Bread Formulas

General Tips

This section contains general information and links to various resources, gleaned from here and there.

WSU Bread Lab Photos

Photos at the Bread Lab of 100% whole wheat bread and croissants

- 100% Whole Wheat Loaves & Croissants
- 100% WW and probably 80 to 95% hydration; depends on the flour.
- Does not retard, uses a 20% preferment
- Overnight mix without salt let sit for an hour, add salt mix a bit to incorporate salt. Then fold 3 or 4 times.

Weights, Measures, and Conversions

- Weights & Measures - King Arthur Flour
- Weights & Measures (from BBA)

Ingredient	Volume	Weight, grams
Bread/WW Flour	1 cup	128g
Coarse WW Flour	1 cup	120g
Cornmeal, Coarse	1 cup	170g
Rolled Oats	1 cup	113g
Salt, table	1 teaspoon	7g
Salt, kosher	1 teaspoon	4g
Salt, Sea	1 teaspoon	5g
Instant Yeast	1 teaspoon	3.1g
Active Dry Yeast	1 teaspoon	2.8g
Sourdough Starter/Levain	1 cup	227 g - 241 g
Granulated Sugar; Baking Powder; Baking Soda	1 tablespoon	14g
Oil, butter, shortening, milk, water	1 tablespoon	14g
Eggs	1 large egg	47g
Raisins	1 cup	170g
Honey, Molasses, Corn Syrup	1 tablespoon	19g
Water	1 cup	223g

- Conversions:
  - 1 tablespoon = 3 teaspoons
  - 1 fluid ounce = 2 tablespoons
  - 8 fluid ounces = 1 cup
  - Weight or volume measure of butter = ¾ that measure of oil, ie, butter is 75% fat

    - Honey is 16-20% water (molasses is 22% water); to eliminate their sugar from formulas, replace them with 20% of their formula weight in water
    - 100% fresh yeast = 40-50% active dry yeast = 33% instant yeast
        - Use ¾ weight of active dry for instant yeast
        - 1g of active dry yeast ≈ 0.75g instant yeast ~≈ 33g of sourdough levain
            - 1 packet active dry yeast ≈ 7g active dry yeast ≈ 5g instant yeast ~≈ 227g sourdough levain

Flour Types

From “The Rye Baker”.

- Protein content of wheat flour determines the ability to build a gluten network for high volume
    - The proteins in rye do not form much if any gluten
- The ash content measures fiber.
    - Fat tends to stick with the fiber, which is where the richer flavors of whole grains come from.
- The high fiber in whole grains tends to cut up the gluten structure resulting in less oven spring and volume.
    - Mitigate this with hydration and gentle handling
- Pumpernickel aka coarse rye meal is coarsely ground whole dark rye
- Table with wheat and rye flour types with protein and ash ranges:

flour types001.pdf

Yeast and Sourdough Culture

Don’t use more yeast than necessary. Too much yeast eats all the sugars produced by the protease and amylase enzymes from the starch in the flour. This reduces the flavor. See the conversions above for different types of yeast and a rough approximation for converting between commercial yeast and sourdough levain.

Use less yeast, maybe ⅔ the original amount if you decide to bulk ferment in the fridge overnight vs room temp for a few hours (no-knead formulas already account for this because they have to bulk ferment for at least a couple of days). See above for the bad effect of using too much yeast. This is why the no-knead formulas with multiple days in the fridge use so little yeast.

In “Bread” 3rd ed. there is a section of tips for home baking. One is “Due to the small mass of the home sourdough, ripening could be slightly sluggish, and an increase of perhaps 25 percent more of mature culture can overcome that sluggishness” The formulas below from “Bread” have the original metric quantities, or the originals divided by 10. For home baking, increase the mature culture quantity by 25%.

Creating a Rye Sourdough Starter

From “The Rye Baker”

Build Rye Starter001.pdf

Dehydrating and Rehydrating Sourdough Starter

Use this technique for preserving some starter just in case, and for sharing with friends.

Dehydrating and Rehydrating Sourdough Starter _ Brod & Taylor.pdf

Dough Strength

Elasticity is the defining property of a strong dough. The gluten framework will support the dough as it rises, and the scores will look better. But, when you try to stretch the dough during shaping, it will tend to snap back. And too much elasticity will inhibit the rising, resulting in lower volume and poorer scoring.

Extensibility is the property of dough that allows you to stretch it without tearing and it will stay stretched. Too much extensibility means that the dough won’t hold up when it rises and the scores will look bad. So the goal is to balance elasticity and extensibility.

This article from the San Francisco Baking Institute explains the factors behind dough strength thoroughly but concisely: SFBI Newsletter Dough Strength. In short:

- Increasing Strength
    - Higher protein flour
    - Bigger batch size (better environment for fermentation)
    - Preferments
        - Higher hydration and high % of preferment increase strength
        - Enzymatic activity in a poolish also improves extensibility
    - Autolyse
        - Also increases enzyme activity that improves extensibility
    - Longer mixing/kneading
    - Longer fermentation
    - More folds
    - Tighter pre-shaping and shaping
- Decreasing Strength

- Higher flour ash content, eg., bran in whole wheat flour
- Higher hydration
- Fat, eg., oil, butter
- Chunky additions, eg., fruit and nuts

No-knead breads are an example of balancing a short mixing/kneading time (0 for no-knead) and high hydration with a long slow bulk fermentation. For dough that needs extensibility (eg pizza dough) don't bulk ferment too long.

Another good article on dough strength: Protecting Gluten in a Weak Dough. The Bread Network explains:

… but any time you are dealing with dough that is weak, with a weak windowpane, a spreading dough, a dough that seems too wet, warm dough or dough that tends to over-ferment too quickly).

Then DON'T do an autolyse! Autolyse doesn't automatically equal a better dough. It's not always appropriate, especially when you have a weak dough or are using a weak/low quality flour. In these instances protect your gluten! (elsewhere in the article they explain that enzymatic activity promoted by the autolyse attacks the gluten).

Things that will help protect the gluten of a weak dough are:

- *Don't do an autolyse.*
- *Add salt right away during mix. Salt acts to strengthen dough and it inhibits the "eating" action of the enzymes. Fermentation will slow down with the addition of salt, so adding it during mix will help when you have any of the reasons listed above for weak dough.*
- *Use cold or icy water during mix to keep the dough temperature down and slow the fermentation. If you mill your flour fresh, you can allow it to cool for a bit before mixing your dough.*
- *Finely mill your flour, it helps the gluten to bond better. The smaller the particles the less slicing damage they will do to the gluten.*

- *Use less mechanical mixing. Go for more of a “do nothing” or “do less” method which will minimize the gluten cutting of the bran and grain particles of whole grain flours.*
- *Add fats and other ingredients that can interfere with gluten bonding after the bonding takes place and you obtain a nice windowpane.*
- *Cool your dough by refrigeration whenever you feel it needs to be slowed down. Also chilling the dough BEFORE shaping will even out the dough temperature so it isn’t warm in the middle longer than the outside and it allows a more even slow rising in the retarder/refrigerator.*
- *Mix or blend stronger flours with weaker flours.*
- *Blend strong white bread flour with a weaker whole grain flour.*
- *Use a lower hydration, it gives the gluten a better chance at bonding and slows down the enzyme action.*
- *Shorten your ferment time if possible.*
- *Cool the dough if you need a longer ferment.*
- *(more controversial) Add ascorbic acid (not citric acid) for gluten strength or vital gluten flour (I don’t care for vital gluten myself).*
- *Use a double or triple hydration technique to get a strong bonding of the gluten before adding additional water.*
- *Be gentle when handling the dough and shaping it.*
- *Don’t spray a lot of water on the dough before baking it (it can weaken the outer crust).*
- *Use a younger starter with stronger gluten instead of a weaker broken down starter.*
- *Consider sifting out the coarser bran, soften it with boiling water and then add it back to the dough after the gluten is developed and the bran is cooled.*
- *Err on the side of slightly under-proofing for the final proof.*

- *Use a very strong flour if you have an extreme fermentation schedule, higher temps or a dough with lots of gluten weakening additions.*

Instead of an autolyse, they make the same recommendation as the King Arthur Flour baking school:

... *resting the dough after initial mixing is a good thing to do (KAF says 30 minutes). Allow the gluten to bond, hydrate and develop on its own. Allow the fibers and bran particles to become more fully hydrated and soften.*

General Whole Wheat Hydration Information

- 70% hydration for 40% CIA straight dough WW or 50% Hamelman Bread
- Increase hydration 4 - 6% per each 10% increase in WW % but see the formula

Desired Dough Temperature

- Desired Dough temp: usually 75-78° F
    - Use the lower end for more time and flavor; higher end for a cold room or faster process
    - DDT x 3
        - - flour temp
        - - room temp
        - - friction factor (26° F for stand mixer; 0 - 6 for hand mixing; higher for stiff doughs like bagels)
        - Net is the water temp to make the DDT
        - If using a poolish, start with DDT x 4 and subtract poolish temp

Preferments, Levain, and Sourdough

Here's what happens when dough ferments:

- Enzymes (mainly amylase) break down the large chain starches in the flour into sugars
    - Malted/sprouted grains and malt additives promote the breakdown of starches
    - More details on enzymes in bread baking
- Yeast (commercial or wild) eats the sugars, pees alcohol, and farts CO_2 (which makes bread rise)

- Bacteria eat the sugars and pee lactic acid (lactobacilli LAB) and acetic acid (LAB and a few acetobacilli); these give the flavor to the bread
    - Higher hydration favors lactobacilli (making acetic acid requires oxygen; the water blocks access to air) - use a poolish or a liquid levain (see below)
    - Wheat starters favor lactobacilli; rye produces more acetobacilli
    - See Detmolder 3 Stage Rye Method below for conditions that favor yeast, lactic acid, and acetic acid

These are the ways to get more tasty organic acids into bread dough:

- Ferment some of the flour in advance
    - Use a sourdough culture; the first step for making dough is to add flour and water to some of the starter to make a levain 8-16 hours before mixing the dough
        - A rye starter needs 12-16 hrs at room temp (70-75℉ in the proofer for my warm weather San Diego rye starter) to ferment a levain
        - For small home-sized batches, increasing the percentage of mature culture in the sourdough build (by 25 to 50% or so compared with the percentage in “Bread” for large commercial batches) may be a good way to improve the ripening of the final dough, especially if there is no commercial yeast in the formula - “Bread” 3rd edition
    - Use a preferment (pre-ferment) to get commercial yeast going on some of the flour. Poolish (high hydration), biga (stiff), or pate fermentee (dough saved from a previous batch).
- Slow down the yeast relative to the bacteria by using retarded fermentation, ie, bulk fermenting the dough in the refrigerator overnight; may not work for sourdough
- Poolish vs long retarded bulk fermentation:
    - Different flavors develop at different temperatures - retarded fermentation can produce deeper flavors due to more organic acids
    - Poolish creates acid which promotes longer keeping.
    - Poolish liquidity promotes protease enzymes which eat gluten making the dough more extensible
- Poolish yeast % of flour in poolish; less yeast on warm days, more yeast on cool days
    - 8 hr 0.23% - 0.33% ⅛’s tsp per 100g flour .6 - .85
    - 12 hr 0.1% - 0.2% ⅛’s tsp per 100g flour .25 - .5
    - 16 hr 0.03% - 0.08% ⅛’s tsp per 100g flour .1 - .2
    - Fully fermented when covered with bubbles, froth
- Another set of poolish yeast %’s, from an Italian web site, The differences are probably related to fresh/compressed yeast rather than dried.
    - - 1-2 hours 2.5% of yeast on the weight of the flour;
    - - 4-5 hours 1.5% of yeast on the weight of the flour;
    - - 6-7 hours 1% of yeast on the weight of the flour;
    - - 8-9 hours 0.5% of yeast on the weight of the flour;
    - - 10-12 hours 0.3% of yeast on the weight of the flour;
    - - 13-14 hours 0.2% of yeast on the weight of the flour;

    - 15-16 hours 0.1% of yeast on the weight of the flour.
- More preferment => faster bulk fermentation and proofing
    - Signs that a preferment/sourdough is ready include these:
        - Dome
        - Lots of little bubbles/holes

Detmolder Three Stage Rye Method

From “Bread”, 3rd edition.

1. Freshening (Anfrischsauer) encourages yeast
    a. High hydration (150%) for 5 to 6 hours at about 78°F (25°C).
2. Basic Sour (Grundsauer) encourages acetic acid for sour-tangy flavor
    a. Stiff-textured paste (60 to 65% hydration). The ripening temperature for this phase is 73° to 80°F (24° to 26°C) and ripening time is 15 to 24 hours
3. Full Sour (Vollsauer) encourages lactic acid for smooth and mild acidity
    a. Moist and warm conditions; paste of 100% hydration and a ripening temperature of about 85°F (29.5°C) for a relatively short period of time, 3 to 4 hours.

Full formula: Detmolder 3 stage 90 percent rye001.pdf There is a sample schedule with the formula entry below.

Mixing

- Start each mix by dispersing the yeast or starter or fermented preferment/levain/sponge/sourdough in the water for that mixing step.
- If using different flours, blend them dry before adding to the dough, especially to a preferment, in order to avoid veins of one flour in the crumb.
- Autolyse/Fermentolyse - Start gluten formation before full mixing
    - If 30 minutes or less, mix all the ingredients (except for a stiff starter); fementolyse, dough starts fermenting during the autolyse; recommended by the King Arthur Baking School
    - If autolyse > 30 minutes, don’t include salt, yeast, or levain; conventional autolyse
    - Never include a stiff starter, including rye, during autolyse. It promotes acid production which attacks the gluten being formed
- In the stand mixer, first speed is the Stir setting (or maybe KA2, depending on the author); second speed is Kitchenaid speed 4 (KA4)
    - For large batch formulas from “Bread” or anything from the CIA baking book, use the same first speed mixing time in the Kitchenaid mixer as listed in the book. Double the second speed mixing time for a KA mixer compared with the commercial mixer time in “Bread” or the CIA Baking & Pastry book..
- Max 66% rye for rolls. The denser rye dough will result in a thick crust., per Hamelman 66% Sourdough Rye formula
- Fold nearly all wheat doughs periodically during bulk fermentation. Only the stiffest doughs (bagels, pretzels) with short fermentations are not folded; high rye percentage doughs do not need folds because they won’t develop much gluten anyway. The higher the hydration, the more folds. See a folding schedule under Bulk Fermentation below.

- For whole wheat doughs, instead of the windowpane, use thumb and forefinger to pull up a piece of the dough about an inch above the dough surface. If the dough holds the pinch and stands in a little ridge without springing back, it is fully kneaded, ie gluten fully developed. When poked a fully developed dough should spring back fast.
    - Test for gluten development right after kneading, before the gluten relaxes
    - Note that Hamelman in "Bread" warns that most doughs should **not** be mixed to full gluten development. Develop some gluten (not generally to windowpane) and allow for additional gluten development during bulk fermentation - especially overnight. Preferments, especially a poolish, will also stimulate fermentation and gluten development. If you mix to full gluten development you get overdeveloped dough that won't rise as high.
- Bassinage - Many doughs will not develop gluten well over 70% hydration with conventional mixing. For doughs over 70% hydration, mix and develop gluten holding back 10% of the water. After the gluten is developed, add the remaining water and fold or mix it into the dough.
- Mix more gently with rye to avoid breaking the pentosans (which will release water and make the dough gummy)
- If the dough pulls away from the sides of the mixer bowl (more common with rye), it's done, even if it's much sooner than the formula anticipates. Stop mixing now and you'll get better oven spring.
- Alternative to kneading: 4 x 30 folds 10 minutes apart, per San Diego Artisan Bread School

Garnishes/Additions

- Add nuts etc at the end of the mix; back on speed 1 until incorporated
    - Or add during the last bulk fermentation fold, especially soft stuff that would be pulverized by the mixer, eg, olives, cranberries or hard stuff that would cut up the gluten, like nuts. A lamentation fold is good for dough strength and additions.
        - Rinse olives to remove extra salt
- 15-20% max weight for additions
- Additions will weigh down high hydration doughs (>80%) creating lower volume

Bulk Fermentation

High whole wheat percentage and/or hydration has to have a long bulk fermentation. Typically:

- 5-6 hours at room temp with folds (increasingly gentle) at ½ -1 - 1 ½ -2 - 2 ½ - 3 - 4 - 5 ½ hrs.
- 2 hrs room temp with folds at ½ - 1 - 2 (sometimes 1.5) hrs
    - Bowl fold, coil fold, then lamination fold
    - Into the fridge overnight
- Rye ferments faster than wheat; usually under an hour

Using a poolish will speed up bulk fermentation. If you use a poolish **and** an overnight retarded fermentation reduce the yeast in the final dough by ⅓. Otherwise the dough overferments and there is no extensibility, limiting the oven spring.

