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Bavarian Dunkels

BRINGING A DARK BAVARIAN STYLE TO LIGHT

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Brewing in . . . Styles

Martin Lodahl, column editor

Revered from London and Paris to St. Petersburg and Scandinavia, the Bavarian dark style defined the essence of beer during the 18th and 19th centuries. A recent tour of traditional Dunkel breweries in Germany reveals the secrets of both the pleasure and toil hiding behind this classic style.

By Jay S. Hersh

Bavaria's Dark Secret —

Shedding Light on the Bavarian Dunkel Style

Trying to research the roots of a beer style can be a daunting task. Where does one start? Many factors have come into play in the development of the classic styles as we know them today (and which even now continue to evolve). The intertwined threads of politics, economics, trade, and technological advance can be difficult to unravel and follow. Woven together, however, they yield the beer culture we have today.

To understand some of these influences on the development of brown beers it is useful to understand something of the political structure of Germany and its economic and technological development over the past 1,000 years. Though the topic is vast, the discussion in the box on pages 48–49, derived in part from reference 1, touches on some of the most important considerations.

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A more detailed account of the many political, economic, and technological changes affecting the evolution of Bavarian Dunkel would take an entire book. But what of the present style? In the space available here I recount my experiences on a recent trip to Bavaria to relate how this style is currently brewed in Germany and to some extent the Czech Republic.

A Taste is Worth a Thousand Words

Let's move on to the task of describing present-day Bavarian Dunkel beer. (See the accompanying box for help with nomenclature and naming conventions.) Even among the beers I'd classify as Bavarian Dark, the flavor profiles of the beers I sampled differed widely. The differences can largely be attributed to the influence of filtration.

Unfiltered Dunkels: Unfiltered Bavarian dark beers (sometimes referred to as Naturtrüb Kellerbiers) are far less prevalent than the filtered version owing to the increased product stability achieved via filtration. In my opinion, the filtered beer's increased stability comes at the expense of a changed flavor profile. Two of the breweries I toured recently — the Schlossbrauerei Kaltenberg (Geltendorf, Germany, brewers of König Ludwig Dunkel) and the Privatbrauerei Inselkammer, a.k.a. Ayinger (Aying, Germany, brewers of Ayinger Altbairisch Dunkel) — offer both filtered and unfiltered versions of their products. The unfiltered versions were available only at the brewery tap rooms — in the traditional 1-L gray stoneware mugs. The filtered versions are bottled and thus more widely available.

The unfiltered versions of both breweries' products bore similar flavor profiles. If you have ever heard beer described as "liquid bread," it was likely by someone who has tasted an unfiltered Bavarian Dunkel. These beers pour a dark brown color and are murky, not bright or clear, with a rich tan-colored head. The aroma is big and rich, with malty, sweetish, and even a bit of earthy/yeasty smells to it. On tap it has a very low carbonation level, reminiscent of British bitters served from a beer engine. These beers are typically served on tap from the more traditional wooden kegs. The flavor is both malty and sweet, with chocolate and sometimes nutty notes as well. The flavor will also generally possess both a slight astringency and a mild chalkiness, which result from decoction mashing and carbonate water, respectively. It is always a quenching, filling beer with a full, dextrinous mouthfeel.

Filtered versions: The profile of the filtered versions show some appreciable differences. Filtered versions generally are deep reddish brown in color and are clear and bright, with a light to medium tan head. The aroma will be sweet, though only occasionally cloying, slightly malty, often with hints of caramel. It will not have the richness of the unfiltered versions nor the earthy/yeasty notes. The taste itself will be sweet, though not overwhelmingly so, and will often possess malty notes and hints of caramel, chocolate, or nuttiness. The mouthfeel is typically dextrinous, and often a mild bitterness and/or slight astringency is present, lingering pleasantly into the aftertaste. Buttery notes are also sometimes present but not as a primary flavor.

The German Nomenclature Decoder — A Glossary of German Styles

A beer drinker arriving in Germany today finds regional styles preserved in a range of locally distributed labels as well as products available through national labels. Terminology can be confusing; naming can be local (as in Kölsch from Köln [Cologne]), can have specific regional meanings (as in Alt, which in Düsseldorf refers to a specific style but more generally means "old"), or can be truly generic (as in Dunkel, which means "dark" and can be applied to Bock, wheat, and other beer styles as well as simply designating its own style). Though confusion may abound to the uninitiated, a wider sampling shows that in typical German fashion the application of names adheres to rules.

Based on a good sampling of beers and discussions with brewmasters, here is what I believe are the currently important descriptors for dark beer found in Germany today.

Alt — (literally) old
Bairisch, Bayerisch, Bayrisch — all mean from Bavaria
Braun — (literally) brown, a historical name for what is now generally termed Dunkel
Dunkles, Dunkel — (literally) dark
Frankisch(es) — from Franconia
Kloster — monastery, cloister (referring to where beer is or was often brewed)
Keller — cellar
Münchner — from Munich
Naturtrüb — naturally cloudy
Schwarz — (literally) black
Ur — origin, source
Urquell — original source/spring
Urtyp — original type or style
Urbier — original beer

