

CHAPTER FOUR

Ingredients

Key Terms

bagged malt

base malt

basic

bins

cider apples

compressed hop pellets

costing

dessert apples

forward contract

fruit

fruit contracts

fruit delivery

fruit supply

grain silo

hop contracts

hop extract

hop supply

hops delivery

isomerization

leaf hops

lovibond

malt contracts

malt delivery

malt supply

perry

private versus public hops

proprietary hop

recipe

specialty malt

spices and flavorings

spot market

sugar

tote

water

yeast

Overview

Ingredients are the foundation of the craft beverage industry. This chapter delves into the strategic raw materials for beer, cider, and spirits: the grains, fruits, and hops, depending on the business concept. As one of the ways to differentiate your products from others on the market, ingredients are a principal part of product design. Insuring a supply of the strategic ingredients involves establishing relationships and creating contracts with the providers of these ingredients, and is covered in detail. This chapter also provides a recipe-costing tool for calculating ingredient estimates.

Learning Objectives

- ▶ Understand the strategic ingredients and average recipe needs for various craft beverages.
- ▶ Understand an ingredient contract.
- ▶ Identify trends in ingredients and implications for future needs.
- ▶ Differentiate between private versus public hop varieties.
- ▶ Understand the delivery options for ingredients.
- ▶ Calculate recipe cost based on ingredients.
- ▶ Apply recipe estimates to develop potential needs for one to three years.

Introduction

Craft beverages are predominately composed of ingredients that follow the agricultural seasons. As a result, they vary in supply and quality based on weather, demand, inventoried supplies, and many other factors. Following the laws of supply and demand, low supplies lead to higher prices and visa versa. For any craft beverage producer, buyers need to understand the factors that influence price as well as the strategic role that any given ingredient plays in the product line. If a product depends on a highly coveted patented hops or an unusual fruit like passion fruit or elderberries, then getting a stable and affordable supply of that ingredient is crucial. The ingredient buyer's toolkit must include a forecast of future needs based on product recipes, an understanding of factors that drive price changes, and the methods for reducing price and supply uncertainty.

Average Recipe Needs and Securing Ingredients

Each craft beverage recipe has a different set of foundational ingredients. Beer **recipes** use malt and hop varieties; ciders use dessert or cider apples as well as other fruits and sweetening ingredients; and spirits have an alcohol base or different types of sugar sources, grains, potatoes, and fruits. Other ingredients are added such as yeast, acid, sulfur, yeast nutrient, finings, filtering aids, spices, and so on. So, it is important that beverage producers understand the sourcing issues and pricing for everything going into a bottle, serving tank, or keg. A general recipe for a craft beverage requires the estimated amounts of base ingredients outlined in Table 4.1.

While average recipes require these amounts, lower alcohol products may require less of some ingredients per barrel. For example, a light ale might have only 40 pounds of base malt. Some maybe diluted later to achieve the lower alcohol levels thus requiring less of the ingredients overall; often fermented ciders are diluted with apple juice or water to bring the alcohol down a few percentage points. Actual yields also depend on the amount of sugar extracted from the malting process or juices extracted during pressing.

TABLE 4.1 Base ingredient craft estimates

Beverage	Key Ingredients <i>Beer barrel (bbl.) = 31 gallons Whiskey barrel (wbl.) = 53 gallons</i>
Beer	Base malt: 50 pounds/bbl. Specialty malt: 20 pounds/bbl. Hops: 1.4 pounds/bbl.
Cider	Apples: 300-400 pounds/bbl.
Whiskey	Base malt: 1400 pounds/wbl.
Mead	Honey: 93-121 pounds/bbl.
Source: Madeleine Pullman.	

