Beer Judge Certification Program

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BJCP Mead Exam Study Guide

What you need to know to pass the Mead Exam

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CHANGE LOG

March 2014, removed the Exam Program description, removed the honey, fruit, grape and spices descriptions.

August 2015, update exam details to correspond with the BJCP Mead Entrance Exam and the BJCP Mead Judging Exam. Updates to the text to conform to the 2015 style guidelines.

February, 2016, fixed a typo on page 43.

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1. Introduction

While the Beer Judge Certification Program (BJCP) has long recognized mead in its style guidelines and competition materials, it has not been a subject covered by the BJCP Exam. Anyone wanting to judge mead would just indicate their desire to a competition organizer; however, the organizer would have no basis for judging the skill or credibility of the judge. The existing BJCP rank structure doesn't provide much help, either. A high rank indicates that the judge understands how to formally evaluate beer, but doesn't provide any information about the judge's knowledge of mead. The Mead Judge certification is designed to fill that gap, and to generally raise the awareness and skill level of those who judge mead.

The BJCP Board approved a proposal to create a Mead Judge Certification in March 2006. A committee was organized to work on the project, with subcommittees of experts in the mead and cider domains. The legacy question pool was finalized and field-tested in 2007, with the exam format determined in early 2008. A pilot mead judge exam was given in August 2008 in Saint Paul, Minnesota. Results of that pilot test were then used to adjust the program, and to determine what information was most needed by examinees and graders.

The development of the 2015 BJCP Style Guidelines and the need to update the Mead Exam created an opportunity to revise the Mead Exam to conform to the exam techniques used for the Beer Exam since April of 2012. The original Mead Exam is now referred to as the **BJCP Legacy Mead Exam** and is retired effective on November 1, 2015. After November 1, 2015 the Legacy Mead Exam will never be given.

The revised Mead Exam consists of a both the online **BJCP Mead Entrance Examination** and the **BJCP Mead Judging Examination**. To become a Mead Judge one must pass both examinations. The Mead Entrance Exam is very similar to the Beer Entrance Exam in that it uses the same type of questions in a timed online manner. The Mead Judging Exam is similar to the Beer Judging Exam in that it consists of completing six scoresheets in a timed manner. Passing the Mead Entrance Exam is a pre-requisite for taking the Mead Judging Exam. Since there are not ranks associated with the Mead Program, there is no need for a Mead Exam equivalent of the Beer Written Proficiency Examination.

1.1. Recommended Reading

Unfortunately, there are much fewer books on mead than on beer, and the books on mead tend to be dated and offer unfortunate advice. Books on winemaking may be of some limited use, although those tend to recommend using more chemicals and additives. Books on beer may dedicate a chapter to mead, but generally don't get into enough detail to be useful. The one recent book that is of most use to those learning about mead is Ken Schramm's *The Compleat Meadmaker*, although even some of its information has been superseded.

It's ironic that meadmaking is one of the most ancient pursuits of man, yet the knowledge and wisdom involved in the process has not been adequately captured. Lacking a large market demand, research in meadmaking has been sorely lacking. Technical research often comes from the amateur level, where new, useful information seems to come out regularly. Reading brewing-

related magazines and online forums tends to be the best way to stay on top of developments related to mead. The nature of the information in the body of knowledge suggests that there is still much more to learn about mead, and that best practices will continue to evolve.

In developing the reading list for the mead judge certification, we had to make some compromises. We realize that not all sources will have equal levels of information, and that some of the relevant data for meadmakers may constitute a small portion of the books. We understand that you may need to read several sources and try to reconcile conflicting information. Hopefully in the main body of this study guide, we've been able to identify the key concepts and modern understanding of mead, mead making and mead judging.

This Mead Study Guide should present all the information you need to know to pass the exam, but it might not cover each topic in detail. Referring to reference sources is necessary to get the rest of the story. If you run across additional references that you think will help prospective mead judges, please pass them along.

- **The Compleat Meadmaker**, Ken Schramm, Brewers Publications, 2003. Singularly the best current resource for meadmakers.
- **Radical Brewing**, Randy Mosher, Brewers Publications, 2004. Has good reference materials on fruits and spices.
- **Sacred and Herbal Healing Beers**, Stephen Buhner, Brewers Publications, 1998. Good reference material on obscure herbs that may be used in some meads.
- **Zymurgy, May/June 2000**, The Mead Issue. Good collection of articles.
- **The Jamil Show** from December 1, 2008. Podcast of Ken Schramm on The Jamil Show. Great interview covering great information on the subject. (http://www.thebrewingnetwork.com/jamilshow.xml)
- The **National Honey Board** website (http://www.honey.com) contains good information related to honey.
- The wikipedia entry on Honey (https://en.wikipedia.org/wiki/Honey) isn't bad, either.
- *Other Fruit Melomels*, Curt Stock, **Brew Your, Own July 2008.** Great article on melomels with modern recommendations.
- *Mastering Mead: Optimizing Honey Fermentation*, Ken Schramm, **Zymurgy, November/December 2005**. Think of it as errata for The Compleat Meadmaker; it contains more modern findings on how to manage mead fermentation.
- *Factors Considered in Wine Evaluation*, Alexis Hartung, **American Wine Society Journal, Winter 1999**. While written for wine, the entire evaluation process is directly applicable to mead.
- *A Treatise on Mead Judging*, Michael L. Hall, **Inside Mead, January 1996**. The instructions for judges are quite relevant.
- *Mead Lover's Digest* is an Internet discussion group on mead. Not all information is helpful and some of the more vocal participants are distinctly lacking in knowledge, but it is a good forum for finding other meadmakers and having discussions related to mead.

- *Mead Making FAQs* is a treasure trove of useful and practical mead-making information and original research by the net user Hightest (Michael Zapolski, Sr.). As of publication, the latest version of his information can be found at: http://www.homebrewtalk.com/f30/sticky-mead-making-faqs-83030/.
- **Great Wine Made Simple**, Andrea Immer, Bantam Books, 2000, 2005 (2nd ed.). Great reference on tasting wine, the sensory and varietal characteristics of grapes and wine, and describing sensory characteristics.

Avoid older mead books, such **as Brewing Mead: Wassail! In Mazers of Mead** by Gayre (Brewers Publications, 1986), **Making Mead (Honey Wine)** by Morse (Aztex Corp, 1992), **Mad About Mead** by Spence (Llewellyn Worldwide, 2002), and **Making Wild Wine & Meads** by Vargas (Storey Books, 1999). They may be interesting from a historical basis but have little practical use today. Schramm's book is a much better reference than all of these books combined.

1.2. Advanced Reading

A collection of references is placed online at http://www.bjcp.org/mead.php. This is where we will provide updates on topics of interest to mead judges. Not all material on the Mead Resources page is relevant for the exam, but it represents the body of published knowledge on mead. Anyone looking for additional insight should read the materials and check out the detailed bibliography.

1.3. Important BJCP References

Current competition materials can be found on the BJCP website in the Competition Center. Other important BJCP references include the most current program rules, information and structure. These documents are stored in the following locations:

BJCP Special Ingredient Descriptions	http://www.bjcp.org/docs/ingredients.pdf
BJCP Exam Program Description	http://www.bjcp.org/docs/BJCP_Exam_Program.pdf
BJCP Mead Scoresheet	http://www.bjcp.org/docs/SCP_MeadScoreSheet.pdf
BJCP Mead Checklist	http://www.bjcp.org/mead/Mead_checklist.pdf
BJCP Cover Sheet	http://www.bjcp.org/docs/SCP_CoverSheet.pdf
BJCP Judge Instructions	http://www.bjcp.org/docs/SCP_JudgeInstructions.pdf
Judge Procedures Manual	http://www.bjcp.org/docs/Judge_Procedures_Manual.pdf
BJCP Competition Requirements	http://www.bjcp.org/rules.php
BJCP Member's Guide	http://www.bjcp.org/membergd.php
Sample Scoresheets	http://www.bjcp.org/examscores.php
Mastering the BJCP Exam	http://www.bjcp.org/docs/mastering.pdf
BJCP Style Guidelines	http://www.bjcp.org/stylecenter.php

Advanced Judging FAQ http://www.bjcp.org/phpBB3/viewforum.php?f=53

There are also a number of essays and helpful materials in the BJCP Exam Center (http://www.bjcp.org/examcenter.php). Look in the sections **Studying for the Exam** and Exam **Grader Resources** for additional information. Some of the references for exam graders are also useful for entrants, such as how to prepare better scoresheets.

2. The BJCP Mead Exam

The **BJCP Mead Judge Entrance Examination** consists of 200 questions to be answered in a 60 minute time period. There is a mixture of multiple choice, true-false and multiple answer questions which are designed to test a prospective mead judge's knowledge of mead styles, mead characteristics and the mead making process. The key reference for the style-related questions is the BJCP Style Guidelines, and prospective judges are encouraged to become very familiar with this document before attempting the entrance exam. The 200 questions are drawn from a large pool of questions so each examination will potentially be different. The BJCP does not intend to publish the list of questions in the pool as that will invalidate the quality of the examination – a published pool would be too easy to query for answers without the examinee actually learning the material. The BJCP will monitor for questions that are made public and will work to remove said questions from the examination pool.

The **BJCP Mead Judging Examination** is closed book and requires the judging of six meads as if one were at a competition, with the scoresheets evaluated on the basis of scoring accuracy, perception, descriptive ability, feedback and completeness. Grading is done by volunteer National and Master judges, with their scores and feedback reviewed by both a BJCP Associate Exam Director and a BJCP Exam Director. These reviews ensure that the scores from different exams and graders are consistent between different exams and with the criteria expected for the different judging levels.

The Mead exam is jointly sponsored with the Mead Makers International (MMI, formerly the International Mead Association). Members of the MMI helped with the exam questions and study materials.

2.1. Mead Exam Details

There is no pre-requisite for taking the **BJCP Mead Entrance Exam**. The exam is open to BJCP judges and those not in the BJCP.

Passing the **BJCP Mead Entrance Exam** is a pre-requisite for taking the **BJCP Mead Judging Exam**. Anyone who passes the **BJCP Mead Judging Exam** will receive a BJCP Mead Judge pin and certificate.

Mead Exams do not count towards program (rank) advancement. An existing BJCP judge may not advance in rank based on the score received on the **BJCP Mead Judging Exam**. Non-BJCP members passing the **BJCP Mead Judging Exam** may not advance in rank without taking the BJCP Beer Exam.

More detail on the Mead Judge designation can be found in Section 3.

2.1.1. Mead Entrance Exam Detail

Questions on the BJCP Mead Entrance Exam cover the following topics:

- The BJCP Mead Program

- BJCP judging procedures and ethics
- Mead Balance and Style Attributes
- Varietal Honey Identification and Usage
- Non-Honey Ingredients in Mead
- Identifying/Troubleshooting Mead Characteristics and Faults
- Mead Making and Process Control
- Mead Troubleshooting

2.1.2. Mead Judging Exam Details

Examinees will judge six meads as in a competition using variants of the standard scoresheets. Meads judged should include at least one mead from each major BJCP style category (M1 Traditional Mead, M2 Fruit Mead and M3 Spiced Mead), including at least one varietal mead. At least one should be flawed and at least one should be a very good example. Within the M4 Specialty Mead category only M4A Braggot is a potential candidate for inclusion on the exam; M4B Historical Mead and M4C Experimental Mead will not be used as exam meads.

