

## *California Malt Sourdough*

### *Page number Content*

- 2-4 California Malt Sourdough – Introduction
- 5 California Malt Sourdough  
Square Slice Sandwich Loaf – description
- 6 California Malt Sourdough  
Square Slice Sandwich Loaf Recipe & Method
- 6 *I. Malt Sourdough preferment preparation, 1 - 3 days before planned  
bake:*
- 7-8 *II. Method using #1 fine organic bulgur.*

## *California Malt Sourdough-Introduction*

The combination of an all-malt with salt sourdough starter, a parched grain product such as bulgur wheat and whole wheat flour is game changing for 100% whole wheat bread. In an optimized combination, the bread is wonderfully light and soft textured, sweet-sour flavored and enhanced in dietary fiber and B-vitamin content, especially folate.

The idea of a sourdough starter made entirely with malt flour (diastatic or enzyme active malt) raises eyebrows, if not eye rolls, among modern bakers. Indeed, the modern refined flour / purified yeast system for bread relies on carefully titrated very small amounts of enzyme active malt, to prevent an excess of enzymic activity in the refined flour that would break down starch and protein and make very heavy bread. Yet the historic sourdough starter (barm) still being used in Scotland in the early 1900s, in one variation, was formulated with malt alone as the grain, a little salt, some hops and water. This was described by William Jago, father and son, in their technical baking book published in various editions from about 1886 through 1911 <sup>1</sup>. This gave me confidence to at least try making a sourdough starter with enzyme active organic wheat malt flour as the sole grain ingredient, a little salt and water. The hops were omitted because they likely had a place only with the intention of reducing the acidifying bacterial content. Instead, at least since 1971 we believe that lactic bacteria are an essential component of a natural sourdough starter<sup>2</sup>. In fact, it is the controlling effect of these acids on the enzymes in malt that allows an amazing bread texture to develop with this all malt with salt sourdough starter system.

Almost from the beginning of dabbling in the making of whole wheat bread, I have added boiling water to a portion of the dough flour or made a porridge with some of the whole wheat flour and dough water. The idea, after cooling these concoctions, was to provide some damaged or gelatinized starch that would be easily degraded by natural amylases in the dough flour and added malt. The sugars produced generously feed the lactic bacteria and yeasts in the sourdough and the breads have good sweet-sourdough flavor. Another advantage is that the excess damaged or gelatinized starch holds much more water in the dough than raw starch. The breads were evidently softened by the increased water content held by the excess pre-cooked starch.

Various available grain products are pre-cooked, so logically they can be used “as is” instead of a porridge as a source of pre-gelatinized or damaged starch in 100% whole grain bread dough. Examples are quick cooking oats, whole grain flakes, malted

---

<sup>1</sup> William Jago & William C Jago. “*The Technology of Breadmaking*”. American Edition. Baker’s Helper Company, Chicago. 1886 -1911.

<sup>2</sup> Kline & Sugihara Leo Kline and T. F. Sugihara, titled “Microorganisms of the San Francisco sour dough bread process. II. Isolation and characterization of undescribed bacterial species responsible for the souring activity ” *Applied Microbiology* (Volume 21, Issue 3, pages 459–465)

wheat flakes, parboiled brown rice, and bulgur wheat. Further questioning revealed that all these do indeed contain some gelatinized or damaged starch. Importantly, these products also contain significant amounts of retrograded (resistant) starch, which would increase the dietary fiber content, as well as an increased B-vitamin content. In dough, resistant starch holds much more water than raw starch and is likely the main component in the bulgur wheat that makes the bread texture extra soft. This resistant starch remains untouched in the bread due to its resistance to flour amylases; although it may be a little degraded directly by the lactic bacterial enzymes. In these precooked grains, the increased B-vitamin content arises from moisturizing (i.e. initiating the sprouting of) the raw grain at the start of producing bulgur or grain flakes. It is this step of moisturizing that is essentially *parching* the grains. Hence the reference to this group of products as *parched* grains. The retrograded starch is the result of the cooling after steam treatment of the moisturized grains. Thus, by using bulgur wheat as an ingredient in a whole wheat bread, we can provide damaged starch, resistant starch and extra B-vitamins. The texture and nutritional value of whole wheat breads are thus both enhanced with the addition of bulgur wheat. Fine bulgur rather than coarse ground bulgur is suggested as best and easiest to use, in a whole wheat bread.