Some good tips for sourdough (especially) bulk fermentation: Bulk-o-Matic

Pre-Shaping and Shaping

- Pat out to degas and form a boule by folding up the corners into a Chinese dumpling-like ball of dough (closure on the seam side, ie, bottom).
- If final shape requires manipulation (ie, not a boule), limit tension pulls to 2 so that there is still extensibility in the dough
- Rest 15-20 minutes after pre-shaping so that the gluten relaxes
- Demi-baguettes fit in a home oven

Proofing

- Boules in a banneton/bowl with a non-gluten floured (rice flour works well) cloth; bâtards in a banneton (or any appropriately shaped basket/bowl lined with a dishtowel dusted with a non-gluten flour or bran) and baguettes on a floured couche
    - Sprinkle rice flour with a tea strainer on the banneton or liner or dishtowel and on the top of the loaf (the side that goes on the bottom of the banneton)
    - Rye is especially sticky - apply rice flour to the banneton and the loaf thoroughly
    - Support the outside edges of the couche to keep the dough from spreading
- To check proof status, with your wetted ring finger gently poke in your dough. If you have a high hydration dough you can first dip your finger in a little bit of flour or water to prevent sticking.
    - If the hole disappears completely: under-proofed
    - If the hole dent pushes half way back out, slowly, proofing is just right - time to bake
        - This can be a bit early; consider what the formula says about proofing time
        - For good oven spring and ears, bake a little earlier (less fully proofed)
    - If the hole stays entirely dented in: over-proofed; make flatbread.
- The poke test often does not work well with whole wheat doughs. Get a small straight sided jar (eg, a spice container). Before shaping the dough, put a pinch of dough into the jar and mark the starting height and 1 ½ and 2 times the volume. Close the jar and keep it next to the proofing dough to monitor how high the dough has proofed.
- The dough should shimmy when gently shaken, ie, gas bag rather than solid mass
- The dough should not feel solid under the surface
- Cold Proofing - After shaping and putting your dough in a bowl or banneton, you can put the whole thing in a closed plastic bag and put it in the fridge. Figure about a 16-19 hr

proof at regular fridge temp; you may want let your dough cold bulk ferment until you're ready to pre-shape, shape, and start cold proofing 16-19 hours before baking
    - Cold proofing is said to create a darker crust, and better oven spring.
    - Opinions vary of whether to leave dough out after shaping for 1-2 hours or go right into the fridge; for sourdough, definitely start at room temp until the dough nearly passes the poke test; natural yeasts snooze at fridge temp.
    - Opinions vary on baking cold right out of the fridge or allowing the dough to warm up as the oven preheats, about an hour.
    - Don't try this with rye; the non-gluten structure that rye forms to hold gas decays during a retarded proof.
- How To Read a Sourdough Crumb - from https://thesourdoughjourney.com/faq-over-under-proofed/ Both include a link to How To Read a Sourdough Crumb Video

Scoring

- Dip the lame in water or spray oil for high hydration doughs
- Shallow angle and **shallow** cut (¼") for grigne (ear)
- 90° and deeper cut (½") for even spreading on both sides of the cut
- Higher hydration => shallower cut (but not too shallow, especially for grigne)
- Score with one corner of the lame
- Score fast and confidently

Baking

- Preheat oven 50° F hotter than baking temp to allow for steam and opening the oven door
    - Or preheat to max oven temp, especially for baking in cast iron
- Start preheat 1 hr (1 ½ hr if you use a baking stone above as well) before baking to heat soak the baking stone(s) or dutch oven
- Reducing baking temp from 475℉ to 450℉ (dutch oven and convection with both) gives better oven spring by slowing the formation of the crust - some formulas have been revised.
- Baking with steam slows the formation of the crust, which will stop the oven spring of the bread. There are multiple ways to create steam in the oven if you don't have a very fancy oven with steam built-in (like a commercial bread bakery oven).
    - Spritz the loaves with water from a spray bottle before loading them into the oven, whatever method you use to make steam.
    - Bake in a dutch oven with a lid, which will hold the moisture evaporating from the bread as it bakes. Unless the formula says otherwise, remove the lid after 15-20 minutes of baking, or at the time when the formula says to remove the steam pan or lower the baking temperature. This allows a crispy crust to form. A dutch oven also eliminates the need for a baking stone (except for pizza).

        - If you have a baking stone and a big dutch oven, it may be convenient to bake the bread on the stone with the dutch oven upside-down over the bread, to hold the steam in. Remove the whole dutch oven when you would be removing the lid.
    - If you have a baking stone (or even better, two - one on which you bake the loaves and one on a rack above the bread; this is particularly good for pizza and forming nice crusts on loaves, and making the oven temperature more uniform):
        - Put a shallow pan on a rack near the bottom of the oven; preheat the pan with the baking stone(s)
        - Boil water on the stove
        - Load the bread on to the baking stone first; then CAREFULLY (wear good oven mitts, preferably silicone) pour the boiling water into the steam pan, close the oven door, and turn the oven temperature down to the starting baking temperature
        - Most home ovens are vented, which allows the steam to escape. After 5 minutes of baking, open the oven and spritz the loaves with water from a spray bottle.
        - At 15 minutes into the bake (10 minutes after the spritz), remove the steam pan CAREFULLY. If your formula calls for reducing the oven temperature 10-20 minutes into the bake, that's a good time.
        - Alternatively, dump plenty of ice cubes into the hot steam pan before loading the bread. Spritz the loaves at 5 minutes in, as described above. Remove the pan at 10-20 minutes into the bake as described above.
- Treat the baking times as a guideline; check for doneness **at least 5-10 minutes before** the shortest baking time in the formula (especially if you have a baking stone above the loaves).
    - Fully baked bread should feel light, and sound hollow when thumped
    - I think it's easier to check for an internal temperature of 198° - 205° F
- Convection for artisan breads:
    - Use only with a dutch oven; convection will vent the steam too fast if the bread is on a baking stone
    - Reduce temp by 25°
    - Check 10 minutes before the earliest end time in the formula
    - Note that the temps below are (usually but not always) based on convection, usually with a dutch oven
- For a crispy crust, shut oven off when the bread has reached the finished internal temp, (usually 198° - 205° F); remove baking stone/dutch oven; move loaf to an oven rack; open oven door a few inches until loaf is cooled, usually about 1 ½ - 2 hours. This vents any steam from the loaf that would otherwise soften the crust,

Resting/Eating

From Hamelman's "Bread", for rye breads:

- Breads with up to 60% rye flour should be eaten in the same way as wheat-based breads: cooled thoroughly (usually ~2 hrs in the cooling oven to keep the crust crusty) and then enjoyed.
- A full 24 hrs of resting allows the crumb to stabilize and firm up and helps the flavors develop fully
- For Vollkornbrot 100% rye (or 80% rye or above) 48 - 72 hrs of resting
    - Best as open-face sandwiches
- After the bake:
    - Leave the bread to cool
    - Then wrap in bakers' linen to allow them to breathe

Bread Schedules

If the baking day is a weekday, set up the oven and dutch oven or baking stones the night before with the oven on a timer to start preheating at 4:00 am the next day (not necessary on weekends or holiday; go for a 7 am start). Wake up at 5:00 am and bake in order to finish baking during super off-peak electricity use hours.

In the schedules below, AM and PM generally mean 0700 and 1900.

2 Day Sourdough Rye

1. Day 1 7 AM - Feed starter culture
2. Day 1 3 PM - Mix sourdough/sponge/levain
3. Day 2 7 AM
    a. Mix final dough
    b. Bulk ferment
    c. Pre-shape, shape, proof, bake

3 Day Yeasted Breads w/ Preferment

1. Thursday (Sunday)
    a. 7 AM - Mix Poolish
    b. 3 PM - Mix final dough, fold, bulk ferment 12 - 24 hours in the fridge
2. Friday (Monday) AM/PM depending on bulk fermentation progress
    a. Pre-Shape, Shape, Proof 1 hr at warm room temp
    b. Retarded proof in fridge overnight
    c. Set up dutch oven and oven timer3 to preheat at 7 am
3. Saturday (Tuesday) AM - Spray with water, apply seeds, score, bake

Alternatively, mix the poolish at 7 pm the evening before and move other steps up by 12 hours.

3 Day Whole Wheat Sourdough for Working People

This schedule works for this bread

Workday 100 Whole Wheat001.pdf

1. Day 1 7 AM - Feed starter culture
2. Day 1 3 PM - Mix sourdough/levain
3. Day 2 7 AM - Mix final dough and bulk ferment
4. Day 2 PM - Pre-shape, shape, retard proof in the fridge
5. Day 3 AM - Bake

4 Day Sourdough w/ Sourdough/Sponge

1. Wednesday (Saturday)
    a. PM - Remove starter from fridge
2. Thursday (Sunday)
    a. AM - Feed rye starter 1:10:10; culture at 85° F in the proofer
        i. 85℉ for doubling by the early afternoon, sometimes close to tripling
        ii. 70℉ for more acetic acid/tangy - sour flavor, but start early and wait for late afternoon/early evening to mix the sourdough
    b. PM - Mix sourdough/sponge/levain
    c. Refrigerate starter
    d. Ferment sourdough/sponge overnight warm room temp (82-85℉ in the proofer for a rye starter and early start; lower temp (70℉) & more time for more sour flavor); look for a dome and bubbles on top
3. Friday (Monday)
    a. AM
        i. Autolyse/fermentolyse per formula, mix final dough,
        ii. Fold, bulk ferment at 82 - 85℉ (for the rye starter) ~2.5 - 4.5 hrs with folds (stretch & fold @ 30 minutes, lamination fold @ 60 minutes, coil folds @ 90 minutes); look for ~30% expansion, wobbly, bubbles on top
    b. PM
        i. Pre-Shape, Shape, Proof 1-2 hr at warm room temp 82 - 85℉ until almost fully proofed by poke test
        ii. Retarded proof in least cold part of fridge overnight
        iii. Set up dutch oven or baking stones and oven timer to preheat at 7 am
4. Saturday (Tuesday)
    a. AM - Spray with water, apply seeds, score, bake

Useful Articles

- Splendid Table Whole Wheat by Chad Robertson
- Whole Grains Council Tips
- Baking Bread with Whole Wheat Flour - abreadeducation.com
- King Arthur Flour Whole Grains Guide
- What Makes Whole Wheat Bread Hard to Bake - Smithsonian Magazine
- American & European Flour Labelling

CIA Whole Wheat Lean Straight Doughs

CIA Whole Wheat Lean Straight Dough 40% WW 70% Hydration

pg 130

Surprisingly tasty when made with white whole wheat flour

Ingredient	Percentage	450g total flour	Notes
			DDT 75° F; TTF 225° F
Whole Wheat Flour	40%	180g	
Bread Flour	60%	270g	
Water	70%	315g	Autolyse 284g + 31g mix
Yeast (instant dry/instant)	0.75%/0.6%	3g	
Salt	2.2%	10g	

1. Autolyse flours with 90% of water, 30 minutes
2. Dissolve salt in remaining water; mix with autolyse and yeast
    a. 1st speed x 3 minutes

    b. 2nd speed x 3 minutes; soft but sufficient gluten development (windowpane)
        i. 3 minutes @ 2nd speed in a commercial mixer => 6 minutes on KA4 in a stand mixer
3. Bulk ferment room temp for 30 minutes and fold; repeat; + 15 minutes room temp or retard
4. Preheat Oven
    a. Start at least 1½ hr before baking (after the last fold)
    b. 50° F hotter than baking temp to allow for steaming and open door
5. Preshape with folds; tuck and turn; rest 15-20 minutes
6. Shape with folds, tuck and turn, tension pulls
7. Proof in banneton/oiled bowl - 45 minutes for room temp fermentation; 3 hrs if retarded bulk fermentation
    a. Poke test - dough springs back slowly but does not collapse
8. Loosen loaf with bowl scraper and gently transfer loaf to peel with parchment paper
9. Boil 2 cups of water
10. Spray loaf with water; garnish with seeds
11. Score loaf
12. Spritz with water or add a ice cubes to the dutch oven
13. Bake in closed dutch oven 470° F for 25 minutes
14. Remove lid bake at 460° F for 10 minutes (check after 5 minutes)
15. Remove loaf to rack and cool 90+ minutes

CIA Whole Wheat Lean Straight Dough adjusted to 50% WW 75% Hydration

Ingredient	Percentage	450g total flour	Notes
Whole Wheat Flour	50%	225g	
Bread Flour	50%	225g	
Water	75%	338g	Autolyse 304g + 34g mix
Yeast (instant dry/instant)	0.75%/0.6%	3g	
Salt	2.2%	10g	

Note: Maybe reduce yeast to 0.2 - 0.4% for overnight retard

1. Autolyse flours with 90% of water, 60 minutes
2. Dissolve salt in remaining water; mix with autolyse and yeast
    a. 1st speed x 5 minutes
    b. 2nd speed x 5 minutes (10 minutes on KA4); soft but sufficient gluten development (windowpane)
3. Bulk fermentation
    a. Room temp for 30 minutes and stretch & fold; repeat with coil folds; + 15 minutes room temp
        i. Add a lamination fold before the 15 minutes rest to incorporate additions, or
    b. Retard in fridge overnight after 1 hour at room temp with folds; use less yeast
4. Flour the board and preshape with folds; tuck and turn; rest 15-20 minutes
5. Shape with folds, tuck and turn, tension pulls
6. Proof in banneton/oiled bowl
    a. 45 minutes after room temp bulk fermentation
    b. 3 hrs if retarded bulk fermentation
    c. Poke test - dough springs back slowly but does not collapse
7. Preheat Oven
    a. Start at least 1½ hr before baking
    b. 50° F hotter than baking temp to allow for steaming and open door
8. Loosen loaf with bowl scraper and gently transfer loaf to peel with parchment paper
9. Boil 2 cups of water - kettle rather than microwave for a full boil

10. Spray loaf with water; garnish with seeds
11. Score loaf with one corner of the lame
12. 1st cup of water in oven tray
13. Load loaf on to baking stone
14. 2nd cup of water in oven tray
15. Bake 500° F for 20 minutes
16. Rotate loaf and reduce temp to 450° F for 30 minutes
    a. Reduce temp if loaf is very dark
17. Remove loaf to rack and cool 90+ minutes

CIA Whole Wheat Lean Straight Dough adjusted to 60% WW 80% Hydration

Ingredient	Percentage	450g total flour	Notes
Whole Wheat Flour	60%	270g	
Bread Flour	40%	180g	
Water	80%	360g	Autolyse 324g + 36g mix
Yeast (instant dry/instant)	0.75%/0.6%	3g	
Salt	2.2%	10g	
Olive Oil (for pizza dough)	5%	23g	Pizza dough or focaccia