2.2. Mead Entrance Exam Question Pool

The questions in this exam are comprised of an assortment of 200 True-False (TF), Multiple-Choice-Single-Answer (MCSA) and Multiple-Choice-Multiple -Answer (MCMA). The MCSA questions will always have one selection that is the best answer to the question, while the MCMA questions will have one or more selections that are correct. There is a 60 minute time limit for answering these 200 questions. Some of the questions on this exam are difficult, and answering a sufficient number of them correctly will require thought and advance preparation.

There is sometimes the perception that an exam with multiple choice and TF questions will be easier to pass than a written exam; this is not the case with the **BJCP Mead Judge Entrance** examination. A prospective judge who would not have been sufficiently prepared to pass the written portion of the **BJCP Legacy Mead Examination** will likely not pass the **BJCP Mead Judge Entrance Examination**. Those who pass the **BJCP Mead Judge Entrance Examination** are provisional mead judges and must take the **BJCP Mead Judging Examination** to become a BJCP Mead judge. Due to the nature of the web-based **BJCP Mead Judge Entrance Examination**, the complete list of questions will not be made available since that would facilitate the creation of an answer key that would defeat the objective of having an entrance exam that tests on knowledge and understanding rather than rote memorization. However, examples of each type of question are even below, and it should be clear to those studying for the **BJCP Mead Judge Entrance Examination** how similar questions were generated from the BJCP Style Guidelines and other references on mead styles and the mead making process.

3. The Mead Judge Designation

To support the Mead Exam program, a new **Mead Judge** designation was created. This designation is treated differently depending on whether or not the person passing the Mead Exam is already a member of the BJCP.

- For existing BJCP judges, the designation is called an *endorsement*. Judges continue to hold their existing BJCP ranks, and otherwise operate within the program in the same manner as before. They may refer to themselves as Mead Judges, but their rank is still based on their beer exam score.
- For those who have not taken the BJCP Beer Exam, the designation will be the judge's *rank*. Non-BJCP members passing the exam become active BJCP judges, get assigned a BJCP ID, may accumulate experience points, and have all other rights, privileges, and responsibilities due an active BJCP member.

Judges in the BJCP have only one rank. Those passing the BJCP Beer Exam use a graduated system of rank levels that depends on exam score and experience points. Those only passing the BJCP Mead Exam use the Mead Judge rank exclusively. Both groups of judges are full BJCP members. The Mead Judge rank differs from the Beer Judge ranks (Apprentice through Grand Master) in that there is only one Mead Judge rank level – no advancement in rank is possible without taking the BJCP Beer Exam.

Note that there are not different types of judging experience points; no distinction is made whether they are earned judging mead, beer or cider. Any judging experience within the BJCP system develops skills and experience, and is recorded on the BJCP judge's judging record. So, experience points gained while holding the Mead Judge rank can be used towards advancing in the Beer Judge ranks once the BJCP Beer Exam is taken. An existing BJCP judge with the Mead Judge endorsement will obviously continue to earn experience points as before; no changes in the rank system are made because of the endorsement.

The criterion for the Mead Judge designation is simply to pass the Mead Judging Exam (i.e., receive a score of 60 or higher). *No* experience points are required. All who pass the Mead Judging Exam may check the *Mead Judge* checkbox on the BJCP Mead Scoresheet and may wear the BJCP Mead Judge pin. Distinctive Mead Judge pins and attractive certificates are provided by the BJCP to all who pass the exam. Existing BJCP judges passing the Mead Judging Exam should check the appropriate *BJCP Rank* checkbox on the BJCP Mead Scoresheet in addition to the *Mead Judge* checkbox.

Existing BJCP judges who pass the Mead Judging Exam will receive CEP credits, which are non-judging experience points on their judging records. CEP points are awarded based on the overall Mead Judging Exam score (0.5/1/1.5/2 points for a score of 60/70/80/90). Judges may receive the CEP credit once for each type of exam (mead or cider). Judges retaking the Mead Judging Exam will be given CEP credit based on their highest score.

4. What is Mead?

Mead has possibly been around for over ten thousand years — anthropologists and food historians tend to feel that the earliest mead production was around 8000 BC. It is a beverage that conjures up many images. It has been associated with Druids, Vikings, and Celts. It has been said to be the drink of the gods on Olympus. It has played a role in the writings of the Irish bards, the Icelandic sagas and in the epic poem *Beowulf*. It has even brought up romantic images in the myth of the Honeymoon. All of this brings up exciting images and in reading all of the folklore you would imagine that this beverage would be almost untouchable – something that could never be recreated properly to such a majestic level. It is amazing that with all of this history, Mead is essentially unknown in the general population. What is even more amazing is how easy Mead is to make.

At its basic elements – Mead is simply fermented honey. Throw some honey and water together with yeast and you get Mead. Well, maybe it isn't quite that simple but there really isn't much more to it. By adjusting the amount of honey or the type of yeast used, you can make the Mead sweet, semi-sweet or dry according to your preference. The different types of honey available will also change the flavor and aroma, as will the yeast strain. You also need nutrient for the yeast and a good recipe. All of this is easy to obtain. If you want to make a variation on this plain mead, you can add any kind of fruit you want and you have a Melomel or you add any spice imaginable and you have a Metheglin. You might want both fruit and spice added for even more variation or you might want to blend your Mead with beer for a Braggot. There are so many possibilities that it is endless. In the end though – they are all Mead.

4.1. What is Honey?

Honey is the substance made when the nectar and sweet deposits from plants are gathered, modified and stored in the honeycomb by honey bees[1]. It is composed primarily of glucose (38%) and fructose (30%) but smaller amounts of maltose (7%) are also present. Honey has approximately the same sweetness as table sugar (sucrose). Honey is typically about 17% water. The major acid present in honey is *gluconic acid*, and the pH of honey can range from 3.4 to 6.1, with 3.9 being the average. Honey also contains some proteins, complex carbohydrates, trace elements and minerals. Trace chemicals derived from particular plant nectars provide the unique varietal character of any specific honey.

Honey has natural antimicrobial properties and a long shelf life. The strong concentration of sugar creates a high osmotic pressure, which is stressful to bacteria. The low pH of honey is hostile to micro-organisms. Honey has low *water activity* and is generally *hygroscopic*, meaning that it tends to pull water from its surrounding environment and any microbes that may be in it. Ancient Egyptians recognized honey's antimicrobial properties and used it as a topical antiseptic

[1] True honey bees are classified as genus *Apis*, with seven species and 44 sub-species. The Western honeybee, *Apis mellifera*, is most common domesticated species in Europe and America. Honey bees are not native to North America; they were introduced by European colonists.

and antibiotic. While honey can prevent microbes from growing, it does not actually kill them. Dormant bacterial endospores may be present in honey and could create toxins (such as *botulinum*) in the immature, low-acid intestinal tract of infants, which is why honey is not recommended as a food for young children.

Honey is produced by honey bees as a food source. In cold or dry weather or at other times when natural food sources are scarce, bees use honey as their primary source of energy. Bees have a strictly hierarchical hive social structure, with a colony having one fertile female (*queen bee*, which lays eggs), many fertile males (*drone bees*, which die during mating), and thousands of sterile females (*worker bees*, which cooperate to collect nectar). Nectar is partially digested, regurgitated, and stored in the honeycomb structure where water is evaporated through the fanning of the bee's wings until the honey is sufficiently concentrated to prevent fermentation.

Honey collection is an ancient activity predating human civilization. Bees were semi-domesticated in antiquity, before 2500 BC, by inducing bee swarms to nest in artificial hives. Beekeeping (or *apiculture*) is the maintenance of honey bee colonies in hives for the purpose of collecting honey and beeswax, and for pollinating crops. A location where bees are kept is called an *apiary*, and a beekeeper is called an *apiarist*.

4.2. How does Mead differ from Other Beverages?

Mead belongs to the family of fermented alcoholic beverages. Fermentation is the process by which yeast convert simple sugars into cellular energy, producing ethanol and carbon dioxide as metabolic waste products. Yeast carry out ethanol fermentation in the absence of oxygen, so fermentation is classified as anaerobic respiration. Fermentation is a less efficient cellular process than aerobic respiration, but it does produce the ethanol that meadmakers (and their brewer and vintner kin) desire.

Alcoholic beverages are differentiated by the source of fermentable sugar consumed by yeast. *Mead* is fermented honey, *wine* is fermented crushed grapes or grape juice, *cider* is fermented sweet apple cider, *fruit wines* are the fermented juice of fruit other than grapes, *sake* is fermented unmalted rice, and *beer* is fermented cereal grains (typically malted barley or wheat). Starch sources must be mashed, or converted to sugar through enzymatic action, before being fermented. Distilled spirits may be produced from any fermented sugar source (cane sugar, corn, potatoes, grains, etc.) by separating and concentrating ethanol through the distillation process. When distilled spirits are added to other fermented beverages, the resulting products (e.g., Port, Sherry) are said to be *fortified*.

Spirits are distilled fermented beverages and typically have an ABV of 20% or higher. Alcohol is toxic to yeast, and most yeast cannot function when the ABV reaches 18% (although some yeast strains have been selected, bred, or genetically-engineered to have higher alcohol tolerances). Different strains of yeast have different alcohol tolerances; most mead yeast come from the wine industry and can have alcohol tolerances ranging from 14 to 18%.

Mead and wine typically have similar alcohol levels, so some people erroneously call mead *honey wine*. However, this is not correct since wine is defined as fermented grape (or other fruit) juice and mead is the fermented mixture of honey and water. The prepared, diluted honey solution ready for fermentation is called *must*, which is the same name applied to the grape-based

solution at the same stage in winemaking. *Must* in meadmaking is analogous to *wort* in beer brewing.

5. Mead Styles

Rather than repeat the information on mead styles in this document, readers are referred to the BJCP Mead Style Guidelines at http://www.bjcp.org/docs/2015_Guidelines_Mead.pdf.

6. Balance in Mead

Mead is not a homogenous product; there are components within it that must be balanced and harmonized in order to create a pleasing beverage. This is not an easy task, since it relies on having good perceptions of the individual components in mead as well as a clear vision of the finished product. A meadmaker who can achieve perfect balance in an exceptionally well-crafted mead deserves as much respect as a master vintner, master Scotch blender, or master lambic blender.

6.1. The Notion of Balance

The concept of *balance* in mead seems very simple on the surface, but it turns out to be quite challenging. Balance refers to the interaction and harmony between two or more of the mead's constituents. The topic is somewhat complex because determining balance is somewhat arbitrary – it may differ dramatically depending on the subjectivity of the taster, the type of mead, or the setting.

More specifically, mead balance is the synergy of all the components that formulate an enjoyable tasting experience: aroma (bouquet), flavor (taste, honey flavor), structure (tannin, acid, and alcohol), residual sweetness, and mouthfeel (body, carbonation). In a balanced mead, individual components do not overshadow one another, and the resulting combination is appropriate for the particular style of mead.