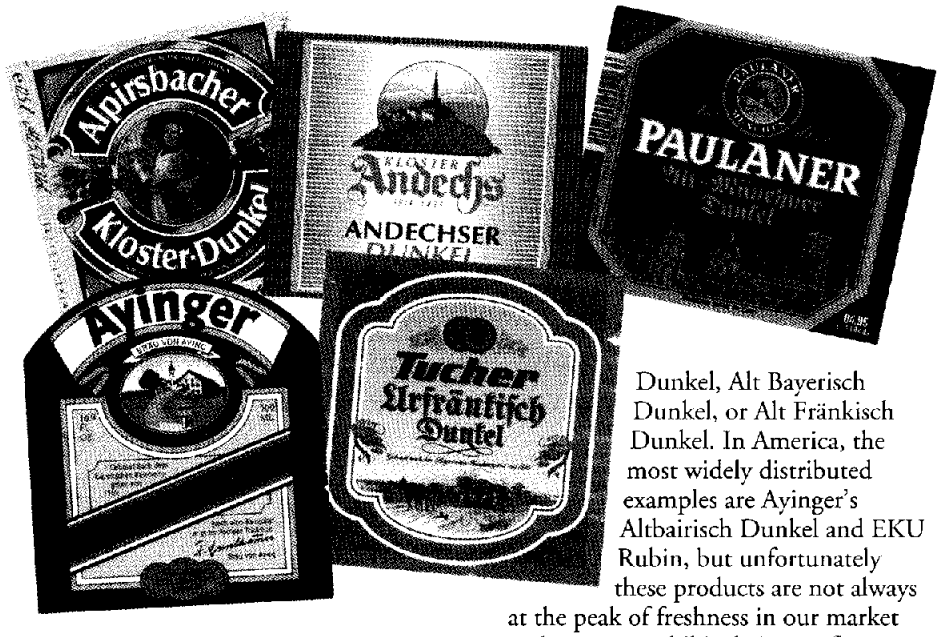
I use the following terms to categorize the styles of dark beer found in Germany today. Although naming conventions are not exact, nor is there any appellation control, these terms seem to be fairly common.

(Alt)Münchner, (Alt)Bairisch, or (Alt)Fränkisch Dunkel (or similar variations on naming) — These beers are generally brewed to emulate the old Bavarian Dunkel style. (See the text for more detail.)

Export Dunkel — These beers typically are a dark version of the usually blonde Export-style beers. Generally they are brewed to a blond beer recipe with some amount of colored malt (Farbemalz) added to the grain bill. In some cases a colored beer is brewed separately and simply mixed with a blonde beer in-line during the bottling process.

Dunkel — Some beers bear no designation other than Dunkel (except perhaps the addition of the town of origin). These beers are often simply dark versions of Pilsener (see Export Dunkel, above), but other times they are a brewery's interpretation of the old Bavarian style. In the latter case, the artwork or an additional designation of Alt on the label may offer hints — or it might be left to the drinker's palette to discern.

Schwarzbier — Although Schwarzbier literally means "black beer," I have yet to encounter one that was a truly dark beer, as dark as a porter or a stout. Of the commercial examples I know, one hails from near Heidelberg, another from Franconia, and the last from Thuringen. Research indicates that Schwarzbier is a regional name originating in the towns of Bad Kostritz in the south of Thuringen (close to the historic brewing town of Jena) (14) and Kulmbach in northern Franconia (16,18), and that historically the style is within the range of the flavor profile used to describe Altbairisch Dunkel beers. Modern-day examples from the Mönchshof brewery of Kulmbach and the Kostritzer Schwarzbierbrauerei of Bad Kostritz support this theory, as does Jackson (19).



Representative commercial examples: The most widely available brown beers are packaged and filtered beers in Germany bearing designations such as Münchner Dunkel, Alt Münchner Dunkel, Alt Bayerisch Dunkel, or Alt Fränkisch Dunkel. In America, the most widely distributed examples are Ayinger's Altbairisch Dunkel and EKU Rubin, but unfortunately these products are not always at the peak of freshness in our market and may not exhibit their true flavor profiles.

Two of the more widely distributed American packaged products that fit this style are Augsburger Bavarian Style Dark from Stroh's (The Stroh Brewery Co., Detroit, Michigan) and Frankenmuth German Style Dark (Frankenmuth Brewery Inc., Frankenmuth, Michigan), which in this author's opinion was the better of the two. Less widely available, though worth a mention as a good example of the style, is the Black Radish Dark Lager produced by the Weeping Radish Brewery (locations in Raleigh-Durham and Manteo, North Carolina). Although not a packaged product, the draught dark lager made by the Gordon Biersch brewpubs of the San Francisco Bay area is also worthy of mention.

In Munich itself, Paulaner, Augustiner, Hacker-Pschorr, and Spaten all offer fine examples. Others of note come from Kaltenberg, Weihenstephan, Andechs, and of course Ayinger, all near Munich. Still farther afield, the beer region of Franconia offers several worthwhile products from EKU, Kulmbach Mönchshof, Kulmbach Reichelbräu, and Tucher, to name a few.

The History and Politics of a Style

Following the death of Charlemagne in 814, Europe was partitioned into the three realms of France, the Rhineland, and Germany. Charlemagne had bound the lords of far-flung estates to his court through a feudal political structure. When the direct line of his descendants died out in Germany around the beginning of the 10th century, the dukes, princes, lords, and others of the more powerful German feudal states banded together and elected a new king, who took the title of Holy Roman Emperor.

Also around this time, Germany, heretofore principally an agrarian state, began to develop fortified towns, known as bergs, for defensive reasons. By and by these towns became trading centers, and the wealth derived from trading enabled many of them to purchase concessions from the German King (who as Holy Roman Emperor needed to finance participation in the Crusades) or local lords (who needed to finance themselves in smaller wars they fought among themselves). Such concessions allowed the towns rights to control many of their own affairs, including the right to brew.

