Tips for the New Brewer

Compliments of the Wizards Homebrew Club, Worcester, MA

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Brewing Timeline

-3 days	Make Starter
-1 Days	Mill Grain
Brew Day	Brew Beer (extract with steeping)
	• Steep grains
	• Bring water to a boil
	• Add hops
	• Boil for 60 minutes
	• Cool wort
	• Aerate
	• Pitch yeast
1 Week	Transfer to Secondary
	Add dry hops or other ingredients such as flavoring if applicable
3 Weeks	Transfer to keg or bottles (add priming sugar)
6 Weeks	Sample Bottle to see if CO2 level is correct

Introduction

Making good beer has to be one of the most satisfying things that anyone who enjoys a hobby can feel. You pour a great deal of time and energy, including a thrown spinal disc or two, into the process and when that first taste of finished product you so eagerly and patiently have been waiting for, hits your lip, the satisfaction of enjoying a good tasting beer makes it all worth it. Making poor beer on the other hand, well, there is no other way to describe it, it just plain stinks!

Most of us have made that batch that just wasn't right! For those of you who have never had this experience, good for you! For the rest of us, you know what I am talking about. The beer isn't bad enough to throw away and it isn't good enough to drink a lot of. So what to do then? We all have the hope that someday it will get better. So we save it. But between the times that we first tasted it and finally decided to dump it, we wonder what went wrong.

Luckily for me, most of my bad batches (and yes unfortunately the word batches is plural denoting more than one and we will leave the actual number out) have occurred in my early days of learning how to brew. Most brewers by nature want to tinker with the process. Whether it is the type of sanitizer we use or how we cool our wort, we are always trying to find the practices that merge "best" with "efficient".

The following article is a compilation of best practices and tips for the new brewer. The goal is to help new brewers improve the quality of their beers and avoid some of the common mistakes that can lead to a bad batch of beer.

Before Brewing

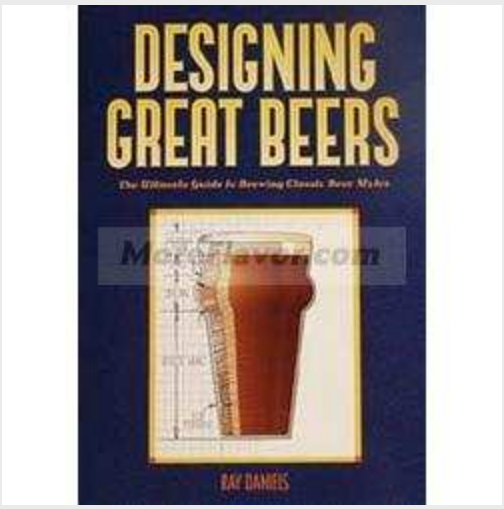
The Recipe and research

Having a good recipe is a good start. If you have a recipe that will not produce a good beer, you are set up for failure from the beginning. The best thing to do is pick a beer that you like and try to find a replica recipe of that beer. Then run the recipe by an experienced brewer to make sure there are no incorrect values. I have seen recipes that call for a tablespoon of spice, like nutmeg, when it is supposed to be a teaspoon. This is a subtle difference to the new brewer, but one that could ruin a batch of beer.

Do the research on the style you are brewing if you are brewing a specific style. I do suggest in the beginning that you do brew according to the styles or try to replicate a beer. This way you have a measuring stick to judge your beer against. There are a few books I recommend, but are not necessary in order to make good beer. The list below contains a few books that I have on my shelf that I rely on almost every time I brew, especially if I am brewing a style that I have never brewed before.

The first, The New Complete Joy of Home Brewing by Charlie Papazian, is an essential for the new brewer. I read this book twice before my second batch. My first batch came out just ok. I wanted to make sure I was doing everything correctly and frankly, I wanted better results. I jumped into my first batch before reading anything short of the "how-to" recipe that came with the kit. If I were to do it over again I would read Papazian's book before brewing that first batch.

