

Home Brewers of the Palouse - Intro

CASSIE: Hi and welcome tonight. I'm Cassie. And this is Rebecca. We are with WSU Global Campus Connections. Welcome to home brewing with Dr. John Wolff, Keith Tyler, and Darren Bystrom, all members of the Home Brews of the Palouse.

Thank you all for joining us this evening. And we are very excited to have you all here. Please feel free to type your questions in the chat box throughout the presentation as we are looking forward to hearing from all of you.

REBECCA: So I just want to go ahead and introduce our presenters in a little bit more detail here. So let's see. I'm going to start in the middle here with John Wolff. He's currently a professor and geologist in the School of Environment who's been brewing ever since graduate school.

Next to him, on his right hand side here today, is Darren Bystrom who works as a systems administrator for the Office of Research and has been brewing for eight years. And then Keith Tyler, who is a 2008 WSU graduate, a CPA by trade, and a Paradise Creek Brewers financial manager and professional brewer. So we're really excited to have this crew here today.

The Home Brewers of the Palouse are a loose-knit group of home brewers located in the Palouse area of Washington state, including but not limited to Pullman, Moscow, and Colfax. So they're a great organization and great community of brewers.

And all of our presenters today are a part of that community. We would encourage you to check out their website at brewwithhops.webs.com, check them out on Facebook at Home Brewers of the Palouse. And you can also learn more about upcoming Global Campus Connection events as well at open.wsu.edu. We'll type that in the chat box shortly here as well.

And we'll be taking questions in the chat all night. So feel free to get those-- get the conversation rolling, log in. Just simply type in a unique username-- anything really will work-- and send in your questions, comments, ideas, feedback, and we'll get those comments to our speakers throughout their presentation so that they can answer your questions. And we're going to kick off tonight with a video that we've recorded ahead of time demonstrating their process.

JOHN WOLFF: This is the first step here. We're drawing our water for brewing the beer through a filter here. That's mainly to get rid of chlorine. And we're using a measured amount of water here. This is going to be important so that we hit exactly the right temperature when we mix the grains into the water for mashing, as you'll see.

We have the malt here. That's been crushed. And it'll be ready to mix with the water when the water's hot enough. The malt has to steep in the water in a process called mashing at a fairly precise temperature. We're going to be about 152 degrees Fahrenheit for about an hour.

That converts the starch in the grains to sugars. And the sugar is the raw material that yeast work on to make alcohol. The mash has now been prepared where we're going to let that mash for one hour. And over the next hour the starch in the malt will be converted to sugars, which is what we want for the next stage of the process.

So what Keith is doing now is re-circulating the wort. This is the sugary solution that we've been producing through enzyme activity in the mash. He's draining some off, pouring it back into the top, just to help clear it up and filter it, get the bits out. So now Keith is lautering. That refers to straining the liquid off of the grains for the process called sparging, which is flushing the grains out and rinsing the grains out to make sure we get all of the sugars out.

KEITH TYLER: It's [INAUDIBLE].

JOHN WOLFF: There we go.

We're now making the last hop addition. We've just killed the heat under the kettle. So these hops will not boil in the wort. The point here is to extract the aroma qualities from the hops to give the beer a hoppy smell after fermentation, which is generally considered a desirable characteristic.

OK, we're now casting the wort into fermenter through a heat exchanger here. The wort is going to come out into the fermentation vessel, between 60 and 70 degrees, to chill the wort. And it'll then go into the fermentation vessel. And yeast will be added.

The yeast can only operate between 60 and 70 degrees. So it's important to chill the wort. It's important to chill the wort quickly, which is the point of the heat exchanger, because otherwise other bacteria, other microorganisms, will get in there and spoil the beer. We don't want that. We don't want to give them a chance. So we chill it quickly and then add the yeast.

OK, good evening and thanks for joining us. You've just seen a video, a very speeded up video, of a typical brewing session. And what you saw in that video was actually a small-scale version of how commercial breweries, craft breweries, big breweries prepare beer.

The process starts with steeping of malt grains in water. This is malted barley. If you have any questions about that, we can talk about it in a little more detail later on. The malted barley is crushed and then steeped in hot water to make sugar. And then that sugar solution later on is fermented to make beer.

The mashing process, as it's called-- that's the steeping of the grains in water-- is quite time consuming. And in just a moment here I'll show you a shortcut that gets around that process. But let's just review what we just saw in the video.

The jar I'm holding up here-- this is basic malted barley grain. We call it base malt. Brewers call it base malt. And 90% of what ends up as the finished beer, apart from the water of course, typically comes from this type of malt. The different types of beer and their flavors and colors are produced by using small amounts of other kinds of malt.

What I'm holding here in my hands are two examples of crystal malt, or caramel malt. The one in my right hand here is relatively light colored. The one in my left hand is relatively dark colored. And it's by blending these that-- this is where a lot of the skill of the brewer lies. It's by blending these that we choose, in part, the type beer we want to brew.

And this growler here, a very nice home brew-- this is the beer that we actually brewed in that video that you just saw that was shot about two months ago. You can see it's a nice dark amber to copper color. And that color is the product of the types of crystal malt, caramel malt, that we used in the beer.

Additionally other types of beer-- the dark brown to black beers such as stout and porter-- are made by the addition of dark grains. This is a type called chocolate malt here. As you can see, it's pretty much black. And hence, you get black beer when you use it-- a no brainer, really.

OK so the mashing process takes about an hour or two to complete. As I mentioned early on, there's a shortcut. You don't actually have to do that at all to make home brewed beer. You can start out instead with this product, which is called malt extract, that is either a syrup that comes in a can like this, or else a very fine powder that is typically bagged, as you can see here.

I'm not going to open the bag, because it would make an awful mess. It's a very fine powder. And it tends to go everywhere unless you have a bucket of hot water to dump it in right away.

So you can skip the mashing process and go straight to boiling the wort, which is the word we use for unfermented beer, by using malt extract. So you might ask why doesn't everybody do that? Well, there's a trade off, is the answer. Malt extract is much quicker and easier to use.