Many towns even achieved the status of free city-states, with nearly complete sovereignty. Nürnberg, in Bavaria, was one such town. Many of the Hansa League towns were also free cities. Towns that were not free cities may still have had town councils that oversaw town business, but those towns (such as Munich) were very much under the control of the sovereign, who could choose to allow or disallow brewing in that locale at a whim.

The church also had a significant (positive) influence on the development of brewing. Before the time of Charlemagne, the Romans exercised great influence on all of Europe, establishing churches and spreading Christianity to the pagan European tribes. City-states such as Freising, Mainz, Köln, and Bamberg, sprang up around these centers of religious influence and in general were controlled by the Church. Some of the earliest records of brewing in Europe are from monasteries and other focal points of church life (2,3).

Thus by the 15th century, when commercial-scale brewing began to become prevalent, Germany presented a complicated political landscape. Feudal lords held power over regions varying in size from manors to modern German states. Within the larger divisions, some hierarchy of fealty (loyalty) could often be found. The church likewise had holdings ranging from individual towns to vast estates. The clashes between and among nobles and church leaders are the stuff of legends. Add the dimension of free cities trying to protect their trading interests and to prosper, and you see a complex political landscape, one that was not the most conducive to economic development, and the development of brewing practice is closely related to economic development.

The Black Plague of the Middle Ages and the 30 years of religious wars of the Reformation (early 17th century) wrought havoc on Germany. Her population was decimated by these events and the famine that accompanied them. Man-made famine wrought by war and natural famine caused by labor shortages from Plague deaths (too few laborers to properly plant and harvest) or crop failures presented the challenge of living with foodstuffs (especially wheat and barley) in short supply. This widespread famine often prompted the nobility, church, or town (whichever held power in an area) to tightly regulate, or even ban outright, the brewing trade. Agriculture, too, was regulated. Barley grew better in the poorly irrigated

For the adventurous traveler, Bavaria — particularly both the regions around Munich in the south and Nürnberg-Bamberg-Bayreuth in the north — offers a wealth of brewery guest houses and small local breweries, many of which produce products in this style.

Dark in the Brewhouse

The following observations on brewing procedures for this style are based upon tours taken at the Kaltenberg Brewery, Ayinger Brewery Inselkammer, and EKU (Kulmbach), all in the fall of 1994. These breweries represent both midsized and large segments of the spectrum and use equipment dating mostly from the latter half of this century, including some very modern, state-of-the-art designs. Although not exhaustive, this sampling is representative of the techniques used in present-day Dunkel beer brewing. Out of courtesy to the brewers I do not identify details of recipe or technique at any specific brewery, but rather a composite portrait (see box, "Profile of a Typical Dunkel," next page, for a general description of Dunkel brewing parameters).

In addition to observations of commercial Dunkel brewing practices, I add my own observations on brewing this style at home. The home brewing experience presented in the following discussion may be of value to both commercial brewers and home brewers eager to try their hand at an authentic replication of the style in their own brewery. Depending upon the scale of your brewery (personal or commercial) and the capabilities of your equipment, you may choose to emulate the more traditional methods presented here (representative of the commercial breweries visited), or to adopt a hybrid approach (such as that detailed in my home brewing experience) more suitable to the practical considerations of your brewery.

The grain bill: In many respects the brewing of Bairisch Dunkels is similar to that of Bock beers. At one of the breweries that produces both styles, the brewer indicated the recipe is the same but the brewing processes differ. The soul of the Bavarian dark beer is the Dunkles-malz, or as we call it in North America, Munich malt. At the commercial breweries I visited, recipes used no less than two-thirds Munich malt in the grist, and some as much as 99%! The balance of the grist is composed of pale malt — typically a German two-row Pilsener malt — with a final 1% of color malt. The color malt used is typically known as chocolate malt here, but black patent malt is also sometimes used. Other malts such as Cara-Munich and Brumalz (used for added dextrin and pH adjustment, respectively) are sometimes used at around 1% of the grain bill.

Mashing: Being a Bavarian style, these dark beers are brewed using the tried and true method of decoction mashing. I must confess that in my home brewing I have in the past avoided decoction mash-

and unfertilized soils of the time, but wheat was a more important foodstuff. To ensure that adequate supplies were grown, royal decrees were often imposed to require that farmers plant wheat. In Bavaria a tightly enforced ban on wheat beer brewing in all but the Royal Court breweries was eventually imposed by Prince Maximillian I in 1602 (4), making wheat beer a prized commodity. In other years when agriculture prospered and extra wheat was available, wheat beer sold outside the Royal Court became an important source of revenue. Brown beer, by comparison, often weak and of poor quality, was considered a common man's drink and was available only in separate taverns marked by green wreaths where ordinary folk drank, as opposed to the taverns reserved for the upper classes where wheat beer was available.

