

YEAST & STARTERS

A few keys to turning **GOOD** homebrew into **GREAT** homebrew

Fermentation temperature control

Proper oxygenation

Yeast health & proper pitching rates

Brewers make wort, **YEAST MAKE BEER**

Purpose of a starter

Small amount of wort used by yeast to **BECOME HEALTHY, MULTIPLY, & PREPARE** for fermentation

Primary focus: 1) Increased yeast health 2) Increased cell growth

When to make a starter

Viability (overall health) of yeast is **QUESTIONABLE**

Old/expired yeast

Yeast left warm for extended time (shipping, etc.)

To increase cell count for larger volume/higher gravity/lager batches

Any **5 GALLON BATCH** of **ALE** with gravity **HIGHER THAN 1.048**

When **NOT** to make a starter

LOW GRAVITY beers (5.25 gallon ale batch <1.028)

SMALL BATCH sizes

When using **DRY YEAST**

When your **SANITATION PROCEDURES** aren't proficient

Making a starter

Equipment: Vessel to boil in, vessel to ferment in (Erlenmeyer flask can serve as both)

Ingredients: Dry malt extract (DME), water, yeast

Optional: Yeast nutrients, stir plate

Let yeast **WARM** to room temperature

Make a wort with **GRAVITY 1.030 - 1.040** using DME & water

Trick: divide ounces of DME by number of liters, then multiply by 10 to get the gravity

example: 3.5 ounces of DME in 1 liter starter equals 35 or 1.035 ($3.5 / 1 = 3.5 \times 10 = 35$)

8 ounces of DME in 2 liter starter equals 40 or 1.040 ($8 / 2 = 4 \times 10 = 40$)

BOIL gently for 15 minutes to sanitize

COOL to room temperature - ice bath or let sit overnight

TRANSFER to fermenting vessel if necessary

PITCH yeast

COVER LOOSLY (foil is best - avoid airlocks, you want air exchange)

Let ferment @ **ROOM TEMP** (~72 degrees) regardless of planned fermentation temps

You are growing yeast, not making beer - temps do not need to match that of the beer

DME

Lighter is better - less impact on flavor

Do **NOT** use sugar - yeast will lose ability to ferment maltose

Water

Same water you would brew with

CHLORINE FREE

Nutrients

~1/4 tsp. **NUTRIENT/ENERGIZER** is helpful (zinc, amino acids, nitrogen)

Diammonium phosphate (**DAP**) is NOT helpful - already present in malt

Manufacturers are all different - **READ LABEL** for contents

ZINC source is helpful (pinch of crushed zinc tablet works)

Oxygen

Inject **OXYGEN**/filtered air -or-

SHAKE often -or-

Use **STIR PLATE** (drives off CO₂, allows air exchange - don't use airlock, keeps yeast in solution)

How big does my starter need to be?

0.75 million cells per milliliter of wort per degree Plato for **ALES**

1.5 million cells per milliliter of wort per degree Plato for **LAGERS**

-or-

3.75 billion cells per gravity point for 5.25 gallons of ale - double that for lagers (7.5 billion cells)

example: 1.060 Ale = 3.75 billion x 60 = 225 billion cells

1.050 lager = 7.5 billion x 50 = 375 billion cells

What that means

WHITE LABS vial & **WYEAST ACTIVATOR PACK** both contain ~**100 BILLION CELLS**

For 5.25 gallons, you can pitch with no starter **UP TO 1.048** ale wort

In general, a **2 LITER STARTER** will **DOUBLE** your cell count

For higher gravity wort, larger batch sizes, or lagers you can:

Pitch **MORE VIALS** (~\$6+ each)

Make **STARTER**

REPITCH slurry from previous batch

YEAST PITCH CALCULATOR: **WWW.MRMALTY.COM**

When to pitch

At **HIGH KRAEUSEN** if possible for smaller starters (ranges from 12 to 18 hours, typically)

If starter is **>5%** of batch volume (larger than 1 liter for 5 gallons), **CHILL & DECANT** wort to pitch slurry

Temp of starter should be **WITHIN 5 TO 10 DEGREES** of wort at pitching time to avoid shock

Large starters

Don't exceed **2 LITERS** at a time

If larger than 2 liters is needed, chill & decant, then add in more wort in **STEPS**