The use of words like *synergy*, *balance*, and *harmony* shouldn't imply that all flavors are of equal intensity. That is much too simplistic (and generally wrong). It means that the components complement each other in a pleasant way.

By far the most straightforward balance is between sweetness and acidity, although not all meads will have these elements. A discussion of this balance will help illustrate the concept.

There is no accurate formula for calculating a perfect acid-sugar balance in mead. In the simplest sense, a mead which has a good acid-sugar balance tastes neither too sweet nor too acidic; the sweetness exists in the right quantity for the acid, and vice versa.

By extension, a mead that is out of balance has either too much acid or too much sweetness. A mead with too little sugar for its acid will taste harsh, sharp and acidic; the evolution of flavors in the mouth will be interrupted by the sensation of acidity. A mead with too much sugar will taste cloying, sugary, and flabby, and will not refresh the palate.

Some meads have too much sweetness *and* too much acid. They are often the result of a meadmaker trying to balance a highly acidic mead by back-sweetening with honey. These meads don't work because the other elements of the mead, especially the honey flavor, don't match the sugar and the acid. Experienced tasters often describe such meads as having a *sweet-tart* character.

While the simplest balance is between sweetness and acidity, there are several other types of balance in mead that will be explored. The most important balance in mead is between acidity, sweetness, and tannin, although sweetness and honey flavor are related and alcohol should be

considered along with acidity and tannin. A secondary balance to consider is between honey character and the flavors from added ingredients (fruit, spice, etc.). Other aspects affecting the balance include mouthfeel components, like body and carbonation. The balance of all these components taken together is another form of balance.

Keep in mind that the quantity and intensity of each element of balance varies by the style of mead; there are no absolutes. The relative difference between the constituents is based on the style definition. For example, sweet meads are obviously sweeter, so they need more structure (acidity, tannin, alcohol) to support them than do dry meads.

All competition meads should have a declared alcohol strength level, carbonation level and sweetness level. These attributes must be taken into account when assessing the balance of the mead. A wide range of results is possible, but well-made examples will have an enjoyable balance of honey flavors, sweetness, acidity, tannins, and alcohol. Strength, sweetness and age greatly affect the overall presentation. Any special ingredients should be well blended with the base ingredients, and lead to a harmonious mead.

6.2. Components of Balance

There are several components in mead that balance against each other. Some of these are discussed in the Mead Style Guidelines found online at http://www.bjcp.org/docs/2015_Guidelines_Mead.pdf. They are the common descriptors of sweetness, alcohol strength and carbonation. However, these are not the only components; acidity and tannin provide much of the *structure* of mead (as they do in wine, along with alcohol).

Each of the components is defined, including how they are perceived, from what sources they are derived, and how they are individually adjusted. The discussion of adjusting balance is covered in the next section.

6.2.1. Sweetness

Sweetness simply refers to the amount of residual sugar in the mead, and is generally assumed to be coming from the honey (although it can possibly come from fruit or other adjuncts in certain mead styles). Sweetness is primarily sensed as a taste, although it is suggestive in aroma and body. Sweetness is one of the five basic taste sensations. Sweetness results from residual sugar in the mead, which can come through natural fermentation, from manually stopping fermentation short of full attenuation, or from adding honey or sugary adjuncts after fermentation has ceased. Note that adding sugar sources to mead can restart fermentation if the mead has not been stabilized first.

In competition, a mead may be declared as dry, semi-sweet, or sweet, but there is a range of perceptions within each level. Dry doesn't necessarily mean *bone dry*, and sweet doesn't necessarily mean *dessert-like* (although both levels fit within their respective ranges).

A dry mead is one with no higher than a barely noticeable sweetness level, although most will remain below the perception level. A sweet mead is one where the sweetness assumes a dominant role within the flavor without being cloying. Semi-sweet (or off-dry) meads are in the middle; they should have noticeable sweetness but without reaching a dominant level.

Sweetness is often confused with fruitiness in a dry mead. Body is somewhat related to sweetness, but dry meads can still have some body. Sweet meads should not be cloyingly sweet, and should not have a raw, unfermented honey character. Sweetness is independent of strength.

6.2.2. Acidity

Acidity is the perception of acids or low pH in mead, and sometimes could be described as tartness or sourness. Acidity isn't a primary flavor in mead; it supports the honey presentation by adding structure. Acidity is one of the five basic taste sensations, so it's primarily a taste but it often has related aromatic elements.

Honey naturally has gluconic acid, although acid levels will vary widely with honey variety, region, and season. Some natural acidity is often present in mead, particularly in ones with added fruit. Fermentation naturally produces acidity (pH drops during fermentation), with some yeast contributing more than others. Meadmakers will frequently adjust the acidity level of their mead (hopefully post-fermentation) using various products such as malic acid, tartaric acid, citric acid, acid blend (a mixture of the three), or citrus juices.

6.2.3. Tannin

Tannins are astringent, bitter-tasting plant polyphenols that bind and precipitate proteins. Tannins are found in leaves and bark of many plant species, and in the skins and seeds of certain fruit. Tannins produce a puckering mouthfeel, have a bitter taste, and leave a drying aftertaste. Tannins are large molecules that are not volatile, so they don't have an aroma. However, the source of tannins often does have an aroma that some tasters might associate with them.

Honey does not have natural tannins. Tannins are added to mead by using fruits, spices, tea, chemical additives (e.g., grape tannin), or oak-aging. Berries often add considerable tannin, typically from their seeds, skins, and even stems. Oak-aging is a good way to help compensate for low tannin, while adding complexity. However, it can add other flavors.

In beer, *dry* indicates a lack of residual sugar. However, in mead (or wine), *dry* can also mean a considerable tannin content. Dryness in mead is a balance concept; tannin can make mead seem very dry even if some sugar is present.

6.2.4. Alcohol Strength

Alcohol is a fermentation by-product, and usually refers to ethanol. Ethanol in its pure form is colorless but has a strong, sharp, characteristic aroma. Ethanol is a versatile solvent and often can carry other volatile aromatics. Ethanol also has a sharp flavor and can add bitterness while also being perceived by some people as sweet. Alcohol produces a warming mouthfeel, which usually increases with alcohol strength (although extended aging can smooth this sensation).

Meads in competitions are identified by alcohol strength, with *hydromel*, *standard* and *sack* being the primary descriptors. Each descriptor identifies an alcohol strength range; in general, a standard-strength mead is approximately the same as a table-strength wine.

Alcohol strength is managed by controlling the amount of fermentables used and the degree of attenuation in the fermentation. Fermentables are generally honey, but can include other adjuncts like fruit, sugars, and malt. The difference between the starting gravity and the final gravity determines the alcohol strength of the mead. Adding more fermentables increases the starting gravity, which increases the potential for alcohol strength. The degree of attenuation measures the percentage of original gravity that has been fermented. A higher attenuation increases alcohol strength. Attenuation can be increased through selection of a more attenuative yeast strain and managing the fermentation so that it fully completes. Fermentation management is a topic in itself, but in general a stronger fermentation generates more alcohol. Stopping fermentation before it completes (intentionally or unintentionally) results in lower alcohol.

6.2.5. Honey Flavor

Some types of honey have a strong varietal character, which is a unique flavor derived from the nectar source. Intense honey flavors are often more desirable. Winemakers refer to this as extract, or the flavor intensity of the grapes; substituting fermentable sugar sources, the concept is similar when applied to honey flavor in mead.

Strongly sweet honeys can produce a character that makes them seem sweet even when fermented more dry. The mental association of honey intensity with sweetness makes one think of the relationship even if it isn't present.

Honey flavor is adjusted by honey variety selection and the amount of honey used. Using more honey results in stronger flavors. Meads with more residual sweetness will have a stronger honey flavor since more unfermented honey is present. Stronger, sweeter meads will have a more prominent honey flavor than weaker, drier meads. Different varieties of honey have different intensities and characters; some (e.g., orange blossom, buckwheat) are more recognizable than others (e.g., safflower, palmetto).

6.2.6. Carbonation

Carbonation refers to the amount of dissolved carbon dioxide in solution. It is an aspect of mouthfeel, although higher carbonation adds carbonic acid to mead.

A mead may be still, petillant, or sparkling. Still meads do not have to be totally flat; they can have some very light bubbles. Petillant meads are "lightly sparkling" and can have a moderate, noticeable amount of carbonation. Sparkling meads are not gushing, but may have a character ranging from mouth-filling to an impression akin to Champagne or soda pop.

6.2.7. Body

Body refers to the viscosity of mead perceived as a sensation of weight or thickness on the tongue; it is a mouthfeel texture, not a flavor. The descriptors used for normal ranges of body include light, medium and full, but can go outside those descriptors for defective meads. Thin and watery are terms that describe very light-bodied meads. Syrupy, viscous, heavy, thick are terms that describe very full-bodied meads.

Different honey varieties have different bodies. Attenuating meads more generally lowers body. More unfermented (or raw) honey in mead adds body. Managing a fermentation for final gravity can thus control the final body. Back-sweetening mead can increase body. Using more honey (fermented or not) generally increases body. Higher alcohol content increases body. Higher tannin levels increase body.

6.3. Achieving Balance

Now that we have discussed the components that can be balanced, we now turn to which specific elements can be used to balance each other.

The sweetness-acidity-tannin balance is most important in determining the overall drinkability of mead, but the balance between honey flavors and those of added fruit or spices is important in melomels and metheglins. Low honey flavor intensity and acidity together will make a mead seem boring. A higher honey flavor intensity with proper sweetness and structure will seem luscious in comparison.

A mead with low sweetness compared to acidity will seem tart. A mead with high sweetness compared to acidity will seem flabby and soft. Tannin and acidity are somewhat interchangeable. Together they provide balance to sweetness and honey flavor. Less tannin means that more acidity can be used; less acidity means that more tannin can be used. Using too much of both results in a harsh, astringent mead.

Acidity, tannin and alcohol help balance the overall presentation of honey and sweetness. The combined tannin and acidity must roughly match the amount of alcohol to be in balance. If there is not enough tannin/acidity for the alcohol, the mead will seem soft, heavy and flabby. If there is too much tannin/acidity for the alcohol, the mead will seem astringent and tart.

The balance between astringency (tannins) and acidity is an interesting topic, since both provide structure to mead. The less tannic a mead is, the more acidity it can support. The higher a mead is in tannins, the lower its acidity should be. The combination of high acid and high tannins make for the hardest and most astringent meads, particularly if sweetness is low.

Alcohol (and some honey varieties and some adjuncts) can add bitterness. Bitterness balances sweetness. Low sweetness in the presence of higher alcohol will make the mead seem bitter. High sweetness and low alcohol will make the mead seem cloying. Adding honey/sweetness reduces perceived sourness, bitterness and saltiness.

Higher carbonation adds carbonic acid to the mead, which gives a “bite” to the finish and can help balance sweetness. Higher carbonation can also balance higher body, making the mead seem lighter.

Tannins make mead seem drier, so take that into account when balancing acidity and tannin in the context of overall sweetness. While it may seem like tannin and acidity can be interchanged, acidity doesn’t make a wine seem dry. Both can balance sweetness but tannin can begin to change the impression of sweetness

Alcohol also balances the structural elements of mead (acidity and tannin). Too little alcohol will cause the acidity and astringency to dominate, making the mead harsh and thin. Too little acid and astringency will cause the mead to taste overly soft, heavy and flabby, with the spirity quality of the alcohol playing too much of a role. Mead tolerates acidity better when the alcohol

content is higher. A considerable amount of tannin is more acceptable if acidity is low and alcohol is high.

