Zando

This tutorial looks at espresso in detail.

You will learn:
What an espresso is.

The meaning of extraction and strength in terms of espresso.

The meaning of an Espresso recipe and the components of that recipe.

What is a Brew Ratio.

How to dial in an Espresso Recipe.

ESPRESSO FUNDAMENTALS

WHAT IS ESPRESSO?

Simply put Espresso is a way of brewing coffee. There are many different ways to brew coffee such as AeroPress, French Press and Pour Over; this particular brew method produces a complex, concentrated drink, also known as Espresso.

Espresso is brewed by forcing a small amount of pressurised hot water through finely-ground coffee, using an Espresso Machine. It is made up of:

- Soluble Solids including complex sugars, acids and caffeine that contribute to the taste.
- Soluble Gases including Co2 that form the aroma of the coffee.
- Insoluble Solids, which are fragments of the coffee cell wall and coffee oils that contribute to a silky mouthfeel.

Espresso has two layers; the top layer is known as the ‘Crema’ and is formed by Co2 gas surrounded by water; the bottom layer is liquid and contains the unique flavour characteristics of the coffee.

ESPRESSO RECIPE

As a barista you need to learn how to take freshly ground coffee and extract the positive flavour attributes and aromatics, at the right strength and concentration, for the espresso to be sweet, smooth and balanced, with a lingering and pleasant aftertaste.

Most coffee roasters nowadays provide guidelines on how to achieve the best from their beans. These guidelines are presented in the form of an 'Espresso Recipe' that tell you how much coffee to use, the amount of liquid you need to extract and the time it takes to extract the shot. An example of an espresso recipe is 20g in, 40g out, 32seconds. Each roaster will have a different espresso recipe, depending on the roast profile and origin used to form the blend. The important thing to note here is that espresso recipes are set out in terms of a double shot of espresso and not the single shot.

Think of an espresso recipe like any other recipe, for example, when baking a cake it is important to use the same amount of ingredients each time if you want the cake to always taste the same. If you change the recipe by adding a little extra sugar or less butter, the taste and texture of the cake will change; it's the same with coffee. If you follow the espresso recipe, your coffee will taste the same, however, if you change the amount of coffee or water or adjust the time it takes to extract the shot, the coffee will taste completely different. Following an espresso recipe, that is repeatable, is the only way to make consistent coffee and keep your customers coming back for more.

If you want to become a better barista and make delicious coffee for your customers, it is important to know how to dial in an Espresso Recipe and find the sweet spot for the coffee being used. There are three components to an Espresso Recipe, all of which have to be measure and controlled:

DOSE: the amount of dry coffee used to brew the coffee.
YIELD: the amount of liquid in the cup as a double espresso.
TIME: the time it takes to extract the coffee.

As well as being a drink in its own right, an espresso is also the foundation and building block of every coffee drink on the café menu and it's important to get it right. Any coffee machine operator can load ground coffee into a portafilter, tamp and extract a shot, however not everyone can produce an espresso that is delicious, sweet and balanced. This requires an understanding of the variable that effect espresso quality, dedication, attention to detail and consistency.

EXTRACTION YIELD

Before we look at the components of the Espresso Recipe and how they effect the coffee, it is important to understand what is meant by the term 'Extraction'. This is where things start to get a little technical, but it's important to understand the following concepts if you want to make great espresso.

When brewing espresso not all of the coffee will dissolve and end up in the cup. The espresso 'Extraction Yield' refers to the amount of dry coffee that dissolves and is communicated as a percentage. For example, if you start with 20g of coffee and 4g is extracted, the extraction yield is 20%. The maximum extraction yield possible is 28%, however most espresso extraction yields range between 18-22%.

To calculate the extraction yield you will need other data, such as the TDS, a fancy term for strength which stands for 'Total Dissolved Solids', discussed later in the tutorial.