- The New Complete Joy of Home Brewing
- Designing Great Beers by Ray Daniels
- Beer Captures and Clone Brews by Tess and Mark Szamatulski
- Any of the Classic Beer Style Series books from Brewers Publications (BP)



Designing Great Beer
BK480
Daniels. This book teaches you how to design recipes. There are so many bad recipes out there and too many times beginning brewers select recipes based on how good the original brewer makes it sound. For example, the name of a recipe says India Pale Ale, but the ingredient list dictates Pale Ale. This is a great resource that is long overdue. The book starts out with in-depth information on malt, yeast, hops and how to choose the right ingredient for the beer you are making. Then subsequent chapters follow up with information on beer styles. Each style chapter contains data from actual recipes that have won awards at the AHA national competition. A must have if you are thinking of entering beer in a competition.

Price: $24.95

Sanitizing

You will hear this all throughout your home brewing career. Sanitize! Sanitize! Sanitize! While you don't have to go nuts with sanitizing, you do have to make sure you sanitize anything that comes in contact with wort after the last 15 minutes of the boil. There are many options that you can use to clean and sanitize. So instead of going into all the available cleaners and sanitizers, I am going to share with you the habits and products I use to ensure a clean environment.

To clean, I use either TSP (non-phosphated) or PBW (Powdered Brewery Wash). To sanitize I use iodophor. Iodophor is easy to use, is cheap, and is a no rinse sanitizer. No rinse is essential for

sanitizing. The reason is that when you rinse with tap water, you are potentially reintroducing bacteria. Also, most city water supplies are treated and may contain chlorine. Chlorine can have negative effects on flavor in your beer. To use iodophor, just make up at a capful per every 2.5 gallons. The contact time is anywhere from 2 to 10 minutes. The one negative to using iodophor is that, in its concentrated form, it can stain. To combat this, I keep around Sodium Thiosulfate, which neutralizes the color. Sodium Thiosulfate can be bought as reagent grade, 0.1 N Sodium Thiosulfate through places such as Fisher Scientific.

Cleaner - PBW (4 lbs)

CL25B

PBW stands for Powdered Brewery Wash, which is a non-hazardous buffered alkaline brewery cleaner. It is cleaner of choice for many breweries where it out performs more hazardous caustic chemicals without removing the flesh off your bones. It will not corrode soft metals. Even better deal on bulk quantity. Comes in a jar with screw top lid.

When mixing hot water and PBW in an air or water tight space, it will create pressure. Please use caution when using PBW in enclosed equipment.

Price: $19.95

B.T.F Iodophor (33 oz)

CL35

Great deal on bulk quantity. An iodine based, no rinse sanitizer safe for use with most materials. 5 to 10 minute contact time when used in the concentration of 1-2 tbls per 5 gallons. It will slightly stain vinyl tubing and some plastic parts over time, which is really no big deal. A time proven sanitizer at an affordable price.

Iodophor has a high freezing point. If it freezes it will still be effective as a sanitizer when thawed. Please be careful to store it at room temperature to avoid freezing in the bottle and possibly causing the bottle to break due to expansion of the contents.

Price: $10.95

Making a Starter

Making a starter is one of two simple changes to the brewing process that will impact results more than anything else. The second is properly aerating your wort and will be discussed later in this article. There are many reasons why making a starter is important to the brewing process but the biggest two are the reduction in lag time and number of proliferation cycles.

The reduction in lag time reduces the chances of bacteria or wild yeast beating the brewing yeast to the fermentation process. The results are obvious. You end up with a beer that has an infected taste among other bad flavors.

One thing that contributes to flavor contribution in beer is yeast growth. If less yeast is pitched into beer, more yeast growth takes place; so more flavor compounds such as esters are produced. Depending on the amount produced, this is how pitching rates can have a direct effect on flavor profile. Too little yeast pitched into wort, will definitely have a negative flavor impact in terms of higher ester levels and potential for bacterial contamination.

