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Getting to 20/20

Can Hop and Malt Supplies Keep Pace?

In February 2014, the Brewers Association (BA) board of directors updated the BA's mission with the ambitious goal of achieving 20 percent market share by volume by the year 2020. As part of this mission, BA staff has been tasked to investigate what 20 percent share in 2020 ("20/20") would mean for the industry and its suppliers.

A critical component of this investigation involves understanding how craft industry growth through 2020 will reshape the raw material sectors, primarily hops and malt, that form the basis of beer. To achieve 20/20 will require a deepening partnership and conversation between the craft beer industry and these vital suppliers as we mutually evolve. The following article is a step in this conversation.

PROJECTED MARKET TRENDS

Although 20 percent market share may seem like a high bar, 20/20 is not only achievable, but a predictable result of demographic, market, and growth trends.

The craft brewing industry has seen incredible growth in the past decade, averaging 12 percent annualized growth for 10 years. That growth has accelerated in recent years, including domestic sales growth of 17.2 percent by volume in 2013. By the end of 2014, the craft industry will likely command between 10.5 and 11 percent of the U.S. beer market by volume (10.7 percent used in Figure 2).

FIGURE 1:
HISTORICAL CRAFT PRODUCTION GROWTH RATE VS. 11% GROWTH AND 2005-2014 AVERAGE

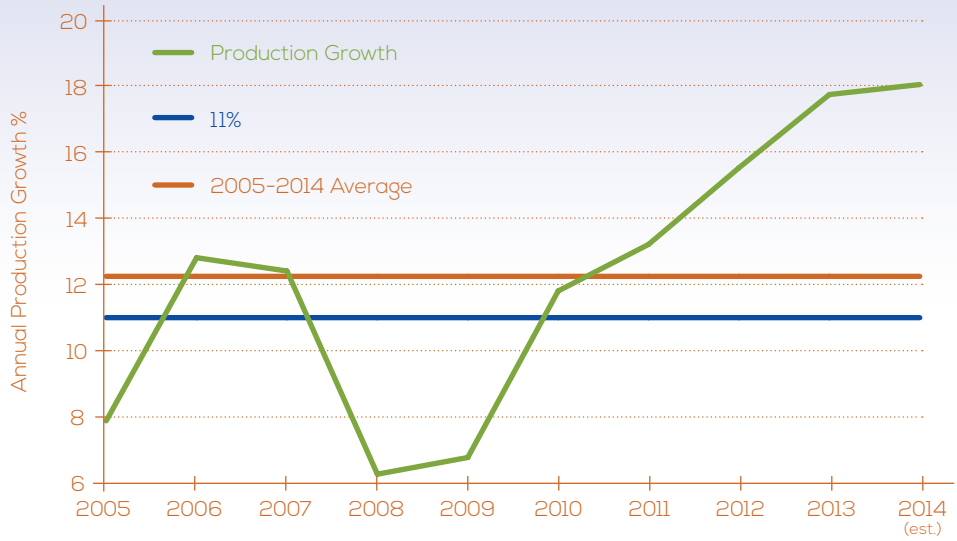
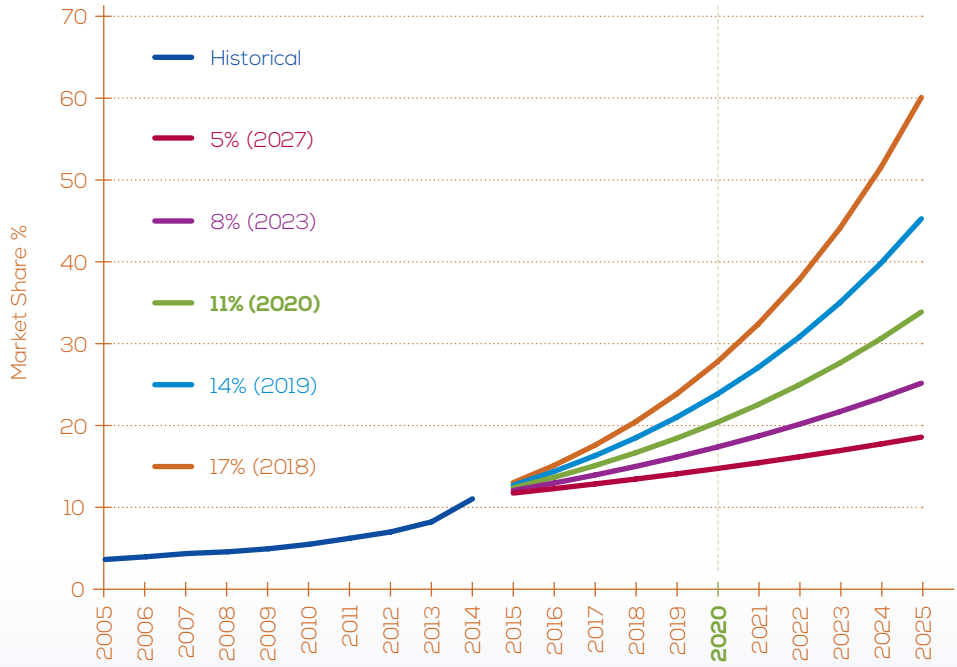