But the trade off is similar to that of buying a can of soup from the grocery store rather than making your own dish from scratch using fresh ingredients. You just can't make as good beer with malt extract as you can with malt grains, even though it's time consuming.

Once the wort, the sugary solution that should be pretty much the color of the finished beer like this, is produced, or once the malt extract is dissolved in water, at that point we add hops. And we boil the wort. Here's a jar full of hops.

The hop is a climbing plant. The flowers of it have been used for at least 1,500 years in brewing. They contribute the characteristic bit of flavor to beer and a lot of the aroma and taste as well. Hops come either in this form, which is the whole flowers of the plant-- they are flowers, even though they're green.

I don't know how easily you can see this here. These are whole hops, which are a traditional product, been used for hundreds of years. Most brewers these days use the hop pellets.

This is a mildly processed form of the hop, which strips some of the vegetable matter out, concentrates the active ingredients, and puts them in this concentrated form of these pellets here. And there's as much bittering power in this small Mason jar here in these pellets-- probably more actually-- than in this big Mason jar of whole hop flowers here.

DARREN BYSTROM: And John, to interrupt you, for those at home, these smell wonderful right now.

JOHN WOLFF: Oh well, that's right.

DARREN BYSTROM: I'm glad he opened them up.

JOHN WOLFF: Yeah, before we went on air here we were passing these jars around sniffing from them.

OK so that's it. Just a very brief overview of ingredients and a little bit about the brewing process-- I'm now going to hand it over here to Darren, who's going to talk a little bit about the equipment you'll need.

DARREN BYSTROM: Well John mentions the mash. And there's a number of pieces of equipment that a home brewer can use to facilitate the mash. But traditionally a home brewer will use a cooler. And we brought a couple examples here that have some different types.

You'll notice the large, round Igloo cooler. It does a great job, generally. It holds mash really well. And it gives you a greater ratio on the height to width of the grains. So later, when you're adding water, and it's draining out the bottom, it interacts with the grains quite well.

If you can actually look inside here, in this particular mash ton there's a braid at the bottom. And that's to facilitate what usually is referred to as batch sparging. So one would add a predetermined amount of water to the grains and drain out the water completely.

And then that will give you the wort. It tends to be quite a quick process as opposed to the alternative, which is fly sparging. And in here, the rectangular cooler, there's what's called a mash manifold. And at the bottom of this mash manifold there are number of holes. And that helps distribute the run off of the wort through the grain itself and out into the cooler.

Now you may look at the holes and think you're going to get some grain particulate through there. Well, during the sparge part of the process is the grain bed itself is the filter bed. So you'll recirculate a couple times to remove any and all grain particulate.

And then you end up with a clear wort at the end of the product. Now if you're thinking hey, I'm new to brewing. I don't feel like going through all this complex dealing with the grain, dealing with the mash, you can jump right to the malt extract that John mentioned. And if you just heat up a predetermined amount of water in the kettle and add that malt extract to the kettle, you effectively have made the same wort that you would have made during the mashing process.

Now if you are new home brewing, you don't have any equipment, I would highly recommend starting with an eight-gallon kettle. It gives you room to grow. So you may do, say on your stove top, a partial boil with the extract and add water later in the process. But later down the road, if doing an all-grain batch, you may use an eight-gallon kettle and that saves you time and money having to purchase additional equipment to facilitate the production of the wort.

From there, after adding the hops and boiling the wort, you'll want to chill it down. And this is called an immersion chiller. And it basically is a heat exchanger. So cold water runs through the copper, inside of the copper coils, which is placed inside the kettle and where your wort is. And then that will chill down the wort to what would be a safe pitching temperature for the yeast, because yeast is a living organism. It's temperature intolerant, depending on how hot it goes.

And there's a number of other ingredients or pieces of equipment along the way. So say before adding the wort, when you're transferring it to a fermenter, which can often be a bucket or a carboy, you can take a reading with what's called a hydrometer. And this measures the density of the sugar in the water.

So you can find out whether-- or at the end the starting and finishing gravities will give you the alcohol content of the beer. And you can determine just your efficiency of the all grain, or if you're just another piece of information to have. That will be placed in the testing chamber, just a tube of sorts, along with the sample of wort. And it goes in there.

An alternative to the hydrometer-- and these are getting much cheaper these days-- is a refractometer. And it basically uses light across a prism. And you place just a droplet of wort on the prism and then look through the eyepiece with some light in the background.

And it'll be unfortunately hard to show on camera here. But if there was a sample on the prism, you would see a white area and a blue area that would be across a graph of what's called Brix on the refractometer. And that will give you the amount of sugars that's in this particular sample, so a similar piece of equipment for measuring sugar as the hydrometer.

After that you ferment your beer. And if you have the privilege of using kegs, you can go that way. There's Cornelius kegs. Unfortunately we do not have one here today. But a lot of

beginning brewers will bottle beer. You can use your standard bottle. You can reuse bottles that you get from purchased beer or you can buy bottles online.

And then you can buy crown caps as well. And this one in particular is an oxygen-absorbing cap. It has this small film of plastic that helps prevent oxygen from getting into the beer. And you can cap that particular bottle by using a capper, such as this. This is an older, well-built one. Most modern ones are plastic. And it just goes on the top. And I'm doing a poor job at it right now. But if one does it well--

REBECCA: [INAUDIBLE] ferment.

--if one does it well they will cap properly. And some other pieces of equipment for measuring-- during the bottling process this is a very handy piece of equipment. It's called an auto siphon. So you would stick that in your fermenter. And you can you lift up.

And during the lifting process it will bring up a sample of wort in the bottom. And you push that down. And a tube attached here, through that process, will automatically start your siphon and save you time from having to either contaminate the tube on the other end by sucking on the tube or using water or sanitizer within the tube to get starter going.