Note: Maybe reduce yeast to 0.2 - 0.4% for overnight retard

18. Autolyse flours with 90% of water, 60 minutes
19. Dissolve salt in remaining water; mix with autolyse and yeast
    a. 1st speed x 5 minutes
    b. 2nd speed x 5 minutes; soft but sufficient gluten development (windowpane)
20. Bulk fermentation
    a. Room temp for 30 minutes and fold; repeat; + 15 minutes room temp, or
    b. Retard in fridge overnight after 1 hour at room temp with folds; use less yeast
21. Flour the board and preshape with folds; tuck and turn; rest 15-20 minutes under plastic wrap
22. Shape with folds, tuck and turn, tension pulls
23. Proof in banneton/oiled bowl
    a. 45 minutes after room temp bulk fermentation
    b. 3 hrs if retarded bulk fermentation
    c. Poke test - dough springs back slowly but does not collapse
24. Preheat Oven
    a. Start at least 1½ hr before baking
    b. 50° F hotter than baking temp to allow for steaming and open door

25. Boil first cup of water and steam hot oven
26. Loosen loaf with bowl scraper and gently transfer loaf to peel with parchment paper
27. Boil 2nd cup of water
28. Spray loaf with water; garnish with seeds
29. Score loaf with one corner of the lame

30. Load loaf on to baking stone
31. 2nd cup of water in oven tray
32. Bake 450° F (w/convection) for 35 minutes
    a. Rotate after 10 minutes to avoid dark spots
    b. Reduce temp if loaf is very dark
33. Open oven a crack and bake 450° F for 15 minutes
34. Remove loaf to rack and cool 90+ minutes

CIA Whole Wheat Doughs with Poolish (and adaptations)

50% Whole Wheat 70% Hydration 33% Poolish

CIA Baking and Pastry pg 155

DDT = 79° F

Ingredient	Percentage	Total Flour 450g	Notes
Poolish			
Whole Wheat Flour	33%	150g	
Water	33%	150g	CIA has 35.3%. Maybe because of whole wheat
Instant Yeast		Pinch	See poolish yeast % in General Tips above; depends on poolish fermentation time and room temp
Final Dough			
Bread Flour	50%	225g	Or high gluten
Whole Wheat	17%	75g	In addition to poolish
Instant Yeast	0.34%	1.5g	**Reduce to 0.22% if also using an overnight retarded fermentation**
Poolish	66%		33% of the flour
Water	37%	165g	
Salt	1.9%	9g	

1. Mix poolish at 75° F by hand; cover and ferment at 75° F 10-15 hours until bubbly, frothy, just starting to recede
2. Add all water to poolish, break it up, and add all remaining ingredients. Incorporate only (4 min speed 1), and let soak for 30 minutes instead of autolyse (KAF method)

3. Mix 4 minutes speed 2 (Kitchenaid 6) dough should be moist with strong gluten development.
4. Bulk ferment 30 minutes and fold gently. Add olives/garnish here, if using. Bulk ferment another 30 minutes
5. Preheat oven 520 °F 1.5 hours before baking (after bulk ferment fold)
6. Preshape (light flour on board and hands to avoid sticking, folds and tuck-and-roll), rest 15 minutes
7. Shape (folds, tuck and roll, tension pulls)
8. For seeds, touch top on damp towel and then in tray of seeds
9. Proof in floured (non-gluten) banneton or couche 1 hr
10. Boil water for steam
    a. Or preheat dutch oven and lid
11. Transfer to peel and presteam oven (ice cubes in small preheated pan)
12. Score, load oven, and steam (boiling water in heavy preheated pan)
13. Bake at 470° F 15 minutes (CIA says 35 minutes total)
14. Rotate 180° degrees; bake 15 minutes
    a. Or bake in closed dutch oven 15 minutes @ 500°F
    b. Remove dutch oven lid and bake 15 min @ 475° F
    c. Open oven a crack and bake 10 minutes until dark
15. Open oven a crack and bake 10 minutes to crumb temp 210° F; dark crust, feels light
16. Cool on a rack 2 hrs

66% Whole Wheat 75% Hydration 33% Poolish

Adapted from CIA Baking and Pastry pg 155

DDT = 79° F

Ingredient	Percentage	Total Flour 450g	Notes
Poolish			
Whole Wheat Flour	33%	150g	
Water	33%	150g	CIA has 35.3%. Maybe because of whole wheat
Instant Yeast		Pinch	See poolish yeast % in General Tips above; depends on poolish fermentation time and room temp
Final Dough			
Bread Flour	33%	150g	I used high gluten
Whole Wheat	33%	150g	In addition to poolish
Instant Yeast	0.34%	1.5g	**Reduce to 0.22% if also using an overnight retarded fermentation**
Poolish	66%		33% of the flour
Water	42%	188g	169g in autolyse + 19g to dissolve salt for mix; CIA shows 39.7% for 75% overall hydration
Salt	1.9%	9g	

1. Mix poolish at 75° F by hand; cover and ferment at 75° F 10-15 hours until bubbly, frothy, just starting to recede
2. Add water to poolish (hold back 10% of water for dissolving salt); add remaining flours and mix for autolyse, 30 minutes room temp (not in CIA formula).
    i. Or, add all water to poolish, break it up, and add all remaining ingredients. Incorporate only, and let soak for 30 minutes instead of autolyse.

3. Add salt, remaining water, and yeast; mix 4 minutes at speed 1 + 4 minutes speed 2 dough should be moist with strong gluten development (see 2i above; speed 2 after 30 minute soak).
4. Bulk ferment for 30 minutes and fold gently. Add olives/garnish here, if using. Bulk ferment another 30 minutes
5. Preheat oven 520 °F 1.5 hours before baking (after bulk ferment fold)
6. Preshape (light flour on board and hands to avoid sticking, folds and tuck-and-roll), rest 15 minutes
7. Shape (folds, tuck and roll, tension pulls)
8. For seeds, touch top on damp towel and then in tray of seeds
9. Proof in floured (non-gluten) banneton 1 hr
10. Boil water for steam
11. Transfer to peel and presteam oven (ice cubes in small preheated pan)
12. Score, load oven, and steam (boiling water in heavy preheated pan)
13. Bake at 470° F 15 minutes (CIA says 35 minutes total)
14. Rotate 180° degrees; bake 15 minutes
15. Open oven a crack and bake 10 minutes to crumb temp 210° F; dark crust, feels light
16. Cool on a rack 2 hrs

75% Whole Wheat 85% Hydration 33% Poolish

DDT = 79° F

Ingredient	Percentage	Total Flour 450g	Notes
Poolish			
Whole Wheat Flour	33%	150g	
Water	33%	150g	
Instant Yeast			See poolish yeast % in General Tips above; depends on poolish fermentation time and room temp; 16 hr cool temp 0.3 × ⅛ tsp.
Final Dough			
Bread Flour	25%	112g	I used high gluten; bread flour possibly better
Whole Wheat	42%	188g	In addition to poolish
Poolish	66%		33% of the flour; 39% of the water
Water	52%	233g	
Instant Yeast	0.34%	1.5g	**Reduce to 0.22% if also using an overnight retarded fermentation**
Salt	1.9%	9g	
Garnish (optional)	Max 15%	Max 67g	Rinse olives to reduce salt

1. Mix poolish at 75° F by hand; cover and ferment at 75° F 10-15 hours until bubbly, frothy, just starting to recede
2. Add remaining ingredients (except garnish) to poolish (may be easiest to mix with water first) and mix, just to incorporation
3. Rest 30 minutes covered
4. Develop gluten with your preferred method; dough should be moist with strong gluten development
    a. Mix 4 minutes (or less; mix too long and you get a closed crumb) @ 2nd speed (4 on Kitchenaid stand mixer)
    b. 10 minutes Rubaud's method (slap and fold in a bowl, more or less)

5. Bulk ferment 30 minutes and fold gently. Add olives/garnish here, if using. Bulk ferment another 30 minutes and fold. Then 1 more hour and fold gently
    a. Move to the fridge overnight or
    b. Room temp bulk fermentation another 3-4 hours (5-6 hrs total); fold gently twice more during that time
6. Preheat oven (and dutch oven if using) to max temp (550° F w/ convection) 1 hour before baking
    a. If baking on a stone, preheat 2 pans for steam before loading and after loading
7. Preshape (light flour on board and hands to avoid sticking, folds and tuck-and-roll), rest 20 minutes
8. Shape (folds, tuck and roll, tension pulls)
9. Proof in floured (non-gluten) banneton/bowl 1-2 hr; start checking proof at 30 min and every 15 min thereafter. Do not be surprised if it's ready to go at 30-45 minutes.
10. Boil water for steam if baking on a stone
11. Transfer to peel and presteam oven
12. Mist, score, load oven, and steam (boiling water in heavy preheated pan)
13. Bake at 500° F (475° F w/ convection) 20 minutes
14. Rotate 180° degrees; bake 15 minutes
    a. Remove dutch oven lid if using; no need to rotate
15. Open oven a crack and bake 10 minutes to crumb temp 210° F
16. Turn oven off, remove stone/dutch oven, and cool on oven rack with door open a crack to vent moisture

80% Whole Wheat 90% Hydration 33% Poolish

This makes a very wet, soft dough. Use as much bench flour as you need (lots) for preshaping and shaping to avoid stickiness. Move the proofed dough carefully from the banneton/couche to the board/peel to the dutch oven to keep shape.

Some extra time for the poolish and bulk fermentation adds a lot of flavor.

DDT = 79° F

Ingredient	Percentage	Total Flour 450g	Notes
Poolish			
Whole Wheat Flour	33%	150g	
Water	33%	150g	
Instant Yeast		Pinch	See poolish yeast % in General Tips above; depends on poolish fermentation time and room temp; 16 hr cool temp 0.3 × ⅛ tsp.
Final Dough			
Bread Flour	20%	90g	I use high gluten
Whole Wheat	47%	210g	In addition to poolish
Poolish	66%		33% of the flour; 37% of the water
Water	57%	255g	
Instant Yeast	0.34%	1.5g	**Reduce to 0.22% (1g) if also using an overnight retarded fermentation**
Salt	1.9%	9g	
Garnish (optional)	Max 15%	Max 67g	Rinse olives to reduce salt

1. Mix poolish at 75° F by hand; cover and ferment at 75° F 10-15 hours until bubbly, frothy, just starting to recede
2. Add remaining ingredients (except garnish) to poolish (easiest to mix with water first) and mix, just to incorporation
3. Rest 30 minutes covered

4. Develop gluten with your preferred method; dough should be moist with strong gluten development
    a. Mix 4 minutes (or less; mix too long and you get a closed crumb) @ 2nd speed (4 on Kitchenaid stand mixer). 3 min 1st speed + 3 min 2nd speed plus repeated folding (see below) to mix in garnish seems to work well.
    b. 10 minutes Rubaud's method (slap and fold in a bowl, more or less)
5. Bulk ferment 30 minutes and fold gently. Add olives/garnish here, if using. Bulk ferment another 30 minutes and fold. Then 1 more hour and fold gently
    a. Move to the fridge overnight (1-3 days; 1.5 days seems to add a lot of flavor) or
    b. Room temp bulk fermentation another 3-4 hours (5-6 hrs total); fold gently twice more during that time
6. Preheat oven (and dutch oven if using) to 500° F w/ convection 1 hour before baking
    a. If baking on a stone, preheat 2 pans for steam before loading and after loading
7. Preshape (light flour on board and hands to avoid sticking, folds and tuck-and-roll), rest 20 minutes
8. Cut off a small piece of dough for the proof-o-meter
9. Shape (folds, tuck and roll, tension pulls)
10. Proof in floured (non-gluten) banneton/bowl or on a supported couche 1-2 hr; start checking proof at 30 min and every 15 min thereafter. Do not be surprised if it's ready to go at 30-45 minutes.
11. Boil water for steam if baking on a stone
12. Transfer to peel and presteam oven
13. Mist, score, load oven, and steam (boiling water in heavy preheated pan)
14. Bake at 450° F w/ convection 20 minutes (Dutch oven covered)
15. Rotate 180° degrees; bake 15 minutes
    a. Remove dutch oven lid if using; no need to rotate
16. Open oven a crack; bake 10 minutes to dark crust and crumb temp 210° F
17. Turn oven off, remove stone/dutch oven, and cool on oven rack with door open a crack to vent moisture for crispy crust

Miscellaneous Whole Grain Breads

King Arthur Flour Baking School Whole Wheat Sesame Bread

50% Whole Wheat 75% Hydration 20% Poolish

Adapted from KAF Whole Wheat Sesame Bread

DDT 75-78° F

Ingredient	Percentage	Total Flour 450g	Notes
Poolish			
Whole Wheat Flour	20%	90g	Original recipe uses AP flour in the poolish
Water	20%	90g	
Instant Yeast		Pinch for overnight room temp	See poolish yeast % in General Tips above; depends on poolish fermentation time and room temp
Final Dough			
AP Flour	50%	225g	KAF AP is as strong as most bread flour
Whole Wheat	30%	135g	In addition to poolish
Instant Yeast	0.4%	1.8g	
Poolish	40%		20% of the flour
Water	55%	248g	
Salt	2%	9g	
Toasted Sesame Seeds	10%	45g	Optional, if you want the KAF WW Sesame Bread

1. Make the poolish - combine flour, water, and yeast, cover and ferment at room temperature
2. Add the remaining water to the poolish and chop it up for more even incorporation.

3. Add the remaining ingredients and check hydration (add water if necessary to make the dough come together). Rest the dough. covered, 15 minutes (maybe 20-30) in place of an autolyse.
4. Knead to smooth and elastic
5. Bulk ferment 2 hours with a fold after 1 hour.
6. Preshape and rest 20 minutes
7. Shape into boule or bâtard and proof until risen and airy, 60-90 minutes.
8. Preheat oven with baking stone, small pan and large pan on the bottom to 500°F
9. When ready to bake (early, for the oven spring), boil 1 cup of water, pre-steam the oven with ice cubes in the small pan, score the loaf, place on the stone, add hot water to the big pan.
10. Bake 15 minutes at 450℉ (w/convection), reduce temp to 425°F, and bake until crusty and golden, about 20 minutes

73/93 Breadtopia Open-Crumb Whole Wheat Sourdough

See full article at How to Get Open Crumb with Whole Grain

The most interesting points in the article are these:

- The very high hydration - 93% + hydrated sourdough starter
- Mix 2.5 minutes to incorporation, rest 5 minutes, then 2.5 minutes mechanical or Rubaud (no time specified)
- Bulk ferment at room temp with folds at 30 - 90 - 150 minutes and then into the fridge overnight
- Photos of bâtard shaping with stitching

80% Whole Wheat + Rye @85% Hydration

My own personal experiment. It seems to get better oven spring with the double-size loaf here.

DDT = 75°F

Ingredient	Percentage	Per 900g Flour	Notes
Poolish			
Whole Wheat Flour	33%	300g	
Water	33%	300g	
Yeast	.03% - .08% of poolish flour	.09g - .24g, ie, a small pinch	16 hr poolish; mix in the late afternoon, finish the dough the next morning
Final Dough			
Poolish	100% of poolish		
Whole Wheat Flour	60% of total flour	240g	
Rye flour	20% of total flour	180g	
Bread Flour	20% of total flour	180g	Or high gluten flour to provide gluten lacking in the rye or cut up by the bran in the whole wheat
Water	85% of total flour (including water in poolish)	465g	Adjust hydration while mixing if necessary. Try 90% 510g
Salt	2%	18g	
Yeast	0.34%	3g	For overnight bulk fermentation, reduce yeast to 0.22% / 2g
Garnish (optional)	10-15%	90 - 135g	Seeds, onion, olives (rinse because of salt in olive brine), etc.