The extraction yield depends on several factors but the rule of thumb is: **The greater the contact time between the water and coffee, the higher the extraction yield.**

In terms of the Espresso Recipe, the following applies:

Higher Extraction	**Lower Extraction**
Higher Dose	Lower Dose
More Water	Less Water
Finer Grind	Coarser Grind

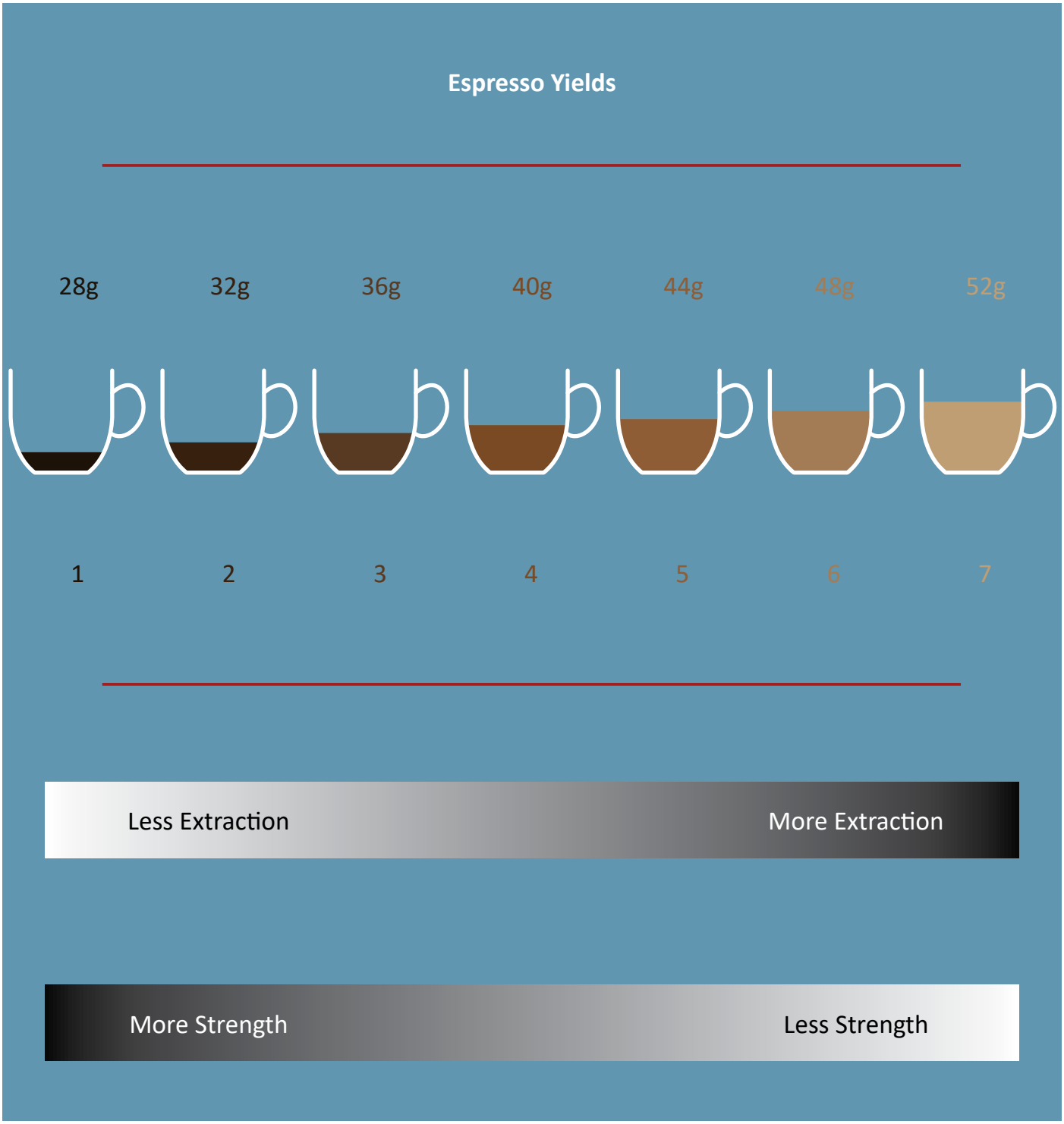
Extraction yield is calculated by using this formula:
Brewed Coffee (g) x TDS (%) /Dose (g)

Example:
Brewed Coffee = 36g
TDS = 10%
Dose = 18g
Extraction Yield = 36 * 10% /18g = 20%

If your extraction yield is less than 18% the coffee is 'under-extracted', which simply means you haven't taken everything the dry coffee has to give. This type of extraction is generally acidic or sour, with a quick finish.