So it's a very handy piece of equipment. Additionally in bottle this is called a bottling wand. And so the end of the tubing that would be attached to the auto siphon would be attached to this. And there's a spring mechanism at the bottom. And so you would just place that within your bottle and push down. And the wort would fill from the bottom to the top. And then you pull out the spring mechanism stops. And you can cap from there.

An important piece of equipment throughout the entire process is temperature. We have a couple of thermometers here. This can be purchased for \$5. You can buy digital ones as well. It's just a good means of knowing where you're at in the process and moving it along from there. And I guess with that so fermentation process and yeast-- Keith is going to talk about some facets there.

KEITH TYLER: All right, so I get to talk about fermentation, which is where all the fun stuff happens in beer. That's what turns the sugary wort solution that John talked about into what we call beer. Like Darren mentioned, we want to quickly chill our wort after the boil.

From there we're going to transfer that to a fermenter of some sort. It can be a food grade classic bucket, a large glass bottle called a carboy. If you get more into home brewing and you want to spend a lot of money you can get a conical stainless steel fermenter. There are a lot of options out there. But the main point I want to make with fermentation is that the top priority is sanitation.

Now there's a difference between cleaning and sanitation. And I want to point out the difference in meaning there. Because they have vastly different consequences in home

brewing. Cleaning, if you want to start out with your brew, just making your pot shiny, getting all the gunk out from the last brew, and scrubbing it down, that is a clean kettle. And you're going to be OK with that on the hot side, on the first half of the brew, because your boil is going to sanitize anything that comes in contact with it.

The difference between cleaning and sanitation is cleaning gets the stuff that you can see. Sanitation gets all the microorganisms, the bacteria, the wild yeast, that you cannot see. There are a couple of methods that are common among home brewers.

Like I mentioned in one, the boil will sanitize your wort and your kettle and anything that it comes in contact with. So heat is one means. The other means is chemical sanitation. There are a lot of chemical sanitizers out there. Let me see, Iota 4 is a popular one.

It's an iodine-based sanitizer-- not my favorite, and I think not our favorite. Because it tends to be hard to rinse out. And if there's even the slightest amount in the finished beer, you're going to taste it. I wouldn't recommend using bleach. That seems to be a popular one within beginning home brewers.

JOHN WOLFF: Keith, it was popular especially about 20 years ago when there weren't too many alternatives.

KEITH TYLER: Yeah, but that's another one that's hard to rinse out. It reacts poorly with stainless steel. I don't recommend using it at all. And I think these guys would agree. This sanitizer, Star San, is probably the most popular sanitizer with home brewers right now.

It's a weak phosphoric acid solution. Basically it takes no rinsing. It just has to come in contact with the surface to be sanitized for about 30 seconds. So you can pour it out at that point and your vessel, your fermentation vessel, or whatever equipment you're using, is ready to go.

DARREN BYSTROM: I would say do pay attention to the sample that you're supposed to add to the water to sanitize. While it is mentioned among home brewers that it's a no rinse sanitizer, that only works at the proper concentration. So if you overdo it, it won't be as-- well, it might come through in the beer. And you don't want that.

KEITH TYLER: So follow the instructions on the bottle.

Let me see. Where were we at? So once you have your equipment sanitized, you have your auto siphon, your tubing, your carboy or bucket or whatever you're using to ferment in sanitized and cleaned, you're ready to transfer it into the fermenter. So go ahead and take your auto siphon. Once it's chilled, the wort is chilled, you can transfer into your fermenter.

At that point you're ready to pitch your yeast. And again, there, like everywhere else, there's a lot of different options. This is a dry ale yeast, Safale US-05, which is a popular American style ale yeast. It's very forgiving and a clean fermentation without a lot of byproducts.

There's also liquid yeast options out there. Wyeast and White Labs are the most popular. Just pay attention to the type of yeast that you're using and make sure it matches up with the style of beer you want. Because you can get vastly different results based on the yeast that you use.

You can pitch the yeast directly into your wort at that point. I would take a gravity reading, like Darren mentioned, with your hydrometer or refractometer so you know what your starting gravity is. Let's see, at that point cap off the fermenter with your air lock or a blow off hose. This is normally inserted into a bung or a stopper of some type, that I did not happen to bring today, and goes into the neck of the carboy or into the hole in the top of the bucket.

At that point the next most important thing in brewing is temperature control, which is important throughout the brewing process, but also very much so in fermentation. Most yeasts have a specific temperature range that they are most effective and most true to style within.

Just pay attention to what that temperature range is. I would say for most ale yeasts probably mid 60s ambient temperatures, so mid to high 60s temperature of the beer in the carboy is where you want to hit.

So a good place, if you don't have a temperature controlled refrigerator or fermentation chamber of some type, is just a dark, cool basement area, somewhere that not a lot of light is going to hit and you're not going to get a lot of wild temperature swings or anything like that.

Throughout the fermentation process-- well, once you pitch your yeast you should see some activity, some bubbles-- krausen, as it's called-- in the beer forming within 12 to 24 hours or so. Depending on the beer and depending on how happy you make the yeast it can be anywhere from-- I've had them as short as under an hour to-- yeah, when I vastly overpitched-- under an hour to as much as 36 hours, without any problems.

But typically the quicker than it goes off, the better off you are. Because the sooner the yeasts start producing ethanol, the less likely you are to have any kind of infection problem.

Once it's fermented the next thing to check is your final gravity. Once the airlock has stopped bubbling, after about one to two weeks usually, I would start taking final gravity readings on a day-to-day basis. Once you hit a period of time of two to three days where your gravity hasn't changed, you're probably at your final gravity. And you can calculate your alcohol percentage and go ahead to bottling at that point.

So once you're ready to bottle-- we'll skip kegging for now, I think. We'll just talk about bottling. Like Darren mentioned, you have the bottles that you're going to use. Typically the 12 ounce bottle is the most standard. A lot of home brewers like to use the 22 ounce bomber bottles. These are nice because you only have to fill about half as many as you would as a 12 ounce bottle.

This is another option. It's called an EZ Cap bottle. A lot of the Grolsch-style bottles are the same thing where you have a flip top cap. You just fill it, hit the lever down, and you're good to go. So you don't have to worry about the capping.