The process of making a starter is pretty easy and well worth the extra work. You are essentially making a mini batch of beer. There are a few variations on how to make a starter so I am going to share with you the way that has given me the best results. The following is a list of thing you will need to make a starter and is based on making a 5-gallon batch and a specific gravity of 1.050. If you are making 10 gallons, bump the starter up to 1 gallon. The general rule of thumb is to make up the starter at 10 % of the final volume.

List of Equipment for Making a Starter

- 64 oz Growler
- #6 stopper with hole
- 3 Piece Air Lock
- Airtight Growler Cap
- 1 Plastic Funnel with Removable Screen (or just use a hop bag for the hops)
- ½ lb of Extra Light DME
- ~5 Hop Pellets (the kind being used in your beer)
- Black T-shirt

The very first thing to do is to prepare the yeast. I use smack packs from Wyeast, so I just smack it. If you are using dry yeast, prepare it according to the direction and time line on the package. Once the yeast preparation is done, fill the growler up to the neck with water to measure out the amount of water to be used for the starter. Pour it into the pot and start to heat. While the water is being brought to a boil fill the growler up with water and sanitizer. In my case I will add a small amount of iodophor to the growler and let it sit. I will then make up enough sanitizer to soak the lid from the pot, the funnel and screen, and the growler cap. Before the water comes to a boil add the ½ lb of DME and make sure you watch careful for a boil over. If the head rises quickly remove it from the heat source until it recedes.

When the wort comes to a boil, add the hop pellets. The hop pellets are optional, but I like to create a starter that is as close to the beer I am brewing as possible. If multiple hops are being used I will use either the bittering or flavor hops, which ever I have more of. Once the hops have been added, boil for 15-20 minutes to sterilize the wort. When fifteen minutes have ended, put the lid on the pot, remove from the heat source (remove from the burner it was on not just turn the heat off) and let stand for 10 minutes or so. Dump out the no rinse sanitizer from the growler and let it stand for 5 min or so to let the last bit of liquid collect in the bottom of the growler. Then dump the small remaining liquid out of the

growler and run the outside of the growler under hot tap water. This will ensure that your growler does not crack. Then use the funnel to pour the wort into the growler.

Another option would be to cool the wort in the pot, but I find it easier let the starter cool overnight to room temperature. I just think it is a pain to make up a cooling bath, and to have to keep adding ice, and to have to continually watch it while periodically stirring it, and the fact that it takes so long and…I could go on and on but I will spare you the agony of my anti-cooling bath campaign. So I just put the airtight growler cap on the growler, cover it with a black t-shirt, and let it sit on the counter over night. There is some lag time here, but I have never had an issue with a contaminated starter due to letting it sit on the counter.

When I get up in the morning, the starter is at room temperature. I make up some fresh sanitizer, sanitize the airlock and rubber stopper, and add the yeast. Once you have made a starter a few time, you will find it easy to do and your pallet will thank you for the improvement in the final product.

TIP: Before pitching the yeast into the starter, if you are using a smack pack that requires scissors, it is advisable to sanitize the scissors prior to cutting to minimize potential contamination. Just dip them into an iodophor solution for 5 – 10 minutes. If you are using yeast in a test tube, dip the entire tube in sanitizer to sanitize the outside and minimize the potential for contamination.

I have one final comment on starters. Make sure you smell the starter prior to pitching it. As stated above, using your senses will help you identify potential issues. If the starter smells funny, don't risk it. Do yourself a favor. Go out to the brew store and buy 2 – 4 packs of yeast and pitch those instead. While this is not ideal, it is the next best thing to making a starter.

Water

Water is probably the most important ingredient in the brewing process because it makes up 90 - 95 % of beer. Fortunately for the new brewer it is probably the last thing you need to worry about if you get your water from a reliable water source such as a municipal water supply. The general rule is if it smells ok, looks ok, and tastes ok, then it is probably ok to brew with.