FIGURE 2:
PATHS TO CRAFT 20 SHARE BY SHARE GROWTH RATE; YEAR 20 SHARE ACHIEVED IN PARENTHESES



* Craft brewer definition changed between 2013 and 2014

Continued growth is very likely, as it is driven by changes in the U.S. population, an ongoing shift toward premiumization in the beer industry, and increased access to market. Demographically, the Millennial generation, which makes up 25 to 27 percent of the U.S. population (depending on the definition of the group), has influenced all categories of products. By 2020, Millennials will comprise 36 percent of the adult population and will represent the dominant consumer demographic.

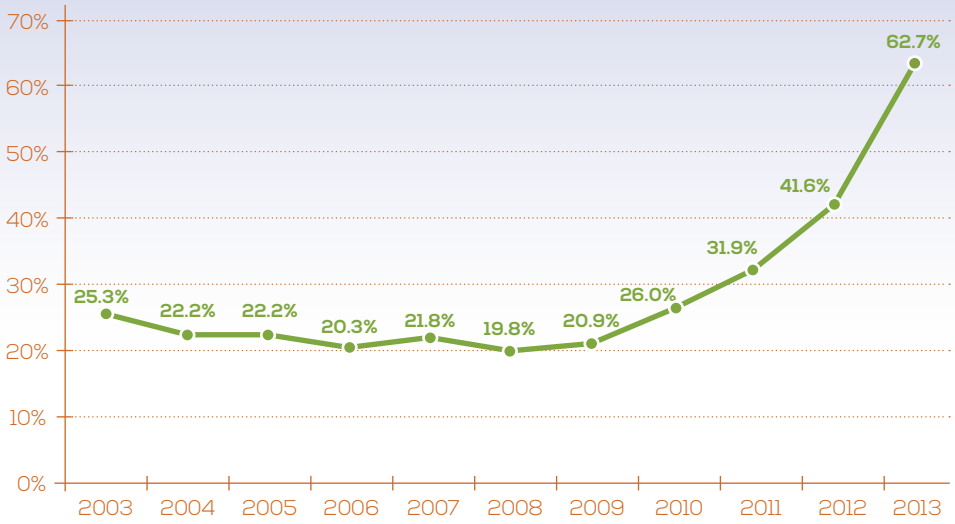
Nielsen finds that Millennials already consume roughly one-third of craft beer volume. Between 2011 and 2013, 80 percent of craft growth came from new craft appreciators, the majority of whom were in the 21 to 29 age group, and their impact will only increase as they come into their own as purchasers. By 2020, the 21 to 36 age group (the 36-year-olds in 2020 are the 29-year-olds from 2013) will grow by almost 4 million, creating an even larger beer lover base than currently over indexes on craft.[1]

Changing U.S. demographics are one part of a larger movement toward premiumization in the beer business. The high end of the beer industry is now the dominant driver of growth, with craft brewers leading the charge. Numerous industry analysts are predicting that the high end (of which there are various definitions based on case price; currently many analysts use $26/case) will control more than 50 percent of the beer market by the 2020s. As the leading segment of the high end category, craft is poised to capitalize on the seismic shift in beer lover preferences.