Finally, remember that serving temperature can play a role in balance. In beer, a cold serving temperature suppresses malt and makes the beer seem more bitter. In mead, low serving temperatures make tannins seem much more apparent while suppressing the honey flavors. Lower temperatures make mead seem a bit less acidic. Higher serving temperatures will make alcohol more apparent. So sometimes balance can be achieved simply by manipulating serving temperature.

7. Braggot Ingredients

Braggots are meads made with malt. This section provides enough background on the ingredients used to make the style so that they can be adequately judged in competition. This isn't meant to be a full background discussion on beer making. For more detailed information on Beer styles, ingredients in beer, and the brewing process can be found in the BJCP Beer Exam Study Guide. Process-specific details on braggot making are contained in the next section on the Mead-Making Process.

Braggots will *always* contain malt, and *may* contain hops. Beer brewers are usually well-versed with these ingredients but meadmakers coming from a wine background may not have the same familiarity. Standard brewing references (and even web-based catalogs from major homebrewing retailers such as Beer, Beer and More Beer and Northern Brewer) are excellent sources of information about these ingredients.

Malt primarily affects the appearance and flavor of mead, but also can affect the aroma and mouthfeel. Malted barley is a starch source that must be converted to sugar before it can be fermented. Brewers typically do this by *mashing* the grain (mixing crushed grain with water at specific temperatures to allow various enzymes to convert starches to sugars). Meadmakers that make braggots by combining beer with mead may use this method, but most meadmakers simply use prepared *malt extract*, a liquid or dry commercial product that contains concentrated converted malt sugars. Brewers have more control over flavors when mashing their own grains, but malt extract is very convenient and saves a great deal of time and effort.

Malt is *kilned* (heated at controlled temperatures with certain water content for specific times) to provide the finished color and flavor profile of the malt. Kilning is done by the maltster, who provides the finished product to the brewer. Not all malt of equal color will taste the same, but the color does provide some indication of the flavor. Paler malt has a lighter, more neutral malty flavor possibly with bready and biscuity overtones. Amber malts may have caramelly, nutty, or toasty flavors. Darker malts may be chocolate, coffee, roasty or burnt in flavor. However, the specific aroma, color and flavor contributions depend on the specific type of malt used.

Malt contributes considerable proteins to a mead, and allows the resulting mead to actually maintain a head (if carbonated). The malt may also add to body and mouthfeel of a braggot, depending on the type of malt used.

Hops are the flowering cones of the hop plant (*humulus lupus*). Hops contain a bittering compound (alpha acids) and various volatile aromatics that contribute flavor and aroma. Hops must be boiled to extract bitterness, which occurs when the alpha acids isomerizes and become soluble in wort. Longer boils favor greater bitterness extraction, but tend to drive off the volatile aromatics. Hops used for bittering purposes are usually added earlier in the boil, while hops that provide flavor and aroma are added near the end of the boil. Depending on the variety of hop used, the flavor and aroma can be citrusy, spicy, earthy, woody, minty, piney, floral, or grassy.

8. The Mead-Making Process

This study guide is not intended to be a complete reference on mead making. However, good judges need to understand the production process so that any potential flaws can be diagnosed. Having a good understanding of how raw ingredients are transformed into the final product makes it easier to offer comments on individual components or steps that may have been used to produce the mead. Knowledge of the process is one thing, but actually having experience making mead and seeing each step is quite another. There is no substitute for actual experience.

This section covers the basics of mead making as understood today, and discusses alternative methods that people may use. The basic process discussion describes making traditional mead, and then highlights the differences involved in creating other mead styles.

8.1. Ingredient Selection

Traditional mead consists of honey, water, yeast, and optional additives; each represents a specific control point.

8.1.1. Honey

Honey is the main flavor component of any Traditional Mead and should be carefully considered. Some of the best honeys can be found at local farmers markets or from local beekeepers (get to know them at county fairs, local festivals, or arts-and-crafts shows), but many varietal honeys can be found on the internet (try *www.honeylocator.com*). Homebrew supply shops may stock some honey (try your local shop first, then check larger Internet-based retailers). The honey found at local grocery stores or (worse) at national supermarket chains and big-box discount retailers has most likely been repeatedly heated decreasing both the honey aroma and flavor considerably, and may have been obtained from questionable sources.

Start with fresh honey that has undergone the least amount of processing possible. Commercially blended honey may be a good, consistent base for fruit meads, but far more interest, variety and complexity can be achieved through the use of pure varietal honeys. Honey is best stored cold to reduce enzymatic action and prevent degradation and color changes.

Select the honey for the type of mead being made. Use the honey references to understand the varietal character of particular honey. Taste the honey and think about how the honey character will pair with any added ingredients, or whether the honey would make a better varietal mead. Cost is a factor; an expensive varietal honey is best showcased as a varietal mead, rather than covering up the character with other ingredients. Honey with less of a varietal character can be used as a base for a mead with other strong flavors.

Put simply, good honey makes good mead. You can screw up good honey, but you aren’t going to make something wonderful using bad honey.

8.1.2. Water

A good source of water is critical to making great mead. Any water that is clean, tastes good, and is free of chlorine and bacteria will work well. Carbon-filtered, pre-boiled tap water will work fine, but if you have hard water, consider using bottled spring water. Do not use water that has been processed through a home water softener as this often leaves a salty taste in mead. If you live in a rural area with a well, your water should be tested for mineral and bacteria content. Avoid water high in minerals or containing any iron. Naturally soft water or reverse osmosis water will also work well.

Note that water obtained from wells or from municipal water supplies may vary in mineral content, bacterial content and/or chlorine based on the time of year.

8.1.3. Yeast

A wide variety of yeast can be used to ferment the must, but most meadmakers use wine yeast strains. Ale yeast might be used to make a braggot, but typically doesn't have the alcohol tolerance for stronger meads.

The varieties of yeast available to the consumer have grown greatly in the last decade. Major yeast suppliers include White Labs and Wyeast (both well known to homebrewers as suppliers of liquid yeast), and Red Star (commonly available dry yeast). Several wine yeast strains are available through online retailers such as MoreBeer and Northern Brewer.

When evaluating yeast for making mead, there are a few characteristics to note: flavor profile, alcohol tolerance, temperature range, nutrient requirements, and flocculation. Most manufacturers and retailers make this data available. Select a strain that has the necessary alcohol tolerance for the style of mead being made, and that generally fits the other environmental characteristics (temperature and nutritional requirements).

Most yeast will list their country of origin and type of wine typically made with the yeast. Those are important clues; think about the aromatic and flavor properties of the honey being used and the overall style of mead being made. Try to match the mead with the type of wine. Look at the flavor and aromatic profile of the yeast. Match the strain of yeast to the type of mead being made. If making a pyment, select a yeast known to produce a pleasant profile for the dominant grape variety used.

Some of the more popular yeast strains for mead making include:

- Cotes du Rhone (Lalvin D-47),
- Cotes des Blancs (Red Star),
- Montrachet (Red Star),
- Montpellier (Lalvin K1V-1116),
- Narbonne (Lalvin 71B-1122),
- Flor Sherry (Red Star),
- Pasteur Champagne (Red Star),

- Sauternes (Lalvin R2), and
- Tokay.

Kept refrigerated, active dry yeast loses only 4% viability a year.

Check the recommended usage of liquid yeast before using; a starter is likely to be necessary. A starter isn't necessary for dry yeast if sufficient yeast packets are used. However, dry yeast should be rehydrated properly prior to use. Lallemand GO-FERM is an excellent product to use while rehydrating the yeast, as it provides necessary micronutrients and properly prepares the yeast for fermentation. To use GO-FERM, rehydrate the yeast in 104 °F water with GO-FERM at a rate of 1.25 grams nutrient per gram of yeast. Measuring nutrients by weight is more accurate than volume, but this is approximately 6.25 grams (2.25 tsp) per 5g yeast packet.

8.1.4. Additives

There is no *Reinheitsgebot* (Bavarian Beer Purity Law) when it comes to mead. There are certain additives that are important to creating great mead, and some additives that are useful if the balance of the finished mead needs adjusting. This isn't meant to be an exhaustive list, just coverage of the common additives that you may see in recipes.

Honey is notoriously deficient in nutrients necessary for fermentation, particularly nitrogen and phosphate. If sufficient nutrients aren't available, the fermentation will be sluggish and the mead may have off-flavors that take a long time to age out (if they do at all). Darker honeys (e.g., buckwheat) contain more nutrients than paler honeys. All honeys have varying acidity levels. When additional ingredients (especially fruit) are added, the acidity and tannin levels can change dramatically.

When to use additives is just as important as the type of additives to use. Adding these ingredients at the wrong time can do more harm than good. Understand the purpose of each additive and under what circumstances to use it, and you will see better results.

GO-FERM. Lallemand's proprietary micronutrient blend containing vitamins, minerals and amino acids. Use when rehydrating dry yeast. Improves yeast viability and encourages a stronger fermentation with a cleaner fermentation profile. Providing the micronutrients to the yeast in a non-stressful, non-competitive environment allows the yeast to take up the nutrients quicker and be better prepared for the stress of fermentation. This is really the only additive to use during yeast rehydration. The dosage rate is 1.25 grams of GO-FERM per gram of yeast. 1 tsp of GO-FERM weighs about 2.8g.

Diammonium Phosphate (DAP). Sometimes called Yeast Nutrient, DAP provides the nitrogen necessary for yeast growth and a proper fermentation. Look for pure DAP and avoid products containing urea, which can lead to off-flavors (salty, metallic) if not completely used by the yeast. Urea is a precursor to urethane, a carcinogen; the wine industry has stopped using it. Many commercial yeast nutrients are a blend of DAP and urea—read the label. Do NOT add to the yeast while it is being rehydrated. Ammonia salts are toxic to yeast at high levels. Used in conjunction with Fermaid-K to supply nutrients necessary during fermentation. 1 tsp of DAP weighs about 3.9g.

Fermaid-K. Lallemand's proprietary yeast nutrient blend, provides nitrogen, key vitamins and nutrients and inactivated yeast hulls. Sometimes known as Yeast Energizer. The manufacturer recommends adding in two additions, the first being at the end of the lag phase (6-12 hours after pitching yeast) and the second being around 1/3 sugar depletion (the end of exponential growth phase). See the discussion of staggered nutrient additions for other recommendations; DAP and Fermaid-K are used together to supply the nutrients necessary during fermentation. 1 tsp of Fermaid-K weighs about 4g.

Yeast Nutrient. An unregulated name; can mean anything yeast need for healthy growth. May mean something similar to DAP, but could contain other ingredients. It's best to understand the formulation of the specific products you are using. Don't rely only on this name when selecting your ingredients.

Yeast Energizer. An unregulated name; can mean anything yeast need for healthy growth. May mean something similar to Fermaid-K, but could contain other ingredients. It's best to understand the formulation of the specific products you are using. Don't rely only on this name when selecting your ingredients.