1. Mix poolish; let stand covered tightly 12-16 hr at room temp
2. Scale and mix the flours so that they are uniformly distributed
3. Add poolish, water, salt, yeast and mix just to incorporation. Let stand 30 minutes for flours to hydrate in place of autolyse

4. Mix all ingredients 3 min at 1st speed; adjust hydration as needed; then 3 min at 2nd speed (#4 on Kitchenaid stand mixer); dough should be supple and lively to the pull with gluten moderately developed
5. Bulk ferment at room temp with folds at 30, 60, 120 minutes
    a. Lamination fold at 30 minutes; add garnishes, eg olives, if using
6. Finish bulk fermentation 3 more hrs at room temp or, better, overnight in the fridge
7. Preshape, bench rest 20 min; place a sample in the proof-o-meter, handle gently and shape and place in banneton or couche
8. Preheat oven (with dutch oven if using) to 500° F (475℉ with convection)
9. Proof 1 - 1.5 hrs; check with poke test starting at 30 min and every 15 min after; avoid overproofing; bake on the way up
10. Mist; add seeds; score; presteam and steam oven or bake in a Dutch oven
11. Bake at 450° F (425℉ with convection) ; 20 min - uncovered 20 min - 20 min oven open a crack
    a. Bake to an internal temp 205-210℉
    b. Bake longer/darker for a harder crust
    c. Remove from Dutch oven; turn oven off; cool in oven with door open (for a crusty crust) at least 90 minutes

Heirloom Dixie Rye

https://theryebaker.com/dixie-rye-bread-united-states

82% whole rye at 85% hydration with commercial yeast and a cornmeal scald; baked in a loaf pan.

Heirloom Dixie Rye (United States) - THE RYE BAKER.pdf

Salty Rye Rolls

From “The Rye Baker”. 56% rye @62% hydration; commercial yeast
3 hours start to finish

Salty Rye Rolls.pdf

Sunflower Seed Rolls

From “The Rye Baker” 57% rye; commercial yeast

Sunflower Seed Rolls001.pdf

Sourdough & Discard

These formulas typically use a levain/sponge/sourdough as a pre-ferment and result in sourdough culture discard; usually the levain does not use all the culture (which would be replaced by part of the levain before mixing the final dough). An alternative that creates no discard would be to refresh the culture 8 hours ahead of mixing by adding flour and water equal to the weight of the levain. Go right to the final dough using part of the starter culture in place of the levain. There is no discard, but you lose the flexibility to customize the levain. My preference is to collect the discard in a container in the fridge and periodically make one of the discard recipes - cornbread, muffins, pancakes, crepes, etc.

B & T Country Sourdough

From the Brød & Taylor Proofer recipes. With whole wheat in the levain, 27% whole grain @ 68% (probably 70% with the extra whole grains) hydration.

Ingredient	**Percentage**	**Per 466g Flour**	**Notes**
Levain			
Whole Wheat Flour	70%	50g	Original says 12% protein unbleached flour, presumably bread flour but try whole wheat to increase the whole grains
Dark/Whole Rye Flour	30%	20g	
Water	54%	38g	Adjust as needed
Starter	26%	18g	
Final Dough			
Levain	32%	126g	
Bread Flour	86%	341g	Unbleached, 12% protein

Whole Wheat Flour	14%	55g	10% of total flour
Water	71%	281g	68% overall hydration; adjust as needed
Salt	2%	9g	

1. Day 1 Morning: Feed starter and leave at room temp
2. Day 1 Evening: 12 hrs later, Feed starter and leave at room temp
3. Day 2 Morning: Feed starter and leave at room temp
4. Day 2 Evening: 12 hours later build levain
    a. Cover and proof at 80℉ 12 hrs (for a wheat starter; 14-16 hrs for a rye starter) until 2.5x rise (based on white rather than WW flour, so probably less). Check like a poolish for a dome and bubbles on top
    b. Instead of the levain, consider Day 2 feeding 8g at 1:10:10 and then mixing the final dough with 130g of mature starter instead of the levain. Compensate for the lack of gluten in the rye starter by using all bread flour in the final dough.
5. Day 3 Morning:
    a. Set proofer to 85℉ with 84-90℉ water in the tray
    b. Mix final dough and autolyse:
        i. Mix flours, add water, and mix to moisten flour
        ii. Make a well in the dough, add the levain, cover with dough without mixing, and autolyse 30 minutes; this softens a stiff levain for hand mixing and equalizes the temperatures
        iii. Add salt, mix to incorporate salt and levain; gentler mixing because of the rye - try lots of folds rather than Rubaud Method
        iv. Folds to build some strength
    c. Bulk ferment 2.5 - 3.5 hrs at 85℉
        i. Folds at 30 (stretch & fold) - 60 (lamination) - 90 (coil fold) minutes
        ii. Volume should reach 1 liter with some wobble, bubbles, and a dome
    d. Preshape with 2 tension pulls (more will reduce extensibility for a a batard), bench rest 20 min; place a sample in the proof-o-meter, handle gently and shape (stitches for batard) and place in lined and dusted bowl or banneton
    e. Proof at 79℉ 2 - 2.5 hrs until passing the poke test
        i. Proof fully (but not overproofed) and proceed to bake or
        ii. Proof a little short (possibly 1 hr), place banneton/bowl with dough in a plastic bag and refrigerate overnight
    f. Preheat oven with dutch oven to 475℉ with convection
    g. Mist; add seeds; score; bake in a Dutch oven
    h. Bake at 425° F with convection 20 min - uncovered 20 min at 410℉ and check internal temp - 10 min with oven open a crack
        i. Bake to an internal temp 205-210℉
        ii. Bake longer/darker for a harder crust

Remove from Dutch oven; turn oven off; cool in oven with door open (for a crusty crust) at least 90 minutes.

Mixed Flour Sourdough Miche - “Bread” 2nd edition

Adapted from Hamelman’s Mixed Flour Miche; changed to single loaf size with additional high gluten flour to offset a rye starter and 100% whole wheat vs high extraction. 60% whole grain, 83% hydration not counting the rye starter.

DDT = 76°F

Ingredient	**Percentage**	**Per 500g Flour**	**Notes**
Levain			
Whole Wheat Flour	50% of levain flour	50g	10% of total flour
Dark Rye Flour	50% of levain flour	50g	10% of total flour
Water	70% of levain flour	70g	
Starter	20% of levain flour	20g	20% prefermented flour
Final Dough			
Levain	100% of levain	190g	
Whole Wheat Flour	50% of dough flour	200g	40% of total flour
Rye flour	12% of dough flour	50g	10% of total flour
High Gluten Flour	38% of dough flour	150g	30% of total flour
Water	85% of total flour	345g	Adjust hydration while mixing if necessary.
Salt	2%	9g	
Garnish (optional)	10-15%	50 - 75g	Seeds, onion, olives (rinse because of salt in olive brine), etc.

6. Day 1 Morning: Feed starter and leave at room temp
7. Day 1 Evening: 12 hrs later, Feed starter and leave at room temp
8. Day 2 Morning: Feed starter and leave at room temp
9. Day 2 Evening: 12 hours later build levain, cover leave at room temp; use a cold oven to avoid drafts
10. Day 3 Morning:
    a. Mix final dough flours and water and autolyse 2 hours

b. Add levain and salt, yeast and mix
    i. 10 minutes Rubaud;s method, 10 minute rest, more Rubaud or folds as needed or
    ii. Mix 2 - 3 min at 2nd speed (#4 on Kitchenaid stand mixer); gluten moderately developed
c. Bulk ferment at room temp 2 ½ hours in oven at proofer temp with folds every 30 minutes
    i. Lamination fold at 30 minutes; add garnishes, eg olives, if using
d. Preshape, bench rest 20 min; place a sample in the proof-o-meter, handle gently and shape and place in banneton or couche
e. Preheat oven with dutch oven to 500° F (475℉ with convection)
f. Proof 1 - 1.5 hrs; check with poke test starting at 30 min and every 15 min after; avoid overproofing; bake on the way up
g. Mist; add seeds; score; bake in a Dutch oven
h. Bake at 450° F (425℉ with convection) ; 20 min - uncovered 20 min - reduce heat 25℉ bake 20 min oven open a crack
    i. Bake to an internal temp 205-210℉
    ii. Bake longer/darker for a harder crust

Remove from Dutch oven; turn oven off; cool in oven with door open (for a crusty crust) at least 90 minutes. Wait 12 hours before slicing.

Mixed Flour Sourdough Miche - “Bread” 3rd Edition

This version uses buckwheat flour and recommends bassinage to help develop the gluten. With the suggested substitution for Type 80 wheat flour, the formula will be 65% whole grain.

mixed flour miche002.pdf

For 10% of the metric quantity use 1.5X the amount of sourdough starter (23g instead or 15g). Be careful not to overhydrate or the dough won’t have any strength.
Remove dutch oven lid after 20 minutes and turn the temp down from 470 F to 440 F. Check for doneness after another 20 minutes.

Sourdough Rye

On Scalds and Scalding

https://theryebaker.com/on-scalds-and-scalding or
On Scalds and Scalding - THE RYE BAKER.pdf

Russian and Baltic formulas with scalds often call for red rye malt; in Russia the original GOST (Soviet standards board) formula calls for fermented red rye malt (solod), which can be hard to find in the USA and expensive. Several websites and videos explain how to make your own with rye grain; this apparently takes a couple of weeks at least. "The Rye Baker" and "Bread" call for red rye malt (malted rye grain from a brewing supply store, toasted dark red in a pan or oven, and ground).

"Mariana" posting at The Fresh Loaf says that unfermented rye malt is nothing like the real thing. She recommends using liquid **rye** malt extract (barley and wheat extracts seem to be more common but don't have the right flavor for rye bread). Adjust the formula if using liquid rye malt extract:

- Add rye flour equal to the weight of the red rye malt in the formula
- For the liquid rye malt extract, use the weight of the red rye malt in the formula, increased by ⅓.
- Don't scald the liquid rye malt extract

Borodinsky Bread

From "The Rye Baker"

80% rye (65% medium rye; 15% pumpernickel)

Two days to make: Evening 1 sponge and scald; day 2 multiple steps with long breaks in between for the dough to rise. The 2nd day work takes longer than usual for most breads, and there's not even any pre-shaping or shaping.

Borodinsky Bread.pdf

Black Rye Bread - Lithuania

From https://theryebaker.com/black-rye-breadjuoda-rugine-duona-lithuania/

90% whole rye @ 74% hydration with a red rye malt scald. Try substituting an equal weight of molasses for the sugar and honey, for less sugar and an even darker crumb.

Very similar to Riga Rye, but in Lithuania they spread the work over a day and a half - morning, evening, and morning. The sponge also uses a more typical 10g of starter (vs 100g for a double loaf of Riga Rye) and room temperature for fermenting and proofing. This formula is also for one 971g loaf, vs the 2,200g double-size loaf in Riga.

Black Rye Bread (Lithuania).pdf

Riga Rye

From “The Rye Baker”

89% rye including malted rye and molasses; 60% hydration. One day 15-16 hour process start to finish (with breaks and a 2-3 day rest afterwards); uses 100g of starter so make extra at the previous refresh. Also requires a 100° F proofer or oven and a 145° F proofer or oven at the

same time for the sponge and the scald, respectively. And the scald uses rye malt. But it makes a beautiful dark rye loaf.

Riga Rye.pdf

Old School Deli Rye

The instructions are a bit unclear. Try 40% Caraway Rye instead.

From “The Rye Baker”
Old School Deli Rye001.pdf

40% Caraway Rye

From “Bread”, 2nd edition.

40% rye (medium or whole rye) + 60% high gluten flour. Overnight sponge; finish the next day. Note that the metric formula uses **fresh** yeast - use ⅓ of this weight for instant dry yeast. Hamelman says that this makes nice rolls or salt sticks.

40 Percent Caraway Rye and Whole-Rye & Whole-Wheat Bread.pdf

Whole-Rye & Whole-Wheat Bread

50% high-gluten flour and 25% each rye and whole wheat at 68% hydration;
Essentially the same as the 40% Caraway Rye but with 50% whole grains, split between rye and whole wheat.

40 Percent Caraway Rye and Whole-Rye & Whole-Wheat Bread.pdf

Jewish Bakery Pumpernickel

From “The Rye Baker”
42% rye; 2 days to bake. Very light rye flavor, with a little sweetness from long cool fermentations and a bit chewy with high gluten flour - use bread flour for a softer crumb. For more rye flavor, add more rye and water and reduce the high gluten flour.

Replace formula water with coffee for dark rye, including 20g of coffee to replace the caramel color. Or, better, use a formula with rye malt.
Jewish Bakery Pumpernickel001.pdf

Cumin Rye

70% rye: 2 days to bake. One ancestor of deli rye from Poland; more rye flavor with medium rye than the light in the formula, but the crumb will be tight. Formula makes one 800g loaf; double it for two loaves or a double-size loaf.

Cumin Rye001.pdf

Sweet-Sour Rye

From"The Rye Baker".

74% rye - mostly pumpernickel plus medium rye at 80% hydration. Uses apple cider as the liquid, except for the sponge, which uses water as usual.

The sponge instructions are ambiguous; I think there's a typo. Start in the morning per the instructions but ignore the instruction to ferment overnight. Make the scald-sponge that evening (or late afternoon) and ferment overnight 14-18 hours (more than the usual 10-12 hours) before mixing the final dough.

Sweet - Sour Rye.pdf

Provençal Rye

From "The Rye Baker" Pain de Seigle Sisteron; said to be good with lamb dishes
54% Medium rye with AP flour @ 72% hydration
2 days to make
Formula makes 1 loaf. If you double it, make sure to double the rye starter feed on the morning of Day 1: 14g starter +140g whole rye + 140g water before making the levain in the evening.

Provencal Rye001.pdf

Ryebatta Bialys

From [Martin Phillp](), successor to Jeffrey Hamelman at King Arthur Baking.
35% rye; 85% hydration; sourdough and yeast. 8 bialys of 90g each. 1 ½ days:

- Day 1 AM feed starter
- Day 1 PM Mix poolish and rye sourdough
- Day 2 AM Mix final dough, ferment, shape, proof, bake; 4-5 hrs

Substack Original
Ryebatta Bialys - by Martin Philip - The Sassafras Curio.pdf

Frisian Black Bread

From “The Rye Baker”

50% medium rye @ 88% hydration; 2 days plus a 2 hrs to set completely
Add additional water to the stage 2 sponge if needed to get the heavy batter described by the formula.

Mixing a double batch requires a 10 liter pot.

Frisian Black Bread001.pdf

Berliner Landbrot

The Rye Bake Blog - Berliner Landbrot
Berlin Rye_Berliner Landbrot - THE RYE BAKER.pdf

Berlin Cobbler Boys

100% rye rolls from “The Rye Baker”
Use 3-5g water instead of malted barley syrup, to skip the sugar. Using coarse rye meal (pumpernickel) instead of light rye yields a tasty, dense roll.

Berlin Cobbler Boys.pdf

Bread Spice

The Franconia Crusty Boule and Paderborn Rye below use German bread spice (Brotgewürz). Here’s the formula from “The Rye Baker”:

- Caraway seeds 10g
- Anise seeds 6g
- Fennel seeds 6g
- Coriander seeds 2g

Toast the seeds in a skillet over medium heat moving constantly unto fragrant, 2-3 minutes. Store in an airtight container in the freezer.

Franconia Crusty Boule

50% medium rye 40% dark rye 10% whole wheat @ 70% hydration

From “The Rye Baker”.
This is 100% whole grain: medium and dark rye and whole wheat. I don’t have the palate to pick up the subtleties of the 3 rye sponges plus the wheat sponge and rye soaker, but the bread spice just shows up in a nice way. It is dense and moist, as promised in the book.

As usual, don’t do a retarded proof with this high rye percentage bread.

Note that in the formula under Final Dough the text says 400g medium rye; in the overall percentages at the end it says 400g dark rye. Use the dark rye in the final dough, maybe pumpernickel for texture and flavor.

The schedule that results in a morning final dough, shape, proof, and bake is this:

- Day 1 PM - Rye Sponge 1
- Day 2 AM - Rye Sponge 2 + Rye Soaker
- Day 2 PM - Rye Sponge 3 + Wheat Sponge
- Day 3 AM - Final Dough, Shape, Proof, Bake, about 4 hours

Franconia Crusty Boule001.pdf

Paderborn Rye

From “The Rye Baker”

Medium and light rye; tasty but not good with retarded fermentation. Note that the original formula from “The Rye Baker” uses bread spice (easy to mix your own) and makes only one pan loaf. You should be able to double it if you have two loaf pans.