Percentages over 22% are considered 'over-extracted' which means too much dry coffee has ended up in the cup. Over-extracted coffee tastes bitter, harsh and sometimes astringent or dry.

This is quite advanced but worth getting your head around as it will make you a far better barista. Once you have an understanding of extraction you can use this knowledge to manipulate the espresso recipe and balance out the coffees acidity, sweetness, bitterness and body. Don't worry too much about the number themselves; eventually with practice, determination and attention to detail, your taste buds will help you dial in an espresso recipe and find the coffees sweet spot.



STRENGTH

Just a note here about strength. Strength and extraction are not the same and it's important to understand the difference. Again just a little technical here; TDS or Total Dissolved Solids represent the strength of your espresso and is measured using a tool called a Refractometer. TDS is communicated in percentages and ranges from 1-12%, the higher the percentage the stronger the coffee, the lower the concentration of TDS, the weaker the cup.

High strength does not necessarily mean high extraction, in fact, more often than not it's the total opposite. Think about it this way, the more water used to brew coffee, the more you will extract and the higher the extraction yield will be, however at the same time the extra water dilutes the espresso, making it weaker.

Not every Barista has access to a refractometer, nor do they need one; so how can you evaluate strength without one? Associate strength with mouthfeel. A strong espresso will have a heavy, thick mouthfeel, whilst weaker espresso will be more tea-like, with a thin, watery body.

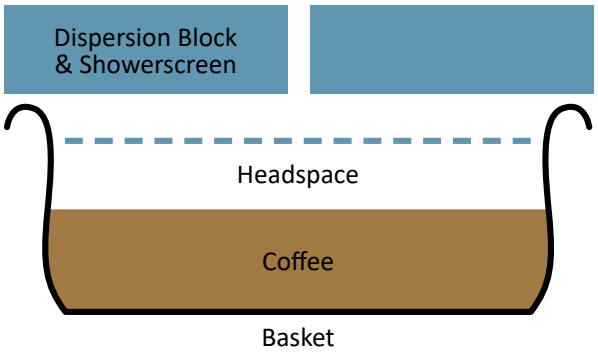
COMPONENTS OF AN ESPRESSO

Dose

The dose is the starting point for every espresso recipe and refers to the amount of dry coffee used to produce an espresso. Most cafes dose between 18-22g of coffee for a double shot.

Think of the dose as the amount of ingredients being used in a cake recipe. The more ingredients you use, the more cake you will get. The more dry coffee you use the more espresso you will get and the less dry coffee you use, the less espresso you will get.

Changing the dose doesn't make the coffee taste stronger or weaker, nor does it alter the taste of the espresso, it simply gives you more or less of the same. For this reason, once you have dialled in your dose and are happy with the amount of extraction you are getting, lock it in and keep it consistent. To make the espresso stronger or weaker or to change the taste of the espresso, adjust the other brewing parameters, i.e. yield and or time.



Dose & Basket Size:

Basket sizes are rated by the manufacturer and it's recommended to use a basket that enables you to dose 1g either side of its rating.

If your basket is too small for the recipe the coffee will sit too high and touch the shower screen. Coffee expands when hot water is added, so there needs to be enough room or headspace between the coffee and the shower screen to allow for this expansion. If the dose is too high, the coffee will press against the shower screen during extraction and the water will not be evenly distributed across the surface of the coffee, resulting in channelling and an uneven extraction, making the coffee taste bitter. It will also cause the group heads to become dirtier.

A larger headspace will result in a wet puck, as less water will be absorbed by the coffee. This doesn't mean the coffee has been unevenly extracted and doesn't pose a problem other than being messier and harder to clean. If the puck is extremely wet your dose is probably towards the lower end of the basket rating and selecting a smaller basket will resolve this issue.

Dose & Manual Grinders

Manual grinders have a dosing chamber to hold ground coffee and are designed to deliver a set amount of coffee when the dosing lever is pulled. They are fairly consistent when the dosing chamber is full, however this tends to fluctuate and become inconsistent as the amount of ground coffee in the chamber is reduced. These grinders are best suited for high volume cafes where the ground coffee is used quickly.