Breads made with an all-malt sourdough starter and fine bulgur can be varied and optimized by the choice of organic whole wheat flour. Further variation is possible by using rye or hull-less barley malt, and by using other parched grain products such as grain flakes. By now, we have had more than four decades of introduction to heritage wheat varieties appropriate for organic agriculture and whole wheat end products. These organic heritage wheat varieties are alternative to wheat that is bred for conventional agriculture and refined wheat flour breads. For the best bread texture and nutritional value, look for a protein level in the heritage whole wheat flour or grain greater than 12%, and preferably more than 14%. Some heritage varieties are well known for their good nature in bread, such as the hard red wheat *Turkey Red* and the hard white wheat *India-Jammu*. However, provided the protein level is high enough many other heritage varieties can be used to make pleasing breads.

To be a truly *California Malt Sourdough* bread, at least the malt should be produced in California. Both malt and bulgur are produced wholesale and distributed in California<sup>3</sup>. Ideally to be completely Californian, the whole wheat flour should also be grown and milled locally in California.

The other ingredients in the bread, salt, water, and extra malt, also need to be thoughtfully attended to. The salt chosen is best finely ground so that it can easily dissolve in the dough water during mixing. The dough water can be filtered through active charcoal to remove disinfectant contaminants that could inhibit the sourdough microorganisms. Charcoal filtered water still retains the normal calcium and

---

<sup>3</sup> Malt: Admiral Maltings, Alameda, CA 94501 ([admiralmaltings.com](http://admiralmaltings.com))  
Bulgur: Sunnyland Mills, Fresno, CA 93725 ([sunnylandmills.com](http://sunnylandmills.com))

magnesium mineral content that is needed to catalyze the enzymatic processes in a sourdough fermentation.

A small amount of fresh enzyme-active or diastatic malt flour is optionally added as a boost to the enzymes already present. Sugars are readily released from the damaged starch in the bulgur, by the fresh malt flour enzymes. The effects are an increased loaf volume, a sweeter taste and deeper browning of the crust. If the whole wheat flour has already been optimized for baking with a favorable Falling Number (250 -300 seconds), none or only the smallest amount of enzyme active malt will be needed. Freshly made malt will be more potent than older malt, so a starting amount to add might be 0.25% with respect to the flour, However, if the malt has aged it may contain much less enzyme activity, such that 1% with respect to the flour, might be needed to produce good volume, texture and flavor. To date, the maximum suggested amount of enzyme active malt flour to add is 1% with respect to the total flour, to avoid overdosing with fresh malt enzymes.

100% whole wheat sourdough breads are mostly being produced in the form of crusty artisan hearth loaves. However, 100% whole wheat square slice sandwich loaves, and buns, which are the mainstay of breakfast and lunch, can also be made with this *all-malt sourdough starter plus parched grain* formulation. Hence the attached recipe and method for a closed pan square slice sandwich loaf. The same formulation could be used for artisan hearth breads, simply by reducing the water amount so that the loaf stands well in the oven.

*California Malt Sourdough - Square Slice Sandwich Loaf*

Commercial and homemade pan breads are frequently made in steel pans, which rarely present a corrosion or flavor problem with yeasted white flour breads. However, acidic sourdough whole grain loaves are likely to pick up a metallic taste from plain steel pans. Indeed, until quite recently I avoided the contact of sourdough leavened bread on a steel pan, by instead using stainless steel pans or lining a steel pan with silicone-coated non-stick parchment baking paper. Finally, I realized that most producers of steel baking pans now offer glazed pans. The glaze is silicone based and presents a non-toxic, non-stick surface, meaning that bread dough cannot interact with this steel surface even if it is acidic. In practice I found that my plain fat-free breads do not fully release from either a stainless steel or silicone glazed pan, so I continued to use a non-stick silicone coated paper liner. Lately, I've solved this dilemma by very lightly coating silicone-glazed steel or stainless-steel pans, with a very small amount of olive oil mixed with oil-based soy lecithin (lecithin oil : olive oil, 1:10, v/v). Lecithin is an emulsifying agent that prevents sticking by enabling a complete covering of the pan surface by the olive oil. Also to complete the conditions appropriate for a soft crusted pan loaf, in a lecithin-olive oil lubricated silicone-glazed pan, the baking temperature chosen is moderate at 190°C (375° F).

