

Pasta Madre (Lievito Madre)



Pasta madre (PM) or Lievito Madre is a specially maintained, low hydration (stiff) sourdough starter kept around 40-50% hydration. Properly cared for, PM can be a powerful natural leavener, and is often used in heavily-enriched doughs that are high in fats and sugar - for instance, the Italian bread known as panettone. A mix of only the simple ingredients of flour and water, PM contains a dense culture of microbes - an ecosystem of wild bacteria and yeast - that act together in fermentation and carbon dioxide production. In the process of fermentation, lactic acid and acetic acid is produced by the wild bacteria that live in the culture. Additionally, carbon dioxide is produced by naturally thriving yeasts and certain bacteria present in the culture, and this is what leavens (or rises) the dough. The PM must be handled in a way to bring out the ideal balance of acids as well as boost leavening action.

Despite the simple ingredients used, it is not quite a simple task to develop a truly active PM for leavening such high enriched dough. Temperature, hydration, timing of feeds, flour choice, submersion vs. dry maintenance, and dough handling (cleanliness/sugar baths/thorough kneading) are all variables the baker must manipulate in the development and maturation of a strong PM. And of course, similarly to the maturation of a liquid starter, the longer your PM has been properly maintained, the stronger it will become over long periods of time.

Generally speaking, at higher temperatures and hydrations (and higher whole grain percentages), lactic acid-producing bacteria (homofermentive lactobacilli) are favored in the microbial balance, and the rate of fermentation increases. At lower temperatures and hydrations (and lower whole grain percentages), there is increased activity of yeasts, and a higher ratio of bacteria that produce both lactic and acetic acids (heterofermentive lactobacilli) which are also capable of producing CO₂. Manipulating these variables as well as others listed above will allow for the selection and control of microbial populations ideal for this type of sourdough starter. *(There is quite a bit of information out there, I've posted some references that I've found to be helpful below).*

Kept at a cool, stable temperature (60-68F/16-20C), you can maintain and mature the mother dough. At this temperature, you would aim to feed, or "refresh", the PM once every 18-24 hours. During this time, fermentation will slow due to the temperature, the PM will slowly expand in volume, and the microbes will proliferate and densely concentrate the mother dough.

For more low-maintenance care, it can be fed as little as every week or two kept cold in the refrigerator, or even in the freezer for months at a time. Just prior to using in an enriched dough, you will want to refresh rapidly in a 10-12 hour period. To help drive optimal exponential growth of yeasts and bacteria, the PM should be kept at warm temperatures during this period (82-86F/28-30C). This will help give the PM a final boost of strength and activity, optimizing fermentation and leavening power.

There are two general ways in which to maintain a PM: dry/bound vs. submerged in water. Personally, I find it easiest to use dry/bound conditions when performing the three rapid refreshments the day of a bake. And conversely, I prefer to use the submerged method when doing my 24-hour daily feeding regimen. But either method (and even a rotation of the methods) can be used after any feeding. During submersion, the water acts as a sort of buffer to pull some of the acidity from the sourdough, resulting in reduced lactic acid load. Dry binding of the PM acts in a different manner, slowing the rate of fermentation and sugar consumption - and the anaerobic environment favors lactic acid production. For more on this topic, please see [here](#) and [here](#) and see the references listed below. Once and awhile, a bagnetto (or sugar water bath) can be performed on the PM, allowing you to determine whether the PM has the right balance of acidity and strength (see instructions below).

Regardless of the method used to refresh and maintain, the pasta madre should have a few observable characteristics:

- Aroma & Flavor
 - Mature PM can be fruity, mildly alcoholic, and not overly sour; it will taste slightly sour
 - Newer/younger PM can be more mild and doughy in aroma and flavor with a slight sourness in flavor
- pH around 4
- White or ivory in color (not yellow)
- It should not be sticky to the touch (sticky & broken down suggests overly acidic)
- It should be capable of tripling in volume in 3-4 hours after a 1:1 (PM:flour) feed at 82-86F (28-30C)

References

From what I read, every pasta madre is different (just like a liquid starter). You must play with your pasta madre and learn how it behaves in your own home kitchen. In addition to carefully monitoring your pasta madre, it is also good to closely observe and record notes as you go. Here are some references that have been helpful to me:

BiancoLievito YouTube tutorial on maintenance

Bake Street submerged pasta madre

@mwilson at thefreshloaf.com

Giuseppe Appezzato

Modernist Cuisine

Instagram bloggers: **@gerrie.lanai** **@food.me.again**

Materials and Tools I use (some are [Amazon Affiliate](#) links):

Very High Protein Bread Flour (14-16% protein):

I use [King Arthur brand Sir Lancelot bread flour](#) (malted) at 14.2% protein. Malted flour will increase enzymatic activity, so I tend to rest my pasta madre at the lower temperatures of the ranges I list below.