Hops

Hops are a strategic ingredient for beer, so what happens when it is time to open the pub and you cannot get the hops you need? Many suppliers require you to be in business before contracting with you. Increasingly, hops are also showing up in hopped products from both mead and cider producers. With few exceptions, all beer recipes contain hops. With India pale ales (IPAs) demanding more hops than the average beer and comprising more than 50 percent of craft consumer sales, the demand for hops is skyrocketing. This “hop craze” is worldwide, in every place where people produce craft-style beers. Aroma hops are the most favored by craft producers. However, due to the continued consolidation of big brewers who demand different hop varieties, aroma hops have lost significant acreage. Today, hops producers are scrambling to shift field cultivation to “hot” hops, but as it takes a few years to replant and get a hop vine into production, there is a lag time to meet the demand. Hops are the key ingredient to secure and maintain a predictable supply.

Hops can be purchased in multiple forms, detailed in Figure 4.2. In the conventional format, hop cones are picked from the vines and dried, compressed into bails, and sold as **leaf hops**. An alternative is to press the leaves into **compressed hop pellets**, which last longer and are easier to handle. Or, the essential aromas and bittering agents can be extracted from the hops into a liquid form, **hop extract**.



FIGURE 4.1 One brewery's annual hops supply

Source: Madeleine Pullman

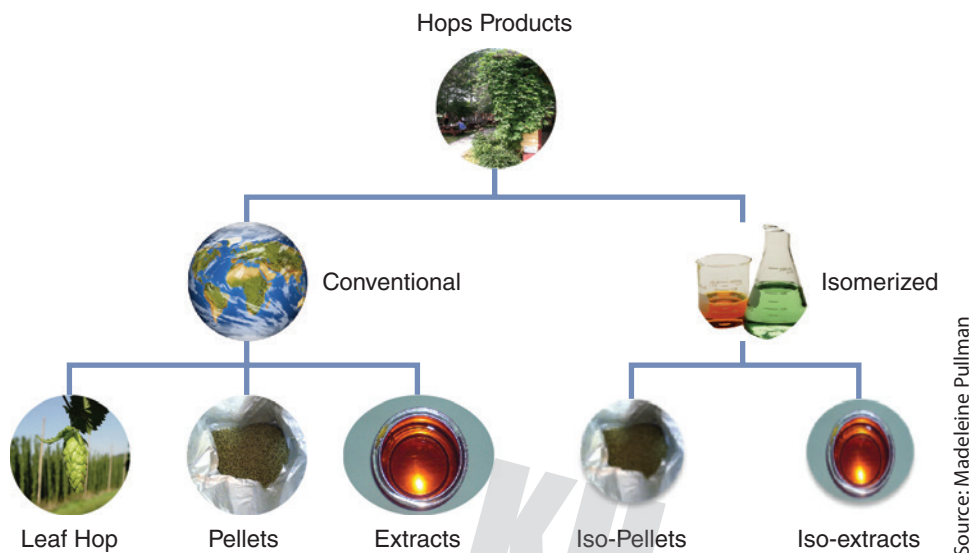


FIGURE 4.2 Hops options

Another route for hops processing is **isomerization**, or converting a molecule into a different arrangement with the same atoms. This process changes the iso-alpha acids so that the hops are more efficiently used in the brew kettle. Isomerized hops come in both pellets (iso-pellets) and extracts (iso-extracts) and have an added advantage of conveniently adding more hop flavors during the conditioning phase of brewing.

Private versus Public Hops:

Major hop companies have found that it is advantageous to create patented or **proprietary hop** varieties. Grown in limited varieties (only authorized growers can grow the patented hop), they tend to be more expensive than the publicly available hops (any grower can buy the vine and propagate it). Of the top 10 most popular hops, four of them are private, and they can be challenging to secure since they are sold out several years in advance to contractual buyers.¹

TABLE 4.2 Most popular hops for craft beer

Public	Private
Cascade	Simcoe®
Centennial	CTZ®
Chinook	Amarillo®
Crystal	Citra®
Willamette	
Saaz (Czech)	
Source: Madeleine Pullman	