If you have a manual grinder, a better approach is to grind the coffee on-demand or as you need it as this will maximise the freshness of the coffee. This technique, like all aspects of coffee preparation, requires practice to become consistent. You will need a set of digital scales and a dosing tool if you have one.

Setting the Dose on Manual Grinders :

1. Remove the portafilter from the espresso machine.
2. Purge the group head.
3. Dry the portafilter.
4. Tare off the portafilter on the scales.
5. Grind a small amount of coffee into the dosing chamber.
   TIP = count the number of seconds it takes to grind your coffee.
6. Dose the coffee into the portafilter forming a slight mound.
7. Tap the portafilter on the receptor fork of the grinder twice, to settle the grinds, using the same pressure each time.
8. Using your finger or dosing tool, sweep across the top of the basket removing excess coffee.
   This is the part that requires practise to become consistent.
9. Weigh the dose.
10. Adjust manually until the target dose is achieved.
11. Tap the side of the portafilter with your hand to distribute the coffee evenly.
12. Tamp evenly.
13. Brew the espresso.
14. Adjust the grind if required, remembering to purge the grinder of old grinds.

Dose & Electronic Grinders:

Electronic grinders grind on time and are convenient, fast and enable you to grind fresh coffee to a preset dose.

Setting the Dose on Electronic Grinders :

1. Remove the portafilter from the espresso machine.
2. Purge the group head.
3. Dry the portafilter.
4. Tare off the portafilter on the scales.
5. Grind coffee into the portafilter.
6. Weight the dose.
7. If the dose needs to be adjusted using this equation to determine what new settings are required:
   Current Grinding Time/Current Dose) x Target Dose = NEW grind time
8. Enter programming mode and program new grind time.
9. Reload the portafilter with the new dose setting and weigh dose.
10. Repeat until the correct dose is achieved.

Electronic grinders grind on time and it is important to remember that changes made to the grind size will change the dose. A finer grind will reduce the dose and a coarser grind will increase the amount of coffee ground hence, increasing the dose. If you make changes to the grind always check to see if your target dose is being maintained.

If the grind is adjusted, the new grind setting will not appear straight away. Up to 60g of coffee is retained between the grinder burrs and the chute, so always purge the old grinds before settling on your new dose.

YIELD

This is the second component of an espresso recipe and refers to the weight of the liquid, measured as a double espresso, in the cup. In recent years we have started measuring yield in terms of the weight of liquid as opposed to the volume, as it is a more accurate approach. Fresh coffee will produce a thicker crema due to the level of Co2 present in the bean. This Co2 dissipates as the coffee ages, which reduces the amount of crema, therefore the difference in the amount of crema between 7 day old and 21 day old coffee is substantial. A good quality set of digital scales will allow you to dial in the yield with greater accuracy.

Changes to the yield or amount of water used to brew the coffee will impact the extraction and strength of the coffee. A higher yield will give you more extraction, yet lower strength. Think of it this way; the more water you use relative to the dose, the greater the extraction, however, the coffee will be more diluted. Conversely, a lower yield will result in a lower extraction, but as less water is used, the espresso will be stronger. This is where Brew Ratios come into play.

The **Brew Ratio** is the relationship between the dose and yield, where the yield is a multiple of the dose, expressed as DOSE: YIELD.

For example:

- Dose of 18g with a Yield of 36g is a multiple of 2 or 1:2 brew ratio.
- Dose of 18g with a Yield of 54g is a multiple of 2 or 1:3 brew ratio.
- Dose of 21g with a Yield of 42g is a multiple of 2 or 1:2 brew ratio.
- Dose of 21g with a Yield of 63g is a multiple of 3 or 1:3 brew ratio.

The smaller the brew ratio the stronger and less extracted the espresso will be. The higher the multiple or brew ratio, the weaker and more extracted the espresso will be, as more water is used to extract the coffee, diluting the strength.

Most espresso coffee tastes the best with a brew ratio ranging between 1:1.5 - 2:2.5.