[Brod & Taylor proofer box](#)

[Cooling Incubator](#)

Very precisely holds cooler temperatures (I set mine to 16C and it holds temperature +/-0.2C). Otherwise try to find a cool, stable spot.

Thermometer

I use both an [infrared surface thermometer](#) and an [internal thermometer](#) to check temperature throughout the process. Temperature monitoring is very important, you'll want to check these often to ensure proper fermentation.

Stand Mixer

I use the [Kitchenaid Pro Model](#), an upgraded model with a more powerful motor and an all-steel gear transmission which can help prevent the mixer from burning out over time. That being said, any stand mixer should in theory work for kneading the pasta madre if you take care to not over-work the machine.. Another option is kneading by hand.

[1.7 quart food container](#) for the water submersion of the mother dough.

[16 oz jars](#) for resting during the 1-3 refreshments on Production Day.

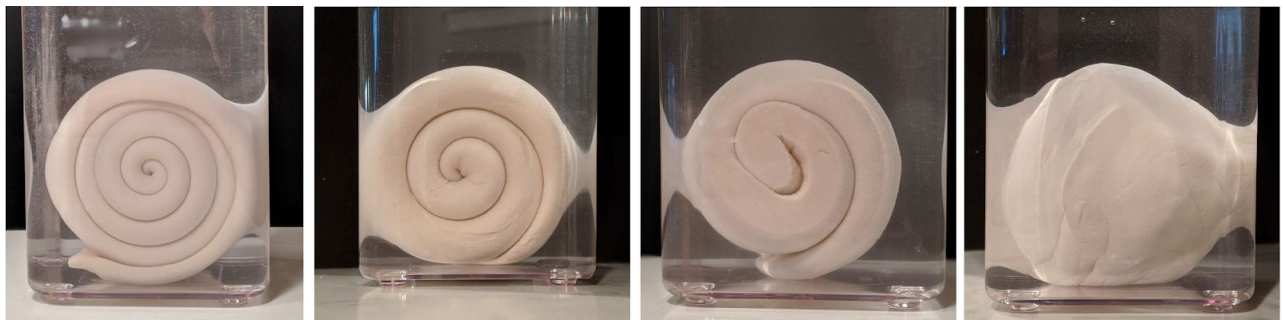
[Rolling pin](#) with handles and non-stick coating. Alternatively, use a [pasta roller](#) which makes rolling out the dough extra fast and easy.

Conversion of Liquid Starter to Stiff Starter



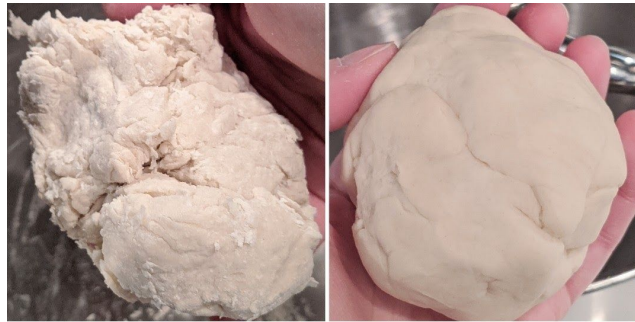
First Feed of Liquid Starter:

1. Measure out **100g liquid starter** (100% hydration) and place in the bowl of your mixer.
2. Add on top **25g water** (purified, warm room temperature) and **100g high protein white flour**. This brings the new stiff starter to 50% hydration (75g total water / 150g total flour).
3. Use your fingers and mix the dough in the small bowl until most of the dough comes together. You can knead by hand (~10-20 min) or use your stand mixer and dough hook (or paddle) to knead the dough (~10-12 min) until the dough becomes soft and smooth.
4. Move the dough to a clean countertop, and roll out the dough using a rolling pin or pasta roller (alternatively you can just roll into a ball; see images below).
 - a. If you spiral roll the dough, you can either roll into a thin strip, or you can roll into a fatter strip. Just ensure that you roll tight so that you limit the surface contact in the water. Try to roll the dough up so that the width of the dough will fit in your submersion container.
 - b. For a [taller, more narrow container](#) that is about 4" square at the base, I like to roll my dough out long and thin, about 2" wide, before rolling up into a spiral.
5. Place the roll of dough in a container with water - 3 times the water by weight than the weight of the pasta madre (for 225g dough, add about 700g water).
6. Let the dough sit in the water at 60-68F/16-20C for 18-24 hours, uncovered. It may take a couple hours for enough CO₂ to be produced to rise the dough to the surface. The dough will continue to expand in the container.



