EXPERT BARISTA · QUICK GUIDE

# Espresso Dial-In Fundamentals

*Quick Guide 1 — Grind, dose, ratio, temperature, and reading a shot*

Dialling in an espresso shot means adjusting a small set of variables until the coffee in front of you tastes balanced — not sour, not bitter, with real sweetness underneath. It's a skill built entirely through repetition and honest tasting, not a fixed recipe you memorise once. This guide walks through the variables themselves, how they interact, how to diagnose what's gone wrong, and why the physical prep of the puck matters as much as the numbers on your machine.

## The five variables

Every espresso shot is shaped by five variables working together. Change one and you usually need to adjust another to compensate, which is why dialling in can feel circular at first — you're not solving for one number, you're balancing a small system.

| Variable | What it does | Too little / too much |
|---|---|---|
| Grind size | Controls resistance to water, and therefore flow rate | Too coarse: flows fast, under-extracts. Too fine: flows slow, over-extracts. |
| Dose (coffee in) | Sets how much coffee resists the water | Low dose: thin, watery. High dose: can choke the flow. |
| Ratio (dose : yield) | Sets strength and body, e.g. 1:2 | Short (1:1.5): concentrated. Long (1:2.5+): lighter, diluted. |
| Water temperature | Speeds up or slows down how fast flavour dissolves | Too cool: sour, flat. Too hot: bitter, harsh. |
| Time | The window the water has to extract flavour | Too short: sour. Too long: bitter. |

### Grind size, in more depth

Grind size is usually the first variable to adjust, and the one you'll touch most often. A finer grind packs more tightly, giving water more resistance to push through, which slows the flow and increases extraction for a given amount of time. A coarser grind does the opposite. Because grind interacts so directly with flow rate, most baristas treat it as their primary lever, adjusting other variables only once grind alone can't fix the problem.

Grind adjustments are rarely linear — a small change on a high-quality grinder can shift your shot time noticeably, especially near the correct setting. Make small adjustments and taste after each one, rather than making a large jump and losing track of which change caused which result.

### Dose and ratio, in more depth

Dose is simply how much dry coffee you put in the basket, usually somewhere between 14g and 20g for a modern double-basket portafilter, though this varies by basket size and machine. Ratio describes how much liquid you're aiming to get out relative to that dose. A 1:2 ratio (for example 18g in, 36g out) is often called a "normale" and is a reasonable default starting point. A shorter ratio like 1:1.5 gives a smaller, more concentrated shot; a longer ratio like 1:2.5 gives a bigger, lighter one.

Changing your dose changes how much resistance the water meets, which is why a dose change often needs a small grind adjustment to compensate — more coffee generally needs a slightly coarser grind to keep the flow rate similar, and less coffee needs a slightly finer one.

### Water temperature, in more depth

Most espresso is brewed somewhere in the 90-96 degrees Celsius range. Within that window, small differences matter: hotter water extracts flavour compounds faster, which can tip a shot toward bitterness if pushed too high, while cooler water extracts more slowly and can leave a shot tasting sour or underdeveloped if pushed too low. Not every machine gives you direct control over this, but where it's adjustable, treat it as a fine-tuning tool rather than your primary lever.

Machine design also affects how stable your brew temperature actually is shot to shot. Single-boiler machines can drift in temperature depending on how recently the steam wand was used, while dual-boiler and heat-exchanger designs tend to hold a steadier temperature. If your shots seem inconsistent despite identical grind and dose, temperature stability is worth investigating before assuming the fault is your technique.

### Time, in more depth

Time is really a downstream effect of the other variables rather than something you set independently — for a given grind, dose and pressure, the shot will naturally take roughly the same time to reach your target yield. That said, tracking time is still one of the most useful diagnostic tools available, because a shot that suddenly runs much faster or slower than usual, with no deliberate change on your part, is one of the clearest signals that something else has shifted: the grind setting, the bean's freshness, or the evenness of your tamp.

A commonly used target window is around 25-30 seconds from the start of the pour to reaching your target yield, though this varies with ratio and bean — a shorter ristretto-style pour will naturally run quicker, and a longer lungo-style pour will naturally run slower, even when everything else is dialled in correctly.