- A brew ratio of 1:1 represents a Ristretto. This shot will be intense with heavy body, strong and under-extracted.
- A brew ratio of 1:2 represents Normale and is in espresso territory. This shot will have a medium body, balanced and sweet.
- A brew ratio of 1:3 represents a Lungo. This shot will be weak, thin body, delicate and possibly dry.

The yield can either be programmed into the volumetric settings of the espresso machine or controlled manually by the barista. For ease of use and efficiency, it is good practice to program the espresso machine to deliver the correct yield. It is important to check the yield during the morning calibration to ensure the espresso machine is delivering the required amount of water.

Yield, Dose and Basket Size:

So how strong do you want your milk drinks to be? Well, that all depends on your cup size.

Looking at the example above using a 1:2 brew ratio, the yield produced from a 21g basket is 6g more than the yield produced from an 18g basket. This equates to 17% more espresso in the cup simply by using a larger basket and dose. If the cup size is the same, the larger basket with a larger yield will be stronger when topped with milk, so make sure your basket size complements your cup size, otherwise you may end up with an incredibly milky and weak drink or one that isn't nicely balanced.

Checking the YIELD:

1. Grind, dose, distribute and tamp coffee into the filter basket.
2. Tare off a cup on a set of scales.
3. Place the cup underneath the group head.
4. Insert the group handle into the espresso machine and activate the brew button.
5. Take note of the finished weight and compare it to the espresso recipe.