Proof of the bread success is in the eating! Once released from the pan, the bread is best allowed to cool completely to room temperature, before wrapping in paper towels or a clean cloth and storing for 8 - 12 hours in a closed container. During this time the moisture content equilibrates so that the crust is softened. If everything has gone well with the loaf production, the slicing knife will be completely clean, and everyone will be grateful for a 100% whole wheat bread with pleasing texture, flavor, and extra nutritional value. For commercial production and customer pleasure, this loaf can be pre-sliced and packaged in a closed kraft paper bag. Ideally the bag would be made with multi-layers to prevent moisture loss, with paper in contact with the loaf.

It's not easy in a first attempt, to choose ingredient amounts, such that the closed loaf pan is filled without spillover during baking and without gaps in the top corners of the pan. Amounts are given for a hard red or white wheat flour, but there is considerable variation in flours, especially in the amount of water they can hold. You may need to adjust the amount of flour to use. In practice it is not necessary to perfectly fill the pan. Instead, enough dough can be used to create a domed loaf, barely touching the roof of the pan. The slice is still almost square for sandwiches, and you will still have the advantages of baking the loaf in a closed pan that allows self-steaming.

## California Malt Sourdough

### Square Slice Sandwich Loaf - Recipe & Method

For 1 loaf using 600 g whole wheat flour, to be baked in a covered glazed-steel loaf pan (with lid) 9 x 4 x 4 inches

#### *I. Sourdough preferment preparation, 1 - 3 days before planned bake:*

*Amounts of sourdough pre-ferment are enough for preparation of 1 loaf based on 600g flour, plus extra to use for making a fresh preferment for the next bake.*

| Ingredients                                | Amount in grams | Baker's per cent |
|--------------------------------------------|-----------------|------------------|
| Malt flour                                 | 30              | 100*             |
| Fine salt                                  | 0.45            | 1.5              |
| Water                                      | 37.5            | 125              |
| California Malt Sourdough (mature reserve) | 3               | 10               |
| Total                                      | 70.95           |                  |

\* 5% with respect to dough flour

[] In a bowl, mix malt flour, salt, water, and California Malt Sourdough reserve to a smooth paste. Cover the bowl and leave at 86°F (30°C).

[] Stir to re-mix ingredients after 8-12 hours and look for changes. Notice normal gassing, thinning texture, and typical aroma. *Optionally measure the acidity (pH) with acidity test paper. The pH should be 3.5 or less before using as a bread ingredient.*

[] Use as mature pre-ferment ingredient for making bread 1-3 days after first mixing ingredients.

[] Store left over mature starter in closed jar at 40°F (4°C) to serve as a back-up reserve ready to make future batches.

*Square Slice Sandwich Loaf - continued*

*II. - Method using #1 fine organic bulgur.*

*Flour basis for Baker's per cent: 600 grams*

| <i>Ingredients</i>           | <i>Amount<br/>in grams</i> | <i>Baker's<br/>percent</i> |
|------------------------------|----------------------------|----------------------------|
| Bulgur (#1 fine organic)     | 60                         | 10                         |
| Water at ambient temperature | 240                        | 40                         |

[] 15 - 60 minutes before making the dough: Add bulgur to a bowl, followed by the weighed amount of water. Mix well and set aside to allow bulgur to soak and swell before mixing with other bread ingredients.

| <i>Ingredients</i>                            | <i>Amount<br/>in grams</i> | <i>Baker's<br/>percent</i> |
|-----------------------------------------------|----------------------------|----------------------------|
| Whole wheat flour                             | 600                        | 100                        |
| Wheat malt flour (enzyme active)              | 0 - 6                      | 0 -1                       |
| Salt                                          | 10.2                       | 1.7                        |
| Water at 86°F (30°C)                          | 210 - 270                  | 35 - 45                    |
| California Malt Sourdough (matured 1- 3 days) | 60                         | 10                         |

[] To mixing bowl: Add and mix whole wheat flour, wheat malt flour, and salt.