### Why weighing matters more than watching the clock

Time alone can be a misleading signal, because it doesn't tell you how much liquid actually came out. Two shots can both run for 28 seconds and still differ significantly in yield if the flow rate wasn't consistent throughout the pour — a slow start followed by a rapid finish, for instance, often points to channelling rather than a genuinely even extraction. Weighing your dose in and your yield out, rather than relying on time or a visual fill line, is the single most reliable habit for consistent dial-in, and it's the approach this guide assumes throughout.

## Extraction: the target you're actually aiming for

Extraction yield is the percentage of the dry coffee mass that ends up dissolved in your cup. The widely used target for a balanced espresso is 18-22%, with 20% often cited as the centre of that range. This number isn't something you can see directly without lab equipment, but it correlates closely enough with taste that you can learn to recognise it by cup alone with practice.

- Under 18% (under-extracted): sharp, sour, thin, short finish.
- 18-22% (balanced): sweet, syrupy body, no dominant sour or bitter note.
- Over 22% (over-extracted): bitter, dry, astringent, sometimes ashy.

It's worth noting that extraction percentage and strength (how concentrated the shot tastes) are related but different things. A shot can be strong and under-extracted at the same time, or light-bodied and perfectly balanced. Ratio primarily controls strength; grind, time and temperature primarily control extraction.

## Grinders: why the burr matters more than the brand

A good espresso grinder matters at least as much as the espresso machine itself, and often more. Espresso demands a very fine, very consistent particle size, and inconsistency in that particle size — some grounds much finer or coarser than the average — makes it far harder to get a clean, balanced extraction no matter how carefully you adjust the setting. Blade grinders, which chop beans somewhat randomly, are not suitable for espresso for this reason; a burr grinder, which crushes beans between two revolving surfaces to a consistent size, is the minimum standard.

Within burr grinders, flat burrs and conical burrs both work well and mainly differ in retention (how many grounds get left behind in the grinder between doses) and subtle flavour character rather than one being objectively superior. What matters more for dial-in purposes is that the grinder holds its setting reliably and produces a consistent result shot after shot — a grinder that drifts or behaves unpredictably makes every other part of this guide much harder to apply.

## A worked walkthrough

To make the dial-in routine concrete, here's how it might play out on a new bag in practice.

- Set dose to 18g and grind to a reasonable mid-point setting, aiming for a 1:2 ratio (36g out).
- Pull the shot. It finishes at 36g in 19 seconds. That's faster than the 25-30 second target, so the flow is likely too fast.
- Taste it: sharp and sour, consistent with under-extraction from the fast flow.
- Grind noticeably finer and pull again. This time it finishes at 36g in 24 seconds — closer, and less sour, but still a little sharp.
- Grind slightly finer again. Now it finishes at 36g in 28 seconds, and tastes sweet and balanced with no dominant sour or bitter note.
- Record these settings against this specific bag, and use them as your starting point tomorrow rather than starting from the mid-point setting again.

Notice that each adjustment was evaluated by both the numbers (time, yield) and the taste — relying on either alone is less reliable than using them together.

## Keeping a simple recipe log

A written record turns scattered dial-in sessions into a genuine skill you can see yourself building. It doesn't need to be complicated — a simple table works well.

| Date | Bean | Dose / Yield | Time | Grind | Tasting note |
|---|---|---|---|---|---|
| Example | Brazil, medium roast | 18g / 36g | 27s | 4.2 | Balanced, chocolatey, slightly sweet |

Over a few weeks, this log becomes genuinely useful reference material — you'll start to notice, for instance, that a particular roaster's medium roasts consistently want a slightly finer grind than another roaster's, which speeds up every future dial-in on a similar bean.

## Diagnosing a bad shot

| Symptom | Likely cause | Fix |
|---|---|---|

| | | |
|---|---|---|
| Sour, sharp, thin | Under-extracted — ran too fast or too cool | Grind finer, raise temperature, or lengthen the pour |
| Bitter, harsh, dry | Over-extracted — ran too slow or too hot | Grind coarser, lower temperature, or shorten the pour |
| Fast, hollow, inconsistent | Channelling — water found a weak point in the puck | Distribute grounds evenly and tamp level (see below) |
| Weak and watery despite correct time | Dose too low for the basket, or ratio too long | Increase dose slightly, or shorten the ratio |
| Overly heavy or muddy | Dose too high, or ratio too short | Reduce dose slightly, or lengthen the ratio |

### A simple dial-in routine for a new bean

- Start from a sensible middle-of-the-road grind setting and a standard ratio around 1:2.
- Pull a shot, weighing both dose and yield, and time it. Aim for roughly 25-30 seconds as an initial reference point.
- Taste it and diagnose using the table above.
- Adjust one variable at a time, generally grind first, and pull again.
- Repeat until the shot tastes balanced, then note the settings somewhere so you're not starting from scratch with the same bag tomorrow.