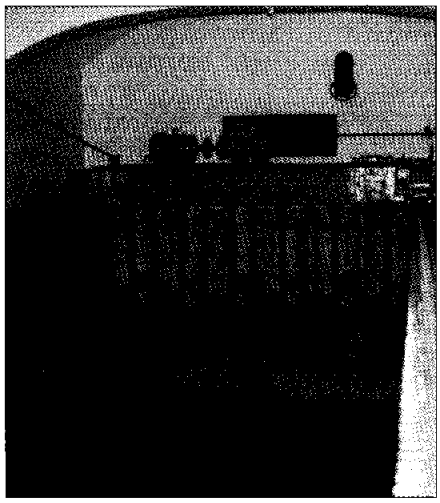
In contrast, despite the many European wars of the period, the 18th century saw relative political stability, and by its end the scientific roots of the 19th century's industrial revolution were being established and the growth of commerce sprouting. In the late 18th and early 19th centuries, the Bavarian nobility relaxed certain brewing regulations, contributing greatly to the growth of factory-scale brewing. The 18th century brought a long decline in the popularity of white beer (wheat beer), once favored by the Bavarian royal court — and sold by the court to the general public as a great source of revenue. By the end of that century the court had released its monopoly on brewing this style. By the early 19th century, the Bavarian sovereign allowed brewing to be freely licensed.

By this time brown beer, which had become available to common people in 1703 (4), was the predominant style (3). Technological developments further enhanced the ascendancy of brown beer (see box). No less important, other factors expanded the markets available to Bavarian breweries, helping to drive their growth, all at the time when brown beer was the predominant style. Transcontinental railroad lines began opening in the 1840s. The founding of the Zollverein (German customs union) in 1842 eliminated tariffs between most German speaking areas (12,13), and German unification in 1872 brought a single currency to the new German Federation. Hence in the last half of the 19th century when Bayerisch beer was touted from London and Paris to St. Petersburg and Scandinavia, it was the Bavarian Dunkel beer that was being praised (14–17).

Milestones in the Development of 19th Century German Brewing Technology

The following developments all fueled the growth of Bavarian brewing during the 19th century:

- introduction of the thermometer into Bavarian breweries (~1810s) (3,5–7)
- steam power (first unsuccessfully introduced at Spaten in 1821 by Gabriel Sedlmayr I, then again for good in 1844 by Gabriel Sedlmayr II) (4,8)
- the saccharometer (1830s, by Gabriel Sedlmayr II) (3,8)
- harvested ice for cellar cooling (1830s) (8)
- artificial refrigeration, first for producing ice to cool the breweries, then later used for cooling directly (1873) (3,8,9)
- Pasteur's conclusive work on fermentation and bacterial contamination (1857) (10,11)
- Emil Hansen's isolation and cultivation of strains from a single yeast cell (1872) (10).
- introduction of the smoke-free (aka English) kiln (listed as 1818 in reference 4 but also mentioned in reference 6 which was published posthumously in 1814).



Malt floor at Ayinger. According to their brewer, Aying no longer produces its own malt.

ing, choosing instead a direct-fire stovetop method in the interest of reduced time and effort. Direct heating at a rate of 1 °F/minute with constant stirring has proved for me to be a good compromise in that it achieves an acceptable level of Maillard reactions, which form melanoidins and the characteristic reddish brown color of the Bairisch Dunkel.

More recently, I have had excellent success with double decoction. A critical concern in decoction mashing is to account for the volume of the grain when determining how much decoct to draw off. I typically use one-third to one-half of the total mash volume in the decoct. Some experience is definitely necessary in determining the right volume to use to achieve the target temperatures when recombining the decoct with the main mash; it will vary with your equipment, and trial and error is the best way to find out what works for you. No matter which approach you choose for mashing, I suggest using between 1 and 1.25 qt of mash water/lb grain to achieve a workable mash thickness (that is, one in which stirring is not too difficult).

With the appropriate equipment, such as pumps capable of moving large amounts of mash, the commercial brewers utilize the traditional technique of decoction mashing. The breweries visited diverge in their exact technique when it comes to the rest temperatures used. One brewery uses a 100 °F (38 °C) acid rest, then directly heats the main mash to a protein rest at ~122 °F (48–50 °C). This rest is held for 60 minutes, at which

Profile of a Typical Dunkel

Grain bill: Dunkel malt (typically known as Munich malt in the United States), is the heart of Dunkel beer. Tours of three Bavarian breweries revealed proportions of 66%, 75%, and 99% Dunkel malt. These breweries typically add 1% color malt (Farbemalz, in German, usually called chocolate malt in the United States [because of its color, not its flavor]). The balance (0–33%) is made up of two-row malt, typically a German Pilsener variety. Other malts such as Cara-Munich and Brumalz (used for added dextrin and pH adjustment, respectively) are sometimes used at around 1% of the grain bill.

Boiling hops: Hallertauer Mittelfrüh, Hallertauer Perling for boil. (I have also mixed Tettnanger or Perle with these.)

Finish hops: Hallertauer, Hersbrucker, and/or Spalt.

Water: Total hardness 18.8 °dH*; carbonate hardness 15.7 °dH; calcium carbonate 178 mg/L; lime 130 mg/L.

Primary fermentation: 39–50 °F (4–10 °C) for 4–7 days.

Secondary fermentation: 7–14 days at 36–39 °F (2–4 °C).

Lagering: 30–36 °F (–1 to 2 °C) for 3–8 weeks.

Original Gravity: 12–13 °Balling (1.048–1.052).

Attenuation: 70–80%.

Alcohol: 4.5–5.5% (w/v).

