METERS

ELECTRONIC (DIGITAL)

- The most accurate, fast and convenient devices. Usually small in size and fit easily in the hand. May have additional functions: automatic shutdown, display backlight, etc.

MECHANICAL

- Use physical principles to measure moisture. Less accurate, but may be more affordable. Usually simple in design and do not require special skills to use.

INFRARED

- They work by using infrared radiation that penetrates the coffee beans and allows you to determine their moisture content. Infrared moisture meters can be very accurate, but they can also be expensive.

CONDUCTOMETRIC

- This type of moisture meter measures the electrical conductivity of coffee beans, which depends on their moisture content. Conductometric moisture meters are easy to use and affordable, but they can be less accurate.

HOW DOES MOISTURE LEVEL AFFECTS THE PROFILE?

- At the beginning of the process, water can prevent caramelization, it excludes the beginning of the reaction. Due to the fact that water requires more energy to evaporate than sugar to caramelize.
- As the water evaporates, the caramelization reaction accelerates as the sugar concentration increases and the water concentration decreases.
- The moisture is heated and evaporated - this process allows the crack to begin and the bean to increase in size to gain extractability in the final stages.
- Rate of moisture evaporation: It is believed that coffee loses 70% of its moisture after the first 6 minutes of roasting, and the rate of water evaporation from the beans is also affected by the processing: natural processing loses moisture more slowly than washed processing due to the longer drying time during the production process.

6. QUALITY CONTROL

6.2 Density

SYSTEMA COFFEE

WHEN IT'S REQUIRED:

- when profiling
- when picking green beans

MEASURING INSTRUMENTS

There are several types of density meters, each suited for specific needs:

BASIC VOLUMETRIC

density meters

Measure the density of beans based on the volume and mass. Suitable for standard varieties and are often used for preliminary density assessment, as a rule, their accuracy is sufficient.

LASER DENSITOMETERS

More modern devices that work on the basis of laser measurements and can measure the density of each individual bean, allowing more detailed and accurate data. More a laboratory device than for everyday use.

6. QUALITY CONTROL

6.3 Reference profile

SYSTEMA COFFEE

REFERENCE PROFILE

— is a kind of roasting "script" for each specific variety or blend. It records all the key parameters of the process: initial temperature, rate of rise - ROR, time and temperature at each stage, turning point, time of the yellow stage start, including the point of the first crack, percentage of development and drop temperature.

SYSTEMA COFFEE

FUNCTIONS

↘ **Fixing and passing checkpoints/targets:**

- charge temperature
- turning point
- change from green to pale green
- start of caramelization
- time and temperature of the first crack
- time and percentage of development
- drop temperature

↘ **Goal - setting the range of the roasting profile parameter, if the target is not reached, a notification is sent after roasting that the target has not been reached**

6. QUALITY CONTROL

6.4 Weight loss

SYSTEMA COFFEE

WEIGHT LOSS

— is a process by which part of the mass of coffee beans is reduced due to the loss of moisture and other volatile substances during heat treatment.

HOW TO CALCULATE WEIGHT LOSS?

$$\frac{\text{product yield}}{\text{weight of roasted beans}} * 100 = \%\ \text{of weight loss}$$

SYSTEMA COFFEE

MEDIUM OF WEIGHT LOSS %

Espresso

15%	Light roasting
17%	Medium roasting
20%	Dark roasting

MEDIUM OF WEIGHT LOSS %

Filter coffee

12% Bright

14% Balance

15% Developed

6. QUALITY CONTROL

6.5 Colorimeter

SYSTEMA COFFEE

COLORIMETER

- is a device that measures the color of beans and gives accurate shade indicators.

Color is directly related to the roast level, and therefore to the intensity and balance of flavor. Darker shades indicate more roasted notes and a dense body, while lighter shades retain acidity and fruitiness. A colorimeter helps to determine whether the beans have reached the right roasting level and compares the result to a reference color, which is important for maintaining flavor consistency.

SYSTEMA COFFEE

COLORIMETERS DIFFER

by operating principle and measurement accuracy

SIMPLE PHOTOMETRIC COLORIMETERS

- These devices measure the absorption and reflection of light by beans. They are suitable for basic colour assessment, but their accuracy can vary.

DIGITAL SPECTROPHOTOMETRIC COLORIMETERS

- These devices determine precise shade indicators and allow color analysis in different spectra. They are used in large-scale productions where high accuracy and stability are required.

TERMS OF USE

- **Always take measurements at the same grinding**
  Closer to espresso
- **After a specified amount of time**
  Minimum 60 minutes
- **Take several measurements**
  Of the same sample for objective evaluation

LIGHTELLS

Espresso color

60-65	Italian espresso
70-85	Balance
90+	Bright/acidic espresso

LIGHTELLS

Filter color

85	Advanced filter
90-95	Balance
95-105	Bright/Acid Filter

ONCE WE HAVE A REFERENCE COLOR RECORDED BY A COLORIMETER, WE CAN USE IT AS A CONSTANT REFERENCE.

The colorimeter allows achieving stability from batch to batch. And this is the most important evaluation criterion, which shares the lead with the drop temperature. There is an acceptable color accuracy corridor, taking into account the error of the device and the heterogeneity of the bean - usually the color tolerance is 2-4 units on the scale.