Potassium Carbonate (K_2CO_3) or **Potassium Hydroxide** (KOH). Minerals play a large role in buffering the must. Potassium levels above 300ppm are critical to maintaining proper pH. Food-grade potassium carbonate and potassium hydroxide can provide this potassium. Adding 5g K_2CO_3 to a 5 gallon batch of mead adds about 136ppm of potassium, while the carbonate raises the pH of the honey. Potassium hydroxide is stronger, but requires careful handling. Both can add necessary potassium. This is a recent innovation (since 2005), and is not widely discussed. Add to the must before pitching the yeast.

Acid Blend. A blend of citric acid, tartaric acid, and malic acid. Used to adjust acidity of the mead. Do NOT add before fermentation, as this can lower the pH below the range of healthy fermentation. Add after the mead has conditioned and before packaging to adjust the final acidity level and to achieve a proper balance for the level of sweetness. Each of the acids in acid blend is also available separately and may be used individually. Citric acid is derived from citrus fruits, tartaric acid is derived from grapes and malic acid is derived from apples.

Grape Tannin. Derived from grape skins, adds tannin. At low levels, provides structure to mead. At high levels, adds astringency. Useful for balancing a finished mead, in a similar manner to acid blend. Tannins can help the aging properties of a mead, and can also assist in the clarification process by binding with proteins and precipitating.

Pectic Enzyme. Pectinase, used in some melomels to reduce pectin haze. Use at the beginning of fermentation to help break down fruit and increase extraction. An optional additive, but sometimes encountered in melomel recipes.

Potassium Sorbate. A commercial food preservative used to inhibit mold and yeast growth. Sometimes labeled as Wine Stabilizer, in mead and wine it forms sorbic acid which prevents yeast from budding (reproducing). It will NOT kill yeast or stop actively fermenting yeast. It must be added after fermentation is complete. Sometimes it is used to make sure sweetening a mead won't restart fermentation. Sorbistat-K is a common brand of potassium sorbate. Usage rate is .5g to .75g per gallon.

Potassium Metabisulfite. Also known as Campden tablets (avoid sodium-based Campden tablets, since they can sometimes give the mead a salty taste). Can be added before fermentation

to kill off any wild yeasts or after fermentation to stabilize the product. Also has preservative effects, protecting color. Known as "sulfiting," this is primarily a winemaker's technique that many meadmakers do not use. It is often used in conjunction with potassium sorbate to stabilize a mead.

There are certainly other additives that are used, particularly when the meadmaker comes from a winemaking background. Some proprietary products are mentioned, but there are competing products that do similar functions. Look for products that say they are equivalent to the listed proprietary products.

8.2. Basic Mead-Making Process

This process covers making traditional mead using what we consider to be best current practices. This is not the easiest way to make mead, but it is what produces the best and most consistent results. You can obviously mix water, honey and yeast and then hope for the best, but this process is tried-and-true. Alternative process control points are discussed in the next section.

Ingredients

This method describes making a five-gallon semi-sweet traditional mead, but identifies where in the process fruit or spices would be added.

18 lbs wildflower honey
4.5 tsp GO-FERM
1 tsp Fermaid-K
2 tsp DAP
6g K_2CO_3 or 150ppm KOH (30ml of 2M solution)
2 packets (10g) Lalvin Narbonne 71B-1122 dry yeast
3.5 gallons spring water
1 packet Super-Kleer K.C. (optional)
3g Sorbistat-K (optional)

Ingredient Preparation

1. If using fruit, wash, chop and freeze the fruit ahead of time. Thaw before using. See Melomel instructions for further detail.
2. Combine the Fermaid-K and DAP. Measure or prepare the potassium source.
3. Warm up honey by putting the honey containers in hot water.
4. Sanitize a fermenter (carboy or bucket) and any equipment used (wine degasser, stirring spoon, airlock).
5. Rehydrate the yeast in water supplemented with the organic nutrient GO-FERM. Dissolve the GO-FERM in 1 pint of 110 °F spring water. When the temperature cools to 104 °F, sprinkle the yeast evenly over the surface of the water without stirring. Wait 15 minutes before pitching.
6. While the yeast is rehydrating, combine the 3.5 gallons of spring water and 18 lbs (1.5 gallons) of wildflower honey in the fermenter. Whip the must together using a drill-

mounted wine degasser (Mix-Stir, or equivalent – basically a long rod with paddles on the end that can combine the must).

7. Oxygenate the must with pure O_2. The length of time will depend on your oxygenation system. You don't need to fully saturate the must.
8. Add ¾ tsp of the Fermaid-K/DAP mixture to the must.

Fermentation Management

1. Pour the yeast solution into the must, stir gently but completely to mix. Install the airlock.
2. Ferment at 65-70 °F.
3. After 24 hours, add ¾ tsp of the Fermaid-K/DAP mixture and 2g of the K_2CO_3 or 10ml of the KOH solution. Stir into the must, aerating. If making a melomel, punch down the cap.
4. After 48 hours from pitching, add ¾ tsp of the Fermaid-K/DAP mixture and 2g of the K_2CO_3 or 10ml of the KOH solution. Stir into the must, aerating. If making a melomel, punch down the cap.
5. After 72 hours from pitching, add ¾ tsp of the Fermaid-K/DAP mixture and 2g of the K_2CO_3 or 10ml of the KOH solution. Stir into the must, aerating. If making a melomel, punch down the cap.
6. Ferment until activity stops, which should be within 1-2 weeks.

Finishing and Stabilizing

1. Transfer to a smaller carboy that can just hold the amount of mead, and put on an airlock.
2. If herbs or spices are used, add them now. See Metheglin instructions for further detail.
3. Age until the mead clears, or until 2-6 months passes.
4. If mead is not brilliantly clear, use 1 package of Super-Kleer K.C., following package instructions.
5. Taste and adjust sweetness and acidity. To sweeten, mix in a honey solution (1 cup honey dissolved in 1 cup water, heated), repeating as necessary. To acidify, prepare a solution using acid blend and water and mix in to taste.
6. If you wish to stabilize the mead, mix the potassium sorbate (Sorbistat-K) in water to dissolve and then stir into the mead.
7. If carbonation is desired, keg and force carbonate.
8. Package in bottles or keg.
9. Continue to age as desired, or drink now.

Traditional Mead Recipes

Gordon Strong's Tupelo Mead
Winner of four best-of-show medals

20 lbs tupelo honey
2 tsp DAP

1 tsp Fermaid-K
2 Tbsp VL-3C Sauternes yeast
4 gallons reverse osmosis water

Heat honey jars in hot water, mix with RO water in carboy. Proof yeast for 15 min in 104 °F water with a pinch of sugar, then mix into must. Combine nutrients, add in 4 daily additions, starting at pitch. Let age 6 months, back-sweeten with 1 lb tupelo. Clarify with Sparkolloid. Enter as sweet, still, sack. If too sweet for your taste, can be force carbonated.

Susan Ruud's Mint Blossom Mead
AHA NHC Gold Medal Winner 2005

24 lbs Wisconsin Mint Blossom Honey
5 grams Fermaid K
1 tsp Yeast Energizer
1 tsp Acid Blend
1/2 tsp grape tannin
1 Tbsp Irish Moss
4.5 gallons water

Mix well and heat to 165 °F for 45 minutes, skimming scum. Chill quickly and transfer to carboy - add 25 drops pectic enzyme and 600 ml starter of Flor Sherry Yeast. Once fermentation starts swirl frequently to remove CO_2 buildup (several times daily) for the first week.

OG 1.135
FG 1.046 at bottling - will carbonate slowly in bottle. Entered it as semi sweet, petillant.

8.3. Mead-Making Process Options

The basic method of preparing mead outlined in the previous section is what we consider to be best practices for modern meadmaking. It is certainly not the only way to make mead, but it is what many experts currently recommend. Many of the aspects of the process have only been recently described in literature, and are likely to change in the future.

This section describes some of the choices that can be made when preparing mead, along with the pros and cons of each approach. Additional process control steps are described in the Advanced Topics in Mead-Making section.

8.3.1. Must Preparation

There are several different ways to prepare the must for fermentation. Possible treatments include boiling, sulfiting, pasteurization, sterile filtering, and no-boil (no treatment).

Most older texts advocated **boiling the must**. The advantages are that proteins and impurities are more easily coagulated and removed, thus resulting in more rapid clarification. Sanitation is also identified as a (somewhat dubious) claim. Disadvantages are that volatile aromatic compounds are driven off, which results in a less interesting mead. A compromise technique—briefly boiling just until proteins coagulate and then rapidly chilling—can reduce the aromatic losses, but a 15 minute boil is still very harmful to the aroma of the resulting mead.

The use of **potassium metabisulfate** (Campden tablets) is the winemaking approach. Honey and water are mixed, then the must is sulfited. Yeast is pitched the next day. Sulfites release sulfur dioxide, which stuns wild yeasts and micro-organisms and allows the pitched yeast to rapidly out-compete them. It has the advantage of not involving heat and the resulting aroma losses. The major disadvantage is that some people are sensitive to these compounds and proper adjustment requires both an accurate scale and a pH meter. Sulfites also tend to bleach fruit. Proteins are not removed, so post-fermentation clarification is needed.

Pasteurization involves bring the water to a boil and adding the honey, allowing the temperature of the must to settle at between 140 and 160 °F. The temperature is held for 15-20 minutes, and then cooled. Yeast can then be pitched. The advantage is that it does not involve boiling so aromatics are preserved, and that those worried about sanitation will be mollified. The disadvantage is that proteins are not removed, so post-fermentation clarification is needed. While faster than boiling, it is not as fast as the no-boil method.

Sterile filtration involves using equipment to filter higher molecular weight molecules. Advantages are removing proteins and micro-organisms. Disadvantages are possible loss of flavor and aroma compounds and body, as well as the cost of the equipment and time involved in processing the honey.

The **no-boil approach** is what was presented in the previous section as the basic technique recommended today. Heated honey and water are mixed, and yeast is immediately pitched. Advantages are the fastest time, least cost and effort, and purest-tasting result. Disadvantages include not removing proteins, thus requiring post-fermentation clarification, and possibly worrying people concerned about contamination.

Published lab tests have shown that the practice of preparing traditional mead musts without heat or the use of sulfites is capable of producing a good medium for clean fermentation. This is why the no-boil method is recommended.

8.3.2. Yeast Preparation

Several methods have been described in mead literature for preparing and pitching yeast. However, only recently has research into yeast health and vitality been taken into account. Older references described pitching yeast directly into the must, while newer references described rehydrating dry yeast or making starters with liquid yeast before using. Current thinking embraces rehydration, but with added micronutrients in order to best prepare the yeast for the stress of fermentation.

Most early references advocated **pitching yeast directly into the must**. Dry yeast would be sprinkled on top of the must and then stirred in after 15-30 minutes. Currently, this is not recommended for dry yeast; the yeast granules are more prone to clump and stick together. In some cases, the must might contain sulfur dioxide or other residual fungicides which could be lethal during the rehydration stage. Once rehydrated, the cells can resist low levels of these toxins, but not during water uptake. The yeast are also severely stressed before they can reconstitute, and they may leak cellular materials that can contribute to off-flavors. But most importantly, pitching directly into the must reduces viability of the yeast and can contribute to weak or stuck fermentations. Compensating by pitching more yeast doesn’t really solve the problem, since the possibility for off-flavors still exists.