Paderborn Rye001.pdf

Muscovite Rye

https://theryebaker.com/muscovite-rye/

69% medium rye @ 67% hydration 10 hrs start to finish
One double loaf will fit in one of our loaf pans
Muscovite Rye_Podmoskovny Rye (Russia) - THE RYE BAKER.pdf

Black Bread of Val d'Aosta

From "The Rye Baker"

67% medium rye at 58% hydration. It can finish mixing (pulling away from the sides of the bowl) in half the time in the formula. Stop at that point, do some manual pre-shaping/shaping before proofing, and you'll get much better oven spring.

Black Bread of Val d Aosta001.pdf

Auvergne Rye Tourte de Seigle

100% dark rye 2 sponges 90% hydration
https://theryebaker.com/sourdough-tourte-de-seigle
The Tourte de Seigle spreads out to make a pretty low volume loaf.

Sourdough Auvergne Rye Loaf_Tourte de Seigle (France) - THE RYE BAKER.pdf

This video makes a similar bread with a very different technique Auvergne Rye Tourte Video.

- Don't divide or try to shape the dough; use a bowl scraper to transfer the fermented dough directly to one large very well floured banneton
- Proof 15 minutes in the banneton
- Bake with lots of steam in the falling oven per the formula

Auvergne Rye-Wheat Boule

Pain de Méteil d'Auvergne from "The Rye Baker"; 50-50 medium rye (a bit too dense with dark/whole rye; maybe OK with higher hydration) and wheat flour.
Use whole wheat flour in the wheat sponge to increase whole grain percentage from 50 to 60%.. Use bread flour rather than AP for more oomph; add a few tablespoons of water for the stronger flour. Do the final proof in a round banneton.
600g flour, about 1.5 loaves; could be doubled.

Auvergne Rye-Wheat Boule001.pdf

Dithmarsch Cabbage Rye

Straight dough From "The Rye Baker"

Simple and tasty; makes moist rolls. Works nicely with kim chee instead of the cabbage and scallions.

Dithmarsch Cabbage Rye.pdf

Rye Miche

From “Bread” 3rd edition.

100% rye; half whole rye, half medium rye. 78% hydration 2 days.
Check for doneness 10 minutes before earliest end baking time. 100% rye delivers a tight, almost dense crumb and a strong, hearty flavor. Delicious with strongly flavored toppings - lox, strong cheeses, etc. Great for rye lovers.

Rye Miche.pdf

Whole-Rye and Whole-Wheat

“Bread” 2nd edition

50% whole grain pain de méteil

whole-rye and whole-wheat001.pdf

Detmolder 3 Stage 90% Rye

“Bread” 3rd edition
40% whole rye / 50% medium rye @ 79% hydration

3 day approximate schedule to allow for promoting yeast, acetic acid, and lactic acid, baking at off-peak electricity rates (if that’s not an issue, extend the basic sour to the full 24 hrs at a lower temp), and fully setting the baked loaf:

1. Day 1 0700 Freshening to promote yeast; 150% hydration 6 hrs at 78 F
2. Day 1 1400 Basic sour for acetic acid; stiff rye malt 60-65% hydration 17 hrs at 79 F
3. Day 2 0700 Full sour for lactic acid 100% hydration 4 hrs at 85 F
4. Day 2 1100 Mixing and bulk fermentation 15 minutes at DDT 83 F
5. Day 2 1130 Shape and proof 1 hr at 82 F
6. Day 2 1300 Bake 1 hr and cool/rest 24 hrs
7. Day 3 1400 Slice and enjoy

Detmolder 3 stage 90 percent rye001.pdf

66% Sourdough Rye

“Bread” 3nd edition
Pain de Seigle, in France

Max rye percentage for rolls

66 Percent Sourdough Rye001.pdf

80% Sourdough Rye With Rye-Flour Soaker

80% Rye WIth Rye Soaker
“Bread” 3rd edition

A hearty 80% whole rye with a hint of sweetness from the soaker. There’s a typo in the sourdough formula metric amount. 3.5 kg should be 35g. If you divide the large batch by 10, increase the culture amount to 44 - 53g. This 1.5x increase in the amount of culture plus 10

minutes more proofing time will usually eliminate the need for adding commercial yeast in the mixing stage.

- Divide the metric batch by 10 for a double loaf
- Use 1.25 - 1.5x the sourdough culture in the metric formula for a home-sized batch (44-55g)
- Shape round per the formula; ovals will flatten out

. 80 percent with rye soaker001.pdf

Leinsamenbrot

From “Bread”, 3rd ed.

60% Medium or whole rye with flaxseeds (Leinsamen) at 75% hydration

Ground flaxseeds have a noticeable flavor.

leinsamenbrot.pdf

The photos are for pumpernickel flour and ground golden flax seeds @ 80% hydration with the optional yeast

Black Bread

From “Bread” 3rd ed

60% medium rye @ 68% hydration, with old bread and coffee to enhance the color. It’s not noticeably darker but does have a deep rich rye flavor.

Black Bread

Sourdough Rye w/Multigrain Soaker

From https://www.thefreshloaf.com/node/32972/rye-sourdough-spelt-and-soaker

Original downloaded to Rye Sourdough with Multigrains and soaker.pdf

37% Rye + 13% Whole Spelt + additional whole grains in the soaker. 58% whole grain counting the flours and the soaker. High hydration results in a slightly open crumb.

Variations: whole wheat flour for whole spelt, and/or other whole grains for semolina (even buckwheat groats) in the soaker.

1. Mix the rye sour
    a. Disperse the culture in the water
    b. Add the whole rye flour, mix, and ferment 8 - 12 hrs at room temperature (72℉) until the surface starts to crack
2. Mix the soaker using boiling water. Cover and let stand until the rye sour is ready (overnight)
3. Mix all ingredients by hand or 5 - 10 minutes in a mixer.The dough will be sticky.
    a. Mix the flours, water, and rye sour first to give the gluten a head start. Then add salt and the soaker
4. Bulk ferment 2 hrs at 78℉, folding after 1 hr. The dough should have risen 50 - 60% by the end of bulk fermentation. End the bulk fermentation based on the volume increase, not the clock.
5. Preheat the oven to 500℉ (with baking stones or dutch oven)
    a. Start preheat while still in bulk ferment in case the dough ferments/proofs more quickly than usual
6. On a heavily floured board, pat to degas, divide in two, preshape, and rest 15 - 20 minutes
7. Shape, place into bannetons, and proof 45 minutes (but check dough volume, not the clock)
8. Spritz and score
9. Place in the dutch oven and cover, or on to the baking stone and pour boiling water into steam pan
10. Bake
    a. Dutch Oven
        i. 15 minutes, remove the lid and reduce temp to 400℉ for 20 - 25 minutes
    b. Baking stones
        i. Bake 5 minutes and spritz
        ii. Bake 10 minutes more and remove steam pan
        iii. Reduce temp to 400℉ and bake 20 - 25 minutes (but check for doneness after 10 minutes, maybe even 5 minutes for 2 loaves rather than a double.

Sourdough 90% Rye

From https://www.theperfectloaf.com/sourdough-90-rye-bread-recipe/

90% whole rye @ 90% hydration
Single stage Schuster Laib. Photos show pumpernickel (coarse whole rye)

Sourdough 90-Rye Bread Recipe _ The Perfect Loaf.pdf

Valais Rye

From “The Rye Baker”. 90% medium + coarse rye @ 85% hydration; makes 2 pan loaves, evening to the next day.

Valais Rye.pdf

Latvian Coarse Rye
https://theryebaker.com/latvian-coarse-ryerupja-rudzu-maize

100% rye at 100% hydration

Sourdough Bauernbrot

https://bakedcollective.com/sourdough-bauernbrot/

40% rye (counting the starter) 60% bread flour @ 67% hydration (counting the starter). Formula is for one 1010g loaf (including 100g of starter). For a double batch, make sure to build out enough starter (200g + enough left over to continue the culture) the evening or morning before mixing the dough.

50g (2%) of chopped dried onions in a double batch adds a nice flavor. 1-2% caraway seeds if you like them.

Schedule:

- Day 1 Morning: Feed starter
- Day 1 Afternoon: Mix, bulk ferment with folds, shape, proof 3 hours at room temperature and overnight retarded proof
- Day 2 Morning: Bake

Note that the formula below is based on baking in a dutch oven. For baking on a stone with a steam pan, increase the starting baking temperature by 25℉ for the baking time in the formula with the dutch oven lid on. After 20 minutes, remove the steam pan and reduce the temperature by 25℉.

Sourdough Bauernbrot (German Farmer's Bread) - The Baked Collective.pdf

Bavarian Village Rye - Breadtopia

Adapted by Breadtiopia from “The Village Baker” by Joe Ortiz.
Evening and then most of the next day - start early to avoid baking during peak electricity rates.
1 x 1.5 kg loaf. 65% whole rye 50% pumpkin + sesame seeds, some powdered, some marinated in soy sauce.

Bavarian Village Rye - Breadtopia

Vollkornbrot - Hamelman

From “Bread” 3rd edition

70% Whole Rye/Pumpernickel (rye meal in the book) 30% Steel-Cut Oats/Cracked Wheat (rye chops in the book) soaker
82% hydration - Pan Loaves

Vollkorn - Hamelman001.pdf

Vollkornbrot - MJD

From Mathew James Duffy Wait 24 hrs before slicing
72% Dark Rye / 28% Whole Wheat 84% hydration

72% Rye 28% WW Sourdough - Two Stage

Sourdough Discard

The Perfect Loaf Sourdough Discard Waffles - Pancakes - Banana Bread

3 Sourdough Discard Recipes-Waffles-Pancakes-Banana Bread - .pdf

The pancakes are very good with whole grain flours - whole wheat or pumpernickel.

Pantry Mama 100+ Sourdough Discard Recipes

https://www.pantrymama.com/sourdough-discard-recipes/

Sweet and savory, with a general discussion of sourdough discard. Includes a no-flour-added 2 ingredient (discard + melted butter or oil) recipe for crackers.

100+ Sourdough Discard Recipes You Must Try! [2024] - The Pantry Mama.pdf

Bread Code Sourdough Discard Pan Loaf

From https://youtu.be/xmt3eXzOQLM

I skip the turmeric. This can bake in the toaster oven. It's surprisingly good, sliced thin as a base for lox, cheese, or spreads. Substituting pumpernickel for the whole wheat flour works well.

Ingredient	**Percentage**	**Total Flour 700g**	**Notes**
Sourdough Discard	Rye flour 71% / Water 71%	1000g discard	500g flour + 500g water included in the discard
Whole Wheat Flour	29%	200g	Any flour
Seeds	14%	100g	
Salt	2%	15g	
Turmeric	1.4%	10g	Optional; probably better without unless you like the turmeric flavor, which tends to overwhelm the rye
Rolled Oats		As needed	Bottom and top of loaf

1. Mix all together
2. Shape for loaf pan
3. Spray or oil loaf pan thoroughly
4. Cover pan bottom with rolled oats
5. Place in loaf pan (no bulk fermentation needed as the discard has been fermenting for a long time)
6. Spritz with water
7. Cover loaf with rolled oats
8. Cover pan with aluminum foil cap
9. Proof at room temp 2 - 5 hrs until dent recovers slowly and volume has increased (maybe if your discard is newer than mine).
10. Preheat toaster oven to 450℉
11. Spritz loaf with water
12. Bake in toaster oven with steam (aluminum foil cap on loaf pan) 30 minutes to 175℉ internal
13. Remove from loaf pan (don't try to flip the loaf over; finish baking upside down) and continue baking to 205℉ internal, about 20 minutes
14. Cool completely before slicing, ~2 hrs

Sourdough Discard Cornbread

Multiply the formula quantities by 1.5 for a 12" cast iron pan. For buttermilk use regular milk and some vinegar. Use a little more salt than the formula calls for; baking time depends on your oven and if you use convection. Not suitable for corn muffins.

The Only Sourdough Cornbread Recipe You Will Ever Need. | Matthew James Duffy.pdf

Sourdough Rye Crackers

https://www.kingarthurbaking.com/recipes/sourdough-crackers-recipe

Sourdough Crackers | King Arthur Baking.pdf

Sourdough Discard Flatbread

https://brodandtaylor.com/blogs/recipes/sourdough-flatbread

This might be better with fresh starter rather than discard. Refresh the starter with a double batch: 14g starter, 140g dark rye flour, 140g water in order to have 150g of fresh starter. Refresh the starter in the evening to have it ready for the next morning.

Sourdough Flatbread – Brod & Taylor.pdf

Sourdough Discard Naan

https://amybakesbread.com/sourdough-discard-naan-bread

Probably fluffier with fresh starter as in the Flatbread formula.
Add onions and/or parsley to the dough for extra flavor.

Sourdough Discard Naan.pdf

Sourdough Discard Pie/Galette/Empanada Crust

https://www.theperfectloaf.com/sourdough-pie-crust/

Leave out the sugar for savory crusts; use whole wheat flour or rye instead of AP for more fiber.

Flaky Sourdough Starter Discard Pie Crust (Sweet or Savory) _ The Perfect Loaf.pdf

Sourdough Discard Granola

https://www.kingarthurbaking.com/recipes/sourdough-granola-recipe?

Sourdough Granola Recipe _ King Arthur Baking.pdf

Sourdough Discard Batter for Frying

https://www.pantrymama.com/sourdough-discard-batter/

Requires seltzer or beer for the batter. Use half the recipe amount of seltzer with 100% hydration rye sourdough discard. Recipe amount for 6 pieces of fish or chicken.

For air frying:

- Breville air fryer mesh basket sprayed/rubbed with oil for non-stick in the air frying position
    - Place a sheet of parchment paper on a rack below the mesh basket to catch drippings
- Preheat with the empty mesh basket in place for better browning
- Traditional deep-frying 3 station coating: flour, beaten egg, batter
- Spritz the food on the rack with spray oil for browning and heat transfer
- Air fry at 425℉ for 12-15 minutes with super convection; rotate food ⅔'s of the way in for more even browning
    - Chicken pieces at 390℉ for 25 minutes

Sourdough Batter [for fish, chicken & vegetables] - The Pantry Mama.pdf

Sourdough Discard Muffins

Sourdough Discard Cornbread Muffins

Regular milk and a dash of vinegar substitutes for buttermilk.
Double the recipe to make enough for a dozen medium-large muffins. Whole wheat flour is a healthier alternative to AP but include the sugar or honey so that the muffins aren't too cardboard-tasting.
https://www.pantrymama.com/sourdough-cornbread-muffins/

Sourdough Cornbread Muffins - The Pantry Mama.pdf

Sourdough Discard Oatmeal Raisin Muffins

https://www.food.com/recipe/sourdough-oatmeal-raisin-muffins-329859

Sourdough Oatmeal Raisin Muffins .pdf

Sourdough Discard Bran Muffins

https://amybakesbread.com/sourdough-discard-bran-muffins/

Sourdough Discard Bran Muffins - Amy Bakes Bread.pdf

Sourdough Discard Lemon Muffins

https://www.pantrymama.com/sourdough-lemon-muffins/

Sourdough Lemon Muffins - The Pantry Mama.pdf

Multigrain

KAF Multigrain Country Loaf 60% WW 90% Hydration

Adapted from Multigrain Country Loaf to increase whole grains from 30% to 60%

Ingredient	Percentage	450g total flour	Notes
Multigrain Flours	60%	270g	No soaker if multigrains are flours
Bread Flour	40%	180g	Bread flour or High Gluten
Water	90%	405g	Adjust based on flours and humidity
Yeast (instant)	1.4%	6g	
Salt	2%	9g	

1. Mix all ingredients to a shaggy mass with no dry flour
2. Stretch and fold; repeat 3 more times at 10 minute intervals
3. Bulk ferment 30-60 minutes until doubled in size
4. Preshape boule; rest 10-15 minutes
5. Preheat oven and dutch oven (or stone and pans for steam) to 475° F
6. Shape boule to a tight ball and place in floured/bran banneton 45-60 minutes until noticeably puffy
7. Gently move the dough from banneton to peel/parchment paper without deflating
8. Score
9. Place in the oven and bake at 425° F (maybe hotter in dutch oven); 20 minutes covered, 10 minutes uncovered; when done turn oven off, place loaf on an oven rack, open door a couple of inches and cool the loaf in the oven for a crispy crust

60% Whole Wheat Multigrain 83% Hydration

Adapted from Hamelman WW w/Multigrain soaker pg 126
DDT = 75°F

Ingredient	Percentage	450g Flour	Notes
Poolish			
Whole Wheat Flour	33%	150g	
Water	33%	150g	
Yeast	.03% - .08% of poolish flour	.15 - .3 x ⅛ tsp	16 hr poolish
Soaker			
Multigrains	20% of total flour	90g	Cornmeal, oats, chickpea flour, cracked wheat, millet, rye flour, steel-cut oats, etc. totaling 90g
Water	25% of total flour	113g	Boiling water for kasha groats, steel-cut oats, cornmeal, etc.
Final Dough			
Poolish	100% of poolish		
Whole Wheat Flour	50% of total flour less poolish	75gm	
Bread Flour	50% of total flour	225g	
Water	83% of total flour less poolish and soaker	111g	Adjust hydration while mixing if necessary
Salt	2.5%	11g	High salt % due to soaker grain
Yeast	1.3%	6g	For overnight bulk fermentation, reduce yeast to 0.87%/4g
Garnish (optional)	10-15%	45 - 67g	Seeds, onion, olives, etc.