But before that, again, make sure your bottles are sanitary. You can do that pretty easily with heat. Make sure they're cleaned out. You can put them in the oven. You can rinse them Star San-- a lot of options there. Just make sure they're sanitized before you start filling.

You're going to want to-- if you're bottling, bottle conditioning means that instead of force carbonating your beer with a CO2 tank you're going to let the yeast do the work and give it some additional sugar to ferment in the bottle and create CO2 that'll be reabsorbed into the beer. Typically, for a five gallon batch of most beers, about four ounces will give you 2.6 volumes of CO2, which is about average, for most ales, I would say.

DARREN BYSTROM: 2.4 to 2.6, probably.

JOHN WOLFF: Roughly.

KEITH TYLER: So what you want to do with a priming sugar-- priming sugar is typically-- you can use any fermentable sugar-- honey, table sugar. The most common is probably dextrose or corn sugar, which you just take your measured amount based on the amount of volumes of CO2 you want-- so the level of carbonation will rise as you have more volumes of CO2-- and boil that with a measured amount of water.

So when I bottle condition, I'll do the four ounces with about 12 ounces of water, boil it, let it cool, and then I'll put it into a racking bucket here, or a bottling bucket, which is just a simple food grade white bucket with a valve attached to it. You can pour the sugar in there, rack the beer on top of that from your carboy or whatever fermenter you're using, using an auto siphon.

That makes sure that the priming sugar is well mixed and you're not going to have any issues of one bottle having more sugar in it than the other, which can cause big problems down the road with bottle bombs, which are always fun. If you have too much CO2 in the bottle, more pressure than the bottle will handle, they tend to explode, which is no fun for anybody.

OK so we're going to rack the beer on top of the priming sugar. And then can you hand me that bottling one?

DARREN BYSTROM: Yeah.

KEITH TYLER: What I like to do is this bottling wand has a short length of hose on it. Again, make sure it's sanitary. You can attach this right to the valve on the bottom of the bucket, which obviously I haven't done on this bucket, because it doesn't fit. But you can hang this over the edge of a table, attach the bottling wand to the bucket, and then you can just use the bottle to fill up. Once you full, cap it up, like Darren demonstrated.

DARREN BYSTROM: Attempted to demonstrate.

KEITH TYLER: Poorly. And once it's capped up you can just let them sit at room temperature for about three weeks. Give it at least three weeks, I should say. That'll give time for the yeast to re-ferment the additional sugar, produce the CO₂, and give it time to reabsorb into the beer. At that point you chill it and drink what you made.

DARREN BYSTROM: Share it as well.

KEITH TYLER: Share lots of it.

DARREN BYSTROM: Yeah, your friends will appreciate it.

JOHN WOLFF: Definitely.

REBECCA: Is there anything [INAUDIBLE] leaving longer than three weeks?

KEITH TYLER: It just depends on the type of beer, usually. Some beers, especially higher gravity beers, tend to improve with aging.

DARREN BYSTROM: Ballpark there. I would say non-hoppy beer, say above 6%, is going to benefit from some age, particularly if you're getting in the 8% to 10% range. But for instance, if you're using hops, say you make an IPA or a pale ale-- excuse me-- you'll want to drink those fresher because there's volatile compounds in the hops that will start to dissipate with age. So there's some key points there. But certainly on the higher alcohol beers they will benefit from a little maturation.

KEITH TYLER: Higher alcohol beers where you may be able to taste the alcohol right away-- that tends to go away with age, or at least it'll reduce. And the other thing which is close to Darren and I's hearts is sour beers, which is not for this class. But bacteria in those beers will take up to a year and beyond to fully mature.

REBECCA: So we've got a couple of questions.

KEITH TYLER: Great.

DARREN BYSTROM: We'd love to hear them.

JOHN WOLFF: OK.

REBECCA: [INAUDIBLE] questions. So one of the first questions that came in at the beginning here was when and where is HOPS meeting these days?

DARREN BYSTROM: Oh, perfect. Well HOPS-- we meet every third Wednesday of the month, which is at Paradise Creek Brewery, in their basement. They're gracious hosts for us at 6:00 PM. Feel free to stop, learn something. It's a great group of people. And ideally we get some more new faces and can share some beer with one another.

CASSIE: Great. Another question-- are there any home brew shops in the Pullman/Moscow area?

JOHN WOLFF: Yes. Tri-State is probably the best one. They've got a good range of ingredients. They have stuff for the beginning brewer. They have all of the things that we've just shown here-- hops, malt, malt extract, yeast, sanitizer, all of the equipment, the various buckets, carboys, and plenty of equipment that we didn't bring along tonight.

Also Market [INAUDIBLE] and Drug have some home brew supplies, again, in Moscow. There isn't a store in Pullman. A little further afield there's a very good store recently opened in Spokane, New Home Brew and Bottles, that's highly recommended.

DARREN BYSTROM: A former HOPS member opened that one.

JOHN WOLFF: Former HOPS member, yeah.

DARREN BYSTROM: He knows this stuff too.

REBECCA: How much-- can you expect to invest up front. And if they're on a budget, what are they looking at? How cheap could you do it, I guess, and still get a good beer?

JOHN WOLFF: That's a really good question. You can certainly get all you need to start for under \$100, depending on how much of the stuff you might have already, like food grade plastic buckets and so forth.

DARREN BYSTROM: A big [INAUDIBLE] kettle.

JOHN WOLFF: Yeah, you might be able to do it for \$50 or \$60. But really you can spend as much as you want. Earlier on this evening Darren and I were talking about one catalog item that's basically a complete, automated home brewery. But it's \$35,000. But between about \$60 \$35,000 there's a lot of leeway.

KEITH TYLER: And the great thing about home brewing is there is a lot of opportunity for DIYing your equipment. So you can save a lot of money by just making this stuff yourself.

CASSIE: Do you guys ever attend any beer events and put out your guys's beer?