## Distribution, tamping and channelling

Even perfect grind and timing numbers can't save a shot if the puck itself is uneven. Water always takes the path of least resistance, so any weak point in the coffee bed becomes the route the water actually follows, regardless of how carefully you calculated your grind setting.

- **Clumps:** grounds stuck together by static or moisture create a dense lump next to an empty gap once tamped.
- **Uneven distribution:** grounds pile higher on one side of the basket, leaving a weak spot on the other.
- **Uneven tamp:** an off-level tamp creates a low side that water rushes through first.
- All three cause **channelling** — water blasts through the weak point instead of soaking the whole puck, giving a fast, hollow, sour shot regardless of how well grind and ratio were dialled in.

A simple habit fixes most of this: give the basket a firm, even tap or two to settle grounds before tamping, use a distribution tool if you have one, and tamp with a level, firm, straight-down press rather than a twisting or angled one. Consistency in your tamping technique matters more than raw tamping pressure.

## Beans: origin, roast and species change everything

- **Arabica** — higher altitude, more delicate, sweeter, higher acidity, lower caffeine.
- **Robusta** — hardier, more bitter, heavier body and crema, higher caffeine.
- **Light roasts** stay dense — they typically need a finer grind and hotter water.
- **Dark roasts** are more porous — they typically need a coarser grind and cooler water to avoid tipping into bitterness.
- There is no single "correct" recipe. Every new bag is a small dial-in exercise of its own, and treating it that way — rather than assuming yesterday's settings will work today — is the core habit this whole guide is trying to build.

## Understanding your machine type

The type of espresso machine you're working on affects how much of this guide you'll apply directly versus adapt.

| Machine type | What's different |
|---|---|
| Single boiler | One boiler handles both brewing and steaming, so temperature can drift depending on recent steam use; allow recovery time between drinks |
| Heat exchanger | A single boiler with a heat exchanger tube supplying brew water, offering steadier temperature than single boiler designs without the cost of a second boiler |
| Dual boiler | Separate boilers for brewing and steaming, giving the most stable and independently controllable brew temperature |
| Lever machine | Pressure is applied manually rather than by a pump, giving more direct physical feedback but requiring more practised technique to pull consistently |

Whatever machine you're using, the underlying variables in this guide — grind, dose, ratio, temperature and time — still apply. What changes is how much control and stability you have over each one, and how much that shapes your realistic troubleshooting checklist.

### Quick troubleshooting checklist

- Shot running noticeably faster or slower than usual with no equipment change? Check for changes in humidity, bean freshness, or a partially blocked group head or basket.
- Consistent sourness across several attempts? Try a meaningfully finer grind, not a tiny nudge, before concluding the bean itself is the problem.
- Consistent bitterness? Check your tamp is level before assuming the grind is wrong — channelling reads very similarly to over-extraction in the cup.
- Shot tastes different partway through a bag? This is normal as beans age; expect to grind slightly finer over the life of a bag as it degasses and loses density.

## Freshness and staling

Roasted coffee is at its best within a fairly narrow window — often cited as roughly one to four weeks after roasting for espresso — and its behaviour changes noticeably as it moves through that window. Very fresh coffee, particularly within the first few days after roasting, releases a lot of carbon dioxide during brewing, which can cause excessive crema and an unpredictable, fast-running shot even at a normal grind setting. As a bag ages past its best window, the coffee loses density and aromatic compounds, typically requiring a progressively finer grind to maintain the same extraction, and eventually tasting flatter regardless of how well it's dialled in.

- Very fresh (0-4 days post-roast): can taste unbalanced due to excess CO2; some baristas rest beans briefly before use.
- Peak window (roughly 1-4 weeks post-roast): most consistent and predictable behaviour.
- Ageing (beyond 4-6 weeks): expect to grind finer over time to compensate for lost density, and expect flavour to gradually flatten.

This is one of the most common reasons a recipe that worked perfectly last week suddenly stops working — the bean itself has changed, not your technique.