1. Mix poolish; let stand 12-16 hr at room temp
2. Mix soaker with boiling water; let stand 4 hrs (overnight with poolish for steel cut oats)
3. Break up the poolish, add soaker, remaining flours, water, salt, yeast and mix to incorporate. Add optional garnishes that can stand mixing, eg, seeds

4. Let stand 30 minutes for flours to hydrate in place of autolyse
5. Mix all ingredients 2.5 min at 1st speed; adjust hydration due to soaker as needed; 4-5 min 2nd speed (#4 on Kitchenaid stand mixer); dough should be supple and lively to the pull with gluten moderately developed
6. Add soft garnishes, eg olives, if using
7. Bulk ferment 2 hrs with folds after 1 hr.
8. Preshape, bench rest 10-20 min; shape and place in banneton or couche
9. Preheat oven (with dutch oven if using) to 500° F
10. Proof 1 - 1.5 hrs
11. Mist; seeds; score; presteam and steam oven or bake in a Dutch oven
12. Bake at 450° F (425°F with convection) ; 15 min - uncovered 20 min - 20 min oven open
    a. Bake longer/darker for a harder crust

No-Knead Breads

King Arthur Flour No-Knead Crusty Whole Wheat

70% Whole Wheat 80-90% Hydration
KAF blog

Ingredient	Percentage	450g total flour	Notes
Whole Wheat Flour	70%	315g	No preferment or autolyse needed because of retarded bulk fermentation
Bread Flour	30%	135g	KAF formula uses AP + vital wheat gluten; I used high-gluten flour
Water	80-90%	360g - 405g	Less hydration in humid weather/summer; higher hydration in lower humidity/winter
Yeast (instant)	1.5%	7g	
Salt	2%	9g	

1. Mix all ingredients
2. Bulk ferment loosely covered at room temperature for 2 hrs or until doubled
3. Cover tightly and refrigerate 1-7 days
4. Pre-shape on a well-floured surface; rest 15 minutes
5. Shape and proof 2 hours in a banneton
6. Set up oven with stone (heat diffuser) on bottom rack and rack above for dutch oven
7. Pre-heat dutch oven and lid at 500° F 1 hr in advance
8. When dough is proofed, remove dutch oven from the oven
9. Place dough on parchment paper smooth side up
10. Mist, sprinkle seeds, and score
11. Place in dutch oven using parchment paper to lower it into the dutch oven
12. Bake 20 minutes covered at 450° F (425° F with convection)
13. Uncover, remove parchment paper, bake 20 minutes
14. Open oven a crack to vent moisture and bake 20 minutes until internal temp 210° F
15. Turn oven off, place bread on oven rack with door partly open to cool (for crusty crust).

No-Knead Multigrain

80% Whole Grain 90% Hydration

Adapted from King Arthur Flour No-Knead Multigrain Crown and Hamelman's Whole Wheat with Multigrain Soaker

Ingredient	Percentage	450g total flour + multigrains	Notes
Soaker			Mix at least 4 hours before main dough, or the night before; add salt in hot weather to block enzymatic activity
Mixed Whole Grains	20%	90g	Cornmeal, oats, cracked wheat, chickpea flour, rye, seeds (flax, sesame, caraway, sunflower, etc)
Boiling Water	25%	112g	Stir in and cover the bowl with plastic wrap. Room temp water OK for flours; boiling for oatmeal, kasha groats, etc.
Final Dough			
Soaker			
Whole Wheat Flour	75%	338g	No preferment or autolyse needed because of retarded bulk fermentation
Bread Flour	25%	112g	Bread flour or High Gluten
Water	83%	374g	Original honey replaced with water

Yeast (instant)	1.3%	6g	
Salt	2.4%	11g	

1. Boil soaker water and mix with soaker grains/seeds
2. Cover tightly and let sit at least 4 hrs at room temp
3. Mix remaining ingredients; no gluten development needed
4. Add soaker
5. Cover tightly and refrigerate 1-7 days
6. Pre-shape on a well-floured surface; rest 15 minutes
7. Shape and proof 2 hours in a banneton
8. Set up oven with dutch oven. No stones needed.
9. Pre-heat dutch oven and lid at 500° F 1 hr in advance
10. When dough is proofed, remove dutch oven from the oven
11. Place dough on parchment paper smooth side up
12. Mist, sprinkle seeds, and score
13. Place in dutch oven using parchment paper to lower it into the dutch oven
14. Bake 20 minutes covered at 450° F
15. Uncover, remove parchment paper, bake 20 minutes
16. Open oven a crack to vent moisture and bake 15+ minutes until internal temp 210° F
17. For crispy crust, turn oven off, remove stone and dutch oven, and cool in opened oven

No-Knead 100% Atta Flour

Adapted from
https://wekigai.eu/recipe/7/how-make-good-no-knead-artisan-bread-indian-atta-flour

Note: Crumb may not be very open but atta has a nuttier flavor than American whole wheat

Ingredient	Percentage	450g Flour	Notes
Atta flour	100%	450g	
Water	100%	450g	
Salt	2%	9g	
Yeast	0.1%	.5g	
Garnish	10-15%	45 - 68g	Nuts, seeds, onions, etc.

1. Mix all ingredients to incorporation
    a. Fold in soft garnishes at the end of mixing
2. Put in a closed container and refrigerate 1 - 7 days
3. Pre-shape on a well-floured surface; cover and rest 20 minutes
4. Shape and proof 1.5 - 2 hours in a banneton (or loaf pan)
    a. Put dough sample in proof-o-meter
    b. Check proof with poke test and proof-o-meter starting at 1 hr
5. Set up oven with dutch oven. No stones needed.
6. Pre-heat dutch oven and lid 1 hour at 550° F with convection 1 hr in advance
7. When dough is proofed, remove dutch oven from the oven
8. Place dough on parchment paper
9. Mist, sprinkle seeds, and score
10. Place in dutch oven using parchment paper to lower it into the dutch oven
11. Bake 20 minutes covered at 450° F (425°F with convection)
12. Uncover, remove parchment paper, bake 20 minutes
13. Open oven a crack to vent moisture and bake 15+ minutes until internal temp 210° F
14. For crispy crust, turn oven off, remove stone and dutch oven, and cool in opened oven 90 minutes

100% Whole Grain

Workday 100% Whole Wheat

From “Bread” 3rd edition

100% whole wheat @ 80% hydration

Good with garnishes like scallions and olives, topped with sesame seeds. Use bassinage - 555g water in the final dough, do the folds, and then slowly add 62g water with more folds. Note - this amount of hydration requires the strongest possible flour, e.g., King Arthur Whole Wheat. If you

use something softer, e.g., King Arthur Golden Whole Wheat, the loaf will spread in the oven unless you reduce the hydration from 80% to something like 75%. This will double the bulk fermentation time from about 12 to 24 hrs. You can get some of this time back by proofing at room temperature rather than overnight (at the cost of losing the morning/evening schedule).

After the retarded proof, if needed 10-15 minutes in 85℉ proofer to finish the rise before baking.

Variations and Schedule:

- 80g chopped walnuts + 40g dried cranberries, soaked in hot water to double weight
    - Use the cranberry soaking water in the dough for holiday flavor
- 85% hydration: use full 617g water in final dough plus 40g water for bassinage.
    - Add-in's at 85% hydration will result in flatter but delicious loaves; the folds below will mostly mitigate the weight of the garnishes
    - Add bowl/coil/lamination folds at 30 - 60 - 90 minute intervals after mixing final dough
        - Use the lamination fold to add nuts etc.
- Day 1 AM - Feed starter 7 am
- Day 1 PM - Mix the levain (3 pm for long slow fermentation - 15 hr)
- Day 2 AM - Mix final dough and bulk ferment - 7 am (at 75% hydration this step lasts until Day 3 AM)
- Day 2 PM - Divide, shape; retarded proof starting 7 pm (at lower hydration, wait until Day 3 AM and proof at room temperature)
- Day 3 AM - Bake - 7 am (at lower hydration, bake in the afternoon)

Workday 100 Whole Wheat001.pdf

High Hydration Whole Wheat Sourdough - KAF

https://www.kingarthurbaking.com//recipes/high-hydration-whole-wheat-sourdough-bread-recipe

100% whole wheat @ 95% Hydration

- Day 1 AM - Feed starter
- Day 1 PM - Mix the levain
- Day 2 AM - Autolyse
    - Autolyse folds over 2 hrs
    - Mix final dough
    - Fold final dough over 1.5 hrs
        - Bowl, coil, and lamination folds
    - Bulk ferment another 2 hrs
- Day 2 PM - Divide and shape; retarded fermentation
- Day 3 AM - Bake

High-Hydration Whole Wheat Sourdough Bread Recipe _ King Arthur Baking.pdf

Dave Miller Basic 100% Whole Wheat

From Smithsonian Magazine What Makes Whole Grain Bread So Hard to Bake
A slightly different version at Dave Miller on Baking with 100% Whole Wheat

Ingredient	Percentage	450g flour	
Whole Wheat Flour	100%	450g	
Water	102%	459g	Autolyse 413g + 46g mix; 102-105% hydration
Instant Yeast	0.5%	2.25g	Reduced from 0.7% = 3g for the overnight fermentation
Salt	2.4%	11g	

1. Use direct method and retarded bulk fermentation for stronger dough, rather than poolish and room temp bulk fermentation
2. 30 minute autolyse with 90% of the water (reserved water to dissolve the salt and yeast)
3. Mix 3 minutes 1st speed + 3 minutes 2nd speed with folds, or 5 min + 5 min for room temp bulk fermentation, no folds
    a. Or 10 min, 15 min rest, 10 min by hand with Rubaud method
4. Bulk Fermentation
    a. 3 hr bulk fermentation room temp, or
    b. 1 hr room temp with folds (try a lamination fold for the 1st one) at 30 and 60 minutes + overnight fridge 15 hrs (recommended for stronger dough)
    c. Fold at 30 (add 15% garnish here if using), 60, and 120 minutes of room temp bulk fermentation
        i. Or fold every 15 minutes.
5. Divide and Pre-shape (folds and tuck-and-turn)
6. 20 minutes bench rest; then get a sample for the proof-o-meter
7. Shape (folds, tuck-and-turn, tension pulls for boules; stitches for batard)
8. 2-3 hr proof in banneton (after retarded bulk fermentation)
    a. Check proof with poke test starting at 30 minutes and at 15 minute intervals
9. Preheat oven 1 hour to max temp 550° F with convection
10. Mist/seeds/score load oven and steam (or bake in dutch oven); try loading the dutch oven first and scoring in the dutch oven to reduce spread
11. Bake 500° F (475°F with convection) (closed cast iron) x 15 minutes + 450° F (425°F with convection) (open cast iron) x 20 minutes + 450° F (425°F with convection) x 15 minutes with oven door venting (another source for Miller says 500° F and 450° F - after 35 minutes at the high temps the internal temp was already close to 210° so I cut the last part short)

The Bread Code 100% Whole Wheat (yeasted) @85% Hydration

Adapted from Perfect Whole Wheat Sourdough Bread Video

Modified to a yeast formula with poolish. Double batch (900g flour) seems to work better.

Ingredient	Percentage	Total Flour 450g	Notes
Poolish			
Whole Wheat Flour	33%	150g	
Water	33%	150g	
Instant Yeast		Pinch	See poolish yeast % in General Tips above; depends on poolish fermentation time and room temp; 16 hr cool temp 0.3 × ⅛ tsp.
Final Dough			
Poolish	66%	300g	Flour + water + a pinch of yeast
Whole Wheat Flour	66%	300g	
Water	52%	234g	Total hydration 85% including poolish, Use 257g water for 90% hydration; 290g water for 95% hydration.
Instant Yeast	0.34%	1.5g	**Reduce to 0.22% (1g) if also using an overnight retarded fermentation.** Estimated from a 20% sourdough starter in the video and then adjusted way down.
Salt	1.9%	9g	
Garnish (optional)	Max 15%	Max 67g	Rinse olives to reduce salt. Using a garnish may reduce oven spring.

1. Mix poolish at 75° F by hand; cover and ferment at 75° F 10-15 hours until bubbly, frothy, just starting to recede

2. Add remaining ingredients (except garnish) to poolish (easiest to mix with water first) and mix, just to incorporation
3. Rest 30 minutes covered instead of autolyse, to increase dough strength.
4. Develop gluten with your preferred method; dough should be moist with strong gluten development
    a. Mix 4 minutes (or less; mix too long and you get a closed crumb) @ 2nd speed (4 on Kitchenaid stand mixer). 3 min 1st speed + 3 min 2nd speed plus repeated folding (see below) to mix in garnish seems to work well.
    b. Per the original video, 10 minutes Rubaud's method (slap and fold in a bowl, more or less) - 5 minute rest - 10 minutes kneading on the bench - laminated fold
5. Bulk ferment at room temp 30 minutes and coil fold gently (or a laminated fold). Add olives/garnish here, if using. Bulk ferment another 30 minutes and coil fold. Then 1 more hour and coil fold gently
    a. Move to the fridge overnight or
    b. Room temp bulk fermentation another 3-4 hours (5-6 hrs total); fold gently twice more during that time
6. Preheat oven (and dutch oven if using) to 450° F w/ convection 1 hour before baking
    a. If baking on a stone, preheat 2 pans for steam before land after loading
7. Preshape (light flour on board and hands to avoid sticking, folds and tuck-and-roll), rest 20 minutes
8. Cut off a small piece of dough for the proof-o-meter (unless cold proofing; the meter won't work in the fridge as the pinch of dough will cool much faster than the whole loaf)
9. Shape (folds, tuck and roll, tension pulls for boules; stitching for batards)
10. Proof in floured (non-gluten) banneton/bowl in the fridge overnight, in a plastic bag (Caution - bread may overproof) or
    a. In a bowl/banneton or a supported couche at room temp 1-2 hr; start checking proof at 30 min and every 15 min thereafter. Do not be surprised if it's ready to go at 30-45 minutes.
    b. As an alternative to overnight cold proof, the The Bread Code suggests room temp proof and then 30 minutes in the freezer
11. Boil water for steam if baking on a stone
12. Transfer to peel and pre steam oven (not needed for a Dutch oven)
13. Mist, score (deeply), load oven, and steam (boiling water in heavy preheated pan)
14. Bake at 425° F w/ convection 20 minutes (Dutch oven covered)
15. Rotate 180° degrees (if no dutch oven); bake 20 minutes after removing dutch oven lid; check temp here for a single batch.
16. Open oven a crack; bake 20 minutes to dark crust and crumb temp 210° F
17. Turn oven off, remove stone/dutch oven, and cool on oven rack with door open a crack to vent moisture for crispy crust

The Bread Code 100% Whole Wheat Sourdough @85% Hydration

The Perfect Whole Wheat Sourdough Bread | Full Masterclass with minor adaptations for feedings

Ingredient	**Percentage**	**Total Flour 450g***	**Notes**
Whole Wheat Flour	100%	405 g	*Total flour 450g counting a 100% hydration starter
Water	85%	340 g	Room temp; 85% hydration includes the starter
Starter	20%	90 g	Build starter with 1:5:5 feedings over 2-3 days. Room temp fermentation ~9 hours. For overnight fermentation, try 15% starter 68g with 11g more flour + 11g more water.
Salt	2%	9g	
Garnish (optional)	Max 15%	Max 60g	Rinse olives to reduce salt. Using a garnish may reduce oven spring.