DARREN BYSTROM: Let's see. I don't know if we've had the opportunity to share. Lentil Fest this year we were approached. But unfortunately timing wise it did not work out. Next year I think we might have a presence. We're going to work out the legalities and the details there.

KEITH TYLER: We will be there though.

JOHN WOLFF: Aren't you our Lentil Festival chairman?

KEITH TYLER: I am, yeah.

DARREN BYSTROM: Keith is our Lentil chairman. Yeah, for those who are going to be in the Pullman area next end of August or so, we'll be around, probably on the Saturday event. Details forthcoming, but certainly on the horizon.

REBECCA: And for those of you at a distance, I think Lentil Festival's a great time to come out to Pullman. There's a lot going on. You can catch a football game. You can go to the whole festival. And it sounds like you can try some HOPS brew this coming fall. So think about taking a trip out.

Let's see, other questions coming in-- can you talk a little bit more about the kits? What would a kit contain?

DARREN BYSTROM: Equipment or ingredients did they mention?

REBECCA: Both, both I think.

JOHN WOLFF: Well do you want to talk about equipment? I can talk about ingredients.

DARREN BYSTROM: Yes, certainly. A standard starter kit, equipment wise, will generally include certainly a kettle, a hydrometer, and then a thermometer as well. Oftentimes they will also include a capper, such as this. We did not show this earlier, but these are hop bags.

This is a muslin bag. And it's used so you can add hops to the kettle to keep them contained. This is a nylon bag. You can use a paint strainer bag at Home Depot. They run a couple bucks. Or you can tend to get some pricier ones that have drawstrings that are more suited for reuse. From there what else can you think of that might be-- oh, certainly a carboy or bucket's going to be in the starter kit.

KEITH TYLER: A lot of them come with all of the equipment, all the basic equipment, you'll need to do a partial mash or an extract brew. So it'll include the bottling wand. It'll include a few caps and a capper-- all the basic equipment that you need.

DARREN BYSTROM: Let's see, typically the pre-assembled kits, if you need everything, are going to be closer to \$150 or so, if I remember correctly, and as much as several hundred, I believe. But those tend to be a lot more inclusive and have optional equipment, such as the chiller.

JOHN WOLFF: In terms of ingredients, again, the kits cover the full range. So you can buy more or less what you want. The most basic kits of all consist of cans like this of what's called a hopped malt extract.

That's about as close to instant beer as you can get. You dissolve it in hot water, bring it to the boil, let it cool, and add yeast. And it takes up about half an hour of your time. And as you probably guessed from what we were saying earlier, the results are not very good.

DARREN BYSTROM: They can be, though.

JOHN WOLFF: Well.

REBECCA: A little controversy over there.

DARREN BYSTROM: I guess to interject there, on the controversy, I've done one extract since going all grain. And I used a number of ingredients, including fresh hops and steeping grain. So it wasn't pure pre-hopped extract.

KEITH TYLER: Straight up out of a can.

JOHN WOLFF: Right, yeah, that's--

DARREN BYSTROM: I think that's what John was trying to get at, is that the pre-hopped extract is limited in what you can do with the beer.

JOHN WOLFF: And then the next level is what Darren just talked about. You take basic malt extract, like this-- nothing else has been done to it. You steep your own speciality grains, such as crystal malt, and then boil it with hops. So that's similar to the full-blown process, except you're skipping the mash step.

And then the most advanced kits actually have all the ingredients you need for a complete mash process. They have the base malt, pale malt, all the speciality malts, crystal malts, dark malts, hops, yeast. And many of the bigger online suppliers, some of which are in the information we've given you, do a lot of their business this way now with these fairly elaborate kits.

CASSIE: Can you guys tell us how to determine the ABB of the beer?

KEITH TYLER: OK so like I mentioned, before you ferment you take an original gravity reading. And typically that's going to be on the higher end of the range here. This hydrometer goes up to 1.070, which is basically a 7% additional solution of sugar in the water.

As the beer ferments you're going to be replacing-- the yeast is going to be converting that sugar into ethanol, which is less dense than the sugar. Actually, the ethanol is less dense than

the water. So that reading, as the fermentation process goes through, it's going to decrease and decrease until you get your final gravity reading, which may be anywhere from eight points to 15, 20, depending on the style of beer.

What you do to calculate the alcohol percentage is take the difference between your original and final gravity reading. So if we started at 50 points, or 1.050, and ended at 10 points, or 1.010, you have a difference of 0.04.

With that difference you can calculate the alcohol percentage. Just a quick and dirty calculation is multiply that by 131. And that'll give you your percentage. There's a lot of other ways around it. You can find calculators online. But pretty much all of them are going to be based on the difference between your beginning and final gravity.

REBECCA: OK, wow.

JOHN WOLFF: And that's fairly accurate too.

KEITH TYLER: It is. And it's a lot easier than it sounds.

JOHN WOLFF: And if you want to know the exact alcohol content, you need an analytical lab. Most home brewers are not working to those fine tolerances. So this method that Keith just outlined is probably accurate to what, plus or minus about 0.2% I would say?

KEITH TYLER: It's pretty close.

DARREN BYSTROM: And John mentioned the analytical lab. There is a lab that just-- oh, it was a couple of years now-- called Hop Analytics that caters towards home brewers.

KEITH TYLER: Alpha Analytics?

DARREN BYSTROM: Or Alpha Analytics, excuse me. And they're out at Yakima, over at Hops Direct. And I personally have not used them, just because I hadn't felt the need. But certainly if you really want to know the fine tune details of say, the alcohol content or the IBU content, which is the bitterness content, you can go from there and submit it.

KEITH TYLER: Yeah, those guys will give you the-- I'm going to have to remember which ones they give you. But they give you the four basic things you need to know with your beer, which is your alcohol percentage, your IBUs, your acidity, your pH level, and your color-- the color, I believe.

JOHN WOLFF: Yeah.

KEITH TYLER: And it costs-- it's only about \$7, plus the cost of shipping a six pack to the lab. So it's really pretty approachable.