Hop supply: As recently as 2007 and 2008, there have been severe hop shortages as well as boom and bust cycles, particularly with high alpha hops. When large breweries buy these hops on contract and warehouse the product, the hop supply gets out of sync with beer production. At this point, buying ceases, prices crash, and many farmers get out of the hop business. In 2007 and 2008, the poor growing conditions plus a warehouse fire that burned four percent of US hops supply, caused scarcity and sky-high prices. Today, most breweries buy hops on multiyear contracts. Given the current growth rate of craft beer and the limited production of hops, there are certain to be shortages in the years to come. Even as many hop farmers switch to growing aroma hops, thousands of new acres are necessary, as are investment in pelletizing and storage infrastructure. Many hop growers' facilities are too small to keep up with demand. According to estimates from the Brewers Association, 12,000 new acres need to be planted in order to produce 25 million more pounds of hops in the near future.²

Hop contracts: Hops can be purchased on the **spot market**—what is available at the price at that moment—or contracts. With a **forward contract** the beverage producer makes a commitment to buy a certain amount of hops from hops producers in the future. Larger breweries contract hops for four years or more at a time and have more ability to secure scarce hops in a tight market. Smaller craft producers secure hops by developing relationships with smaller scale growers and contracting for at least two to three years of supply. **Hop contracts** protect both the grower and the beverage producer. Since new hop vines can take up to two years to start producing usable hops, a contract gives the farmer enough leeway to plan for demand. On the brewer side, the brewer is guaranteed a supply of strategic ingredients. Key items for hops contracts are detailed in Table 4.3.

Hops delivery: Most hop companies hold hop products for the buyer in appropriate warehouse conditions (refrigerated and humidity controlled) and deliver them as needed. Whole hop cones are baled with burlap into 175–230 pound bales—great for buying freshly picked hops but challenging to move around once in-house. Alternatively, pelletized hops are vacuum-sealed in 11-pound (5 kg) or 44-pound (25 kg) pouches and boxed in a convenient form to measure and to move around.



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FIGURE 4.3 Hop vines

TABLE 4.3 Contract items³

Item	Definition
Price and Payment	What is the agreed-upon price to pay for each variety or limits on the escalation of prices over the time period, terms of payment such as upfront money, money due at the time of delivery, and payment after delivery? This will vary between growers.
Quantity	What is the amount of each type of variety? Typically for a three year contract, one might contract for 100% of the next year, 75% of the following year, and 50% of the year after. Numbers should be updated every January to reflect updated forecasts.
Quality	Requirements stating the acceptable range of attributes, such as % alpha, % beta, and oil ml/100g (aroma, acidity, and oil content). Growers will have a target range for each variety. Only large breweries can specify quality levels.
Delivery Requirements	How will the hops be delivered, who pays for shipping, and when is the ownership or risk transferred? This can be negotiated with the grower.
Right to Inspection	Does the buyer have the right to inspect and reject or accept hops prior to delivery? Can the supplier solve the defective issue and resubmit?
Creditors' Rights	What will happen in the case of bankruptcy from either party?
Terms	What period of time is covered in the contract or is it open-ended? How can either party terminate the relationship?
Disputes	Does the contract define how a dispute should be resolved? Under what law (state) and forum (court or mediation) will disputes be resolved? Who will pay for damages and costs of the dispute?
Source: Madeleine Pullman	

Oregon Hophouse Cultivates Organic Hops Market

The Oregon Hophouse is a national leader in organic hop farming. Certified organic by Oregon Tilth in 2007, Oregon Hophouse was the first certified organic hop farm in Oregon. The farm has been growing hops for over 100 years, and is now run by the grandson of the original farmer, Patrick Leavy, who took over the family farm in 1978. Today, organic hops from the Leavy's farm are sold to breweries all over North America.

Hophouse refers to the picking machine and hop dryer on site, which can process tens of thousands of pounds of hops. Hop plants go through a three-story picking machine to strip the hops from their vine, sending individual hop cones down a conveyor belt. The majority of the hops are dried to less than 10 percent moisture in a drying kiln and are compressed into

200-pound bales for delivery. Fresh hops skip the drying process and are delivered in bags. This perishable ingredient must be used within a few weeks.

