

Buns Galore!

Introduction

100% whole wheat soft sandwich buns for schools – here's hoping! Beyond the convenience of sliced bread for a sandwich, is the sliced bun! School lunch and breakfast programs need kid-pleasing soft 100% whole wheat buns. That's my perception. Among artisan bakers 100% whole grain baking, is most often towards the crusty loaf. Crusty breads are wonderful for teenagers and adults with strong teeth, but a soft bun is also likely to please young children.

For buns, after the whole wheat flour, water, salt and natural sourdough leavening, increased softness can come from such ingredients as base malt (enzyme active wheat malt), milk, olive oil and egg. However, the most important condition is to keep the dough moist all the way through the baking stage. Simple steaming will do this, but if steam can be maintained in an oven at say 350°F, the cooking time is reduced compared with the simple steaming time, and the bun will be somewhat browned.

To this end I now have an ANOVA precision steam oven on my kitchen counter. Since acquiring it 6 months ago, I have not used my standard home kitchen electric oven for bread! Instead, I bake soft buns every few days in this steam oven. I am not whole-heartedly endorsing this oven, since I see flaws in its function; it needs to be turned off manually, whereas my regular oven can be set to turn off at the end of a cooking time! Also, I have yet to manage a connection with it to the internet and my iPhone, which I suppose is the way in which it can be controlled. Perhaps I have not persevered sufficiently or is it because my iPhone operates with 5G! There are other home steam ovens on the market that could be chosen. Nevertheless, I can make soft 100% whole wheat buns in this ANOVA oven, and its steam-baking function seems to be comparable with the commercial RATIONAL *Combi-Ovens* used in some school and food service kitchens and bakeries. My goal here is to provide pleasing whole wheat soft bun recipes that can be easily used in school kitchens and bakeries.

Whole wheat sourdough bread-making tips

In the following recipes, some methods for whole wheat doughs are not commonly used by refined flour bakers.

For whole wheat bread making, care is taken to *add all the needed flour at the beginning of mixing*, so that it can be hydrated and fermented evenly, for the entire time before baking. *Flour is not spread on the work surface or used for handling the dough*. Instead, when the dough is sticky, it is *handled with lightly moistened hands, and the work surface can be moistened*. In practice, after the dough has been left to ferment for the first rise, and has been fully developed by adequate kneading, it is not sticky and can be handled nicely as it is.

The workable dough texture for these soft buns requires a similar hydration to that used for refined flour baking; approximately 60 -70 % with respect to the flour. Therefore, when first making these buns, it is helpful to initially make the dough with the minimum amount of water suggested. If this does not produce a suitable dough texture, add more water in increments of 5% with respect to the flour, until the desired

texture is achieved. Note the amount of water needed to give the desired dough texture with a particular flour, ready for the next batch.

Enzyme active malt is made by sprouting grains for a few days and drying the sprouts at a low temperature to preserve the enzymes produced. Thus, a generous amount of malt in whole grain dough supplies enzymes that can favorably modify the whole grain flour for making bread. Enzymes in malt include *amylase* that produces simple sugars from starch and *phytase* that releases minerals such as potassium, magnesium and iron. The sugars are used by the sourdough micro-organisms and enhance the fermentation. Released minerals are nutritionally easier to absorb. Other malt enzymes target the soluble dietary fiber, so that whole grain dough texture is improved and antioxidant phenolics are released.

Sourdough is best for leavening doughs with wheat flour in the whole grain form, due to the presence of lactic bacteria together with acid tolerant yeast. Lactic bacteria are primarily used in the fermentation of the bran and germ, whereas yeasts mostly ferment the endosperm starch. At the beginning of making the dough there is very little acid present and the pH is approximately the same as the water added. By the time the dough is ready to bake the acidity is considerable, enough to bring the dough to pH 4 or less. In practice this is useful for doughs containing added enzyme active malt. The effect of this much acidity is to halt the action of the starch-degrading amylase before baking. This prevents unwanted starch breakdown in the oven.

Sourdough starter maintenance is simple. The sourdough starter stock is replenished by mixing a small amount of the previous batch of starter into a mixture of whole wheat flour, enzyme active malt and water. The starter matures and is ready to use in 36 hours at 86°F (30°C). A week's supply of mature sourdough starter can be prepared regularly and refrigerated at 40°F (4°C), ready for use directly in bun dough.

Effects from different wheat varieties, storage, and crop year

Whole wheat flour can be made from each of the many wheat varieties, to provide the baker with a wide range of texture, flavor, and color possibilities.

Wheat with red or dark brown bran color is the most likely to provide an elastic dough. Durum and most light bran color wheat produce a relatively short dough texture. Dark colored wheat likely has the most intense flavor since most of this flavor comes from the colored phenolic compounds in the bran. Light crumb coloration is generally provided by wheat with light colored bran. There are exceptions, but these generalizations can be useful as a starting point.

Even when using a chosen single variety of wheat for whole grain baking, it soon becomes evident that the quality of the whole wheat flour produced can vary due to grain storage conditions and due to the crop year.