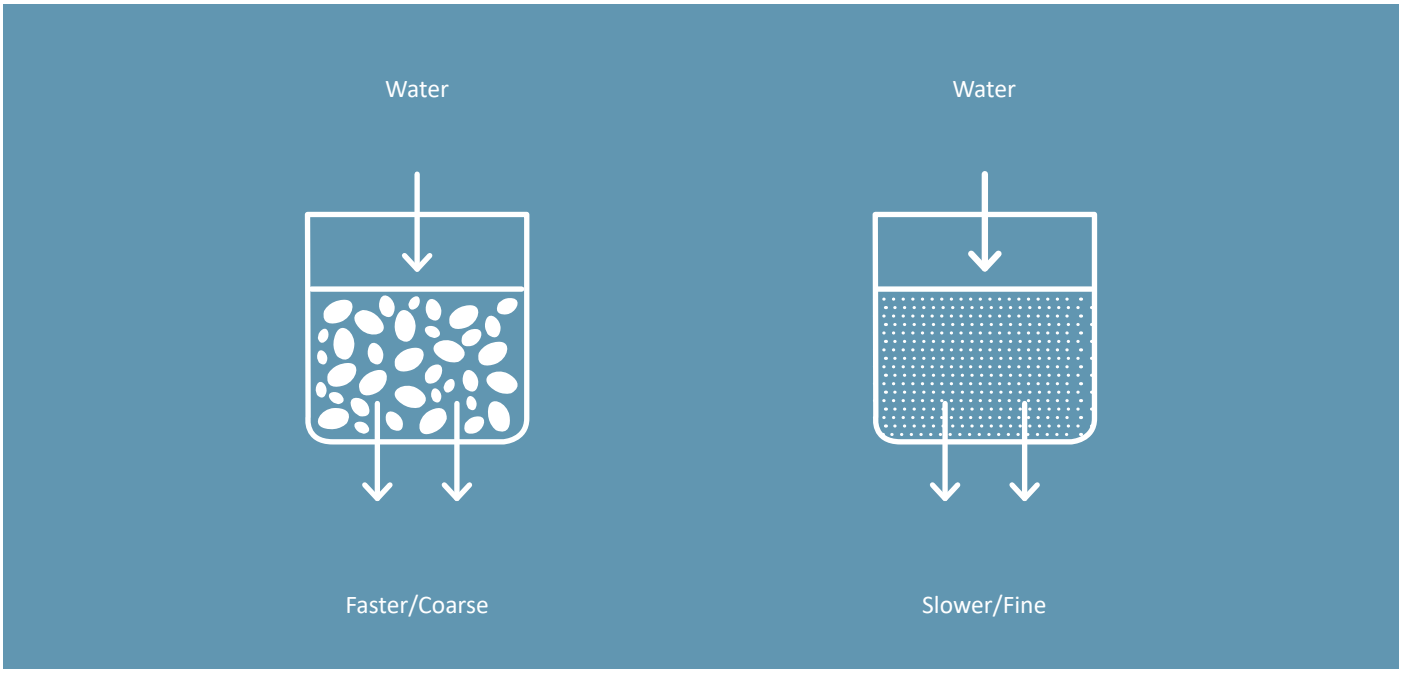
TIME

Once you have locked away the dose and yield, the brewing time is the final component of an espresso recipe. Brew time is measured in seconds from the moment the brew cycle is activated, until the pump stops and will generally range between 20-35 seconds, depending on the roast profile. Darker roasts prefer shorter brew times as they are easier to extract than lighter roasts. Adjusting the brew time by adjusting the grind, will enable you to fine-tune this part of the espresso recipe and find the coffees sweet spot.

So Why Does the Grind Size Matter:

The partial size of the coffee or the grind size as it's known, will determine the contact time between the coffee and water.

To help you understand how the grind size effects the brew time, consider the grind as either pebble or sand, where the pebbles represent a coarser grind and sand a finer grind. If the pebbles are placed in one bucket and the sand in another and water poured over them at the same time, the water will pass through the pebbles faster, simply because there is more space between the pebbles than the sand. So in terms of time, a coarser grind will give you a faster brew time and a finer grind will give you a slower brew time.



The grind size is related to the position of the grinder blades. The closer the blades, the finer the grind and the further apart, the coarser the grind. Only make small incremental adjustments at a time as this will fast track your understanding of the grinder and enable you to be more accurate and efficient when making adjustments in the future.

Keep in mind that grinders retain coffee between the blades and the chute, which means the new grind will not come through immediately. It can take up to 3 shots for the new grind setting to appear, so make sure you purge out the old grinds before evaluating the new grind level.

Over-extracted: If your coffee is tasting bitter, astringent or paper and harsh, it is over-extracted. This occurs when too many soluble flavours have been taken out of the coffee, as well as other chemical components found in coffee. Selecting a coarser grind will reduce the level of extraction, allowing for more sweetness and balance.

Under-extracted: If your coffee is tasting salty has an aggressive sourness and a short finish it is under-extracted. This occurs when not enough has been extracted and there is a lot leftover that could help balance out the cup. Selecting a finer grind will lengthen the contact time between the coffee and water, therefore the level of extraction, allowing for more sweetness and balance.

Once you have dialled in the recipe to the target numbers, it is time to taste the espresso and make final adjustments. The goal is a sweet, well balanced, delicious espresso.

For example:

The recipe for the coffee is 20g in, 40g out, with a brew time of 30 seconds.

First Shot:
The first shot extracts in 25 seconds, however, it is acidic, flat and short finish. Adjusting to a finer grind will increase contact time and extraction.

Second Shot:
The second shot extracts in 27 seconds. The coffee has a bright acidity and some sweetness, but potentially you could achieve more sweetness and balance. Adjusting finer again will increase contact time and extraction.

Third Shot:
The third shot extracts in 29 seconds. The coffee now has a pleasant acidity, more sweetness, balanced with a long pleasant finish. But could you achieve more sweetness?

Fourth Shot:
After adjusting the grind again the fourth shot extracts in 31 seconds. This time the acidity is softer and the coffee is still sweet, however there is a distinct bitterness that wasn't present before.

Based on the results the optimum brew time for the espresso is 29 seconds.

UNDER	IDEAL	OVER
Sour	Sweet!	Bitter
Lacking Sweet	Ripe	Dry
Salty	Transparent	Astringent
Quick Finish	Complex Acidity	Hollow
	Finishhhhhhh	Empty

QUIZ

What are the 3 components of an espresso recipe?

- o Dose
- o Strength
- o Time
- o Milk
- o Yield

What should you set first when dialling in a recipe:

- o Yield
- o Dose
- o Time

Is the brew ratio the relationship between:

- o Dose and yield
- o Dose and grind
- o Grind and time

Which brew ratio will give you a stronger coffee:

- o 1:3
- o 1:2.5
- o 1:1