USDA National Organic Program agents inspect the hop farm annually, checking for fertility and pest management. Hops are a high-input crop, and the Oregon Hophouse uses a blend of natural fertilizers, including composted chicken manure, cow manure, cover crops, and other organic fertilizers with plant materials and minerals; it manages pests with a combination of natural predators and insecticidal soap. Leavy also has a hop-breeding program to develop patented pest-resistant hop varieties.

Prior to earning organic certification, the Oregon Hophouse provided hops to major brewers like Anheuser-Busch. In 2008 Leavy began growing different hop varieties for craft brewers, but he encountered a major hurdle: breweries could legally make certified organic beer *without* using organic hops because the weight of hops is so low compared to other beer ingredients.

With the help of other organic hop growers, Leavy formed the American Organic Hop Growers Association in 2009 and successfully lobbied the USDA to remove hops from the list of exempted products for organic beer certification, ensuring a market for organic growers. By 2014, the Leavy farm supplied both organic and conventional hops to 16 brewers in the United States and Canada. According to Leavy, the organic brewing market is still too small to focus on organic hop farming. Many breweries make a couple of organic beers, but only a handful are certified organic breweries.

With organic hops twice the price of conventional hops, brewers were initially reluctant to spend the extra cash especially since the organic varieties were less full flavored than conventional hops. In order to manage pests, possibly the biggest challenge in organic hops cultivation, growers were picking hops before they reached their peak. As organic pest management has improved however, organic hops now can be grown to their peak flavor.

The Oregon Hophouse cultivates seven varieties of organic hops with more anticipated through Leavy's breeding program. With a 20 percent growth in dollar volume during 2014, the organic beer market is expected to keep farmers like Leavy busy for years to come.

Malt

Malt is the foundational ingredient for beer and whiskey. Barley malt is made from processed barley, a weeklong process of sprouting barley seeds and then drying the seed once the essential starch altering enzymes emerge. Other grains (wheat, rye, millet) are also malted using the same process, but barley is the most common. Barley malt is categorized into two main types: **base malt** and **specialty malt**. Base malt makes up the bulk of the recipes for beer and whiskey and generates most of the fermentable sugars and main flavor. The malt is defined either by its barley varietal, process style, or

wheat; the most popular are 2-Row, 6-Row, Pale Malt, Pilsen Malt, Maris Otter, and Wheat. Specialty malts go through more processes to develop different types of sugar profiles as well as darker roasted colors. The color rating system, **lovibond**, gives an indication of the color intensity from pale base malts (under 1.4–4 lovibond) and crystal specialty malts (15–150 lovibond) to chocolate or black roast specialty malts (300–550 lovibond).

Barley malt demands high-quality barley with a low protein content, which can be challenging to grow in less than ideal conditions. From a farmer's perspective, growing barley offers few advantages relative to other crops like wheat or corn, both of which are subsidized in the United States and other countries with well-funded research for developing higher yielding GMO crops. If a barley harvest does not achieve the necessary protein content or suffers from weather damage, it cannot be used for brewing and is sold off in low-priced animal feed markets.

Malt supply: Due to the challenges growing high-quality barley, United States and European Union barley acreage continues to shrink, losing out to GMO wheat and corn that offer higher yields and profits to farmers. In 2015, United States barley acreage reached an all-time low. With the growth of craft breweries and distilleries, demand is sure to outstrip supply. The main malt production houses are looking to increase capacity and exploring diverse areas for barley growing to improve the supply side. The United States relies on imported barley malt to fill its production gap. In 2012, 18 percent of US malt usage came from imports, up from only 9 percent in 2002. In the United States, organizations like the American Malting Barley Association are lobbying for research support and favorable federal farm programs, including crop insurance to reduce farmers' risks and policies that level the playing field with other crops.⁴ Maltsters, small-scale artisanal producers, are slowly coming on line but they will not be producing enough malt to fill the gap for a long time.