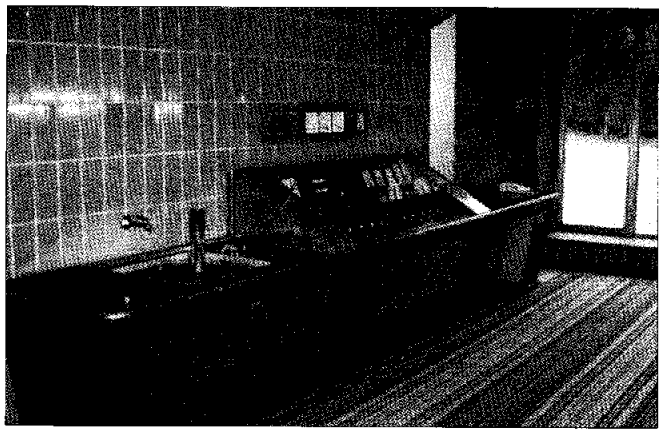
pH: 4.4–4.6

Bitterness: 20–25 IBUs

Color: 40–80 EBC†

*As noted by Norm Hardy in a previous issue of BrewingTechniques (20), 1 °dH (German hardness) is equal to the alkalinity of 10 mg/L calcium oxide, or, equivalently, 17.9 mg/L calcium carbonate.

†Jackson (19) lists Ayinger at 52 EBC, but personal communication (21) lists it as 70–80. Jackson also lists Kaltenberg at 40, so this would indicate the range of 40–80 noted here.

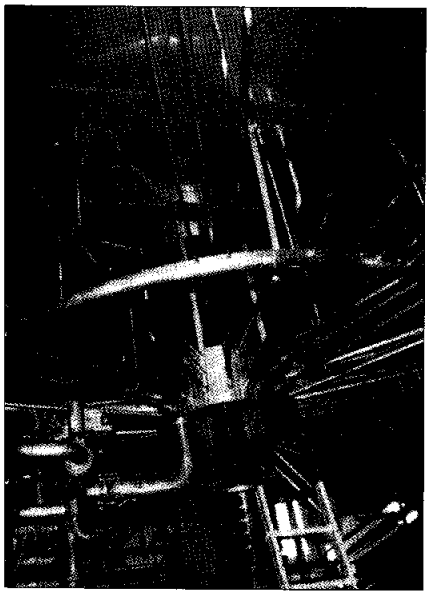


The brewhouse control room (circa 1950) at the Ayinger brewery. The window on the wall just right of the control panel (not the window to the outside!) looks directly onto the kettles.

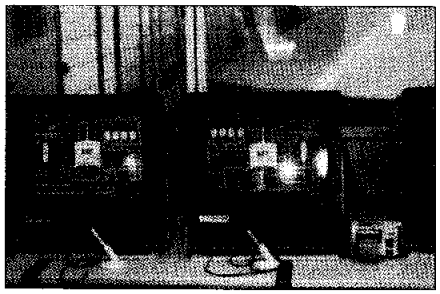
point a one-third decoct is drawn off, heated to 158 °F (70 °C) for 20 minutes, and then added back to the main mash to raise it to 154–158 °F (68–70 °C) for a saccharification rest. It is held there until conversion is complete (time varies), then another decoct is taken, boiled for 15 minutes, and added back to the main mash to raise its temperature to 169–172 °F (76–78 °C), where it is held for 60 minutes before being taken to the lauter tun and sparged with water at the same temperature.

A second brewer uses a somewhat different approach. No acid rest is performed. The first grist is mashed at a 113 °F (45 °C) protein rest for 50 minutes, a decoct taken off and boiled, then added back in. The second mash is then held at 169 °F (76 °C) for 105–120 minutes, before a transfer to the lauter tun for the 90-minute sparge.

Still different, a third brewer starts the mash at 144 °F (62 °C), heats the decoct to 149 °F (65 °C), 154 °F (68 °C), and 162 °F (72 °C) for 5 minutes each, then boils for 10 minutes. The decoct is added back to the main mash, heating it to 154 °F (68 °C), where it is held for 10 minutes. The main mash is then heated by steam jacketing to 169 °F (76 °C) and pumped directly to the lauter tun for sparging.

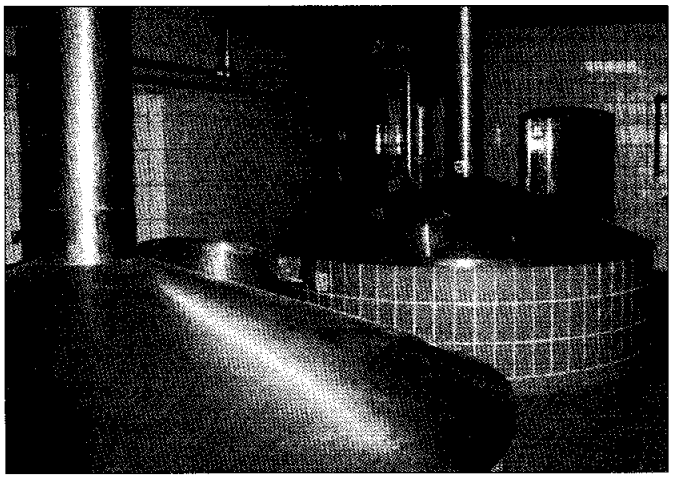


Engine room of an alien spaceship?? No, it's the computer-controlled sparging system at the EKU brewery, which adjusts the flow from different parts of the lauter tun during sparging to ensure maximum extract.



High-technology touch-pen computer control panels at the EKU brewery.