Starter size (in liters) for 5.25 gallon batches – assumes very fresh yeast

ALES	1.050	1.055	1.060	1.065	1.070	1.075	1.100
Simple Starter	1.63	2.01	2.43	2.9	3.4	3.95	7.33
Simple Starter w/ O2 at Start	1.22	1.51	1.82	2.17	2.55	2.97	5.5
Intermittent Shaking	1	1.16	1.4	1.67	1.96	2.28	4.23
Continuous Aeration	1	1	1.22	1.45	1.7	1.98	3.67
Stir Plate	1	1	1	1.09	1.28	1.48	2.75

LAGERS	1.050	1.055	1.060	1.065	1.070	1.075	1.100
Simple Starter	8.07	9.96	12.06	14.37	16.89	19.62	14.67*
Simple Starter w/ O2 at Start	6.05	7.47	9.04	10.77	12.66	14.71	11*
Intermittent Shaking	4.65	5.74	6.96	8.29	9.74	11.32	8.46*
Continuous Aeration	4.03	4.98	6.03	7.18	8.44	9.81	7.33*
Stir Plate	3.03	3.73	4.52	5.39	6.33	7.36	5.5*

* requires 2 vials/packs of yeast

Dry yeast

A starter should not be made for dry yeast - it should be **RE-HYDRATED**

Pitching dry yeast directly into wort, without re-hydrating, will **KILL ~50% OF CELLS**

Dry yeast cells cannot regulate what passes through their membrane right away

Sugars, nutrients, hop acids & other compounds

How to re-hydrate dry yeast

Let yeast **WARM** to room temperature

HEAT small amount of water to **~105 DEGREES** - temperature is important

Water should be same water you would brew with - chlorine free

Amount of water should be 10x weight of yeast (10ml/gram)

SPRINKLE yeast into water, let sit 15 minutes, then **STIR**

Once yeast is reconstituted, **STIR AGAIN** to make a cream, then sit 5 minutes more

ADJUST to within 5 to 10 degrees of wort then **PITCH** yeast

Add small amounts of wort to adjust

Culturing yeast from a bottle

Yeast can only be cultured from a bottle of beer that was **BOTTLE CONDITIONED**

Yeast used to condition yeast is **NOT ALWAYS SAME STRAIN** used to ferment beer

How to culture yeast from a bottle

Equipment: 1 to 3 bottles bottle conditioned beer, vessel, flame source

Ingredients: Same ingredients to build a starter

REFRIGERATE bottle for 1 week to get nice slurry on bottom of bottle (2-3 bottles will yield better results)

Open bottle and sanitize the lip with a **FLAME**

It's not a bad idea to spray sanitizer on/around the cap before opening the bottle

POUR beer into a glass **GENTLY**, leaving sediment behind in the bottle

SWIRL the sediment in the bottle & **RE-FLAME** the lip

POUR sediment into a sanitized container

Grow this yeast up using a **STEPPED STARTER**

Start with 75ml (~1/3 cup) wort - let ferment for 2-3 days

Add 750ml wort - let ferment 2-3 days

Repitching yeast slurry

A freshly fermented batch of beer is great yeast source assuming:

SANITATION is/was meticulous

Previous batch was **NOT A HIGH GRAVITY WORT** (>1.070)

Previous batch was not **MUCH DARKER** than next batch

ADDITIONAL INGREDIENTS were not added to the fermenter (dry hops, spices, fruit, etc.)

Slurry can be collected & reused, but contains dead yeast cells, break material, & hop bits

RINSING yeast is suggested before repitching

Yeast can be reused **SEVERAL TIMES** over - 3rd generation is typically the '**SWEET SPOT**'

How to rinse a yeast slurry for reuse

Equipment: Slurry from fermented beer, two vessels (one for separation & one for storage)

Ingredients: Sterile water (de-chlorinated water that has been boiled & cooled)

RACK fermented beer off slurry in **PRIMARY** fermenter

ROUSE fermenter to loosen slurry - add sterile water if necessary

POUR slurry into sanitized container large enough for the slurry plus four times as much sterile water

Tall, narrow vessels are best

Avoid opaque vessels

Add cool, **STERILE WATER** to vessel - leave about 10% headspace

Close & **SHAKE** vessel vigorously for a minute or two

SIT the vessel down for about 10 minutes - the mixture will stratify

Hop bits, dead cells, & brown yeast will drop to the bottom very quickly

A thin, watery layer may form on the top

The largest area in the middle is a mixture of water & healthy yeast

POUR off the top watery layer if possible

COLLECT the center creamy area into a sanitized container

DISCARD the bottom layer

REPEAT the process only **AS NECESSARY**

COVER loosely (tin foil works well) and **STORE** in fridge for up to 2 weeks if not using immediately

REFERENCE: *Yeast: The Practical Guide to Beer Fermentation* by Chris White & Jamil Zainasheff