The European Union is the largest grower and malting barley supplier today, but sells most of its production domestically, and production is projected to decline. Traditional producers like Australia and Canada have some barley surpluses available for export while new producers, including Argentina, Ukraine, and Russia, are stepping into the barley malt export arena.

Malt contracts: Similar to hop buying, beverage producers choose to buy malt on contract or spot market. And, given the increasing gap between supply and demand, contracting is a wise approach. The same types of contract items for hops apply to malt although malt quality specifications contain limits on protein and maximum moisture content, color range, and potential extract levels.

Malt delivery: Depending on the quantity needed, shipping distance and method, and storage space available, malt is delivered in



Source: Madeleine Pullman.

FIGURE 4.4 Grain tote

several different ways. Craft producers who buy small volumes of base or specialty malts use **bagged malt** in 50-pound bags from US suppliers or 55-pound (25 kilograms) bags from European and Canadian suppliers. Bagged malt is shipped on pallets ordinarily holding 40 bags. The buyer pays the shipping fee as well as assorted other fees (fuel surcharge, hazardous materials, lift gate delivery, and sometimes other fees for challenging delivery locations). In most cases, it pays for the buyer to order more than what is immediately required since there is a volume discount and the other fees are one-time order fees (not based on quantity). Bags are easy to move around and store; plus they don't require special handling equipment. The next size up from bagged malt is the 2,000-pound **tote**, which saves between four and five cents per pound. The cost of shipping a tote is similar to a full pallet of bags. Totes require equipment for moving the tote into place and for moving the grain out of the tote, such as an auger or a gravity suspension sack structure.

As a beverage producer's demand for malt increases, a **grain silo** becomes the most viable and cost-effective option. A silo can take delivery of a full truckload of malt, 48,000 pounds in the United States, which cuts the malt price by more than half compared to bags. So, if a brewery produces 2,000 barrels per year and needs roughly 100,000 pounds of malt (2000 bbl. x 50 pounds base malt/bbl.), then taking delivery of full or half trucks quickly pays back the cost of silo infrastructure. This breakeven point is covered in Chapter 5: Equipment.

Overall, with malt demand growing and supply struggling to keep up, it makes sense to contract for malt for businesses experiencing growth. Additionally, planning for deliveries of either bagged, tote, or truckloads of malt means carefully monitoring the economic implications of changes to the total cost of buying malt.

Fruit

An array of **fruits** is showing up in many craft beverages. From traditional fruits like apples, pears, peaches, cherries, and berries to other "fruits" like pumpkin (the family cucurbitaceae is considered a berry) to "vegetables" like rhubarb, fruit is expanding craft beverage portfolios. Producers choose to grow or buy whole fruits and extract their own fruit juice, such as pressing apples into cider, or they buy preprocessed fruit juice, purées, concentrates, extracts, and flavors. Of all these options, fresh fruit and juice is significantly more perishable than frozen purees or concentrates, extracts and flavors.



FIGURE 4.5 Silo

Source: Madeleine Pullman.

TABLE 4.4 Dessert and cider apple examples

Dessert Apples	Cider Apples
Pink Lady	Kingston Black
Golden Delicious	Yarlington Mill
Red Delicious	Esopus Spitzenberg
Jonagold	Dabinett
Granny Smith	Winesap
Gravenstein	Vilberie
Fuji	Crimson Black
Gala	Bramley
Honey Crisp	Newton Pippin

Source: Madeleine Pullman.

Traditional **cider apples** have a much shorter shelf life than dessert apples and are best used in season, creating a push to produce a lot of juice and process it in the fall. **Dessert apples** have a longer shelf life and can be stored for many months in appropriate warehousing environments. Cider apples (“bittersweets” and “bittersharps”) tend to have more acid and tannins than dessert apples, which are sweet and less acidic. Generally speaking, cider apples make a more complex, flavorful cider and dessert apples less so, but the two are often blended with other ingredients to enhance flavor.