So what should the home brewer do? If your water pH is fairly high (8.5 or higher), as many municipal waters are, then a mash-in and acid rest at around 100 °F (38 °C) for at least 20 minutes is useful but not necessary (the small amount of dark grains used will modify mash pH somewhat). If you have the patience, your beer will suffer no detriment from a protein rest at 122 °F (50



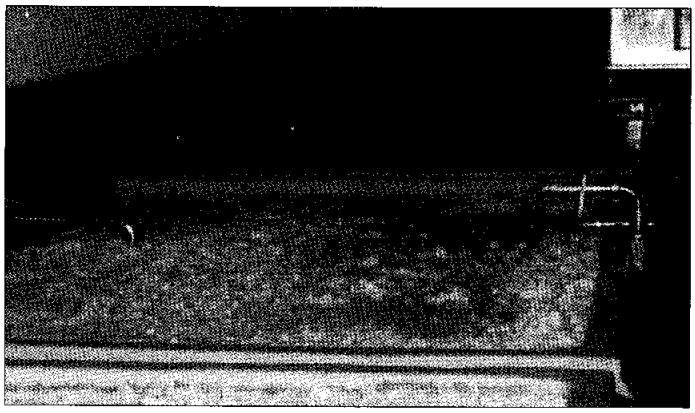
A view of the kettle room at the Kaltenberg brewery.

°C) for a maximum of 30 minutes; however, because the modification levels of modern malt are fairly high it is possible to skip this step entirely and proceed to the saccharification rest. Check with your local homebrew shop or supplier.

Commercial brewers perform saccharification rests at high temperatures — 158–168 °F (70–76 °C) — which gives the beer a lower level of fermentable sugars and a richer, more dextrinous mouthfeel. As a home brewer, I have in the past made Bavarian style beers with saccharification rests in the more common 148–156 °F (64–69 °C) range, with excellent results. The commercial breweries have, for the most part, a better grade of equipment and in general achieve a better rate of extract than my humble home brewery (see the accompanying photo showing the computer-controlled lauter tun at the EKU brewery, which achieves optimal extract by adjusting sparge flow through pipes spread across the entire lauter tun bottom). I suggest that home brewers use a saccharification temperature in the 154–158 °F (68–70 °C) range.

Typical mash thicknesses are on the order of 2:1 water to grist (by weight), though sometimes as much as 3.4:1 is used. Postboil volume yields are on the order of 6:1 wort to grist (by weight). Thus, depending on the thickness of the initial mash, the sparge volume may be twice the volume of mash water used. I have had good success using about twice as much sparge water, at 172 °F (78 °C), as used in the mash. This seems to produce a wort of proper sweetness and astringency, and boiling reduces the wort to the proper final volume.

In the kettle: After the sparge, the boil commences. Brewers also differ in their approaches to boiling. Although two of the breweries I visited used 90-minute boils, the third varied the time using volume reduction (9–10%) as the guide as to when boiling was complete. Steam jacketed boilers are most common, although the ultramodern EKU brewery



A view into the top of several ceramic-lined fermentation tanks at Ayinger. The entire room is temperature controlled, and Kräusen covers the beer, protecting against infection.

The bottom of the massive fermentation tank building at the EKU brewery (reminiscent of a cavern).

uses a system in which wort is pumped out of the boiling vessel, boiled in line, and pumped back in. This system is much more energy-efficient for the over 600-hL (511-bbl) batch sizes.

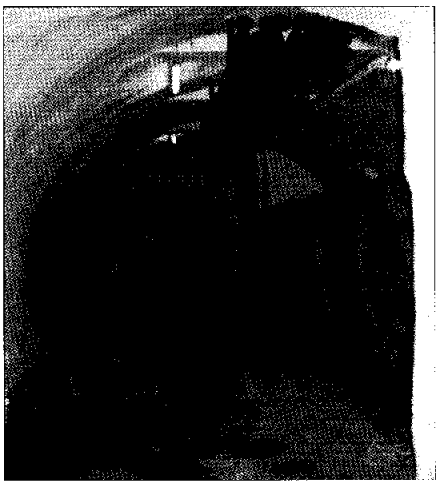
Hopping schedules: Bavarian Dunkel is not a highly hopped beer and has little bitterness or hop aroma. Hops used are from the Hallertau region, from towns like Hersbruck or Spalt (all near Nürnberg), and their additions are calculated as grams of alpha-acid (percent alpha-acid times weight in grams), which for known utilization rates provides the most consistency. For home brewers, Tettnang, Perle, Saaz, or any of the Hallertauer varieties all make good choices. British or American varieties have distinctive flavor and aroma profiles that are not traditional for this style, so I recommend avoiding them.

Of the boiling hops, roughly half are added at the beginning of the boil and the balance during the boil, but always at least 30 minutes before knockout. Aroma hops are added 5 minutes before the end of the boil and are measured at ~20% again as much as the boiling hops by weight, or ~16% of the total hops added.

Bittering units (IBUs) for this style range around 20–25 (19,21). Among the breweries visited, 10 g alpha-acid/hL (or 0.38 g alpha-acid/gallon) was typical. Assuming hops at 4% alpha-acid, this amounts to about 0.33 oz/gallon, or about ~1.66 oz bittering hops for a 5-gallon batch, though my most successful recipes have used slightly lower hopping rates — about 1–1.5 oz of comparable hops.

The wort should be boiled for a minimum of 60 minutes to allow sufficient extraction of the alpha-acids from the boiling hops. I generally boil at least 90 minutes to reduce the wort volume and provide some additional color through caramelization. Longer boils also allow a longer period during which to vary your bittering hop additions while ensuring that they are all boiled for a minimum of 30 minutes.