I can honestly say that I pay little attention to water. However, one reason to pay attention to your water is because water can manipulated to match water profiles of places where many styles originate. The benefit to this is that certain water profiles accentuate certain styles of beer such as the water from Burton-on-Trent accentuating the hops in English bitters that were originally brewed there. Treating water does have some benefits, but for the beginner brewer I would pass on doing so. I personally only pay attention to water when I am troubleshooting.

Here is a quick tip to eliminate your water as a potential source of contamination. If you brewed a bad batch I would first eliminate a number of other sources of contamination, such as sanitizing or bad yeast before suspecting the water. However, if you can eliminate everything else, then buy enough bottled water to brew the same batch. Poland Spring sells their water in big 2.5-gallon jugs, which make it slightly more convenient than the gallon jugs. If you are doing a partial mash or steep method you should buy at least 7.5 gallons to allow for sparging. I would recommend 10 gallons. If the brew comes out the same, you can eliminate the water as a source of contamination.

Ingredients

Using your sense of taste and smell in brewing is an important aspect of becoming a good brewer. Always smell and taste everything that you use in your beer. Taste your grain and water, smell your hops and yeast. This will not only enhance your ability to recognize where flavors and aromas come from but will also help you detect when something is stale or sour. I have had to replace barley and yeast that just wasn't right. The worst thing you can do is brew with bad ingredients. If an ingredient is suspect throw it out and buy new. Never compromise a batch by using suspect ingredients to save money. Your time and effort is worth more than the extra $5 you spend replacing the bad ingredient. I had a situation where my yeast starter did not smell right. So instead of pitching it and saying 'what the heck', I tossed it out, bought 3 smack packs the next day, and pitched them as soon as they swelled the tiniest bit. I risked the potential of contamination due to lag time but I was not going to pitch suspect yeast and risk ruining a whole batch for sure. So in short, brew with fresh ingredients; you get out what you put in…garbage in equals garbage out.

Brew Day

Brew day for me is a whole day event. But it doesn't have to be. The process can take under 3 hours or less from start to clean up. My advice is to block off time so you are not rushed. Take your time, enjoy a homebrew or two from past batches, and take in the experience for what it is worth.

With that being said, no one wants to spend more time than they have to when brewing. Efficiency is a word that is thrown around the brew house quite often. In general efficiency is usually measured in a value like the percentage of sugars extracted from the mash. However, we are going to focus on the other type of efficiency. The ones that make brew day easier, and helps create great tasting beers.

Mash and Boil

Since this is an article to help the new brewer, I am going to focus on the following three techniques of brewing, extract only, steeping, and partial mash. All three techniques will produce good tasting beers.

In fact my first batch I ever made was an extract kit that contained no specialty grains. I brewed it not knowing a single thing about brewing besides the instructions that it came with and it turned out tasting great. I was lucky because if that batch did not taste that good I might not have gone onto a second batch. But I did. And the reason was that, while I liked the beer, I felt I could do better.

One quick way to improve your beer is to steep some crushed specialty grains prior to bringing the water to a boil. You can steep 5 lbs of grains or more if you have a big enough steep bag to do so. You basically put the grain (which is in a muslin bag) in the water and bring up to approximately 170 F. then pull the bag out and slowly pour some hot water over the bag to get the last bit of sugars out. Then bring the water to a boil and proceed as you would any other extract batch.

A second way to improve you beers and gain more control over the flavor variables, it is to utilize a technique called a mini-mash. This technique is a little more advanced and requires some equipment but is a nice step to take before going all grain. Some brewers do not have the time or space to do all grain and doing partial mashing will allow control without taking up the space required by many all grain setups. Below you will see a picture of my original mini-mash tun. This was a pot that I had in college whose handle broke off and was going to be chucked. Instead, I drilled a hole in it with a regular drill bit and added a few weld-less brass fittings you can find easily at Home Depot. The mash tun holds about 7 – 8 lbs of grain with about 1 .5 gallons of water (2.5 gallon pot). To this day I still use the mash tun when I want to make a batch quickly. Another easy way to make a small mash tun is to just purchase those pasta pots that have the built in strainer that pulls out to leave the liquid behind. You only need to make sure that the water level is high enough to cover the grain.