DARREN BYSTROM: Although unfortunately, it's a whole six pack.

KEITH TYLER: Right the five go [INAUDIBLE].

JOHN WOLFF: They only need one bottle of beer to do that. So they're drinking the other five.

REBECCA: OK, a couple other questions here-- what are some good beers to start with at home? And what's the advantage of all grain? I think I know what you're going to say. So what's a good beer to start with? And what are some of the advantages of all grain?

JOHN WOLFF: A style to brew?

REBECCA: I think so, like if you're going for a certain type.

JOHN WOLFF: I would imagine most home brewers start off with either a pale ale or a stout, I'm guessing. The stout, in particular, is one of the more forgiving styles. If you're using malt extract you can just steep dark grains in the malt extract dissolved in water and then boil with hops. And you'll get a pretty acceptable beer.

DARREN BYSTROM: There are different colors of malt extract rated light extract, amber extract. I would recommend, if you're doing a stout, use light extract. And then add the steep ingredients, the black malt or the roasted barley, to really get that color. Because it does not take much to get it dark. And the darker malt extracts tend to give you some off flavors.

KEITH TYLER: And one other point to make is that when you're beginning, pretty much any of the beer styles-- well, I shouldn't say that-- most of the beer styles are going to have the same process to brew and ferment. So they're not necessarily going to be one is going to be more difficult than the other. But the darker beers, the porters and stouts and whatnot, will be more forgiving on flavor than the paler beers.

That said, I'd also start with probably a medium to low gravity beer. The higher the gravity is-- the original gravity, that is-- the more tension it's going to take, the more detail you have to pay attention to to really crank out a good beer.

DARREN BYSTROM: On that note too-- well, I'm losing my train of thought, but I had an idea.

JOHN WOLFF: Part of the question was what's the advantage of all grain. Was that right Rebecca? Well the advantage is simply flavor. Yeah, you can brew awful beer using the all grain procedure, just as you can cook from scratch and make an awful dish. But the potential is that, in both cases, you can do much better than any canned product, basically.

REBECCA: I was thinking of your canned soup analogy.

JOHN WOLFF: Yeah.

KEITH TYLER: Plus it's a lot more fun.

DARREN BYSTROM: And I did remember what I mentioned. I would say for starting brewers as well start with an ale, rather than a lager.

JOHN WOLFF: Yeah.

KEITH TYLER: Oh, good point.

DARREN BYSTROM: A lager is going to be a more difficult beer because more flaws might show up through bad practices. And it will certainly require temperature control during fermentation and aging to make a quality product that you would really call a lager. So an ale is going to be a good one to start with.

CASSIE: Another question-- have you made beer with grains other than barley? And is it still considered beer when you do that?

DARREN BYSTROM: Yes.

JOHN WOLFF: Yes.

DARREN BYSTROM: A typical one that-- folks will use either a malted wheat or oats, either flaked oats or rolled oats, as an option. Those are what's called adjuncts. You can also use flaked maize or rice as well, gelatinized rice-- basically any type of starch that might be able to be converted to sugar. If you are going to use those particular ingredients, the adjuncts, you will need to mash, as they are not soluble in water.

KEITH TYLER: Yeah, you just have to pay attention to the characteristics of the grain that you're using. But yeah, anything that's a starch, typically, you can ferment. I've made in fact a malt liquor out of packing peanuts.

JOHN WOLFF: That's right.

KEITH TYLER: Corn starch packing peanuts. So you can do it. I wouldn't recommend it, but you can do it.

REBECCA: What did that taste like?

KEITH TYLER: Like malt liquor. It was better than Olde E, but just barely.

REBECCA: OK so another-- well, I should say quite a few people have been asking what are your favorite styles of beer? We have gotten that question a couple of times in different forms. I think people are wanting to know what you guys like.

KEITH TYLER: Well, I think probably this is the same for all of us. But my taste changes as I evolve as a brewer. And different times of year I like different beers. But I've really been getting into brewing the sours, of any type. It's a lot of fun. And it adds a different level of complexity with the different yeasts and bacteria that you use to create the beer.

DARREN BYSTROM: I agree with Keith there. Certainly the time year will change. Like right now, weather's getting cold, a stout just sounds nice and drinkable, keep warm. At the same time, spring comes around, maybe a nice pilsner. It just depends on how the weather's going.

And I'm with Keith there. I've been brewing sours for a few years now. And they add a good level of complexity and difficulty that-- just something to experiment with, something new. And you get a whole different beer out of it. It's not for the beginning brewer, unless you're really, really looking for a challenge. But they're fun to do.

JOHN WOLFF: I'm going to buck the trend here and say you can drink any style of beer at any time of the year. Because I have greatly enjoyed pints of 11% ABV imperial stout when it's been 100 degrees outside.

REBECCA: OK, let's see here. What exactly makes a higher alcohol content beer? It's a more general question. The hops-- I know IPAs are generally higher. That is not a function of the hops, actually. The hops are there purely for bitterness and flavor and aroma.

REBECCA: Flavor, right.

KEITH TYLER: The alcohol percentage is dependent entirely on how much fermentable sugar you add to the wort. So the more grain or the more malt extract you have to start with, the higher alcohol percentage the beer will be.

REBECCA: OK, got it.

CASSIE: And then someone asked do you need to treat the water before brewing in it?

DARREN BYSTROM: John?

JOHN WOLFF: That's a really good question. And the answer is yes, no, and maybe, depending on where you live and what style of beer you want to brew. Here on the Palouse we have fairly clean water, but it does have some carbonate in it.

And that style of water is actually ideally suited for brewing stout and porter, because these black grains that are an essential part of stout and porter have some acidity. They have chemical properties that neutralize the alkalinity that comes from the carbonate.

Alkalinity you do not want, because it'll mess up the mash. You can't mash the malted barley properly if the water is too alkaline. The way to get around that if you want to make a pale beer

is to add the gypsum to the water. This actually has an effect-- actually, could we go to the PowerPoint here.

REBECCA: Sure.