Also, because Munich water is fairly carbonate, it helps to add calcium carbonate (about 1 teaspoon for a 5-gallon batch) to the boil if your water is soft; calcium carbonate adds a very slight chalkiness to the aftertaste of the beer, which is appropriate for the style.



A view of the old lagering cellars at Kaltenberg. Some of these barrels date back to the 1840s. This cellar was in use until 1976, cooled by ice brought in through a service elevator. Since that time, portions of it have been converted to use more modern equipment.

Fermentation: When the boil is done the wort is chilled, whirlpooled to remove trub, and transferred to the fermentor. Both open and closed fermentors were in use at the breweries I visited. Each of the breweries maintained their own yeast strains in the yeast banks at Weihenstephan or Berlin.

A typical process employed at some of the breweries is to obtain a starting culture from their yeast bank and to work a portion of this up to pitching volume. The commercial breweries I visited typically pitch a very dense slurry — a rate of 1% of total wort volume! This pitched yeast is reused up to eight times, bearing designations A1 to A8. Subsequent pitching volumes derived from the same master culture would be labeled B through H; that is, eight pitching volumes derived from the master culture, and each reused up to eight times. Thus a single master culture is used for a total of 64 batches.

Starting fermentation temperatures at these breweries may be as low as 39 °F (4 °C), although at all the breweries visited the heat released by fermentation typically raised fermentation temperatures as much as 11 °F (6 °C) over seven days. In general, fermentations were conducted between 43 and 50 °F (6 and 10 °C).

Close-up front view of an ornamented lagering keg in the Kaltenberg cellar. This keg holds 50 hL (43 bbl) and stands about 6 ft high.

One brewery used a 7-day fermentation, allowing the temperature to gradually rise from 39 °F (4 °C) to 50 °F (10 °C) over that period, then lagering for 6 weeks at 32 °F (0 °C). Another fermented for a total of 12 days, the wort warming during the first day from an initial temperature of 43.5 °F (6.5 °C) to a peak of 49 °F (9.5 °C) from the heat released by fermentation, then gradually cooling down to 36.5 °F (2.5 °C) over the subsequent 11 days, followed by an 8-week lagering period at 36 °F (2 °C).

The third used a more complicated schedule that also involved lowering the temperature from an initial fermentation at 46 °F (8 °C) for the first 4 days down to 39 °F (4 °C) for the next 3, then racking the beer to a blending tank for 2 more weeks' fermentation at 39 °F (4 °C) before lagering 3–4 weeks at 32 °F (0 °C). From a commercial standpoint, there are no firm rules.

Earlier I mentioned that the commercial breweries visited pitch a very dense slurry (about 1 part medium to 4 parts sedimented yeast by volume) at a rate of 1% of total wort volume. Translating to homebrew scale, this pitching rate would amount to 200 mL of slurry for a 5-gallon (~20-L) batch! I have tried this in my home brewery with excellent results. The yeast had no lag phase (it didn't need to undergo reproduction in the wort medium), but went right to work fermenting the beer.

Unfortunately for the home brewer, liquid yeasts are not currently sold in such large volumes. The alternatives are to plan ahead and use successive starters to build up the yeast volume, or to pitch what is available. I recommend the former as it will reduce both lag time and fermentation times. In practice, I have found that even one-tenth of the amount used commercially in Bavaria (say, 20 mL for a 5-gallon batch) will work well, though this amount still requires building up yeast volume from that present in the package.

If it is not possible to substantially build up your yeast volume, then expect to compensate by utilizing longer fermentation times because even in a well-aerated wort the level of yeast reproduction will mean a smaller number of yeast cells with more work to do. Whichever approach you choose, reasonable results can be achieved with a good yeast strain.

As a home brewer, I have had great success with Wyeast products #2124

Dunkel Recipes

Extract Recipe

(Makes 5 gallons)

Ingredients

9 lb	Munton & Fison light syrup	1 oz	Saaz, 2.6% alpha-acid (5 minutes before end of boil)
1.5 lb	Pils malt (grain)		
0.5 lb	Chocolate malt (grain)		
		Yeast	Wyeast #2124
2 oz	Northern Brewer, 7.5% alpha-acid (60 minutes before end of boil)	Original gravity	1.040
1 oz	Saaz, 2.6% alpha-acid (30 minutes before end of boil)	Final gravity	1.012

Procedure

Put crushed grain in muslin grain bag and place into 1 gallon hot tap water (~122 °F [50 °C]). Heat to 160 °F (71 °C), then remove grain and add extract syrup. Bring to boil. At boil, add hops at specified intervals; total boil time is 75 minutes. Cool to 65 °F (18 °C), add yeast, then ferment at 52–55 °F (11–13 °C).

Notes: For extract-only beers, substitute 0.75 lb dark extract syrup for the grain.

Bayerisch König Dunkel

(Makes 5 gallons)

Ingredients

6 lb	Munich malt	1 oz	Hallertauer, 2.5% alpha-acid (5-minute finish)
2 lb	Pilsener malt		
0.25 lb	Chocolate malt		
		~200 mL	Ayinger yeast slurry
0.5 tsp	Calcium carbonate in mash water		
0.5 tsp	Calcium carbonate in sparge water	Original gravity	1.042
1 tsp	Irish moss (30-minute boil)	Final gravity	1.014
1 oz	Hallertauer, 2.5% alpha-acid (75-minute boil)		

Procedure

Mash grains with 10 qt water for 30 minutes at 123 °F (51 °C). Decoct one-third to 158 °F (70 °C); hold 5 minutes, then bring decoct to boil. Add decoct back into main mash to raise temperature to 145 °F (63 °C) and hold 20 minutes. Draw another one-third decoct, raise to 158 °F (70 °C); hold for 5 minutes, then bring to boil. Add decoct back into main mash to raise temperature to 162 °F (72 °C) and hold for 30 minutes. Sparge with 5 gallons 172 °F (78 °C) water. Total boil time: 90 minutes.