Liquid yeast could be added directly to the must with less impact due to rehydration, but the need for a proper cell count might not be met. **Making a starter** increases yeast viability and ensures the yeast are properly prepared for fermentation. This method is currently recommended when liquid yeast is used, although adding micronutrients prior to pitching still has advantages.

Rehydration is recommended for all dry yeast. Dry yeast must reabsorb all of their cellular water before they can function properly. Proper rehydration ensures that healthy cells will retain their good fermentation characteristics. If rehydration isn't carried out, yeast cells can leak important cellular compounds through the membrane, which is extremely permeable at the time of rehydration. Yeast will lose viability and the remaining populations will be unable to initiate a rapid fermentation.

When using dry yeast, allow 30 minutes for the yeast to come to room temperature before rehydrating. Rehydrate in clean water rather than must, and never use distilled water. Water hardness of 250-500 ppm is optimal. In the first critical minutes of absorbing water, the yeast will take up micronutrients if provide as well as water, largely due to the pH of the water being near neutral, which makes it less stressful for the yeast to incorporate these nutritional elements. Use the proper water temperature (99-105 °F). The rehydration temperature makes a big difference as how the yeast cells reconstitute from their dried state. The addition of dried yeast to cool water or must can decrease cell viability by as much as 60%.

After 15-30 minutes of rehydration, pitch the yeast. If unable to pitch within 30 minutes, add ¼ tsp sugar and cover with plastic wrap. The yeast should show visible signs of viability (proofing).

While rehydration is important, still more can be done. Adding a **micronutrient blend** to the rehydration liquid is the best current practice for yeast preparation. The use of a product such as GO-FERM greatly increases the viability and performance of yeast. See the discussion on Additives (Section 8.1.4) for a more detailed description of this product.

8.3.3. Nutrient Additions

Nutrient use in meadmaking has not been well-understood until recently. Current research has provided detailed information on yeast nutrient requirements and on the nutrient levels in honey. Older references either didn't mention nutrient additions or said to add them all at once, along with other additives. This resulted in inconsistent fermentations, occasional chemical or metallic off-flavors, and long aging times before mead could be considered drinkable.

Adding **no nutrients** is not recommended, although meads made with darker honeys, with malts, or with added fruit have more nutrients available. Even in those cases, some nutrients are likely to be needed by the yeast. Mead can be made this way, but the results are likely to be inconsistent.

Adding nutrients **all at once** does provide more nutrients to the yeast, but it doesn't deliver them when needed. Adding them all at once can overstimulate the yeast and result in off-flavors. The yeast need available nutrients throughout their growth phase, but adding the nutrients in one batch at the start does not ensure that they will be present later. This approach is better than not adding nutrients at all, but with a slight modification in delivery can yield superior results. Understanding how much nutrient is needed by the yeast is critical since nutrients left over after

fermentation can feed growth by unwelcome yeast, or can remain and leave behind undesirable flavors.

The **staggered nutrient addition** approach was first widely advocated by Ken Schramm and by the *nom de net* Hightest (Michael Zapolski, Sr.) based on research by Dr. Clayton Cone of Lallemand. Unfortunately, this advice came after the seminal *The Compleat Meadmaker* was published. This illustrates how the march of progress continues and new techniques continue to be learned. Since this technique has proven to be so important to modern meadmaking, it is presented in detail:

Staggered Nutrient Additions

The basic meadmaking instructions describe the use of a combination of 1 gram diammonium phosphate (DAP) and 0.5 gram Fermaid-K (Lallemand's micronutrient blend) at pitch and at 24-hour intervals for three days. This is a major advance in meadmaking in recent years, and is known as *staggered nutrient additions* – or SNA. Instead of adding all the nutrients at once, the same amount is staggered over several days. SNA promotes yeast health and helps assure a fast, clean and healthy fermentation. This allows the mead to be enjoyed sooner because it doesn't require as much aging.

SNA was developed by the commercial wine industry as a way of supplying nutrients as the yeast needs it during the growth phase – kind of a just-in-time delivery. Healthy yeast are essential for a clean fermentation with less chance of off-flavors or the production of higher alcohols (fusels) which can give mead a burning sensation on the back of the throat – the "rocket fuel" sensation.

It is important to keep the yeast in the growth phase (yeast produce 33 times as much alcohol per cell during the growth phase than in the stationary phase). So keep the yeast growing as long as possible by using the staggered nutrient additions. The yeast will continue to take up oxygen, which means that the must can be stirred during nutrient additions (or during cap management in melomels).

Fermaid-K (yeast energizer) and diammonium phosphate or DAP (yeast nutrient) add the additional nutrient requirements of the yeast during fermentation. One teaspoon of Fermaid-K and two teaspoons DAP should be adequate for a five-gallon batch. You can mix them together for a stock blend and add them using the following schedule:

- Add ¾ teaspoon yeast energizer/nutrient mix immediately after pitching yeast.
- Add ¾ teaspoon yeast energizer/nutrient mix 24 hours after fermentation begins.
- Add ¾ teaspoon yeast energizer/nutrient mix 48 hours after fermentation begins.
- Add ¾ teaspoon yeast energizer/nutrient mix after 30% of the sugar has been depleted.

Anyone who has ever stirred a fermenting beverage knows the foaming, triggered by the release of CO_2, can make one heck of a mess! To help minimize this, you should mix the nutrient blend into ½ cup of must and add it back to the fermenter. Then begin to slowly stir the must to release the main portion of the CO_2 gas. After the foaming has subsided you can begin to stir more vigorously. Mix the must well enough to introduce plenty of oxygen into the fermenting must. Oxygen is needed by the yeast throughout the growth phase. Oxidation is not a huge concern until you get past 50 percent sugar depletion.

SNA serves many purposes for yeast health. Abundant CO_2 is toxic to yeast, so mixing while adding the nutrients will release the gas. Vigorous mixing introduces oxygen need by growing yeast. In a melomel, the mixing also disturbs the fruit cap (or floating fruit). Punching down the cap should be done at least three times a day during the period of vigorous fermentation.

8.3.4. Fermentation

There are a few choices in how to manage fermentation, although some special cases do exist. The fermentation temperature is the main choice, but how/when to add honey in a high-gravity fermentation, and the length of fermentation are also choices. Fermentation management can have an impact on how much aging the mead will need before it is drinkable, as well as the obvious contribution to overall flavor profile.

The **fermentation temperature** range for wine yeast is generally quite broad. Many yeast list ranges from 55 °F to 90 °F. This range has led to advice that mead is a good beverage to make in the summer since the yeast like to be warm. Warmer temperatures will certainly drive the yeast to be more active, but active doing what? The objective is a clean fermentation, not the fastest way to make ethanol. High fermentation temperatures tend to produce fusel alcohols, which are solventy and give the drinker headaches. Several other off-flavors can result from high fermentation temperatures. Cooler temperatures promote cleaner fermentations, but they need to be warm enough for the yeast to not be stunned. The production of off-flavors is somewhat yeast strain-dependent, but higher temperatures increase the chance of these undesirable flavors. Cool room temperatures seem to be the best compromise for most uses.

Using **step feeding** is a technique to make high alcohol meads. Basically, it is a technique of incrementally feeding the yeast as the honey sugars become depleted. If all the honey was added at the start of the fermentation, the osmotic pressure on the yeast could be too stressful for a healthy fermentation. By starting with a fermentation in the normal gravity range and then adding additional honey as the fermentation peaks will keep the yeast fermenting until their absolute alcohol tolerance is reached (which may be higher than their nominal alcohol tolerance). One problem with this approach is that yeast nutrients may not be available throughout, and the later honey additions could cause additional off-flavors as the yeast become stressed by the alcohol. It is possible to ferment quite strong meads (24 lbs or 2 gallons of honey in a 5 gallon batch) using a well-managed fermentation program as advocated in this guide.

The **length of fermentation** can be managed as a way of managing residual sugar in the finished mead. The most common way to produce sweeter meads is to ferment the mead to completion, which normally produces a dry mead and then back-sweeten it with honey to produce the desired level of sweetness. Another method is to select yeast that have lower alcohol tolerances, and thus will finish fermenting with residual sugar remaining. This is often hard to manage since yeast will perform differently from batch to batch. The fermentation can be interrupted at the desired level of fermentation by techniques such as crash-cooling the yeast or intentionally starving the yeast of nutrients (a technique used when making French ciders). Again, these are somewhat hard to manage and require careful monitoring of sugar levels and then taking somewhat aggressive steps to cause the yeast to stop. Using potassium metabisulfite and potassium sorbate can sometimes stop the yeast while in action, but this method is very unreliable. The risk of these intervention techniques is that yeast can produce off-flavors when stressed with sudden environmental changes, and the timing is somewhat tricky. Unreliable methods can also result in

restarted fermentations at inconvenient times (say, after bottling). Alcohol levels are best managed by selecting the proper amount of honey in the original must, and sweetness levels are best managed by adding the desired honey sweetness after fermentation has completed. These techniques result in the cleanest fermentation character with the easiest to determine sweetness level.

Any technique that causes a more stressful fermentation is more likely to produce off-flavors that may or may not age out. Healthy fermentations produce less undesirable compounds and tend to clean up their fermentation by-products more thoroughly. It used to be standard practice to age meads a significant length of time before consuming. While this can still lead to desirable results, it is not required to make the meads initially drinkable. A positive benefit of a healthy fermentation is a mead that is ready to drink at a younger age, and that will continue to age and improve over time.

8.4. Fruit Meads

Melomel is a term for a mead comprised of honey and fruit. The BJCP style guidelines split Fruit Meads into five separate styles for judging convenience. Two traditional varieties of melomels with their own BJCP categories are Cyser (mead with apple cider) and Pyment (mead with wine grapes). Most meadmakers source local apple cider in the fall season to make cysers, and commercial varietal grape juice to make pyments. It is rare to find a meadmaker who will press apples or crush grapes to make mead. However, this is not true with other fruit meads. Canned fruit purees can be used (and are a good option for out-of-season fruit meads), but best results will happen when using fresh, ripe, in-season fruit.

Making fruit meads is similar to making traditional meads, except that additional thought must be given to honey selection, fruit handling, and cap management.

Honey Selection

Honey choice in a big melomel is not that crucial. Varietal honey character will be overshadowed in most melomels by the strong fruit character. A couple common exceptions to this could be orange blossom or tupelo honey. With less assertive fruits (stone fruits in particular) these honeys can add a great complexity to the finished mead. A high-quality wildflower honey is often both inexpensive and flavorful. Be aware that wildflower honey will change from season to season, so make sure you aren't using honey that contains harsh flavors (e.g., dandelion, basswood from northern climates).

Fruit Handling

Type of fruit. Choosing a fruit for your melomel is as simple as deciding what type of fruit you like. If you enjoy eating the fruit, it will likely yield pleasant mead to you. Common favorites include berries of any kind, including strawberries, raspberries, blackberries, blueberries and currants. Stone fruits such as cherries, plums, peaches and apricots also produce great mead. Basically, any fruit you have access to can be used in a melomel. Any combination of fruit that is pleasing to your palate also will do fine. Use your taste buds and imagination.