JOHN WOLFF: And it's slide seven.

REBECCA: Slide seven on the PowerPoint please, James.

JOHN WOLFF: What happens when you add gypsum to the water is the pale malt produces phosphoric acid in small amounts when it's mashed. But phosphoric acid by itself is not very acidic. You've got to liberate the acidity out of it.

Adding gypsum, which is a naturally-occurring mineral-- it's dissolved in many waters, including in famous brewing areas, such as Burton on Trent in England. The calcium in the gypsum reacts with the phosphate. And for those of you with some chemistry background, the calcium phosphate is insoluble. That precipitates and it leaves hydrogen ions in solution.

Translated, what that means is that brings the acidity of the mash into the range which is optimum for converting the starch in the malt to sugar. So if you're interested in these things, there's a few steps you can take. You want to get a water analysis from your local authority, which they have to provide free by law, and look at the total hardness in the water and the carbonate hardness.

If the calcium content and magnesium content of the water are quite high, then you're probably good for just about any style of beer. If they're low and the total carbonate hardness is high, then you definitely need to add gypsum. Again, there are many resources that can help you with this. John Palmer's online book *How to Brew* lays all this out in great detail.

KEITH TYLER: One additional point I'd like to make is that obviously the water treatment can get as detailed or complex as you'd like. But at the most simple level, and one thing that's very common around here in Pullman are on a lot of municipal water supplies, is chlorine and chloramine.

JOHN WOLFF: Oh yeah, that's a good point.

KEITH TYLER: They'll bind with other compounds in the beer, be processed by the yeast, and create polyphenols that you don't want in the beer. It just tastes nasty. So there are several ways of getting around that. You can take the water that you're going to mash with and let that sit overnight.

You can boil it, which will drive off the chlorine. Chloramine is a little tougher. You can either filter that out with a carbon filter, carbon water filter, or use Camden tablets, which are it's just

potassium metabisulfite, which you can just let sit in the water. And it'll drive the chlorine and chloramine off by itself.

JOHN WOLFF: One tablet per five gallons is plenty.

KEITH TYLER: More than enough, yeah. It doesn't take much.

REBECCA: OK, I like that you're like just a-- and you throw out this long--

KEITH TYLER: That's a simple one.

REBECCA: There you go.

KEITH TYLER: Throw tablets in the water. It'll take care of everything.

REBECCA: I think Cassie's got a question.

CASSIE: We have one question. So since you do do your home brewing, do you find yourself critiquing other beers? And do you find inspiration from other home brewers or small market brewers?

DARREN BYSTROM: Both.

JOHN WOLFF: Yeah.

KEITH TYLER: Absolutely. You're always looking for something new and exciting, certainly when you've tried a lot of styles. And so when a home brewer or a craft brewer comes out with something unique and interesting, it's fun to try and it's fun to go huh, I wonder how they did that. And you think it and you try and put something together, maybe to mimic it, and go from there.

KEITH TYLER: You also learn a lot from even the bad beers. You learn what not to do. And we've all had the case where, at a home brew meeting or elsewhere, is you taste something off in beer like, oh they used Iota 4 or there's some green apple or Bandaid flavor in that that's--

JOHN WOLFF: [INAUDIBLE].

KEITH TYLER: Yeah, or it tastes like popcorn. So it's a learning process any time you drink a beer, really.

REBECCA: OK, so we've got a specific question here. Smith says he currently brews with one gallon set up that's all grain from a Brooklyn brew shop and wants to upgrade to a full five gallon set with a keg. But should he immediately jump into all grain or hold off?

KEITH TYLER: I think that if brewing is a hobby that you're going to be into and you know you're going to be doing it for a while, I would just buy it once, rather than slowly step up and get the equipment piecemeal. Figure out what you want to get and where you're going to want to be, which is almost impossible. But if you know you want to do a five gallon all grain set up, then I would jump right into the all grain.

DARREN BYSTROM: I guess just to run through it, you guys, I know I piecemealed a little bit starting in the beginning.

KEITH TYLER: We all do.

DARREN BYSTROM: I wish I would have started with 10 gallons, but certainly that wasn't feasible, cost wise, at the time.

JOHN WOLFF: It's like any other hobby. You start small and get bigger, if you decide you like it.

REBECCA: OK, can anyone come to a HOPs meeting and learn? Or do you have to be actively brewing [INAUDIBLE].

DARREN BYSTROM: Everyone can come.

JOHN WOLFF: Anyone can come.

REBECCA: Pretty open community.

DARREN BYSTROM: Ideally, if you haven't brewed beer before, stop by, learn a thing or two, and then it will hopefully motivate you to go and brew your own. And then please bring it back and share it. Because that's the fun part.

KEITH TYLER: And we certainly have one or two people that come to meetings somewhat regularly that have never brewed a batch in their life. They just enjoy beer.

JOHN WOLFF: And we can help you brew your first beer.

DARREN BYSTROM: Yeah, we've done a number of brewing demos in the past, both extract and all grain. Most of our core members tend to be all grain brewers. So that's what we've been brewing lately. But if anybody wants to come out and they say hey, I'd really love if you could show us an extract beer, we can put something together and involve you in it. It can be your first beer if you want. And we'd love to share our knowledge.

REBECCA: That's pretty cool. OK, so we're running short on time here. So I'm going to squeeze in one last question before we go to our final video. And that is since you guys home brew, do you find that drinking processed stuff, through maybe larger companies in terms of big beer producers, are not as good as the home brews?

JOHN WOLFF: Again, it depends. I don't know. Between us it's probably what, 30 man years since we actually drank a Budweiser?

KEITH TYLER: Oh, it's a sacrilege. But I enjoy a Coors Light in the summer.

DARREN BYSTROM: I'll give the big guys credit. Their ability to make consistent beer at that quantity, day in and day out, is a feat.

KEITH TYLER: Is magic.