## Common beginner mistakes

- **Changing more than one variable at once.** If you adjust grind and dose in the same attempt, you won't know which change actually caused the result, and you'll end up guessing rather than learning.
- **Chasing a specific time instead of tasting.** A shot that hits 27 seconds exactly but tastes wrong is still wrong. Time is a diagnostic tool, not the actual goal.
- **Giving up after one bad shot.** A single pull tells you less than two or three in a row — small natural variation is normal, and one outlier shouldn't trigger a big adjustment.
- **Ignoring the puck.** It's tempting to treat every problem as a grind problem. Checking distribution and tamp first, especially for fast, hollow-tasting shots, saves a lot of wasted coffee.
- **Assuming yesterday's settings still apply.** As covered in the freshness section, the same bag genuinely changes over its lifetime, and different bags need their own dial-in from the start.

## Environmental factors worth knowing about

Grind behaviour isn't purely a function of the bean and the grinder setting — the environment around you plays a real role too, something that surprises a lot of newer baristas.

- **Humidity** changes how ground coffee packs and flows. Higher humidity days often need a slightly finer grind to reach the same extraction, and vice versa.
- **Ambient temperature** affects how quickly your machine loses heat between shots, particularly on portable or less insulated setups.
- **Altitude** affects the boiling point of water and can subtly shift brewing dynamics, though this matters far more for filter coffee than for the shorter, pressurised extraction of espresso.

None of this means you need to treat every trading day as an unpredictable mystery — it simply means that pulling and tasting a reference shot at the start of a session, rather than assuming the previous session's settings still hold exactly, is good practice.

## Building the habit

Dialling in isn't a skill you finish learning — it's a habit of paying attention, made faster and more intuitive through repetition. The most useful thing you can do early on is keep a simple record: bean, dose, grind setting, yield, time, and a one-line tasting note. Patterns become obvious quickly once you can look back at a few weeks of these notes side by side, and the whole process speeds up considerably once you've built an internal sense of what a given adjustment is likely to do before you even taste the result.

- Change one variable at a time, and taste after every change.
- Weigh dose and yield rather than relying on time or a fill line alone.
- Treat every new bag as a fresh dial-in, not an assumption that yesterday's settings still apply.
- When something tastes wrong, check the puck itself (distribution and tamp) before assuming the fault is purely a numbers problem.

## Practising without wasting milk

Steaming technique and pouring technique can both be practised without using real milk, which is useful given how much dairy a beginner can go through while building consistency.

- For steaming practice, water with a single small drop of washing-up liquid froths in a broadly similar way to milk, making it a cheap way to drill wand position and vortex control repeatedly.
- For pouring practice, the same soapy water can be used once frothed, letting you drill jug height, speed and wrist-wiggle control without the cost or waste of real milk.

- Because you can reset and repeat this practice as many times as you like for the cost of a little water, it's a genuinely efficient way to build muscle memory before applying the technique to real milk during service.

This is also exactly what the milk steaming and latte art sections of the simulator are built to let you drill, without needing any equipment at all.

## Frequently asked questions

### Should I always aim for exactly 20% extraction?

Treat 18-22% as a well-supported starting range rather than a rigid target. Personal taste, the specific bean, and the drink you're making (a shot destined for milk can often tolerate slightly different extraction than one drunk straight) all reasonably shift where you land within or even slightly outside that window.

### Why does my shot taste different at the start of the day versus the end?

This is usually either a bean freshness effect building up over the life of a bag, a temperature stability issue in the machine, or environmental drift such as rising humidity through the day. Keeping a log, as described above, makes this kind of pattern much easier to spot.

### Is a more expensive machine always going to give a better shot?

Not automatically. A simple machine with a good grinder, fresh beans and correct technique will consistently outperform an expensive machine paired with stale beans and an inconsistent grinder. Prioritise the grinder and your own technique before assuming equipment is the limiting factor.

### How long does it realistically take to get good at this?

Most people can learn to reliably diagnose sour versus bitter and make the correct adjustment within a few dozen deliberate, tasted attempts. Genuine fluency — adjusting almost instinctively for a new bean within a shot or two — tends to come with sustained regular practice over weeks and months, not a single sitting.

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*Expert Barista Quick Guide 1 — free for all app users. For hands-on practice, use the Distribution & Tamping and Pull the Shot sections of the simulator.*