Second Feed (next morning, ~18-24 hours following first feed):

1. Drain the water from the container and place the dough on the countertop. Remove any dry dead crust and discard. Squeeze the dough gently and wring out the excess water.
2. Measure out 150g of your stiff starter and place in the bowl of your mixer.
3. Add on top 60g (40%) water (purified, room temperature) and 150g high protein white flour.
4. Use the dough hook to knead the dough until it comes together into a smooth, pliable, soft dough, approximately 10-15 minutes on low speed. *I find that if I briefly knead the dough by hand for a minute in the bowl and form the dough into a shaggy mass, the dough hook works more effectively.



5. Take the dough to your clean countertop and roll briefly using your hands. You can use a rolling pin or pasta roller to make a long, narrow strip of dough. Roll the dough up so that the width of the dough will fit in your submersion container (see notes above).



6. Add on top cool water to cover the dough. I use approximately 3X as much water by weight - for instance, if your dough weighs ~350g, add 1,050g water.
7. Rest the submerged pasta madre 24 hours (uncovered) somewhere cool - approximately 60-68F/16-20C. I use a [cooling incubator](#), but I also used a spot in the basement under the stairs which maintained a fairly stable 64-68F.
 - a. The dough will initially lie at the bottom of the tub, however as it activates and produces CO₂, the pasta madre will float up to the surface and the top of the dough will stick out of the water, usually within the first couple hours.

- b. The dough will expand in the water, the top part sticking out of the water will harden somewhat, forming a crust. I just leave mine uncovered, however you can cover very loosely with cling wrap or with a towel or you can just leave it exposed to the air - this hardened, dried dough must be discarded at the next feed.
- c. The thinner your submersion container, the more your dough will stick to the walls and the dough will appear to climb up the walls of the vessel. I have read that taller, more narrow vessels can help strengthen the pasta madre, however some use a wide bowl to submerge their pasta madre (see [here](#)) with great results. You can play around with different containers and see how your pasta madre develops.

Regular Maintenance Daily Feeds



General Maintenance Feeds (every 24 hours):

1. Pluck out the dough from the submersion container. Remove the dried crust and discard. Press the dough into a log and remove the excess water.
2. *Bagnetto*: You may want to add in a sugar bath, or *bagnetto* every several feeds (I do one every week). I like to use the bath as an indicator of PM strength. The purpose of a *bagnetto* is to wash away the excess acidity and sweeten the sourdough. You want to do a *bagnetto* if the sourdough seems overly sticky, or has an overly strong aroma, but not too often as it can actually weaken the PM.
 - a. Prepare the water bath by combining ~2 liters water (room temp ~75F/24C) and 3 teaspoons sugar (1-2 tsp/L water) in a large bowl. After squeezing out the excess water from the dough, form the dough into a thick log shape. Cut the dough into large chunks (approximately 1-.5" thickness) and drop the pieces into the water bath. Let soak for 15-20 minutes.
 - b. **Watch your pasta madre when you add to the water:
 - i. if the pasta madre immediately floats in the water, you know it is likely too weak and you can skip straight to the refreshment. Consider feeding next at a ratio of 1:0.8 (starter:flour) for the next couple feeds to help concentrate the microbes.
 - ii. If the dough sinks initially and then floats within 10-20 minutes, the acids are likely balanced and it is at the right strength. Feed next at 1:1 ratio.
 - iii. If the dough sinks and fails to float over 20 minutes, the acids are unbalanced. Consider feeding closer to 1:1.5 or 1:2 for the next feed.
3. Use your hands to squeeze out much of the water, then transfer 150g dough into the bowl of your stand mixer.
 - a. For a 1:1:0.4 ratio, add 150g flour and 60g water.
 - b. For a 1:0.8:0.4 ratio, add 120g flour and 48g water.