Ideally, wheat grain should be cleaned free from harvesting debris, immediately after harvest. Clean grain should be dried down to 10% or less moisture and stored at cool room temperature in closed containers excluding moisture, insects and rodents. Grain shelf life under these conditions is 10 years or more. Whole wheat flour is best milled fresh using this stored grain as needed. In the presence of moisture and warmth, molds and insects can thrive in grain and give off flavors and reduced functionality to the whole wheat flour.

A single wheat variety is changed in dough characteristics from farm to farm due to the differences in farm practices, and the weather each year. Dry farmed wheat in one

region likely has a higher protein than irrigated wheat produced elsewhere. The higher protein whole wheat flour may need a little more water in the dough and have better dough character. Drought stressed wheat may have a very high protein, but less favorable dough qualities. If by chance the wheat is harvested with another crop or weed with a strong odor, such as sweet clover, the wheat can be tainted in flavor.

Equipment considerations for sourdough whole-wheat soft bun production in food service kitchens

Grain storage and mill

The starting point for whole wheat buns is fresh whole wheat flour. Currently there are very few local mills producing freshly ground whole wheat flour. Therefore, the best way to provide fresh whole wheat flour may be to have storage space for a year's supply of wheat grain and a whole grain flour mill.

Constant temperature cabinet

For predictable timing and a consistent final product, all stages of sourdough fermentation from the maintenance of sourdough starter and through all the sourdough bun preparation steps, are best managed at a chosen constant temperature, such as 86°F (30°C). Thus, a constant temperature cabinet is needed and should be large enough to accommodate all scheduled dough and finally rising buns.

Scales, Dough Mixer & Bench

Most bakeries and kitchens are equipped with appropriately sized scales, a dough mixer and work bench. It will be important to make sure that all equipment and surfaces contacting dough leavened with sourdough, can resist the acidity. *Stainless steel and wood are the most suitable surfaces for handling sourdough* leavened dough; they do not react with the acidic dough. Acid resistant food-grade plastics can be used to hold dough during fermentation.

Bun divider and rounder

A mechanical bun divider and rounder makes very short work of converting a piece of dough into neatly rounded buns, all the same desired weight. The best design for functionality is a mobile one-piece unit. A large piece of dough of known weight is placed on a special indented tray and inserted into the machine. Pressing the buttons first initiates the dividing into a known number of pieces, and afterwards the rounding of the buns.

Steam oven

Softness in buns is mostly achieved by the presence of plenty of steam during baking. Most bakery ovens have steam injection systems, but the intention is generally to provide steam only at the beginning of the bake time. The ideal oven for soft bun baking combines full steam production with convection heating for the entire bake-time. Ovens with a combination of cooking methods are regarded as *combi-ovens*. The RATIONAL line of combi-ovens specializes in this feature of combining full steam with convection heating. They recommend them for food service kitchens where a wide range of cooking conditions can be provided by just one oven. Thus, in some school and food service kitchens as well as in some bakeries, such ovens are already in use.

Nutritional advantages for whole wheat malt and sourdough buns

Whole wheat flour is made using all parts of the entire grain: *bran*, *germ*, and *endosperm*. In contrast refined white flour is purposely made with only the endosperm that contains mostly starch and gluten protein, with almost no other nutrients. Thus, the main nutritional advantages for whole wheat flour are due to the presence of bran and germ which are very rich in essential nutrients other than the starch and gluten protein.

All parts of wheat bran and germ are nutritionally valuable. They provide dietary fiber (soluble and insoluble), essential oils, B-vitamins, vitamin-E, minerals (potassium, phosphorus, magnesium, calcium, iron, and zinc), protein, enzymes, antioxidant phenolics, alkyl-resorcinols, phytosterols, carotenes, choline, and other useful nutrients some of which likely have yet to be discovered. All these nutrients are used by the wheat grain to produce a plant. Similarly, people need these nutrients, to make proper use of the endosperm starch for energy, and for using the protein for cell building in all parts of the body. B-vitamins are especially needed by people, to make proper use of the starch, so that it provides energy rather than an excess of stored fat. Thus, whole wheat foods as the base of the diet are well known to be highly protective against metabolic disease: obesity, type-2 diabetes, cardiovascular disease, and some cancers.

Wheat malt contains extra enzymes such as *amylase* and *phytase*, and more available B-vitamins and minerals due to sprouting the wheat grain. Amylase releases sugars from starch that are food for the sourdough microorganisms, so enhancing the fermentation. Phytase releases minerals from the phytate in the bran and germ.

Much of the effect of sourdough leavening is due to the lactic bacteria that convert simple sugars and soluble bran fiber into short chain fatty acids. The increasing acidity during a sourdough fermentation brings various enzymes into and out of action in the dough. Vitamin B1 (thiamine) is stabilized by the acidity; the enzyme phytase is activated by acidity and increases the availability of the minerals; the short chain fatty acids are absorbed and provide balance to fat metabolism and much more to enhance the texture, flavor and nutritional value of 100% whole wheat buns.