Once the wort has been collected, boiling the wort is the next step. Many new brewers boil only part of the 5 gallons because of space constraints. Partial boils utilize concentrated wort and “top off” water that is added prior to pitching the yeast. While this method is acceptable and can produce good results. It is not ideal. Utilizing the full 5 gallons to boil will keep the color lighter and increase hop utilization. One way to boil all 5 gallons is to use two pots and split up both the wort and hops between them. Lastly, if you want to end up with 5 gallons, I recommend that you start with 5.5 gallons. About half a gallon of volume will be lost to the transferring process.

Extract

Using extract to make beers can sometime produce a much darker than anticipated color, especially when trying to make the very light beers like Kolsch or Hefeweizen. There are a few reasons why this happens. The first is that the extract may stick to the bottom of the pot and cause it to spot burn or scorch, which will darken the color. The second reason is because of the Millard reaction. The Millard reaction basically changes the color of wort based on temperature and length of boil. The longer the boil, the darker the work gets to a point. The easiest way to avoid unwanted darkening is to add the malt extract at the last 15 – 20 minutes of the boil. The extract only needs to be boiled for sanitization reasons. Doing this, however, will result in an increase of your hop utilization. You may need to cut back on your hops by about 10 -15 % because without the sugar in solution, more bitterness will be extracted from the hops. The best thing to do is brew the batch as is and adjust for future batches.

Hops

My preference is to use hop plugs. Hop plugs are compact and store easily. When you add them to boiling worth, they expand just like whole hops. They are also very easy to add to glass carboys, where pellets would require a bag (introducing potential contamination) and whole hops would require you to clumsily and unsanitarily add them via a cupped hand around the carboy top. My recommendation here is to bag all of your hops during the boil. This will save time on clean up and will also improve the beer flavor. My first batch of beer, I added the pellets right to the pot. The pellets expanded and made a mess. Then when I siphoned the wort over to the bucket, the hops came with it. You really don't want to have your wort sitting on top of old hops that you used to boil. Just make sure that there is enough room in the hop bag for the hops to expand. If need be use two bags. I recommend using the reusable hop bags as seen in the picture below.

Bag - 9'' x 12'' Fine Mesh

BAG12

Great for additions of pellet hops during the boil! The ultra-fine mesh fabric keeps a majority of hop material from entering your fermenter. It also works well for dry hopping in the keg, with pellet or whole hops, where it retains most all of the hop matter. Note: Dry hopping with pellets in a keg, using this bag, will throw a little matter into your beer, but it settles out pretty quickly and we have had good luck with this procedure. Perfect size for 1-4 ounces of pellets and 1-2 ounces of whole hops.

Price: $4.75

Cooling the wort

Cooling the wort is probably one of the longest parts of the brew day if you do not have the right equipment. There are several ways to cool wort down to the right temp. If you are not doing a full boil, adding the water to top off the batch will cool the wort down. If this is the way you brew, there are a few things to consider. When you add "top off" water to the fermenter you are essentially adding non-sterile water. The easiest way to combat this is to prepare the top off water the night before. Boil it for 20 minutes and store it in a sanitized container in the refrigerator over night. This is an easy and fast way (on brew day) to cool your wort without potentially introducing contaminants.

The second and more commonly used method for many new brewers is to utilize an ice bath. This method works well. But can take up to 1 hour based on the volume of wort and amount of ice. If you use this method, stirring the wort with a sanitized spoon will help maximize the wort that touches the sides of the pot.

A third option is to use a chiller. There are two types of chiller available. The first is an immersion chiller. This type of chiller is essentially coiled tubing that you run cold water through. This type of chiller works well in conjunction with the ice bath. You can utilize the chiller to stir the wort as well as its primary function. The one thing to remember is that it has to be sanitized. The easiest way to do so is to put it into your boiling wort for the last 20 minutes.