Fruit supply: Over the last 50 years dessert apples have taken over fruit orchards in countries like the United States, so cider apples are hard to find in these places. As the demand for cider grows, more cider apple orchards are being planted. In the traditional apple and pear cider-making countries like the United Kingdom, 95 percent of the cider fruit is either under 20 to 25 year contracts to other orchards or grown by major producers themselves. In the United States many of the cider producers are growing their own cider apples because so few are available to purchase, and **perry** (pear cider) pears are even more rare. Dessert apples as well as other types of orchard fruits and berries are readily available for use in ciders and other craft beverages. The large apple and pear processing businesses (in Washington state, Michigan, New York, and California) store fruit through the off-season, and the dessert apple juice culls (less attractive apples) are significantly less expensive than in-season fruit, often one-third of the price.

Fruit contracts: Fruit contracts are essential for anyone looking to buy cider apples or perry pears in any volume. As seen in the United Kingdom, cider apples are such a strategic ingredient for the major producers that they have extremely long contracts with apple and pear growers. As other countries follow suit, expect to see long contracts, especially as the emerging cider markets like the United States are dominated by a few big players. Fruit producers and brokers have payment terms similar to other ingredients, but typically offer 30-day payment terms to smaller businesses.

Fruit delivery: When buying fresh fruit in the volumes needed for pressing, the fruit is transported in fruit **bins** (800 to 875 pounds each for apples or pears). A full semi-truck can fit 48 to 50 bins. Bins require an appropriate storage place free of pests and a cool environment. Alternatively, pre-processed juice or purées can be purchase in all sizes of containers: tanker trucks with huge volumes, plastic totes (250 gallon), drums (50 gallon), bag-in-box treatments (multiple sizes), and plastic

bottles (multiple sizes). Depending on the juice purchased, it can be pasteurized or shelf stable and therefore not requiring refrigeration.

Other Ingredients

Water: Often overlooked as an ingredient for all craft beverages, water is a significant ingredient. Good-quality water with appropriate mineral content can be a huge differentiator for beer. Water is also added to cider, mead, and spirits to achieve the desired alcohol content, and it needs to be distilled or pure (bacteria and chlorine-free). Having an adequate water supply is key; during droughts, states like California have rationed water to breweries.

When selecting a site for production of a craft beverage, the water district can provide analysis of the local water. If water has too much sodium or chlorine, it may require additional treatment for brewing or creating wort for whiskey. Activated carbon filters remove the odor and taste of chlorine. The mineral makeup of water can change seasonally, so if brewers want a consistent product, then the alkalinity may need to be adjusted. High alkalinity produces dull-flavored beer and can be adjusted with food-grade lactic acid. If the water has low mineral content, then mineral salts can be added to adjust for specific beer styles. Some of the brewing water additions include salts such as gypsum, Epsom salt, calcium carbonate, and calcium chloride. Similarly, cider makers, who tend to like acid in their cider, often supplement the juice with sulfuric, malic, and citric acid.

Yeast: Every fermented beverage requires yeast. Beer makers have a wide range of beer-specific yeasts to choose from in the ale and lager families; other beverage makers typically use wine or champagne yeasts. Yeast is often available in both dry and liquid versions. Production breweries generally re-use (“re-pitch”) yeast from one batch to the next or share yeast with other breweries so the cost is spread out over multiple batches. Production cider and mead makers tend to use dry yeast and do not re-pitch between batches in order to avoid potential contamination. Distillers use a wide variety of dry yeasts including high alcohol tolerant distillers yeast. Given that spirits are distilled after fermenting, the yeast has less of a flavor impact than in other beverages. There are many suppliers of yeast, and some of the strategic issues with yeast are managing the cost of ordering yeast (ordering in advance for many months can save money); limiting the varieties of yeast used in the facility to prevent problems and costs; and finding yeast flavor and performance characteristics that fit the operation and desired taste profile.