*Notes:

- Total flour and hydration assume 100% hydration starter
- if room temperature is below ~70° F, use the oven at proofer setting (~73 F)

1. Day 1 - Feed starter
2. Day 2 - Feed starter - Wait until starter has doubled ~4 hrs
3. Mix all ingredients except garnish
4. Lots of kneading to build dough strength
    a. 10 min Rubaud's method + 5 min rest + bench kneading or
    b. Stand mixer 3 min speed 1 + 3 minutes speed 2
    c. In addition to either of the above, lamination fold plus garnish, + coil folds + tension pulls; 3 sets of folds 30 minutes apart.
5. Ferment at room temp until doubled (possibly overnight)
6. Day 3 - Preshape + tension pulls; rest 20 minutes
7. Preheat oven and dutch oven to 550° F w/ convection 1 hour before baking
8. Take a sample for the proof-o-meter, shape, and proof
    a. Shape (folds, tuck and roll, tension pulls for boules; stitching for batards)

b. Proof in floured (non-gluten) banneton/bowl in the fridge overnight, in a plastic bag (Caution - bread may overproof) or
c. In a bowl/banneton or a supported couche at room temp 1-2 hr; start checking proof at 30 min and every 15 min thereafter. Do not be surprised if it's ready to go at 30-45 minutes.
d. As an alternative to overnight cold proof, the The Bread Code suggests room temp proof and then 30 minutes in the freezer

9. Mist, score (deeply), load oven
10. Bake at 480° F 20 minutes (Dutch oven covered)
11. Remove dutch oven lid; reduce temp to 450 F; bake 20 minutes
12. Open oven a crack; bake 10-20 minutes to dark crust and crumb temp 205 210° F
13. Turn oven off, remove stone/dutch oven, and cool on oven rack with door open a crack to vent moisture for crispy crust

Nisa Homey 100% Whole Wheat with Atta Flour

From https://youtu.be/CkrSLpBI074

The fine-ground atta flour needs higher hydration than coarser western whole wheat flour. It is probably too weak to be shaped, so bake in a loaf pan.

Ingredient	**Percentage**	**Total Flour 450g**	**Notes**
Whole Wheat Flour (atta)	100%	450g	
Yeast	1.3%	6g	
Salt	1.8%	8g	
Water	~111%	~500g	The video shows volume measurements, 3 cups flour and 2 cups water (134% hydration). At 111% hydration, the dough (more like a batter) came out looking like the video. .

1. Mix ingredients in the order above; add water until you get a batter but not a loose one.
2. Knead with a spatula, and/or 10 minutes of Rubaud's method followed by some spatula folds

3. Ferment covered at room temp 2-3 hours until doubled, or overnight in the fridge
    a. Gentle spatula folding at 30 and 60 minutes may improve dough strength
4. Fold gently with a spatula
5. Oil a loaf pan and fold the dough/batter into the pan. Reserve some for the proof-o-meter
6. Proof at room temp, covered, until doubled, ~2 hours
7. Pour into a loaf pan; sprinkle on seeds/nuts if using
8. Bake at 400 F (no convection, or 375 F with convection) ~45 minutes until the crust is nicely browned and the internal temperature is 205-210 F

Rye - Raisin Scones

From “The Rye Baker”; 53% medium rye + 47% whole wheat; straight dough w/commecial yeast

Rye - Raisin Scones.pdf

Bittman Bread - 100% Whole Wheat Sourdough

Bittman NYT Article and the book “Bittman Bread”

Ingredient	Percentage	Total Flour - 300g	Notes
Levain			Bittman calls it “jumpstarter”
Whole Wheat Starter	33%	100g	Starter at 100% - 150% hydration
Whole Wheat Flour	33%	100g	
Water	33%	100g	
Dough			
Whole Wheat Flour	67%	200g	For rye bread, replace 30 - 50g of whole wheat flour with whole (dark) rye flour; work less water into the dough
Water	37%	110g	Total hydration with the starter is ~74% plus water from wet hands and the working surface; it can reach 100%.
Salt	2.3%	7g	
Garnish (optional)	15-20%	45-60g	Seeds, scallions, olives, nuts, etc.

Straight-through timing is:

- 8 - 12 hrs to build the levain
- 1 hr autolyse after incorporating dough flour and water (but not salt)
- ½ hr rest after adding the salt (and optional garnish)
- 4 folds 30 minutes apart -> 1 ½ hr
- Proofing 15-20 minutes
- Bake 35 minutes lid on + 10 minutes lid off + 15-30 minutes on the oven rack/stone total 1 ½ hr
- Total time 14 - 18 hrs, including working time (mixing and folding). Add 3 - 4 hrs if you feed the starter before mixing the levain

However, you can stop the process at any point (except after the 4th fold) and put the dough in

the fridge overnight (which can have other benefits as well). Bittman suggests building the levain in the evening and baking the next morning, or building the levain in the morning and backing in the evening. Here is a 2 day schedule which will produce bread for lunch on the 2nd day:

- Day 1
    - 0700 Feed starter (optional step to create more oomph)
    - 1000 Build levain
    - 2000 Mix dough (no salt) and autolyse 1 hr
    - 2115 Add salt (and optional garnish) - use a laminated fold and rest 30 minutes
    - 2140 1st fold - wet hands and wet surface for all folds but reduce water if the dough weakens; subsequent folds every 30 minutes
    - 2230 2nd fold and refrigerate
- Day 2
    - 0700 3rd fold; line dutch oven with parchment paper
    - 0745 4th fold
    - 0750 Proof in cold dutch oven 15-20 minutes (check with poke test at 15 minutes)
    - 0810 Bake, starting in cold 485 F (460 F with convection) oven with dutch oven on a baking stone, lid on. 35 minutes because it takes 20 minutes for the oven to come to temp with the baking stones inside (vs 30 minutes in the book where their oven reaches temp in 15 minutes)
    - 0845 Remove dutch oven lid; bake 10 minutes
    - 0855 Remove loaf from dutch oven and place on baking stone; reduce heat to 400 F (375 F with convection) and open oven door a crack to vent steam for a crusty crust
    - 0905 When the loaf is nicely dark brown (about 10-20 minutes) check internal temp; should be 205 F - 210 F
    - 0910 Cool on oven rack with door open for a crusty crust
    - 1100 Slice and eat

Here is a two day schedule starting in the evening:

- Day 1
    - 1700 Feed starter (optional step to create more oomph)
    - 2100 Build levain; leave on the counter
- Day 2
    - 0700 Mix dough (no salt) and autolyse 1 hr
    - 0815 Add salt (and optional garnish) - use a laminated fold and rest 30 minutes
    - 0840 1st fold - wet hands and wet surface for all folds but reduce water if the dough weakens; subsequent folds every 30 minutes
    - 0930 2nd fold
    - 1000 3rd fold; line dutch oven with parchment paper
    - 1045 4th fold
    - 1050 Proof in cold dutch oven 15-20 minutes (check with poke test at 15

minutes)

- 1110 Bake, starting in cold 485 F (460 F with convection) oven with dutch oven on a baking stone, lid on. 40 minutes because it takes 20 minutes for the oven to come to temp with the baking stones inside (vs 30 minutes in the book where their oven reaches temp in 15 minutes)
- 1150 Remove dutch oven lid; bake 10-15 minutes or until crust darkens
- 1205 Remove loaf from dutch oven and place on baking stone; reduce heat to 400 F (375 F with convection) and open oven door a crack to vent steam for a crusty crust
- 1215 When the loaf is nicely dark brown (about 10-20 minutes) check internal temp; should be 205 F - 210 F
- 1230 Cool on oven rack with door open for a crusty crust
- 1430 Slice and eat

Whole Grain Sourdough Bialys

https://www.janiesmill.com/blogs/recipes/hearty-bialys-from-maritime-bread-co

Both of the wheat flours in the formula are 100% extraction, so use whole wheat flours, plus a whole/dark rye.

Whole Grain Sourdough Bialy Recipe – Janie's Mill.pdf

100% Whole Wheat Barbari Bread with Poolish

Adapted from here and there. Make one bread so it will be thick enough for the traditional grooves

Ingredient	Percentage	450g Flour	Notes
Poolish			
Whole Wheat Flour	33% of total flour	150g	
Water	33% of total flour	150g	
Instant Yeast		pinch	See general information for yeast in a poolish for the desired time
Final Dough			
Poolish	100% of poolish		
Whole Wheat Flour	67% of total flour	300g	
Water	52% of total flour	233g	85% total hydration
Yeast	0.22%	1g	Reduced because of poolish and overnight fermentation. Use 0.27% 1.2g if no overnight fermentation. 1.4% for straight dough
Salt	2%	9g	
Olive oil	5%	23g	Necessary to soften 100% whole wheat dough and improve elasticity

1. Follow pizza with poolish directions 1 - 6
    a. Or replace the poolish with a sourdough levain and leave out the yeast in the final dough
2. Mix barbari glaze 6g flour in 78g water
    a. Bring to a low boil
    b. Simmer until the glaze sticks to a spoon
    c. Remove from heat
3. When dough is proofed, pat/stretch to a rectangle the size of the peel/stone; high edge not needed; rest dough 20 minutes covered
4. Brush with glaze

5. Make grooves by dimpling with the fingers
6. Sprinkle with sesame and nigella (black onion) seeds
7. Bake 9 - 12 minutes at 480° F (455° F with convection)
    a. Alternatively 400° F (375° F with convection) 25-30 minutes

100% Whole Wheat Empanadas

https://www.myrecipes.com/recipe/whole-wheat-empanada-dough who got it from Cooking Light April 2016

Ingredient	Percentage	Weight for 378g Flour	Notes
Whole Wheat Flour	100%	378g	Original was half WW, half AP
Salt	0.8%	3g	
White Wine	45%	170g	Or use water + lemon juice for acidity
Olive Oil	21%	80g	

1. Combine flours and salt in a large bowl, stirring with a whisk.
2. Make a well in center of flour mixture.
3. Combine wine and oil in well, stirring with a fork until moist.
4. When dough begins to form, use fingers to continue to mix until a ball forms.
5. Turn dough and any remaining flour in bowl out onto a work surface; knead 2 minutes or until dough is smooth.
6. Wrap dough tightly in plastic wrap, and let stand at room temperature for 1 hour (or maybe in the fridge)
7. Roll dough out to 1/8-inch thickness on a very lightly floured surface
    a. Or, mix and knead dough in the stand mixer and roll out with pasta roller attachment settings 1 & 2
8. Cut as many 5-inch circles as possible using a round cutter or knife.
9. Cover circles with a kitchen towel. Gather scraps, cover with plastic wrap, and let rest 20 minutes; repeat procedure with remaining dough for a total of 15 circles.
10. Stack circles between single layers of parchment paper. Use dough disks as directed in empanada recipes, or store, wrapped and chilled, for up to 24 hours. (Disks can also be frozen for up to 1 month. Thaw overnight in the refrigerator. Lightly dust with flour before using.)
11. Preheat oven to 350°F
12. Fill, fold, and crimp
13. Brush with egg wash
14. Bake on a pan with parchment paper 20-25 minutes

100% Whole Grain Baguettes

100% Whole Wheat w/Poolish - Bread Experience

100% Whole Wheat 85% Hydration 25% Poolish
https://www.breadexperience.com/whole-grain-poolish-baguettes/

Save Print

Whole Grain Poolish Baguettes made from 100% freshly-milled whole wheat flour. The dough is a simple, lean French-style dough which utilizes an overnight preferment to help develop the flavor and potential of the loaves.

Author: Adapted from Bread Revolution by Peter Reinhard

Recipe type: Baguette

Ingredients

Ingredient	Percentage	Total Flour 450g	Notes
Poolish			
Whole Wheat Flour	25%	113g	Note that this is ¼ rather than the ⅓ in most of the formulas.
Water	25%	113g	
Instant Yeast	.03% - .08%	.13 - .36g 1/24-⅛ tsp	16 hr poolish fermentation; warm - cold room temperature
Salt		Pinch	Slow down enzymatic activity because there is also an overnight bulk ferment of the final dough
Final Dough			
Whole Wheat	75%	338g	In addition to poolish
Water	60%	270g	No autolyse; add all water
Poolish	25%		25% of the flour
Instant Yeast	0.23%	1g	Low yeast because of poolish + overnight retarded fermentation
Salt	2%	9g	

Original formula based on 680g flour - 6 baguettes

Poolish

- 1⅓ cups / 6 ounces / 170 grams whole-milled wheat flour
- pinch instant yeast
- pinch salt **(!)** - to slow enzymatic activity because there is also an overnight bulk fermentation
- ¾ cup / 6 ounces / 170 grams water, at room temperature

Final Dough

- 1¾ cups + 1 Tablespoon / 14.5 ounces / 411 grams water, at room temperature
- all of the Poolish
- 4 cups / 18 ounces / 510 grams whole-milled hard wheat flour (red or white, or combination)
- 2 teaspoons / 0.5 ounces / 14 grams salt
- ½ teaspoon instant yeast

Instructions

Day 1: Making the Poolish

1. Stir together the flour, yeast, and salt**(!)** in a large bowl. Pour in the water and mix until the flour is fully hydrated. It will form a thick, batter-type dough. Scrape down the sides of the bowl using a wet bowl scraper or spatula.
2. Cover the bowl with plastic wrap and let the poolish sit overnight at room temperature, about 12 -14 hours. It should get bubbly and swell in size. My poolish never did get bubbly but it did swell in size. If your poolish gets bubbly before you are ready to use it in the final dough, place it in the refrigerator. You'll need to compensate by using lukewarm water when mixing the final dough instead of using room temperature water.

Day 2: Final Dough:

1. The next day, add the water to the poolish and mix to break it up. Whisk together the dry ingredients and add to the poolish water mixture. Mix thoroughly using a Danish dough whisk or wooden mixing spoon. When the dough gets too thick to mix with the whisk or spoon switch to using wet hands. The dough will be somewhat shaggy. Resist the temptation to add more flour. *Note - this is mix only to incorporation, followed by a 30 minute rest for hydration*

2. Shape the dough into a rough ball and place into a clean, lightly greased bowl. Cover the bowl with plastic wrap and ferment the dough at room temperature for 30 minutes.
3. Remove the dough to a lightly oiled work surface or leave it in the oiled bowl and stretch and fold the dough onto itself from each side and the top and bottom. Place the dough back in the bowl and let it rest again for 30 minutes.
4. Repeat the process of stretching and folding and return the dough to the bowl. The dough should become more supple after each fold. After the second fold, the dough should be tacky, but not sticky.
5. Let the dough ferment at room temperature for 30 to 60 minutes, until it increases in size by about 1½ times. Cover the bowl tightly with plastic wrap and place it in the refrigerator overnight.

Day 3: Shaping and Baking the Baguettes

1. On the 3rd day, oil a work surface and transfer the dough from the refrigerator to the work surface. Gently degas it and shape it into a boule. Let the boule rest for 15 minutes.
2. Divide the dough into 6 pieces *(4 pieces for 450g total flour; maybe 6-8 for demi baguettes to fit on the baking stone*) using a metal pastry blade or bench knife. If you want larger baguettes, divide it into 2 to 4 pieces. Shape each piece into a baguette and place on a floured couche, parchment paper or baker's peel. Lightly spray the tops of the loaves with oil and cover loosely with a clean towel or plastic wrap. Proof the loaves for 1 hour or until the dough increases 1½ times its original size.
3. At least 45 minutes before you plan to bake the baguettes, place a baguette baker on the lower shelf of the oven and preheat the oven and baker to 500 degrees F.
4. Ten minutes or so before baking, uncover the loaves to let the surface dry and make it easier to score.
5. Remove the preheated baguette baker from the oven and place on a heat resistant surface. Carefully transfer three of the baguettes to the preheated baker. Quickly score the loaves. Place the baker in the

oven, cover with the lid and close the door. Immediately lower the temperature to 450 degrees F.