DARREN BYSTROM: As a home brewer, if you can make one batch, and you can make it again the next day, and they confirm it next to each other and all that, and they might be different. And that's just dependent on variables throughout the whole process. And the big guys have it dialed in. Now whether or not I enjoy drinking it so much, yeah, I'll give them credit for making a consistent beer. But I prefer some other styles.

JOHN WOLFF: This right now-- we're in a golden age of beer in America. There's never been so much, so many, such good beers in the history the United States as right now. There are literally thousands of craft breweries just producing superb products.

REBECCA: Yeah, I'm from Colorado.

JOHN WOLFF: Well, yeah, the other ground zero.

REBECCA: Exactly. So actually we lived in Longmont, which was in the middle of it all. And so we had Fat Tire, Left Hand, and then--

DARREN BYSTROM: Okar Blues.

REBECCA: Yep. [INAUDIBLE]. And then we've got the big ones too, [INAUDIBLE] Golden and right off of the I-25 highway. So I totally can see why you're saying that John. OK, well that is going to wrap us up tonight.

Thank you so much for coming. We're going to go out with a little clip that we made getting last words of all of the brewers as we interviewed them during their live demo a couple of months ago. So thank you again for attending. Feel free to continue chatting for the next few minutes here.

And check out more Global Connections events. And check out the home brewers. It sounds like they meet regularly. And I'm going to go ahead and include their information in the chat as well. So thanks again for coming.

JOHN WOLFF: Fulfilling, personally rewarding, and I love beer. It's like any other creative act. You're making your own thing. An artist probably feels the same way. It's something you've

done yourself, from your own resources, your own knowledge and skill. And if the results are good, you give yourself a pat on the back. If the results are bad, you just deal with your depression by drinking it away.

Most difficult is that it's if you're doing the brewing as we are here, what we're doing here is in micro what any commercial brewery would do. And it's a little bit time consuming. For the hobbyist there is a shortcut that we'll explain here pretty soon that involves the use of a substance called malt extract.

What we've done up to this point, in fact, is just make malt extract. But yeah, it's the time involved is probably the most difficult part. But if you get a good product, it's worth it.

Oh, yeah. Yeah, the worst beers-- for most home brewers the worst brewing experience is when a batch gets infected with microorganisms that you don't want. And that can result in just undrinkable beer. So you pour it out. I've had that happen a few times. The best experience is when you brew a beer that you know is world class.

You know, I don't really have a favorite. I like pretty much all beer, except maybe some dodgy fruit beers. My favorite style of beer to drinker is English bitter, like we're brewing here at the moment, and dark beers such as porter, stout, and Munich dunkel and bock.

DARREN BYSTROM: I guess I brew because it's intriguing. There's a lot going on. There's good friends to be had. And at the very end you have something to drink and share and enjoy. What I enjoy most about home brewing?

It's a phenomenal mixture of both art and science. You have the creative side of things, where you try and idealize what your beer is going to be. And at the same time there's the science behind it. There's a number of factors-- chemistry, biology-- that take a huge part into making a good beer.

And trying to get everything together to make it excellent is a lot of work. It can be a lot of work. For instance, stopping by here, hauling our equipment, there's a lot of manual labor involved. The bigger breweries that do it professionally, having everything in place makes it a lot simpler. And someday put in either a home system that's in one place or shoot, brewing professionally would be a lot of fun.

Advice I would give to beginning brewers? Try and keep it simple. There's so many things you can find on the internet, so much information, so many books to read. But what it comes down to is just paying attention to the various things, such as temperature.

Just paying attention to temperature-- both in your mash, if you happen to be all grain, or if you start extract, just at the very end of things-- fermentation temperature is going to make a world of difference in a good beer. And from there you can research and go into something much more elaborate and take it from there.

I originally got started-- a roommate had a Mr. Beer kit some eight or nine years ago that made terrible beer. And I remember thinking I can do better than this. And so I ended up researching for a while and decided yeah, this is going to be a lot of fun. And eight years later, yeah, it's still a blast. It's still enjoyable. And I can't imagine having a better hobby.

KEITH TYLER: There's a lot of things I like about home brewing. As they've said, I enjoy the science of it, the art of it. There's always something new to brew. And you never get bored doing it. So I've found it's something that's just-- there's always something new to learn, new processes to check out. And it's just a lot of fun all around.

My favorite part about brewing is just learning new things every time. There's a lot of literature out there. There's a lot of other experienced people. And that's actually one of the best parts about brewing, is just the camaraderie of the home brewing community. There's always people out there willing to help, willing to come by and drink a beer with you and show you some new things.

The worst part about home brewing is not having the space to keep expanding your hobby. You can spend as much money, get as much equipment as you want, to do whatever you want to do with the hobby. But constraints are usually space and money. And it can get expensive.

Well this is slightly embarrassing three years down the road now. But I got started with brewing because I wanted to clone a Mac & Jack's. And looking back on that now, that may not have been the best one to try and clone. And I haven't done it since. But yeah, not being able to get Mac & Jack's at home or in a bottle at the time was how I got started.

NICHOLAS CRABB: Because it's the hobby that never ends. You can learn as much as you can about any kind of hobby. But you're never going to stop learning about home brewing. Every person that I come in contact with about home brewing always sheds some new light on the subject.

And it's like this ever-evolving hobby that just never ends. What I like most about home brewing is being able to step back, once the product's done, once we're done brewing, and it's done carbonating and conditioning, and you get to reap the benefits of your sewing, or whatever.

The hardest part is definitely sanitation. Making sure that everything is as clean as you can get it is the key to making a good beer. And it's also the hardest part. Because infections are the worst part of brewing a beer. Don't get discouraged. I made a bunch of really undrinkable beers. I've thrown out some batches when I first started.

And not giving up hope. It's a learning process. And the best thing that you can do is just power through those-- I guess they would be the equivalent of a C on a test, or D on a test. You keep working and then you'll get the A.

How did I get started? A friend of mine showed up with a kit and was like hey, we're going to brew some beer. And I said well, I've got nothing better to do today. So let's do it. And it snowballed from there. It's a hobby that snowballs. Once you get started you're a brewer after it starts.