Spices and flavorings: Increasingly, spices are becoming very popular for use in craft beverages of all kinds. Craft breweries have a long tradition of spiced beers at Christmas, but increasingly, ginger is showing up throughout the year in all craft beverages. The more experimental producers are also playing around with exotic spices or flavorings, such as lavender, saffron, cinnamon, clove, nutmeg, cardamom, chilies, chocolate, coffee, raisins, and even flowers like rose hips and chamomile.



FIGURE 4.6 Boxes of apples

Some of the big malt distributors like Country Malt in the United States carry many of the ingredients; other sources include local farms, specialty spice stores, big grocery stores, and restaurant supply houses. Recipes that call for spices should be cost checked in advance (as shown later in this chapter) since large-scale use of exotic spices can be out of line with other ingredient costs.

Sugar: Different kinds of sweeteners are a vital part of many craft producer's tool kit, boosting the alcohol content and imparting particular flavors. Prior to fermentation, adding sugars will increase the alcohol content and add some flavor; when adding sugars after fermentation and maturing, sugars will add sweetness and different flavors such as caramel notes from brown sugar. Sugars are derived from all kinds of sources, including sugar beets (usually GMO), sugarcane, honey, maple sugar, brown rice, sorghum, and fruit concentrates. Sugar comes in many forms: syrup or concentrate, rock, moist, and other powders or crystals. It also ranges in color from clear or white to amber, brown, or dark brown. Most sugar products are widely available with relatively stable prices with the exception of honey and maple syrup. Both are more severely affected by weather conditions, and honey suffers from repeated bee die-off problems.

Locally Sourced Ingredients Distinguish Ale Apothecary

Ale Apothecary, a small brewery outside of Bend, Oregon, prides itself on creating an exceptionally hand-crafted product. Most recipes and production processes use natural and local ingredients produced with minimal contact with stainless steel. Mashing, open fermentation, conditioning, and dry-hopping all take place in oak barrels. The oak wood is porous, inviting the bacteria and yeast, which gives the beer its unusual and somewhat unpredictable character. The beer moves directly from the barrels to champagne bottles, unfiltered, with the house yeast culture and sugar added for secondary fermentation.

Ale Apothecary created its own lauter vessel out of a spruce tree for its beer, Sahati. Spruce branches line the vessel's bottom, filtering the wort through the needles. The brewery's annual fruit beer, Spencer, is aged for eight months with wild blackcurrant fruit picked from along the river near the brewery. The beer at Ale Apothecary is a reflection of its surroundings, incorporating ingredients unique to the area and creating a differentiated product in the ever-growing craft beer market.



Source: Madeleine Pullman.

FIGURE 4.7 Pine bough lauter

Basic recipe costing: The starting point for any recipe costing calculation is a recipe. If you do not already have a recipe, look online under beer, cider, mead, or spirit forums to find one. Many of those are for five gallons so it's important to scale it up to an appropriate size for an industrial application—at a minimum one bbl. (31 gallons) or one hectoliter for most ciders, mead, or beers and one wbl. (53 gallons or 200 liters) for spirits. Most equipment is sized in bbl., hectoliters, or liters. For example, brewing systems are sized based on the batch sized produced (mash tun/brew kettle capacity) and are three, five, seven, 10, 15 bbls., and so on. In this example, you will take a five gallon recipe and scale it up to one barrel as shown in Table 4.5:

TABLE 4.5 Scaled ingredients for American IPA for five gallons to one bbl

(A) Ingredients	(B) Weight (5 gallons)	(C)Weight (31 gallons=1 bbl.) Column B times (31/5)=6.2
2 Row Pale Malt	11.5 lbs.	71.3 lbs.
Crystal Malt 20 Lovibond	1 lbs.	6.2 lbs.
Light Munich Malt	0.75 lbs.	4.7 lbs.
Carapils	0.75 lbs.	4.7 lbs.
Torrified Wheat	0.25 lbs.	1.6 lbs.
Chinook Hops	1 oz.	6.2 oz.=.4 lbs.
Cascade Hops	5 oz.	31 oz.=1.9 lbs.
Willamette Hops	1.5 oz.	9.3 oz.=.6 lbs.
Source: Madeleine Pullman.		