The rapid growth of craft brewers to date has resulted in very different outcomes across various critical supplier industries. The hop growing and processing industries have already reoriented production toward craft brewer needs in terms of variety, and are now actively investing in expanding total industry capacity to satisfy continued demand growth. In contrast, the barley and malt processing industries have been much slower to respond to the specific needs of craft brewers, both in terms of variety and infrastructure investment.

The most dramatic change in the hop industry has been the steady, inexorable shift away from alpha hop acreage and toward aroma hop acreage (Figure 3). Aroma hops, the type preferred by many craft brewers, represented less than 20 percent of hop acreage as recently as 2008. In 2013, that percentage had risen to over 60 percent, and mid-year 2014 planting data indicates that aroma acreage will continue rising in line with aroma hop demand. Demand for aroma acres has not been driven by U.S. craft brewers alone. The large brewers have increasingly turned to aroma hops for their domestic specialty brands, while the success and innovation of U.S. craft brewers has driven up export demand for U.S. aroma varieties by small and large brewers worldwide. Although export demand increases are not included in this article's projections, they will likely compound the figures outlined here.

FIGURE 3:
AROMA HOP ACREAGE AS % TTL U.S. ACRES



In contrast, there is already increasing evidence that the demand for malt grown and malted specifically for all-malt beer production is not being met by domestic maltsters. Prior to the advent of craft brewing in the late 1970s and early 1980s, barley growers and the malting industry responded to adjunct brewers' needs by developing a relatively small number of high diastatic power, high FAN (free amino nitrogen) malt varieties suitable for adjunct brewing. Further, much of the malting capacity developed during the 20th century was capitalized and owned by large brewing companies, and this continues today. This committed capacity makes the malt industry less flexible than the hop industry. Although brewer needs and the entire malting barley market have shifted considerably, the scale and shape of the U.S. malt industry continues (with some exceptions) to largely resemble the brewing industry of the late 20th century. The combination of growing demand and committed capacity means that while everyone is focusing on hops, critical gaps in the future are more likely to appear with malt supply than with hops.

The disconnect between craft brewer demand and U.S. malt supply can be partially seen in the increasing share of imported malt used by domestic brewers. In 1990-91, the U.S. Department of Commerce calculated that the volume of U.S. imported malt was equivalent to 1 percent of U.S. usage. That level has steadily increased over time, reaching 18.5 percent in 2011-12. This suggests that brewers are increasingly looking at imported malt to meet demand that is not being supplied by domestic maltsters.

Not all of the rise in imported malt can be assigned to shortages of quality malt from U.S. producers. Much of the rise in imported barley comes from Canada. Canadian imports have risen for a variety of factors including climate change, which has pushed barley growing north, NAFTA (passed in 1994), and divergent governmental agricultural policies on barley between the U.S. and Canada. Consequently, U.S. barley acres have decreased substantially, whereas Canadian acres have remained relatively high.

RAW MATERIALS WITH 20/20 VISION

Further changes are needed in both the hop and malt industries to meet increased domestic demand, primarily driven by craft brewers. Craft brewers on average use far more hops and malt in their beers than the industry as a whole. In 2013, the Brewers Association Hop Usage Survey found that craft brewers used 1.36 pounds of (primarily aroma) hops per barrel of production: 3.4 times the overall industry average of less than 0.45 pound per barrel. Similarly, malt usage by craft brewers topped 55 pounds per barrel, more than 3.4 times the rate of other domestic brewers, and 2.7 times the domestic industry average. As noted above, the domestic industry average is also likely to rise as large brewers increasingly turn to more raw material-intensive domestic specialty brands in order to offset volume losses from premium and premium light lagers.