Pyments are often made with high acid, low brix grapes since they can take the additional honey sweetness. Cysers are made using apple cider with considerable acidity for the same reason.

Amount of fruit. The amount of fruit used will vary depending on preference, sweetness level and type of fruit. Sweeter meads generally require more fruit to balance. When using berries or stone fruits, a minimum of three pounds of fruit per gallon is often required – usually, more like 3.5 to 4 pounds of fruit. For fruit with a strong character (such as black currants), the amount of fruit used is lower (possibly in the 2 lbs per gallon range). Personal tastes vary, but 3 pounds per gallon is a good starting point for most fruit. Fruit can be added in multiple batches if additional flavor intensity and complexity is desired.

The honey sweetness balances the acid content of the fruit and helps to bring out the actual fruit character in the finished mead. If you prefer dryer mead, reduce the fruit to 1 to 1.5 pounds per gallon, as well as keeping the alcohol content below 10% ABV. This will reduce the harshness of the finished melomel.

Pyments and cysers are often made with raw juice substituting for water in a normal mead recipe. So a 5-gallon batch of mead might be made with 1 to 1.5 gallons of honey and 3.4 to 4 gallons of varietal grape juice or cider. If the pH of the juice is too low, it can be adjusted upwards before fermentation or the juice can be diluted with water. Concentrated juices must obviously be diluted with water, but more concentrated fruit products typically have an inferior character when compared to the natural juice.

Fruit Preparation. Care should be taken when selecting and preparing fruit. If you are hand-picking or buying from a local market, be sure to discard any poor quality or moldy fruit. If you wouldn't eat it, you shouldn't use it in your mead. Remove all stems and leafy material. Clean the fruit, then freeze it to burst the cell walls. Stone fruits, with the exception of cherries, should be pitted and frozen. (Cherry pits lend a very nice character to melomels if removed within four weeks.) When using fruit in the primary fermentation, there is no need to puree the fruit. Fermentation and other processes discussed later will sufficiently break up the fruit. Mash the bags of fruit with your hands just before you add it to the fermenter.

Bags of frozen fruit from discount stores and supermarkets work very well, and the fruit is already clean. Using pureed canned fruit will provide acceptable results but be prepared for significant waste. Pureed fruit will settle to the bottom of the fermenter in a two- to four-inch layer that is virtually unrecoverable. Fruit concentrates are a nice solution when whole fruit is not available. The resulting mead will be good but lacking in real fruit character. A combination of concentrate and a few pounds of whole fruit will improve the quality. When using concentrates make sure they do not contain preservatives as that will inhibit fermentation.

Adjusting pH. The pH of the mead must is important for healthy fermentation. pH will drop during fermentation. Yeast can adapt to the lower pH environment to a point, but an extreme drop in pH could result in a stuck fermentation. Some fruit contains enough potassium to buffer the pH and keep it an acceptable range. But it is a good idea to adjust the pH of the must to 4.0 prior to starting fermentation. Potassium carbonate works well for adjusting pH and provides potassium, which aids in keeping yeast healthy. But be careful. Using too much carbonate will reduce the total acidity of the must and cause acid balance issues in the final mead. Excess carbonate can also impart a metallic or soapy note in the flavor. Don't use more than 5 grams of potassium carbonate when adjusting pH of the must. For measuring pH, use a good quality calibrated pH meter instead of pH test paper.

When to add fruit. There are several schools of thought (and plenty of debate) on when to add fruit to your mead. Many people believe that to preserve the fruit character and aroma, fruit

should be added to the secondary fermentation. This method works well but has several drawbacks. The fruit must steep in the secondary fermenter for many weeks or months to extract all the goodness the fruit has to offer. In addition, considerable aging will be needed to have the fruit and honey meld together into a great beverage. Renewed fermentation could also result from the sugar in the fruit. If primary fermentation finished due to the alcohol content reaching the yeast's tolerance level, fruit added to the secondary will dilute the alcohol content (fruit is typically 70% water) allowing the yeast to reactivate.

Fruit can be fermented separately from the honey and blended when done. This method is sometimes used when making pyments or cysers by making wine or hard cider and then blending to taste with mead (this could also be used when making fruit wines, but that is less common). This is useful when you are unsure of the relative balance between the fruit character and the mead, or when you want to experiment with varying fruit sources, grape varieties, or other ingredients. It also allows you to make a partial batch of pyment or cyser and enjoy the other components separately. However, the flavors do not fully meld as quickly and there can be differences in fermentation character. You also will miss out on the benefits the fruit will add to the fermentation of the mead must.

Sometimes raw fruit will be added after fermentation has completed and the mead has been stabilized. This gives the maximum fruit flavor, but often has a sugary, sweet, raw fruit flavor since it hasn't been fermented. Raw fruit additions can also introduce bacteria, but the mead will already have alcohol in it, so this isn't a major problem. Some meadmakers use this technique sparingly to adjust the fresh fruit character of a mead, but it is rarely used with the entire amount of fruit for a recipe.

Ken Schramm has written about a two-stage fermentation for melomels. Prepare an initiate fermentation in a smaller honey must, half the amount of water and honey for the full batch. Prepare the yeast as usual, and use staggered nutrient additions. After the must is fermenting vigorously (two to three days), add the remainder of the honey and the fruit. This will create a healthy yeast population to compete with any bacteria or wild yeast present on the fruit. Continue with the staggered nutrient additions per the previous schedule. This process works well, but is more work than the last alternative.

The final option is to add fruit in primary fermenter before fermentation. This approach requires effective sanitation and a fast start to fermentation because the must is most susceptible to infection at this stage. Washing, freezing and thawing the fruit before using reduces bacteria and also bursts the cell walls of the fruit making the juice more available for fermentation. Fruit in the Primary Fermentation (FPF) has many benefits, and is the recommended option. Fruit will provide many of the nutrients needed by the yeast during fermentation and helps regulate the pH of the fermenting mead must. FPF will typically take much less time than traditional mead fermentations. Fermentation of mead with an original specific gravity up to 1.145 should be complete in three to four weeks in most cases.

FPF will extract fruit character during fermentation without expelling the aroma compounds. Only the most volatile aroma compounds will be lost. These most volatile aroma compounds are usually lost during multiple rackings and aging anyway. The fruit and honey components will be fully integrated after a month or two in secondary. If a fresh fruit character is desired, try adding a pound per gallon of fruit to the secondary, which adds another level of fruit character to your melomel.

Cap Management

The *cap* is the layer of fruit that floats up and is held at the top of the fermentation vessel by CO_2 during fermentation. The term originates in the winemaking industry, and refers to the conical shape of the fruit visible in an open fermenter. Managing the cap during early fermentation is important to reduce the loss of fruit flavor, reduce yeast stress, help prevent a stuck fermentation, and to reduce off flavors or characters.

Breaking up (or "punching down") the cap accomplishes two key goals: releasing toxic CO_2 and preventing temperature buildup below the cap. For every 1 degree reduction of brix in the must, there is an approximately 2 °F increase in temperature. Unmanaged, the temperature can increase to the point of killing your yeast in the heat zone below the cap. This literally cooks off the floral fruity character of your fruit and kills some of your yeast, which could cause a stuck fermentation. Off-flavors could result from the stressed yeast before they are killed.

The CO_2 buildup under the cap deprives the yeast of oxygen, which is required by yeast for optimal ethanol tolerance. Aerating during the first third of fermentation helps the yeast synthesize sterols to strengthen their cell walls. Carbon dioxide is toxic to yeast, so removing the gas helps provide a healthier environment for fermentation.

If the cap is not pressed down into the must, it can dry out. Then, if oxygen is introduced, spoilage organisms can grow and produce off flavors. Yeast are also stressed since they must compete for nutrients with spoilage organisms, which results in a less healthy fermentation and a less clean finished mead. Mixing the fruit back into the must will also facilitate the extraction of color, tannin, aroma, flavor and fruity character. In other words, it gets more fruit character into your mead and wastes less of your expensive fruit.

The highest concentration of yeast are found in and directly below the cap, so punching down the cap also redistributes the yeast and encourages a healthier and more vigorous fermentation. If the yeast distribution is uneven, then the reduction of sugar in the must will also be uneven; this could ultimately result in a sluggish or stuck fermentation. Punching down the cap evenly distributes yeast, sugar and temperature within the must.

A large open plastic wine fermentation pail (7.9 gallon) with a removable lid works well for melomels due to the extra head space in the bucket. Extra space is need for the fruit cap, stirring and degassing. Put a lid on the bucket with an airlock, but make sure the cap isn't touching the lid. The wide opening and removable lid makes it easier to punch down the cap, add nutrients, and to mix the mead.

Melomel Process Summary

Submerse the honey containers in hot water to loosen the honey, which will make it easier to dissolve and pour. Partially or totally thaw the fruit. This should be obvious, but needs to be stated: sanitize all equipment used for making your mead. Mash the bagged fruit with your hands. If you prefer, put all the fruit into the pail and mash with a potato masher or similar tool. If using fruit with thick skins (currants, cranberries, etc.) break as many of the berries as possible to release the juices.

Use enough honey and water to get a total volume of 4.5 to 5 gallons (excluding fruit). Honey weighs approximately 12 pounds per gallon. Put all the fruit into the 7.9-gallon fermenting pail. You will want the temperature of the mead must to be 65 to 70 °F. If the fruit is still very cold you should heat the water enough to bring the temperature of the must into that range. Add the

honey and water to the pail. Use a drill-mounted wine degasser to mix the must and completely dissolve the honey. After the honey is dissolved, stir vigorously for a few minutes to aerate the must, or oxygenate using an external system. Do not heat the must to pasteurize the honey or fruit.

Prepare your yeast by re-hydrating following the instructions on the packets. The use of a re-hydration nutrient such as Go-Ferm is highly recommended. This will prepare the yeast for the strenuous journey ahead of them. Pitch the yeast, add the first SNA and mix well.

Fermentation should begin in about 12 to 24 hours. When signs of fermentation are noticed, start managing the fruit cap and begin the SNA schedule. With some luck, fermentation will be complete in two to four weeks. Once half of the sugar is depleted, continue to punch the cap at least twice a day but refrain from introducing oxygen into the must. Allow the mead to stay in primary for 4 weeks. At that point, transfer to the secondary carboy for clarifying. Taste the mead for sweetness level. If you desire more sweetness, now is the time to adjust it.

To sweeten mead, start with a cup of the mead and add honey to a level sweeter than you want. Then blend the dryer mead with the sweetened sample to get three samples that vary by 10 gravity points ranging from too sweet to not sweet enough. Taste and blend the samples until you get the sweetness level you want.

Take a gravity reading of the sample you chose. Determine the specific gravity difference between the mead and the sample. Now you can figure out how much honey you will need to sweeten the entire batch to the desired level. One pound of honey will raise one gallon of mead approximately 34 gravity points. If you have 5 gallons of mead, each pound of honey will raise the batch about 6 to 7 points.

Once you determine how much honey you need to add to the batch, use 1 cup of boiled water per pound of honey to dilute the honey. Pour the mixture into the carboy and mix until evenly dispersed. Take a sample and see if further adjustment is needed. Take caution to keep from over-sweetening the batch. It's much harder to make it drier!