The second type of chiller is a counterflow chiller. This type of chiller is the fastest way for a home brewer to cool their wort. You essentially run cold water through an outer tube and wort through an inner tube in opposite directions. This method takes about 10 to 15 minutes to cool the wort depending on the temperature of the cooling water. It is important to be diligent about cleaning this type of chiller. As soon as I am done with cooling and have pitches and aerated my wort, I run sanitizer through it and let it sit for about 10 minutes. Then I run more sanitizer through and drain it by slowly spinning it in one direction. No pump is needed. Gravity works just fine. Below are pictures of an immersion and a counterflow chiller, respectively. The chillers are a little pricey, however, both can be made at home. The counterflow chiller can be made with a garden hose, copper tubing, a few fittings, and the ability to do a small amount of welding.

Efficient Wort Chiller - 25' x 3/8" With Brass Fittings

WC23A

25' of 3/8'' copper tubing with connection fittings for garden hose. Equiped with new proprietary water turbulation technology making it more water efficient. The measurements are: 10" dia. 8" to the top coil. 15" to the bend to go over the lip of the kettle.

Price: $61.95

Chillus Convolutus Counterflow Chiller

WC90

Uses the same amount of water as our original Chillus Maximus counterflow but chills in half the time. The inner tube is made from 12' of 5/8" convoluted (twisted) copper, which continually turbulates the wort as it flows through. The outer tube is made from 7/8" copper. The Convolutus counterflow chiller allows you to pump wort through without having to restrict your pump to slow down flow. Use 1/2" line to connect to wort in and out feeds. The water connections are male and female hose connections.

10 1/4" height by 11" overall diameter (coils themselves are about 6" in diameter)

Price: $155.00

Aerating the wort

Aerating your wort is one of the easiest things to do that will result in a significant improvement to your final product. In the beginning of the proliferation cycle of yeast, oxygen is required. Oxygen promotes healthy cell walls and is especially important when the alcohol content of the beer gets above 8% ABV.

There are a few ways you can aerate. The first is to just use the free air that is in your brewery. To do so either stir the wort with a sanitized spoon or shake the fermented, vigorously, a few times over 10 minutes after the wort has been cooled. A friend of mine swears by taking the carboy for a ride around the block a few time making sure to hit every pothole in sight. The downside is that air is made up only

21% oxygen. This should be fine for lower gravity beers, but for higher gravity beers, there is just not enough available oxygen to properly aerate. Also, if you shake when the fermenter is open to the air, then there is a small chance for airborne contaminants to be inoculated into your wort. The chances of this happening are small, but if you have a small area to brew and mill your grain, like I do, in the same space as the rest of your operation, then grain dust is lingering. Grain dust is full of wort spoiling bacteria and usually gets everywhere. An add-on to this method is to use an aquarium pump with or without an aeration stone. The aeration stone is the key, however, because it produces small bubbles of air that are more easily dissolved into your wort.

The ideal way to aerate is to use pure oxygen. Below is a picture of a cheap setup (see the description for more technical information). This setup attaches to a small welding tank that you can get at Home Depot or Lowes for about $10. Make sure that you get the red canister that will be for oxygen. The idea is to put the oxygen on full blast and bubble it through your wort for about a minute and a half. I also swirl the aeration stone around to maximize the oxygen contacting with as much fresh wort.