This means that overall demand for hops and malt will increase sharply through 2020 and beyond, both driven by increased craft brewer market share as well as increased share from raw material-intensive specialty products from large brewers.

Craft beer averaged 15.0 percent category growth from 2010-13, and looked on pace to exceed that growth average in 2014, posting an 18-percent production increase through June. Given this trajectory, market growth toward 20 percent volume share by 2020 seems imminently achievable. This statement holds true even with an assumption of slowing production growth (12 percent annualized), increased craft beer exports (taken out of domestic market share), and assumptions about a return to growth for the overall beer industry (based both on increasing craft volume and the growing strength of Mexican imports).

Consequently, using growth projections, by 2020 total domestic demand for hops will increase by 26 percent and total demand for malt will increase 25 percent over 2014 requirements. Note that these changes are poised to occur *assuming unchanged per barrel usage rates of hops and malt*, both of which have steadily increased in recent years. By factoring in modest increased usage rates, the increase in demand by 2020 could be even more dramatic. (See Figures 4 and 5)

Some of this increased demand may be met by imported raw materials, but given both that U.S. hop varieties are a critical component of many U.S. brands and that many foreign brewers are increasingly demanding U.S. hops, on the hop side of the equation at least, these demand projections may be conservative. On the malt side, the rising percentage of malt usage fulfilled by imports does show some ability to meet increased demand. However, the malt demand forecasted above is an increase larger than total current malt imports. Additionally, imported malt may not meet the specifications of brewers accustomed to using specific American malts in their recipes, or who will increasingly need malts differing from the current varieties available in North America. Finally, domestic demand may also increase due to exports, particularly to meet the growing Mexican brewing industry.

HOW DO WE GET THERE?

It is vital to stress once again that meeting the demands of 20/20 will not be simply a matter of level, but just as importantly, changes to the type of inputs. Even in the hop market, where the ubiquitous presence of hop contracts has made growers much more responsive to shifts in varietal preferences (more than 99.8 percent of craft beer volume is produced with hops grown under contract), recent BA hop surveys show unmet demand for a variety of proprietary hops. With the rise of more sessionable styles that rely on new proprietary hop varieties, the demand for many currently undersupplied hops will likely increase.

FIGURE 4:
PROJECTED CRAFT HOP USAGE

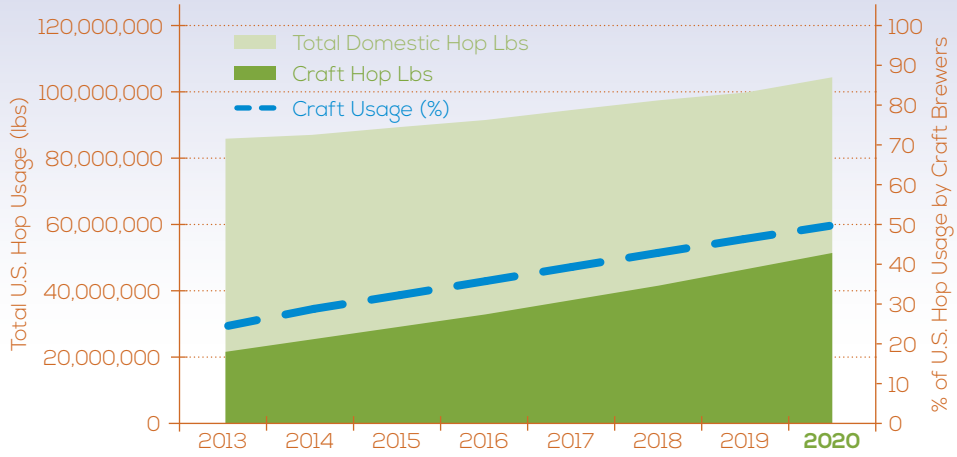
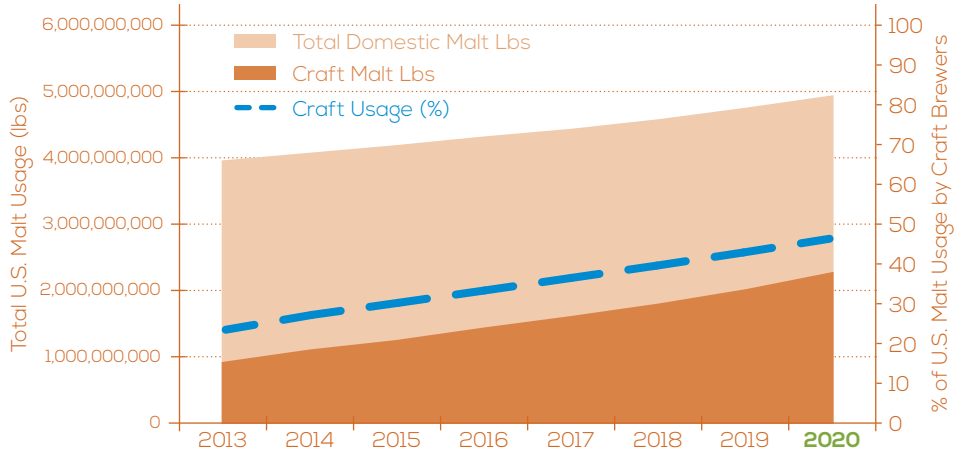


