

# Ch 17. Sensory evaluation of unroasted cacao beans as coarse powder

## 17.1 Objective

This protocol\* outlines the procedure for preparing and conducting sensory evaluation of unroasted cacao beans ground into a coarse powder. The primary objective is to perform an initial quality screening of fermented and dried but unroasted cacao bean samples, complementing the physical evaluation and aroma profile obtained from whole and cut beans. This evaluation helps identify defects, off-flavours, and other characteristics relevant to decision-making processes. Additionally, it provides an indicative flavour profile and overall quality assessment that can be expected once the beans are roasted and processed into cacao mass or chocolate.

The process can be conducted either in the field or a laboratory setting, with or without access to electricity, and by an individual assessor or a panel of assessors. This method serves as a complement to the sensory evaluation of cacao beans as mass or chocolate. It offers a quick and cost-effective tool for monitoring the quality and flavour potential of a small, uniform cacao bean sample at an early stage of the value chain, following harvest and post-harvest processes. It is important to note that the results obtained will be indicative and should be interpreted with caution, considering the representativeness of the tested sample (as explained in Chapter 5, 'Sampling bagged and bulk cacao beans'). It is also essential to recognise that flavour precursors develop during the roasting process, and the particle size of the powder can impact the release of flavour compounds.

*\*The content of this protocol was developed by the Fine Cacao and Chocolate Institute (FCCI) and reviewed by the members of the ISCQF Working Group.*

## 17.2 Key specifications

**Table 35.** Key specifications for the sensory evaluation of unroasted cacao beans as coarse powder.

	<b>Parameter</b>	<b>Specification</b>
	Sample size from a 2kg representative sample	500g
	Test sample size for a small uniform cacao bean lot	30–50 cacao beans
	Particle size of coarse powder	0.5mm
	Quantity of coarse powder for sensory evaluation	Half a teaspoon (2.5ml)
	Palate cleanser between sensory evaluation of a sample	Water at room temperature
	Flavour attributes to be evaluated	Glossary of terms
	Scale for intensity of flavour attributes and global quality	0–10

## 17.3 Equipment, tools and materials

The recommended tools and equipment for preparing and conducting a sensory evaluation of fermented, dried and unroasted cacao beans as coarse powder, are as follows:

- A popcorn popper (see Annexes, Figure 68) can be used if electricity is available. In cases where electricity is not available, a nutcracker (see Annexes, Figure 85) or a knife can be used.
- A grinder able to grind cacao beans to a particle size of 0.5mm without heating, such as an electric blade mill grinder with stainless steel blades (Annexes, Figure 86) or a manual burr mill grinder (Annexes, Figure 87).

- A container of 180–240ml (3/4 to 1 cup) sealed with a lid, food-safe and odourless in order to hold the sample during the sensory evaluation (Annexes, Figure 88). If the sample is not immediately assessed, keep the container sealed to preserve volatiles until an evaluation is performed.
- Spit and rinse cups.
- Water at ambient temperature (neither cold nor cooled) to rinse the palate between samples.
- A teaspoon with a standard capacity of 2.5ml.
- An evaluation form and a pen with unscented ink.
- A pair of tweezers.

## 17.4 Procedure

### 17.4.1 Sample preparation

This protocol involves handling unroasted cacao beans. Unroasted beans are a raw agricultural product that may contain pathogens, posing a food safety hazard if consumed. The coarse powder should not be tasted by individuals who are young, old, pregnant, or have weakened immune systems.

It is important to maintain good hand hygiene by washing hands frequently, especially before and after sample preparation and before and after sensory evaluation. If sample preparation is interrupted, hands should be washed again before resuming the process or handling the beans. Additionally, all tools and working surfaces should be cleaned and disinfected prior to processing. For further food safety recommendations, please refer to Chapter 3.

The following steps are recommended for sample preparation:

1. If the evaluation is conducted blind, a person other than the assessor should select the sample and assign a randomised three-digit blind code to the cacao bean sample. The processing can then be carried out by the assessor.
2. Either sample 500g from a 2kg representative sample or select 30–50 cacao beans randomly from a sample that has undergone physical quality and moisture content evaluation, as outlined in Chapter 7 'Determination of moisture content,' Chapter 8 'Physical evaluation of whole cacao beans,' and Chapter 9 'Physical evaluation of cut cacao beans'.



**NOTE:** 30–50 beans may be sufficient for the evaluation for a uniform and small lot. However, in order to obtain a statistically representative sample, 500g of beans should be obtained from quartering from the representative sample of 2kg, then ground and mixed for sensory evaluation (see Chapter 5 'Sampling bagged and bulk cacao beans').