Oxygen Partial System

FE376

Yeast needs oxygen to make good beer. The problem is that after boiling for an hour the wort is void of oxygen. Fermentations with low levels of oxygen will produce yeast that start slower, have sluggish ferments, and are more likely to poop-out and stop fermenting. On the contrary, fermentations that have been infused with oxygen will have healthier yeast that start faster, ferment faster, have a greater tolerance to alcohol, produce beers with less residual sugar, and produce better overall flavors. Currently, the standard practice of getting oxygen to the yeast is to splash the wort as it enters the fermenter or to shake the fermenter once full. This practice is definitely better than nothing, however it is impossible to infuse enough oxygen by shaking or splashing and the air you do infuse is usually contaminated to some extent. MoreBeer's pure Oxygenation System solves these problems by pumping pure-oxygen into your cooled wort using a disposable oxygen tank and stainless steel diffusion stone. Takes a mere 1-2 minutes of operation to achieve adequate oxygen levels. Comes with a disposable oxygen tank regulator, sterile inline filter, our .5 micron stainless steel oxygenation stone and tubing.
Disposable Oxygen tanks **Not Included**
Disposable Oxygen tanks are available at some hardware stores. Each disposable oxygen tank will last for approximately 10-15 five gallon batches.
About the inline filters: There are two sides to the filter - an "in" and an "out". The direction you use doesn't matter, however, you want to take note of which way you first push air through it and always keep it that way. There is an arrow on the edge of the filter housing that we use to keep the air flow going one direction when using it. **The filter should never get wet, so don't try and sanitize it by dunking it in sanitizer.** If you want to clean the outside of it, use Alpet D2. To store the filter, use a little tinfoil on the "In" of the filter and store in a zip-lock bag.

Price: $34.95

Fermenting and Bottling

Fermenting

Fermenting ales is pretty straightforward. From start to finish, the total time should take between 3 and 4 weeks. After this time, the beer should be ready to either bottle or transfer to a keg. Fermentation is broken up into two categories, primary and secondary. Primary fermentation is where the most yeast activity takes place. The yeast is converting the malt sugars into alcohol and CO2. The primary fermentation process should take between 7 and 14 days. Once the activity slows (the time between gulps of gas that flows through the airlock take about 7 – 10 seconds), take a specific gravity reading. If the reading is within 2 to 4 points of your target gravity, it is time to transfer to the secondary. The general rule of thumb is to transfer to the secondary no longer than 3 weeks from inoculation. If the specific gravity is not at or near your target gravity after 3 weeks, transfer the wort to the secondary anyway and consider repitching yeast or living with the higher final gravity.

The Fermentation temperature for ales depends on the yeast strain and the target flavor. The higher the temperature, the more esters are produced. I try to ferment on the lower side of the range. I like to keep the temperature between 66 and 72 degrees F. Ideally I try to keep it at 68 F. The issue is that most new brewers have no way to control the temperature. Try to find the coolest spot in the house and put the fermenter in that spot. The fermentation process will generate heat. So, if your target is 70 degrees F, you would need to compensate for this heat by approximately 5 degrees F depending on the activity of the fermentation.

If I were going to splurge on something, this is the first place I would spend my money. The two most common ways to control temperature is to either buy a temperature-controlled fermenter or to utilize a refrigerator or chest freezer with an external temperature controller. A cheaper way to cool the fermenter is to cover it with a wet tee shirt and use a fan to continuously blow on it. You will be surprised at how well this works.

The secondary fermentation is to clarify the beer and to get the last bit of sugar conversion to alcohol and CO2 (usually no more of a drop than 0.002 specific gravity points). The rule of thumb is to clarify for 14 days. However, you can leave the beer in the secondary for up to 6 months before running into problems. If you are going to leave the beer in the secondary for an extended period of time, be sure to keep your airlock filled. As far as temperature, try to keep it the same, or as close as you can, to the primary temperature. If you are kegging and force carbonating and have a way to drop the temperature, I would recommend doing so. I keep the temperature at the primary value for 1 week, and then drop the temperature to 45 degrees F for the second week. The lower temperatures will clarify the beer better than the higher temperatures. If you are bottle conditioning the beer, keep the temperature at the primary value. This will keep more yeast in suspension and will reduce your condition time.

Tip: Be sure to keep light away from your fermenting beer. The easiest way to prevent light from coming in contact with wort is to place a black tee shirt over the fermenter. Also, brown bottles block out the most light. If possible use brown bottles instead of green, blue, or clear colored bottles.

Check the websites for both Whitelabs (www.whitelabs.com) and Wyeast (www.wyeastlab.com) for more information on fermenting and yeast strains. There is a lot of great information to improve your knowledge of the fermentation process. Below is a picture of what a healthy fermentation looks like.