FIGURE 5:
PROJECTED CRAFT MALT USAGE



Barley is also unique in that its market is undergoing a retrograde evolution, slowly transitioning from a commodity market to a custom contract market focused primarily on the brewing industry. Generally speaking, barley as feed and food has been declining for decades, primarily due to competition from corn and other crops for acreage, whereas production of barley for malting is relatively stable.

Malt needs from one craft brewer to another are divergent, but as a group, craft brewer malt needs diverge far more dramatically from the needs of adjunct brewers. Even so, areas of consensus have emerged that allow for targeted development of varieties suited to all-malt beer brand production. Number one is flavor. Craft brewers agree that distinctive flavor is a critical factor for future malting barley varieties (although they might not agree on *which* flavors are important to their respective brands). Craft brewers favor increasing yields and disease resistance through marker-assisted selection and continued use of phenotype characteristics provided by TCAP (Triticeae Coordinated Agricultural Project) to allow barley to remain competitive with other crops. Additionally, they favor the development of malting barley varieties with increased water usage efficiency (WUE) and nitrogen usage efficiency (NUE) to allow for decreased input requirements.

With respect to yield and increased geographic spread, craft brewers believe that development of winter barley lines suited to different U.S. growing regions is very important to long-term malting barley competitiveness. Craft brewers agree that lower FAN levels are required to allow for greater physical and flavor stability in the package. Finally, craft brewers put a premium on relatively lower protein, lower S/T (soluble/total, or Kolbach index), and high levels of extract, all of which go hand in hand. Historically speaking, craft brewers have preferred two-row varieties for their extract advantage, and favor continued development of malting barley varieties with increased extract content. These characteristics are described more fully in "Malting Barley Characteristics for Craft Brewers," published by the Brewers Association Pipeline Subcommittee in April 2014 and available at BrewersAssociation.org.

The evolution of both the hops and malt industry will therefore require large investments not only in new acreage, but in different types of crops, continued research, and additional infrastructure to process these crops. Some of this will come from new locations, including states now exploring local hops and/or malting industries, but the vast majority of additional capacity in the short and medium term will likely come from existing locations and players.

Part of this is due to the sheer scale on which investment is needed. Hop acreage, including land, root stock, and trellis can run $10,000 an acre in current production regions. Land costs may increase as available acreage dwindles and growers are forced to seek out new acreage (or perhaps even replace existing perennial crops, such as apple orchards, with hop fields). Add to that an average of $5,000 per acre in onsite processing capacity, and the additional investment in acreage required to meet aroma hop demand will start at $180 million. These costs will only grow if the investment comes in diverse locations or at a smaller scale, where a survey of new startups shows costs can reach $25,000 or even $30,000 per acre. Additionally, the cost of capital is likely to increase in future years now that the Federal Reserve has phased out its quantitative easing program, and as historically low interest rates rise, these startup costs may increase in value. Given these adjustments, total hop supply investments of closer to a quarter of a billion dollars seem plausible.