- c. For a 1:2:0.4 ratio, add 300g flour and 120g water.
4. Use the dough hook to knead the dough until it comes together into a smooth, pliable, soft dough, approximately 10-15 minutes. *See tip above - I like to first mix by hand into a shaggy mass so that the dough hook can grab the ball, then allow the dough hook do the rest of the work for you.
 5. Take the dough to your clean countertop and roll briefly using your hands. Spiral roll as described above and place in your submersion container.
 6. Add on top cool water to cover the dough. I use approximately 3X as much water by weight - for instance, if your dough weighs ~350g, add 1,050g water.
 7. Rest the submerged pasta madre 24 hours somewhere cool - approx. 60-68F/16-20C.

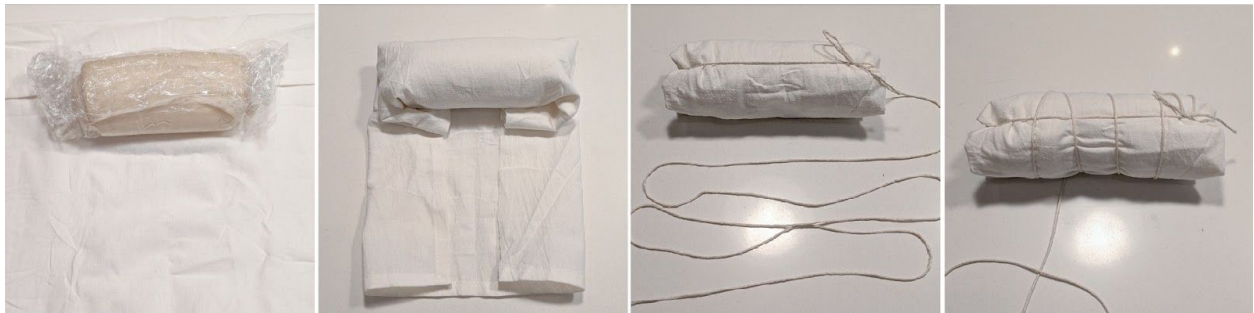
You will want to continue these daily feeds for *at least a week* to strengthen the pasta madre before using in a recipe such as panettone. After a couple weeks of feeding daily (in effect, maturing your PM), you can store it temporarily in the refrigerator and only feed once every week or two (instead of daily). Over time, with regular maintenance, the pasta madre will become more active and powerful. Note that if you can get your hands on a mature years-old pasta madre starter (from instance, from a bakery) - this would be a great head start!

Storing in the Refrigerator or Freezer

If you do not plan on using in the next couple days, you can store the pasta madre in the refrigerator for 1-2 weeks, or in the freezer for up to 6 months without a feed:

I like to use the Dry/Bound Method for cold storage: Perform a regular feed as described above (with or without a *bagnetto* as necessary): kneading with mixer and dough hook, rolling out and up into a spiral log. For longer spells in the refrigerator, consider feeding at higher ratios (1:2 starter:flour) or even greater, depending on when you can feed it next.

1. Wrap loosely with cling wrap, and then wrap up using a [flour sack towel](#) or other non-pilling towel and twine or rope as described in more detail [here](#).
2. Leave the bound dough at room temperature for a couple hours, then move to the refrigerator, at 36-40F/2-4C, for 4-7 days; or to the freezer for longer periods (6 months).



Feeding the refrigerated starter:

1. Remove the dough from the fridge and let rest at room temperature for a couple hours.
 - a. If your PM was in the freezer, first let it thaw 24 hours in the refrigerator, then allow another 24 hours at 60-68F (16-20C). For additional tips on reviving a frozen PM, see [here](#).
2. Unwrap the dough from the linen and cling wrap, and remove any dry outer skin.
3. Slice into 1-1.5" slabs, and wash using a 10-20 minute *bagnetto* as described above.
 - a. If the PM floats immediately, remember this is a sign it is overly weak. Feed next at a 1:0.8 ratio (starter:flour). If your PM sinks and floats within the 10-20 minutes, feed as usual 1:1. If your PM sinks and fails to float within 20 minutes, the acid balance is off - the PM is overly strong - in this case, feed next at a higher ratio such as 1:1.5 or 1:2.