SYSTEMA COFFEE

6. QUALITY CONTROL

6.6 Refractometer

SYSTEMA COFFEE

REFRACTOMETER

— is a device that measures the refractive index of light in a liquid, in this case coffee extract.

The refractive index depends on the number of dissolved particles, i.e. the concentration of the extract. The more particles in the drink, the higher the index, and based on this device, you can understand how effectively the extraction from the beans was carried out, and predict how rich the coffee will be.

SYSTEMA COFFEE

REFRACTOMETERS ARE DIVIDED INTO

two main types:

OPTICAL REFRACTOMETERS

- Easy to use, require manual adjustment and work on the principle of light reflection from the surface of the liquid. Such devices are suitable for basic analysis, but they are less accurate and sensitive. For our work - too simple.

DIGITAL REFRACTOMETERS

- These devices provide accurate readings with minimal error, determining the refractive index with an accuracy of hundredths. Digital models are widely used in professional roasting shops, where accuracy is especially important.

TDS

Total Dissolved Solids

— is an indicator that reflects the total amount of dissolved solids in coffee. It is measured in percentages and allows you to evaluate the richness of the taste and aroma of coffee.

Filter: 1.3-1.45% Espresso: 9.5%-11%

SYSTEMA COFFEE

WHEN TO USE

WHEN SETTING UP

espresso

Before tasting the espresso, it will show that the extraction is at the right level.

WHEN CUPPING

several bean samples

will show which coffee is less or more developed.

6. QUALITY CONTROL

6.7 Cupping

SYSTEMA COFFEE

CUPPING

— is a standard coffee tasting technique that analyzes the aroma, flavor, acidity, body, aftertaste, and overall harmony of the drink.

Doing cupping helps many people: roasters, green bean buyers, baristas, for coffee producers it is also undoubtedly very important.

SYSTEMA COFFEE

FACTORS

- **Degassing**
  Objective cupping after at least 12-24 hours
- **Recipe**
- **Coffee Extractivity**
  Espresso/filter
- **Blind cupping**
- **Triangulation**

MAIN STAGES OF PREPARATION:

FRESHNESS OF COFFEE

I recommend developing a tasting schedule, trying coffee after a certain time after roasting (24 or 48 hours). By trying coffee after different times, you will understand how the taste of coffee develops after roasting, and how your customer will get it.

TEMPERATURE AND MINERALIZATION OF WATER

The water in the lab should be standard, as close as possible to the water your customers use, it is not advisable to have reverse osmosis if all your customers use softeners. This will not prevent you from roasting perfectly to your parameters, but it can make it difficult to get feedback.

WATER TO COFFEE RATIO

The standard ratio for quality control is 8.25 g per 150 ml of water.

CLEANNESS OF KITCHENWARE AND ACCESSORIES

Special cups, spoons and analysis equipment are required, and they must be clean to prevent foreign odors or tastes from distorting the results.

To ensure that cupping is carried out as objectively as possible and in accordance with the standards of the SCA - Specialty Coffee Association, adhere to the follow to the scheme:

FILLING WITH WATER

- Immediately after grinding, pour hot water over the ground coffee and let it steep for about 4 minutes.

BREAKING THE "CRUST"

- After 4 minutes, break the crust that has formed on the surface and evaluate the aroma. This stage helps to catch the primary notes - fruity, floral, nutty and others.

CLEANING

- After breaking the crust, remove the foam and after 8-12 minutes, start testing. A spoon will help you with this. Tasting is done with a sharp draw - slurping - so that the coffee is evenly distributed across the palate, allowing you to feel all the flavor notes.

EVALUATION AND RECORDING OF RESULTS

- Pay attention to acidity, sweetness, bitterness, body and aftertaste. It is recommended to use special sheets or programs to record the indicators in order to compare them with the standard.

6. QUALITY CONTROL

6.8 Espresso

SYSTEMA COFFEE

BREW RATIO

— is the ratio of the weight of ground coffee to the volume of water used to prepare the drink. This indicator helps to determine how strong the coffee will be and affects its taste.

1.8 Syrup-like

2.0 Balance

2.2 Descriptive

SYSTEMA COFFEE

When evaluating coffee for espresso, it is important to consider several key parameters:

ACIDITY

- Immediately after grinding, pour hot water over the ground coffee and let it steep for about 4 minutes.

BODY AND TEXTURE

- After 4 minutes, break the crust that has formed on the surface and evaluate the aroma. This stage helps to catch the primary notes - fruity, floral, nutty and others.

AFTERTASTE

- After breaking the crust, remove the foam and after 8-12 minutes, start testing. A spoon will help you with this. Tasting is done with a sharp draw - slurping - so that the coffee is evenly distributed across the palate, allowing you to feel all the flavor notes.

SWEETNESS AND BALANCE

- Pay attention to acidity, sweetness, bitterness, body and aftertaste. It is recommended to use special sheets or programs to record the indicators in order to compare them with the standard.

TDS

espresso

12 %	Syrup-like ("brick")
14 %	Balance
15 %	Varietal

SYSTEMA COFFEE

EQUIPMENT

for quality control

1. **Colorimeter**
2. **Refractometer**
3. **Single-origin coffee grinder**
4. **Cup 150-220 ml**
5. **Cupping spoons**
6. **Espresso machine**
7. **Espresso grinder**
8. **Hygrometer**
9. **Density meter**
10. **Micro precision scales**