In parallel with on-farm investments, additional investments are needed in storage, as dealers have already reached capacity at existing storage facilities. At an invested cost of roughly 25 cents per pound, storage may appear cheap, but with roughly 25 million more pounds of hops a year, that's an additional $6.25 million. Similarly, packaging and pelletizing infrastructure will need to be increased, as well as support for hop research and development. All told, these

WHAT CRAFT BREWERS CAN DO

Individual brewers have an important role in managing growth. Here are five steps craft brewers can take to help mitigate the demands the growing craft industry will place on its supply chain.

1. Focus on appropriate levels of hop contracting in order to avoid cash flow mistakes in a growing marketplace.
2. Focus on accurate forecasting of raw materials needs in the coming years.
3. Manage use of materials more efficiently in the current era of tight supplies.
4. Actively explore how to get more extract out of malt and more hop oil into finished beer using fewer pounds.
5. Participate in raw materials surveys such as the BA Hop Usage Survey in 2015 to help ensure the information going to growers is of the highest quality.

additional infrastructure costs are likely to double acreage costs, meaning that hop growers and dealers may reach half a billion dollars in investment by 2020.

On the malt side, the challenges are equal if not greater. Current estimates of U.S. malting capacity show the ability to malt between 2.2 and 2.3 million metric tons annually. Given that the U.S. malting infrastructure is used not only to supply domestic demand but also Mexican brewers, industry insiders see total production as using 95 percent of that current annual capacity, but much of that capacity is committed and unavailable to craft brewers. Our analysis of consumption and production confirms that current uncommitted U.S. malting capacity is unable to meet *current* craft demand.

U.S. capacity is only one piece of the puzzle, as Canadian maltsters do provide additional capacity, making it a North American malt system more than a U.S. malt system. Canadian malt production is largely export focused, with around 65 percent of Canadian malt production going to exports, primarily to the United States.[2]

Even with Canadian exports, capacity will need to expand sharply to accommodate the 25-percent growth in malt demand forecasted for 2020, driven both by craft brewers and increasing malt usage by large brewers as the domestic specialty category grows. Additionally, expanding the suite of malting barley varieties needed to fulfill all-malt beer production will require increased binning and storage investments. At scale, recent projects demonstrate that increased malt capacity requires investments of approximately $875 per metric ton. These costs can increase sharply and even double at smaller scales. Consequently, expanding U.S. malting capacity by 25 percent requires a *minimum* investment of $500 million to create 560,000 new metric tons of capacity (two to three new large-scale malting facilities). Given the potential for increased demand from Mexican brewers, smaller-scale investments in specialized malt houses, and increased future costs, this may be a conservative estimate. The alternative scenario to growing U.S. capacity to meet all malt production needs is a shift northward in the North American malting system, leaving Canadian maltsters and growers as the dominant providers to a growing share of the U.S. brewing industry instead of domestic producers.

The level of these investments, as well as those on the brewer side, creates the potential for cash flow shocks on the road to 20/20. Although market trends suggest growth is inevitable, that does not mean it will occur smoothly across time or across industry players. As dealers lend to growers to help them capitalize as they expand or as growers expand on their own, they must balance opportunities for growth with caution to not overextend themselves. This will at times be challenging as infrastructure bumps up against capacity maximums, since infrastructure for additional acres will often be more capital intensive than the cash flow from those additional acres. One potential solution is more shared and incremental usage of capacity. Growers sharing infrastructure like pickers and driers may be a way to diffuse capital costs and make them more closely align with cash flow.