[] Separately: weigh water. *Start with the lowest amount of water but expect to use the full amount if working with a favorable whole wheat flour.* Add matured California malt sourdough to the water and mix well, before adding to the mixing bowl.

[] Add bulgur-water mixture to the main mixing bowl.

[] Mix until dough is cohesive. *Mix in a stand mixer with dough hook. Or mix by hand in a mixing bowl, at first with a spurtle until dough forms, and then knead the dough in the bowl using water moistened hands, by folding the dough from the edge to center and pressing with the fist repeatedly, all around. The bulgur may prevent formation of a totally smooth dough. At this stage, the dough may not fully develop and may be sticky and soft due to relatively slow uptake of water by the bulgur. The dough should be medium stiff and easily stretched. If too stiff, add more water in 30-gram amounts (5% with respect to flour) and continue mixing until all the water is absorbed and the required cohesive texture is achieved. Make a note of total amount of water used for that batch of flour.*

[] Press the dough into a container with lid. Cover and allow it to ferment at 86°F (30°C)<sup>4</sup> for approximately 7 hours. *Dough should be distinctly puffy at the end of this time, although*

---

<sup>4</sup> 86°F (30°C) is an ideal temperature for bread dough. Fermentation times are 2-3 times longer for each drop of 10°C in temperature. Thus, at 68°F (20°C) the time for dough to approximately double in first rise is 17 hours. A constant

## California Malt Sourdough

*it may not have exactly doubled in volume. Alternatively allow to ferment to nearly double volume at 68°F (20°C) for approximately 17 hours, or at 64°F (18°C) in a wine cooler for approximately 21 hours.*

[] Water moistened hands, a clean water moistened board, and a dough scraper are all that are needed to handle the dough. Do not sprinkle flour. Punch dough down on a smooth surface and knead briefly to complete dough development. Round the dough piece and leave to rest under a cloth for 20 minutes.

[] Prepare the baking pan. Use a silicone pastry brush to very lightly but completely coat the internal pan surface with just one or two drops of an olive oil and lecithin mixture (e.g. olive oil : soy lecithin oil, 10 : 1, by volume). *This mixture can be stored in a bottle with a nozzle ready for use.*

[] Shape dough on moist board. Invert the dough ball, stretch and flatten into an oval approximately 8 inches wide and half an inch thick. With a stretching motion roll up the dough piece towards you. Tuck ends under. Seal and roll the dough-log before placing it in the lubricated bread pan, seam side down. Close pan with lid. *Dough should approximately half fill pan.*

[] For the final rise before baking, keep the covered bread pan at 86°F (30°C) for 2-3 hours. *Dough should three quarters fill the pan before baking. If the first rise was at a cooler temperature allow up to 3 hours at 86°F (30°C) for this final rise.*

[] Preheat oven at 375°F (191°C) for regular baking on open rack. Bake the loaf enclosed in the pan for 60 minutes at 375°F (191°C). *When done, the crust should be deeply browned and the crumb soft-springy. A pale colored crust, and pastiness of the crumb suggests insufficient baking. Firmness in the crumb-spring even though well expanded, suggests overbaking.*

[] After baking, almost immediately remove loaf from pan, allow to cool completely to ambient temperature on a rack. Before serving, store cooled loaf wrapped in paper towels or a clean cloth, in a closed container for 8-12 hours to allow moisture equilibration and softening of the crust.



[] Revive old bread slices by briefly dipping in hot water and toasting.

[] After 3-5 days store bread pre-sliced in a closed plastic box at freezer temperature. Revive slice by slice by dipping briefly in hot water and toasting.



---

*temperature cabinet or dough proofing box makes bread timing consistent and is recommended. For a longer cool first rise of approximately 21 hours, a wine cooler at 64°F (18°C) can alternatively be used*