Yeast Nutrients (Servomyces)

Yeast nutrients can be added to help with fermentation. The following is a description of Servomyces, which is available from White Labs. Servomyces is yeast and is propagated in a micronutrient rich environment then is killed off prior to packaging. Boiling incorporates the Servo into the wort. The benefit of Servo is that micronutrients, e.g. zinc, are able to pass through its cell walls to your live yeast cell, thereby delivering the micronutrients without toxicity. Because this system is so effective in eliminating autolysis and improving the health of your yeast, it should be used in every batch.

Servomyces is GMO free and was originally developed for German brewers by Weihenstephan and the Munich University. It conforms to the restrictions of Reinheitsgebot. Servomyces enables any yeast strain's ability to incorporate essential nutrients into its cellular structure. Tested in breweries around the world, it has been proven to:

- Cut down fermentation time
- Increase flocculation
- Greatly reduce harsh sulfur notes
- Improve the health and viability of yeast
- Reduce levels of diacetyl at the end of primary fermentation
- Produce faster, more complete attenuation

Each retail packet contains 6 capsules, which can each be used for a 5-gallon (20-25L) batch of beer, wine mead or cider. The instructions are listed below:

1.) Add 1 capsule 10 minutes prior to the end of the boil.
2.) If your fermentation does not require a boil, open the capsule and pour in the Servomyces, since the capsule requires boiling to melt.
3.) Only one capsule is required per 5-gallon (20-25L) batch.

Bottling

You will need about 50, 12 oz bottles or 26, 22 oz bottles in order to bottle a 5-gallon batch. It is also a good idea to chill your beer down before bottling, if possible. I have a temperature controlled freezer that I use for my fermentations so the last step before packaging is always to chill the beer down to 33 degrees in order to get the yeast and other solids to drop down to the bottom and settle out. If you can chill your beer down before packaging, your beer will have much less sediment in it. If you can't, then that is no big deal, as you should be refrigerating your beer before you drink it and this will also help to clarify the beer before consumption. But back to bottling, you will need to prepare a mixture of water and corn sugar in order to "prime" the beer for natural carbonation. Bring 1 cup of water to a boil and then add 1/2 cup of corn sugar to it. Make sure you stir it up so that it doesn't burn! Now cool it down a bit and add it to the wort, stirring it in gently. The goal here is to mix the sugar in the beer without stirring up the sediment on the bottom. So what is the purpose of this? Well, the beer needs to be carbonated. There is still some yeast in the beer but most of the sugar has been fermented. By adding some sanitized corn sugar to the beer, we can get a slight fermentation going again and this will be enough to give the beer some "natural" carbonation. The alternative to this is to get a CO2 tank, kegs, and force carbonate the beer with CO2.

Now you need to start a siphon much like you did when racking between vessels, except this time you are going to attach the bottle filler tool to the end of the hose. Before the beer can go into any bottle though, the bottles must be sanitized! You should clean the bottles well before you begin the bottling process too as it will give them time to dry. Using a bottle brush in conjunction with cleanser/sanitizer is a good method to use. Don't use soapy cleaners as these leave an undesirable film on bottles and equipment. Bottling is a good *2 person" operation so try and have the hands necessary to perform the operation efficiently. My wife usually helps me and she will hand me the empty bottles and then cap the filled ones while I fill up the bottles. Works pretty well!

Oh yeah, when you carbonate the beer with corn sugar, you should let the beer sit for a week or so at room temperature in order to make sure that the "carbonation" fermentation takes place

Conclusion

While the last 15 pages are full of tips and step-by-step instructions, the essentially can be summed up in a few bullet points.

- Make a starter.
- Boil the entire volume of your beer.
- Aerate your wort prior to pitching the yeast.
- Try to maintain the fermentation temp between 66 and 72 F for ales.
- Quickly cool the wort to reduce lag time.

Now you are ready to dive into your first (or next) batch of beer with the tools to ensure a successfully batch. Good luck and happy brewing.