Similarly, brewers must focus more than ever on appropriate levels of contracting in order to avoid cash flow mistakes in a growing marketplace. This does not mean brewers should think about contracting below their projected needs. Acres will not go in without contracts, and in an era of growth, excess materials will likely be easier to sell than in a more static market. However, it does suggest that all players should focus more on accurate forecasting in the coming years, as growing pains will likely create new stress points throughout the system that proper planning can help mitigate.

One open question is how much these investments in hop and barley malt infrastructure will and/or should resemble the existing industry, both in type and location. As agricultural industries, both hops and malt have long been concentrated in particular regions. Associated infrastructure has followed. Malting reduces barley weight by approximately 30 percent, so locating malt houses close to barley production saves on freight costs: it is cheaper to ship finished malt from those houses to brewers than to ship raw barley to plants closer to brewers. One solution includes developing two-row malting barley varieties that thrive in traditional six-row growing regions including North Dakota and Minnesota, to make use of existing capacity located in the Midwest. Future capacity should take into account changes in the industry in location decisions. This means locating malting capacity in two-row growing areas of Idaho, Montana, and other states as craft can currently only access less than 25 percent of the malting capacity in Idaho and Montana. It also means exploring more locally-sourced capacity. As local brewing industries seek methods of differentiation and the best available raw materials, there is growing interest in developing locally sourced hops and barley, increasing the possibilities for corresponding local malting and hop pelletizing.

Although a more diffuse set of suppliers would likely increase the cost of raw materials due to decreased scale, it would have several advantages for the industry as a whole. One of the largest is a reduced risk of shocks due to natural events, such as wet conditions in barley growing regions during harvest (as occurred in 2014). Similarly, more localized industries would potentially reduce environmental impacts and lead to shorter transport times and lower freight costs (though again these benefits might be offset in the medium run by decreased scale). In general this would present a vision of raw materials industries that—like brewing—are shifting away from concentrated large-scale production and toward a more flexible model of diffused, local production.

The ability to work more flexibly at a smaller scale remains the key difference between the initial responses on the part of the hop and malt industries. Although custom contracting with craft brewers has become common in the hop industry, maltsters have been slower to engage in such contracts with the majority of craft brewer businesses. Currently more than 75 percent of craft breweries are too small

to use malt bins for bulk delivery and storage, meaning they purchase bag malt on the spot market. Along with increased capacity, increased sales infrastructure investment by maltsters and dealers to engage in custom malt contracts will be essential in improving the functioning of the malt market.

MOVING FORWARD TOGETHER

In summary, craft brewers cannot make it to 20/20 alone. It will take a concerted effort from a host of industries to continuously invest and update in order to meet the demands the growing craft industry will place on its supply chain.

Individual brewers have an important role in managing growth. Managing their use of materials more efficiently has already become a business imperative in the current era of tight supplies. Craft brewers and researchers are actively exploring how to get more extract out of their malt, and how to deliver more hop oil into finished beer using fewer pounds.

The Brewers Association is also playing an active role in this process, with the aforementioned "Malting Barley Characteristics for Craft Brewers" white paper. In conjunction with the American Malting Barley Association, Inc.'s (AMBA) "Barley Breeding Guidelines for All Malt Two-Row," there are now clear guidelines for the entire barley malting industry. And on the hop side of the equation, the BA is a paying member of the Hop Research Council (HRC), which funds the lion's share of hop supply chain-related research and coordinates new U.S. public hop variety development.

The BA will continue to clearly communicate information to dealers and growers about upcoming demands through raw materials. Annual surveys of BA member brewers on their hop and malt usage help support these efforts, so participation in these surveys is encouraged to help ensure the information going to growers is of the highest quality.

Finally, the BA is actively supporting grants for research on the hop and malt supply chain. Ongoing research includes projects on Cascade hop powdery mildew disease, Cascade hop aroma, and supporting hop supply reporting. On the malt side, BA supports malting barley variety development, research into barley and malt flavor-causing metabolites, and agronomic practices best suited for producing malt for all-malt brewing.

The BA remains committed to supporting future research into raw materials research, and is already substantially increasing its investment as craft's role in the beer industry grows.

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