6. Bake the loaves for 14 minutes, then remove the lid and rotate and bake the loaves another 10 minutes or until the crust is a rich golden brown and the bread sounds hollow when thumped on the bottom. It should have an internal temperature of 200 degrees F.
7. Repeat the process with the second batch of loaves. Placing the baker back in the oven to preheat before baking the loaves.
8. Transfer the loaves to a wire rack to cool for at least 30 minutes before slicing and eating

100% Whole Wheat Sourdough Baguettes - Breadtopia

https://breadtopia.com/whole-grain-baguettes/

100% whole wheat @ 87% hydration

- Day 1 PM - Feed starter with 10:100:100 for a single batch in order to use 115g of refreshed starter as the levain and leave enough culture for the next dough
- Day 2 AM - Saltolyse, Mix, fold, bulk ferment w/folds, retarded fermentation
- Day 3 AM - Pre-shape, shape, proof, bake

Whole Grain Sourdough Baguettes – Breadtopia.pdf

Pizza

100% Whole Wheat Pizza Dough @ 85% Hydration

From Vito Iacopelli video https://youtu.be/5vVHLBYX0As with some adjustments
Another great source is The Artisan Pizza Basics
More good tips https://www.washingtonpost.com/recipes/whole-wheat-pizza-dough/16949/
NY Pizza School notes on sauce, stretching, white flour dough, toppings:: Pizza Class Notes

Vito Iacopelli's formula on the video calls for 68% hydration, which would be high for white flour but low for whole wheat flour. The Artisan formula for white flour has a hydration range of 66 - 89%. I used to make a nice white flour crust right in the middle of this range. Becky Krystal of the Washington Post, who graciously responded to a question, uses 84-87% hydration (depending on how much water is in the honey).

Neapolitan pizza dough has no oil; only flour - water - yeast - salt. But it's baked at 900° F in 1 - 2 minutes. In a 500-550° home oven, it will take 5-8 minutes, so the dough needs a little oil to create crispness and color at the lower baking temp. The oil also makes the whole wheat dough more extensible.

Quick tomato sauce: 1 can diced tomatoes (drained; drink the juice) + 1 clove of garlic + 1t of oregano or Italian seasoning in the blender or food processor. Or process longer and simmer while the oven preheats for a thicker, smoother sauce.

Ingredient	**Percentage**	**450g Flour**	**Notes**
Whole Wheat Flour	100%	450g	2 pies x 225 g of flour each
Water	85%	383g	Dough will be sticky
Yeast	.31%	1.4g	Reduce to 0.22% 1g for overnight fermentation
Salt	2%	9g	
Olive Oil	5%	23g	Improves extensibility for whole wheat

1. Mix all the ingredients to incorporation
2. Rest 30 minutes to promote hydration of the whole wheat flour (in place of an autolyse)
3. Knead all ingredients until it doesn't stick to the bench, but it will be sticky to the touch

    a. 3 minutes on mixer speed 1; then 5 minutes on mixer speed 2 (#4 on KitchenAid)
    b. Or 3 minutes 1st speed; 3 minutes speed 2; laminated fold
4. Dust with flour, cover, manual folds at 30 minutes and1 hour
5. Divide into 2, shape into rounds, dust with flour
    a. Not necessary to divide if bulk fermenting overnight (but make sure you used less yeast)
    b. Pre-shape gently to avoid too much elasticity
6. Bulk ferment/proof 5-6 hrs at room temp or retard overnight in the fridge;
    a. Fold at 30, 60, 90 minutes for room temp or fridge
    b. Reduce yeast for overnight fermentation
    c. Dough should double in size during fermentation
    d. If it fermented overnight, preshape gently and allow an hour, covered, to warm up and another hour, covered, to relax, for more extensibility
7. Preheat oven with a stone near the top (or in front of the fan for convection) to max temp 1 hr before baking
    a. If the dough is in the fridge, take it out to warm up. Divide and pre-shape (gently) to balls and dust with flour so that it does not stick to the plastic wrap that you use to cover the balls.
    b. Proof dough until doubled; at least 30 minutes, better 1 hour so that the dough relaxes and it is easier to stretch
8. Cook toppings like rapini because they won't have much time to bake with the pie
9. Shape each pie; make sure to stretch the dough to the max size of your peel/baking stone or the crust will be too thick and the baking time will be longer than 8 minutes, which can burn some toppings. These amounts should make 2 x 12" / 30 cm pies.
    a. Do the shaping on a piece of floured parchment paper on the peel; the dough can be too fragile to move from the board to the peel unless you're really careful
    b. If the dough is more elastic than extensible, try letting it rest 15-20 minutes to relax the gluten.
    c. 85% hydration dough is fragile. Stretch it gently; if you see thin spots, stop and try a different stretch so that the dough does not tear. The first two techniques below seem to work best with fragile dough.
    d. Stretching techniques - https://youtu.be/Entzcl8q7H4
        i. Finger Press - start in the middle and work toward the edge
        ii. DJ
        iii. Steering Wheel/Gravity
        iv. Knuckle stretch - may not work with this dough
10. Place the dough on the peel with semolina or parchment paper (if not on the peel already for shaping)
    a. Drizzle a little oil on the dough to keep the liquid (in the sauce and toppings like mozzarella or fresh tomatoes) from soaking in; maybe brush a little oil on the cornicione (outer rim) for color
    b. Apply sauce and toppings *except the fast melting cheese (like mozzarella)*

    c. Drizzle a little more oil on top of the toppings for flavor and to help cook them
11. Note the two stage baking process in order not to burn the fast melting cheese in a slow home oven::
    a. Bake 5-6 minutes until the crust shows some color
    b. Remove from the oven, top with mozzarella or other high water content easily melting cheese, and bake 3-4 more minutes. The 5-6 min + 3-4 minute split helps bake the whole wheat crust in a 550℉ oven with convection without burning the cheese.
        1. A variation on this is to put one stone on the bottom rack in the oven and another on a rack just under the broiler.
            a. Bake 4-5 minutes on the lower stone
            b. Start the broiler on high and remove the pie
            c. Apply the fast-melting cheese
            d. Finish on the upper stone under the broiler, 3-4 minutes until the cheese is bubbling and there is some color in the crust. Timing depends on how close you are to the broiler and how fast your broiler heats up
            e. For the next pie, turn off the broiler and re-start the oven on the highest setting. Give it a few minutes to come back to full temp, while you prep the next pie.

100% Whole Wheat Pizza Dough @85% Hydration with Poolish

This technique is a poolish adaptation of the original formula above, to improve flavor and extensibility. Use this over 2 days, or, better, 3.

Ingredient	Percentage	450g Flour	Notes
Poolish			
Whole Wheat Flour	33% of total flour	150g	
Water	33% of total flour	150g	
Instant Yeast		pinch	See general information for yeast in a poolish for the desired time
Final Dough			
Poolish	100% of poolish		
Whole Wheat Flour	67% of total flour	300g	2 pies x 250g of flour each
Water	52% of total flour	233g	85% total hydration for lightness
Yeast	0.22%	1g	Reduced because of poolish and overnight fermentation. Use 0.27% 1.2g if no overnight fermentation
Salt	2%	9g	
Olive Oil	5%	23g	

1. Mix poolish just to incorporate. Cover with plastic wrap and ferment overnight at room temp.
2. Follow the directions above including the poolish with the remaining ingredients

100% Whole Grain Pizza Dough @75% Hydration with Sourdough Discard

This formula is very loosely adapted from KAF Sourdough Pizza Crust

Ingredient	Percentage	450g Flour	Notes
Sourdough Discard	85%	245g	Discard at 100% hydration includes 123g of flour; formula % based on new flour weight only
Whole Wheat Flour	100%	327g	2 pies x 225g of flour each. You may need substantially more flour for a strong-enough dough with enough elasticity to stretch. Keep adding flour until you get a dough rather than a batter, and then a little more for strength.
Water	65%	215g	The hydration of the sourdough discard brings the overall hydration to 75% of the total flour (discard + added)
Yeast	0.66%	3 g	There should be some oomph in the sourdough discard so only a little yeast is needed. But use enough to get a rise with a short bulk fermentation. Use 0.44%/2g for overnight bulk fermentation
Salt	3%	9g	Higher than usual salt % counts only the added flour
Olive Oil	7%	23g	Helps with stretching the whole grain dough

1. Stir the sourdough discard to make sure that any water on top is mixed in
2. Mix all the ingredients to incorporation. No autolyse needed because the flour in the discard is fully hydrated
3. Knead all ingredients until it doesn't stick to the bench, but it will be sticky to the touch
    a. 3 minutes on mixer speed 1; then 5 minutes on mixer speed 2 (#4 on KitchenAid)
    b. Or 3 minutes 1st speed; 3 minutes speed 2 + lamination fold
    c. Or 10 minutes Rubaud's Method, 10 minutes rest, and more Rubaud as needed

4. Put the dough in a container to bulk ferment until it doubles in size; 2 - 4 hours at room temperature
    a. Two rounds of folds at 30 and 60 minutes
    b. Or, overnight in the fridge
5. Make a basic tomato sauce if using: drained diced tomatoes and garlic and oregano in the food processor; simmer if you like to thicken
6. Preheat oven with a stone near the top (or in front of the fan for convection) to max temp 1 hr before baking
    a. Or, 450 F for a thick crust pan pizza
7. Divide into 2, shape into rounds, dust with flour. Pre-shape gently to avoid too much elasticity; rest 20 - 30 minutes
8. Cook toppings like rapini because they won't have much time to bake with the pie
9. Shape each pie; make sure to stretch the dough to the max size of your peel/baking stone or the crust will be too thick and the baking time will be longer than 8 minutes, which can burn some toppings. These amounts should make 2 x 12" / 30 cm pies.
    a. Do the shaping on a piece of floured parchment paper on the peel; the dough can be too fragile to move from the board to the peel unless you're really careful
        i. Or, for a thicker crust, oil a baking pan and stretch in the pan
    b. If the dough is more elastic than extensible, try letting it rest 15-20 minutes to relax the gluten.
    c. 75% hydration with discard dough is fragile. Stretch it gently; if you see thin spots, stop and try a different stretch so that the dough does not tear. The first two techniques below seem to work best with fragile dough.
    d. Stretching techniques - https://youtu.be/Entzcl8q7H4
        i. Finger Press - start in the middle and work toward the edge
        ii. DJ - turn the dough on the bench with both hands, stretching as you turn
        iii. Steering Wheel/Gravity
        iv. Knuckle stretch - may not work with this dough
10. Place the dough on the peel with semolina or parchment paper (if not on the peel/pan already for shaping)
    a. Drizzle a little oil on the dough to keep the liquid (in the sauce and toppings like mozzarella or fresh tomatoes) from soaking in; maybe brush a little oil on the cornicione (outer rim) for color
    b. Apply sauce and toppings *except the fast melting cheese (like mozzarella)*
    c. Drizzle a little more oil on top of the toppings for flavor and to help cook them
11. Note the two stage baking process in order not to burn the fast melting cheese in a slow home oven::
    a. Bake 5 minutes until the crust shows some color
        i. 8 minutes for thick crust pan pizza
    b. Remove from the oven, top with mozzarella or other high water content easily melting cheese, and bake 3 more minutes. The 5 min + 3 min split helps bake the whole wheat crust in a 550℉ oven with convection without burning the cheese.

i. Approximately 8 minutes with the cheese for a thick crust pan pizza
    1. A variation on this is to put one stone on the bottom rack in the oven and another on a rack just under the broiler.
        a. Bake 4-5 minutes on the lower stone
        b. Start the broiler on high and remove the pie
        c. Apply the fast-melting cheese
        d. Finish on the upper stone under the broiler, 3-4 minutes until the cheese is bubbling and there is some color in the crust. Timing depends on how close you are to the broiler and how fast your broiler heats up
        e. For the next pie, turn off the broiler and re-start the oven on the highest setting. Give it a few minutes to come back to full temp, while you prep the next pie.

White Flour Breads

Challah

Hamelman 2nd edition pg 292

One large loaf, big enough for a double- or triple-decker.

DDT 75-78° F

Ingredient	**Percentage**	**900g Flour**	**Notes**
Bread Flour	67%	600g	Can be half whole wheat, half bread flour
High-Gluten Flour	33%	300g	
Sugar	5.5%	49.5g	
Yolks	7.5%	67.5g (about 5 yolks)	
Whole Eggs	14%	126g (about 3 eggs)	
Vegetable Oil	7.5%	67.5g	
Water	32%	288g	
Salt	1.9%	17g	
Instant Dry Yeast	2.5%	22.5g	15g if retarding overnight

1. Mix all ingredients 3 min on 1st speed until incorporated, then 2nd speed (#4 on the KitchenAid stand mixer) 5-6 min for strong gluten development
    a. If using whole wheat, incorporate ingredients and let soak 20-30 minutes.
    b. This stiff dough may overload a stand mixer; mix by hand
2. Bulk ferment 2 hrs, folding at one hour
    a. Or, bulk ferment 1 hr at room temp; then retard in fridge overnight degassing twice within 4-6 hrs (say 2.5 and 5 hrs). Use only ⅔ of the yeast if retarding overnight
3. Divide into pieces; preshape round and rest 10-20 min.
    a. 3 strands about 510g each
    b. Two-decker:
        i. 3 x 343g

        ii. 3 x 171g
    c. Three-decker
        i. 6 x 154g
        ii. 6 x 77g
        iii. 3 x 51g
4. Roll out strands, allow them to relax under cover 15-20 minutes, and braid; cover with linen and plastic to prevent formation of a skin
    a. Braiding techniques Braiding Techniques from Bread 3rd Edition001.pdf
5. Preheat oven no stone, no dutch oven, no steam to 430℉
6. Proof 1 ½ - 2 hrs at 76° F
7. Egg wash, apply poppy or sesame seeds
8. Bake no steam at 380°F about 30 minutes vents open the whole time (home oven door can be closed)

Bagels

Hamelman. “Bread” 3rd edition

bagels001.pdf

Bialys

Hamelman, “Bread” 3rd edition

bialys001.pdf

Pain Rustique

“Bread” 2nd edition

50% Poolish; 69% hydration
50% poolish allows the bread to ferment and proof fast; 3 hr to finish once the poolish is ready. Because there is no preshaping or shaping, it’s similar to a ciabatta.

DDT: 76° F

Ingredient	Percentage	450g Flour	Notes
Poolish			
Bread Flour	50% of total flour	225g	
Water	50% of total flour	225g	Equal to poolish flour
Instant dry yeast	0.2% of poolish flour	0.9g	12-16 hrs at 70°F
Final Dough			
Poolish	100%		
Bread Flour	50% of total flour	225g	Equal to poolish flour
Water	19% of total flour	86g	77g for autolyse; add 9g to dissolve salt
Yeast	1.4% of total flour	6g	
Salt	2% of total flour	9g	

1. Mix poolish; let stand 12-16 hrs at room temperature
2. Add final flour and water (no salt or yeast) for autolyse 30 minutes
3. Add remaining water, salt, and yeast; mix 2 minutes at 2nd speed (4 on the KitchenAid); fairly well developed, supple, and moderately loose
4. Bulk fermentation 70 minutes - fold after 25 minutes and 50 minutes
5. Preheat the oven (and Dutch oven) at max temp when bulk fermentation starts
6. No preshaping or shaping required (!)
7. Proof 20-25 minutes at warm room temp
8. Slash, steam the oven or place in a dutch oven
9. Bake at 460°F (435℉ with convection) 17 minutes; then open oven door a crack for 17 minutes longer