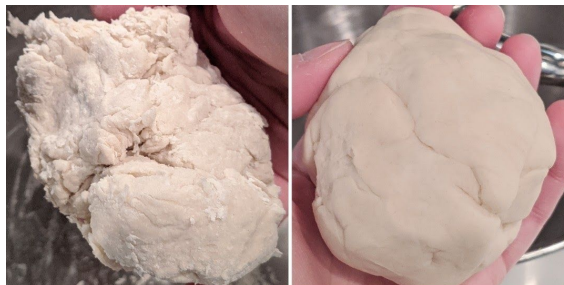
4. Squeeze out the excess water, and measure out 150g PM into the bowl of your stand mixer.
 - a. For a 1:1:0.4 ratio, add 150g flour and 60g water.
 - b. For a 1:0.8:0.4 ratio, add 120g flour and 48g water.
 - c. For a 1:2:0.4 ratio, add 300g flour and 120g water.
5. Knead for a minute by hand until the dough comes together into a shaggy mass.
6. Using your stand mixer, knead using the dough hook until the dough comes together into a smooth, pliable, soft dough, approximately 10-15 minutes.
7. Roll out on a clean countertop; roll up into a spiral.
8. Depending on whether you want to use in the next couple days...
 - a. If submerging, add on top cool water at 3X the weight of the dough. Rest the dough for 24 hours at 60-68F/16-20C as described previously (continue feeds every 24 hours to strengthen). It is recommended to do 2 days of these feeds prior to building up the activity for Production Day (the day of three rapid refreshments) following a time in the refrigerator.
 - b. If you do not plan to use the dough soon, again wrap up in cling wrap and the linen towel and return to the refrigerator. I like to allow the dough to first sit at room temperature for an hour or two before transferring to the refrigerator.

Production Day Refreshments

The day you want to mix up your dough, you'll want to build up your pasta madre levain. For lean breads and breads that have lower enrichments, one or two feeds is sufficient to fully activate the starter. For breads such as panettone (highly enriched breads), you will want to perform the full three refreshment feeds throughout the day, every 3-4 hours giving a new feed. The three refreshments will fully activate and strengthen the PM so that it is capable of efficiently leavening the panettone dough, giving you a final product with a very long shelf life.



1. Refreshment #1: Start in the morning (~8am).
 - a. We will feed not only enough our Production Day levain but also enough *for the propagation of the mother dough*. As described previously, you will squeeze out the excess water and rid of any dry crust.
 - b. Add 235g of the dough to the bowl of a stand mixer.
 - c. Add to the mixer bowl an equal amount of flour (235g) and 40% (94g) water.
 - d. Use the dough hook to knead until the dough becomes a soft, pliable, smooth ball of dough (~10-15 min). As noted above, I like to first bring the dough together into a mass by hand before turning on the dough hook.



- e. On the countertop, divide the dough.
 - i. *For the *mother dough*, weigh out about 350g dough and submerge in 3X by weight water (1,050g water). Move this to a cool spot (60-68F/16-20C).

Alternatively, you can wrap, bind, and refrigerate as discussed above in more detail.

- ii. For the *production dough*, roll into a ball, slash an X across the top of the dough ball, and place in a Mason jar (wide mouth jar is great). You can cover loosely with a lid or cling wrap.
- f. Place the production dough somewhere warm (82-86F/28-30C) and rest 3-4 hours until tripled.
2. Refreshment #2: ~3-4 hours later (~12pm) once tripled in volume.
 - a. Measure out 80g PM (I like to pull from the center of the dough mound). Feed with 80g (100%) flour and 32g (40%) water. Squeeze and mix together briefly using your hands in the mixer bowl, then use the dough hook to knead the mass for 10-15 minutes until dough is smooth, soft, and pliable.
 - b. Roll into a ball, slash, and rest 3-4 hours in the jar at 82-86F/28-30C until tripled.
3. Refreshment #3: ~3-4 hours later (~4pm) once tripled in volume.
 - a. Measure out 80g PM, feed with flour and water, and knead as in Refreshment #2.
 - b. Roll into a ball, slash, and rest 3-4 hours in the jar at 82-86F/28-30C until tripled.
 - c. At ~7-8pm, we will use this levain in the panettone "**First Dough!**"

| Production Day Refreshments for Panettone | | | | |
|---|-------------|-----------|--------------|---|
| Time | Pasta madre | Water | Flour (100%) | Temp during rest periods |
| 8am* | 235g | (40%) 94g | 235g | [*~350g for mother dough: 60-68F/16-20C] 82-86F (28-30C) |
| 12pm | 80g | (40%) 32g | 80g | |
| 4pm | 80g | (40%) 32g | 80g | |