1993 AHA National Competition 1st Prize Winner

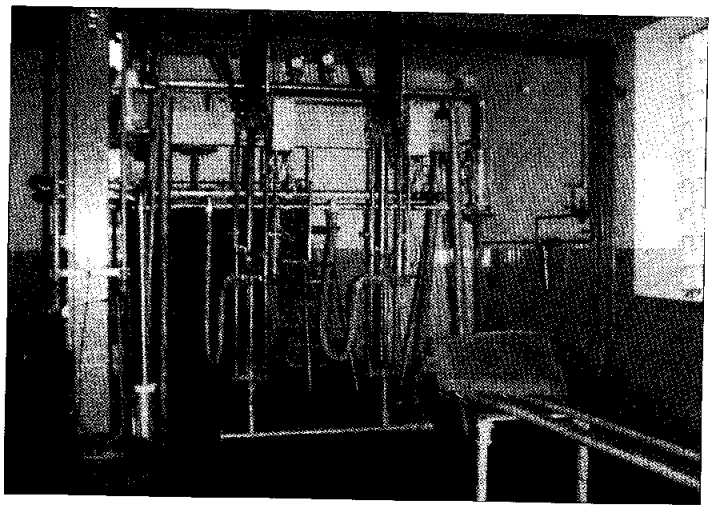
(Makes 3 gallons)

Ingredients

0.75 lb	Ireks Vienna	0.5 oz	Tettnang, 4.5% alpha-acid (boil)
2 lb	Ireks Munich	0.5 oz	Styrian Goldings, 5.3% alpha-acid (finish)
2 lb	Ireks Pils		
0.5 lb	DeWolf & Cosyns Aromatic		
0.25 lb	Cara-Pils		
0.125 lb	Chocolate	Yeast	Wyeast 2206
		Original gravity	1.046
0.66 tsp	Calcium carbonate per 3 gallons	Final gravity	1.014

Procedure

Mash grain in 4.5 qt water at 130 °F (54 °C) for 30 minutes. Add 2 qt boiling water to raise to 152 °F (67 °C) (use direct heating of mash if target temperature not achieved by boiling water infusion); hold for 90 minutes. Sparge with 3 gallons of 172 °F (78 °C) water. Collect 4.5–5 gallons (losses in home brewers' systems will likely vary; adjust water volumes as needed, ensuring temperature rests are met). Boil for 90 minutes, adding hops with 60 minutes left in boil and 1 teaspoon Irish moss with 30 minutes left. Ferment at 48 °F (9 °C).



The keg filling rig at the Kaltenberg brewery. Note the wooden barrel in the lower left foreground. Barrels such as these are still in limited use in some breweries today, including Kaltenberg, of course.

and #2206, finding them both well suited to this style. Domestic commercial suppliers may have comparable yeasts; check their descriptions. If you travel, another possibility is to do as I sometimes do — take along some sterile sample tubes and pour some unfiltered beer (including its yeast) into them to bring home.

I have recently achieved great results in experiments performed with a yeast captured at Aying. In my early attempts at recreating this style I used a 3–4 week fermentation at 48 °F (9 °C). This rather long primary fermentation resulted from low pitching volumes and consequently slow fermentation. More recently, I have continued utilizing 48 °F (9 °C) as my fermentation temperature, but by pitching larger volumes I have shortened the fermentation times down to around 10 days. However you approach this, trust your hydrometer readings, be patient, and don't be afraid to pitch more yeast if you feel it is necessary.

In my attempts at emulating the flavor profile of the filtered products, I have lagered for 6–8 weeks at 32–36 °F (0–2 °C) after primary fermentation. To emulate the unfiltered products, I have simply stored the beer at serving temperatures (48–54 °F [9–12 °C]) and tapped it immediately to prevent the dissolved proteins from settling out of solution before drinking (they are the source of the rich earthy aromas and flavors cited earlier).

Filtration and packaging: Commercially, filtration is done with diatomaceous earth or a combination of both paper and diatomaceous earth filters, depending on the brewery. In two of the breweries, the bottling lines are housed in separate buildings. One located theirs a ½ km away due to a lack of space for expansion in the town center where the brewery is located! With modern clean-in-place systems, however, this poses no problems.

In no case are these beers pasteurized. At the breweries I visited, even when brewed for export markets, pasteurization of the beer is frowned upon. The brewers believe that pasteurization would destroy the flavor of the beer. Even with packaged products, freshness is therefore a consideration, and stale flavors can be evident in very old products.

A Beer for All Seasons

Whichever way you choose to go, filtered or unfiltered, you will find the results quite enjoyable. Bavarian Dunkel, when brewed properly, is a hearty, full-bodied beer, rich in flavor and one that makes a good complement to traditional Bavarian foods such as pretzels, wursts, and schnitzels. As it is not a particularly strong style, it is well suited to being enjoyed in good quantity, and many a Bavarian has been known to make a meal of it alone.

However you choose to enjoy it, you will see why this is the style that made Bavaria, and Munich in particular, a world-famous brewing center. Prost!

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