3. Loosen the shells of the beans:
  - If electricity is available loosen the shells by puffing the beans in a popcorn popper (Annexes Figure 68) for a maximum of 60 seconds. Agitate the popper during this period to continuously minimise the heat exposure of the beans.
  - If electricity is not available, use a nutcracker (Annexes, Figure 85) to slightly crush the beans with and loosen the shells for an easier peeling. A knife can also be used to loosen the shells.
4. Peel the cacao beans with your fingers to obtain the nibs (shelled cacao beans). Collect them in a clean bowl and the shells in another bowl. Follow the protocol for winnowing manually for a quantity of 500g, Chapter 12 'Breaking and winnowing cacao beans'.
5. If shell fragments remain on some of the nibs, use the tweezers to remove (pick) them all.

6. Pour the shelled nibs into the grinder.
7. Grind the nibs into coarse powder with a particle size of around 0.5mm (this size can be inspected visually):
  - If using an electric grinder, process for 10 seconds while vigorously shaking the mill up and down to prevent clumping and to ensure that areas inside grinder that rise in temperature do not overheat the sample.
  - If using the burr grinder, turn the handle continuously until the particles are of a uniform size, approximately 0.5mm.
8. Label the odour-free container with the identification code for the sample. If the samples are to be blind assessed, use a randomised three-digit code (see Chapter 16 'General guidelines for sensory evaluation').
9. Pour the coarse powder into the odour-free container and close the lid until the sensory evaluation begins.



**NOTE:** Once ground into coarse powder, the sample should be in a sealed container and evaluated immediately. If stored for a successive evaluation, the sample should be kept in a tightly sealed container and the time lapse between sample preparation and sensory evaluation should not exceed three hours. The ground beans should not be stored in a fridge or freezer during this time as condensation may occur and freezing may alter the flavour profile. If samples need to be stored over a longer period, store whole beans and prepare the coarse powder shortly before the sensory evaluation.

### 17.4.2 Sensory evaluation

The following steps are recommended for the sensory evaluation of unroasted cacao beans ground in coarse powder:

1. Gently stir or tumble the coarse powder sample while placing the nose over the open container.
2. Assess the aroma of the sample and record any observations in the comments section of the evaluation form (access the form in Section 20.3).
3. Place a half teaspoonful (2.5ml) of the sample on the tongue and hold it in the mouth for the necessary duration needed to score the attributes, moving it across the palate. Do not chew.
4. Inhale tiny amounts of air through the mouth, as if sipping, and exhale through the nose to allow the aroma and flavour to become fully apparent.
5. In the mouth, notice the different attributes that become apparent at three contiguous time intervals: (1) the initial, (2) middle and (3) residual end flavour notes. Some flavours appear or disappear very quickly or are easily masked, while others can linger with a distinct aftertaste. The order or appearance of these notes varies from sample to sample.
6. While the different attributes are becoming apparent, evaluate the flavour of the coarse powder using the attributes and the intensity scale between 0 to 10 (refer to Table 38 in Chapter 20). The appearance and perception of flavour attributes may not necessarily align with the order listed on the form. Any attribute can become noticeable at the beginning or middle stages and then fade away. Evaluate the intensity of the attributes in the order they appear and are perceived, using a scale of 0–10, while keeping in mind the scale's defined meaning in the Glossary of Terms.



**NOTE:** The flavour attributes are divided into three groups:

**Core attributes:** Cacao, acidity, bitterness and astringency that are expected to be present in every cacao sample and scored.

**Complementary attributes:** Characteristics that may or may not be perceived in a cacao sample.

**Off-flavours:** Resulting from defects that may or may not be perceived in a cacao sample.

7. Once the sample is characterised, score the global quality between 0 and 10. The meaning of the scale is explained in Section 20.2, Table 39.
8. Spit out the coarse powder and saliva bolus into a spitting cup for this purpose.
9. Pay attention to the flavours that may be present in the finish and aftertaste and modify or review your scoring accordingly.
10. In the comments section, include any additional observations about the sample that have not been mentioned elsewhere. This includes any specific recommendations for the cacao producer, especially if there are notable observations related to the fermentation and drying process.
11. Thoroughly rinse the palate with water at ambient temperature (avoid cold or cooled water) and spit the rinse water into a cup for this purpose. Repeat as necessary, particularly in cases of significant off-flavours.
12. Note any general comments about the sample.
13. Take a break if you experience palate overload or carry-over effect.
14. Proceed with the next sample.