The next step is to price the recipe. Prices for industrial-level production ingredients are significantly lower than the cost of the same ingredients at a homebrew shop or grocery store for fruit or juice. In this example, the prices will be in the ballpark for that product (without transportation costs) for purchasing in pallet volumes in the Northwest of the United States. Looking at the recipe below for one barrel of beer, notice that the grain bill comes to \$52.82 and the hops bill comes to \$21.15 with a grand total for \$73.97 for one barrel (31 gallons) of ingredients. According to the recipe developer, this recipe on a homebrew scale costs almost \$100 for five gallons, so there is a clear benefit to buying ingredients on a wholesale volume scale. Since this example is a hoppy IPA, there is a significant hop bill and more malt to balance the hops for an above-average malt bill.

TABLE 4.6 Recipe Cost for 1 bbl or 31 gallons

(A) Ingredients	(31 gallons = 1 bbl.)	(C) Price per pound	Cost for item (B) times (C)	Total
2 Row Pale Malt	71.3 lbs.	\$0.56	\$39.93	
Crystal Malt 20 Lovibond	6.2 lbs.	\$0.79	\$4.90	
Light Munich Malt	4.7 lbs.	\$0.68	\$3.20	
Carapils	4.7 lbs.	\$0.78	\$3.67	
Torrified Wheat	1.6 lbs.	\$0.70	<u>\$1.12</u>	<u>\$52.82</u>
Chinook Hops	6.2 oz. = .4 lbs.	\$8.75	\$3.50	
Cascade Hops	31 oz. = 1.9 lbs.	\$7.00	\$13.30	
Willamette Hops	9.3 oz. = .6 lbs.	\$7.25	<u>\$4.35</u>	<u>\$21.15</u>
Total				\$73.97
Source: Madeleine Pullman.				

SUMMARY

As more competitors enter into each of the craft beverage business segments, producers are looking for new ways to differentiate their products through their choice of ingredients. For many years, hop varieties have been the main way to differentiate a craft beer, and more hops producers are working to breed new and unusual hops. But the use of craft malt has only begun to enter the recipes even though malt makes up the bulk of the ingredients in both beer and spirits. Craft maltsters are stepping up to produce local, organic, and unusual grains like millet, and custom malts that could make a big difference in the emergence of new products. Additionally, orchardists are planting heirloom and heritage cider apples and perry pears, but there is a lag time before these will become available, as trees need to mature and yield appropriate amounts of fruit. Those involved in the craft industry need to stay on the lookout for ingredient trends and opportunities to innovate as well as monitor factors influencing supply and demand of all strategic ingredients.

LEARNING ADVENTURES

1. Find a recipe online or through your existing collection and price the recipe with the available pricing that you can find online. Remember that if you use homebrew shop or grocery store prices, they are probably five to 10 times what industrial scale producers pay.
2. What are varieties of juice and cider apples available in your area? What can be purchased in juice form versus fresh apples?

3. Create a recipe for a barrel of cider and a barrel of beer based on recipes found through an Internet recipe database.⁵ How do the recipes compare in price? What is the significant driver of cost?

ENDNOTES

1. Bart Watson, “Craft Brewing and Hops Usage,” Brewers Association, http://www.usahops.org/userfiles/image/1422493631_Bart%20Watson%202015%20Hop%20Convention.pdf.
2. Ibid.
3. Marc Sorini and Beth Hatf, “10 Items to Address in Supply Contracts,” *The New Brewer*, November/December 2012, 20–21.
4. “AMBA Overview,” American Malting Barley Association, <http://ambainc.org/content/8/amba-overview>.
5. “Homebrew Forums: Recipe Database,” Homebrewtalk, [is “Homebrewtalk” ok here or should be “Homebrew talk”?] <http://www.homebrewtalk.com/>.

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