After a month or two if the mead is not clear, transfer again and use a two-stage clarifier such as Super-Kleer. You can also use relatively inexpensive plastic filters with filter pads, pumping the mead from one keg, through the filer to a second keg. You will be amazed by the amount of fruit debris and insect parts on the filter pads, but your mead should be sparkling clear. One word of caution when filtering: pectin will clog a filter very quickly. You can use pectic enzyme to help remove the pectin. Two-stage clarifiers do not remove pectin. Once you are completely sure there is no fermentation and the mead is clear, you can bottle. For sparkling mead, it's much easier to keg and force carbonate. Bottle-conditioning sweet mead can be difficult, unless you like creating exploding bottles.

Melomel Recipes

Curt Stock's Strawbana Cabana Mead (Strawberry Banana Melomel)
AHA NHC Gold Medal Winner 2004

22 lbs Wildflower Honey
18 lbs Strawberries - frozen
4 lbs Ripe Bananas (about 8 bananas)
3 gal Water
3 tsp Yeast Energizer/Nutrient Blend (Fermaid-K and DAP)

10 g Lalvin Narbonne Yeast (71B-1122)

Approximate OG 1.155
Target FG 1.025 to 1.035
Estimated ABV 16.0%

Follow process instructions above. Fermentation will last 2 to 4 weeks. Once complete, rack to secondary fermenter. Now it's time to add the bananas. Purchase about 4 pounds of ripe bananas. Trim off the stems that look moldy. Rinse the unpeeled bananas to remove molds and bacteria. Place a funnel in the carboy, peel and place the bananas in the funnel. Use a racking cane or other device to mash the bananas into the carboy. This should break them up enough to extract the flavors and aromas. In 3 to 4 weeks, rack to another carboy for aging and clarification. This mead is best at a final gravity between 1.025 and 1.035.

Thomas Eibner's Two-Cherry Melomel
AHA NHC Gold Medal Winner 2008, 2009

24 lbs tupelo honey
10 lbs unpitted Montmorency sour cherries
10 lbs unpitted dark sour cherries
1 tsp pectic enzyme
Filtered water up to 5.5 gallons volume
2 packets Lalvin 71B yeast
Curt Stock nutrient additions

Mix honey with cold water and pour on top of cherries. Ferment, filter and keg. Back-sweeten with tupelo to taste. Sweet, still, sack.

Steve Fletty's Orange Blossom-Gewurztraminer Pyment
AHA NHC Gold Medal Winner 2007

Version 1: Unblended

3 gallons Riesling or Gewurztraminer juice
12 lbs orange blossom honey
2.5 gallons water
OG will be about 1.120
Wyeast 3783 Rudesheimer or something for a white German wine will bring out the fruity aromatics

Gravity after primary may be quite low, about 1.006 or less

Add sorbate and sulfite and then back-sweeten to taste, usually around 1.024 or so. Shouldn't need any acid with these grape varieties.

After sweetening, use Super-Kleer to fine, then keg and counter-pressure fill bottles. The Riesling version was what won the gold medal.

Version 2: Blended

Gewurztraminer Wine

6 gallons fresh juice from California
OG 1.096

Yeast: 58W3 Portuguese Wine Yeast from MoreBeer
FG 0.992

Orange Blossom Mead

12 lbs OB honey
3 gallons water
Yeast: 58W3
OG 1.115
FG 1.007

Six gallons of wine blended with four gallons of mead, sorbated, back-sweetened with more OB to about 1.016, fined, kegged, pressurized. This version was served at the AHA NHC 2008 judge reception.

8.5. Spiced Meads

The BJCP Spiced Mead Category includes meads made with a combination of spices and fruit as well as mead made from spice, herb or vegetables or a combination of them.

Metheglin is a term for a mead made with honey and spices. Metheglins are easier to make than melomels since spices don't add any fermentables. However, achieving a pleasant balance with spices is harder than fruit because the intensity of spices is much greater so there is less margin for error. Spice levels in mead are also a matter of personal preference, so obtaining the final spicing level is best done by taste. The age, freshness and condition of spices will vary greatly, so be wary of blindly following recipes that give specific quantities. It's easy to add more spice to mead, but adding too much usually means that the mead will have to be aged a long time or that it must be blended with another mead to cut the spice character.

Think of making metheglin as like making traditional mead, except that you have to add spices at some point. Other than choosing the desired spices and adjusting the final balance of spices, the main decision in making a metheglin is selecting the time and method of the spice addition. There are at least five different common methods used:

Steeping spices in the boil. A common technique when spicing beer, this may not be applicable in mead since no-boil techniques are becoming more common. If the honey is boiled, spices can be added when the must is hot to extract flavor. This is probably the least common method for adding spices since it is hard to determine the right flavor level, boiling can drive off aromatics, and fewer people are using this meadmaking method.

Adding spices in the primary. Spices can be added in the primary fermenter, but this offers the highest opportunity for introducing infections since the must is cool and there is little alcohol present. The spices have a longer contact time with the mead, and the spicing is ready when (or before) fermentation is done.

Adding spices in the secondary. Adding spices after fermentation is complete is probably the most common traditional method for incorporating spices into mead. Depending on the spice, this can work fine. The alcohol in the mead inhibits bacteria, the alcohol in the mead can extract flavors, and the temperature of the mead allows easy sampling to determine if the proper flavor level has been reached. There are two drawbacks to this method. The extraction of flavor occurs over an extended period of time, which means that the mead must be carefully monitored for

changes in flavor. Some spices require heat to let their flavors bloom. Cold extraction of their essences may give a different character than expected. Undesirable raw, uncooked flavors and tannins might be extracted. Depending on the spice, this method is reliable and generally takes several days to a few weeks to work.

Making a spice tea. Pour 1 pint boiling water over the spices, cover, and let steep for 3 to 10 minutes. Strain out the spices, let the tea cool, then blend in to taste. This approach gives the most control since the exact amount of spice flavor can be tasted immediately upon blending. Sample blends can be done in smaller amounts and then scaled to the full batch. However, this does introduce some water into the mead, and can drive off some aromatics. This is the fastest way to add spicing, and can be used to adjust a previously spiced batch as well.

Making a spice tincture. This approach is similar to making a tea, except using neutral alcohol (vodka, for instance) to extract flavors. This technique allows careful blending as with the tea method, but also has the downside of the secondary fermenter method with extracting tannins and raw flavors. Depending on the spices, it might work well. It will add some additional alcohol, so care must be taken with the quantities used.

The environs in which spices are harvested and the processes by which they are prepared for market are rife with poor sanitary practice and opportunity for exposure and contamination. Keep this in mind when using spices; alcohol and boiling water will kill most contaminants.

The metheglin style definition allows for ingredients beyond the traditional herbs and spices. Flowers, rose petals, chocolate, coffee, nuts, and chile peppers can all be added to metheglins. Each is handled differently, but the common point is that some method must be used to extract the flavor, aroma (and sometimes color) contribution of the ingredient and to blend it with the base mead. The best recommendation is to understand if the flavors are water-soluble or alcohol-soluble, and whether a raw or a cooked character is desired from the ingredient. Also consider the manner in which the added ingredients are separated from the final mead (are they put in a mesh bag? must they be filtered out? do they settle naturally?). Then select a method that adds the desired character while allowing the spent ingredients to be easily removed.

Metheglin Recipes

Steve Piatz' Ginger Metheglin
AHA NHC Gold Medal Winner 2008

20 lbs raspberry blossom honey
3.75 lbs fresh ginger
Lalvin 71B yeast

Staggered nutrient additions

Sliced ginger in primary. Back-sweeten with a very sweet raspberry blossom mead until ginger flavor is balanced and sweetness level is judged to be sweet. Force carbonate to petillant.

Byron Burch's Spearmint Metheglin
AHA NHC Gold Medal Winner 2001

18 lbs clover honey
4 Tbsp tartaric acid
1 Tbsp malic acid

5 tsp stock Sodium metabisulfite solution (after fermentation)
8 oz bruised spearmint leaves
2 oz The Beverage People yeast nutrient for mead
4 tsp acid blend
10 g dry Prise de Mousse wine yeast

Heat water until warm, turn off stove and stir in honey until it is dissolved. Boil five minutes, skimming, and add nutrients and acid. Cool to room temperature. Sprinkle yeast on surface, and stir in after 12 hours. Ferment two to three weeks. Place mint leaves in mesh bag in a keg and rack mead on top; let stand at 15 psi for one week. Fine with Sparkolloid, add sulfites, and let age four weeks. Sweet, sparkling, standard.

8.6. Braggots

Braggots can be produced in two different ways: fermenting the malt along with the honey, or fermenting a beer and a mead separately and then blending. Fermenting the malt along with the honey has the advantage of providing additional nutrients for the yeast, and reducing the time needed to get a fully blended product. Fermenting the beer and mead separately allows each product to be separately tuned and tweaked, and then mixed together in different ratios until the desired goal is reached. Fermenting separately might be a better idea when a recipe is being formulated and the proper ratio of beer to honey is unknown. Once a recipe is known, then fermenting it in one batch usually produces a better result.

The balance between the honey/mead and the beer is critical to the overall impression. Imagine a continuum from beer to honey beer to braggot to mead, where the percentage of honey to beer increases from 0 to 100%. There are no hard-and-fast rules about what constitutes a honey beer versus a braggot, but judges will be looking for a beer-based mead not a beer with some honey character. The mead character should come out more in the balance.

Brewing beer is beyond the scope of this study guide, but several excellent resources exist. Start with the BJCP Study Guide for the Beer Exam and use John Palmer's *How to Brew* online resource for additional detail. Look at additional references in the study guide for the beer exam if necessary.

Braggots are often made without hops, so it's not always a true beer-mead hybrid. A beer without hops will not taste right, so perhaps brewing separate batches and blending is best for the hopped braggot option. Most braggots have less bitterness than a typical beer, so beer recipes have to be adjusted before using.

Formulating a braggot recipe involves substituting malt-based sugars for some of the fermentables. Think about the flavor profile of the malt contribution and how it will blend with the flavor of the honey. Also recognize that sweetness balances bitterness, so if a hopped beer is used, then a sweeter mead might be desired.

As a first attempt, try an unhopped braggot and see how the flavors of malt blend with the honey flavors. Remember that the overall impression needs to be that of a mead, not of a beer. The malt character should be recognizable, but it should not seem like a honey beer; it's a mead. If using malt extract, then making a braggot is as simple as boiling the extract for 15 minutes in some of the water to be used for the mead, mixing the boiled extract with the honey, and then fermenting

as typical for any other mead. Ale yeast or mead/wine yeast can be used, although ale yeast is probably more typical. If you want to experiment with the style, start by making a batch with half malt and half honey and then vary the proportions until you get to a ratio that is pleasing to you. Most braggots have between 25% and 50% malt with the remainder honey.

Braggot Recipes

Petar Bakulić's Braggot
Russian Imperial Stout with Macadamia Nut Blossom Honey

12.5 lbs Pale Malt
2 lbs Special B malt
1 lb Flaked Oats
0.75 lbs Chocolate malt
0.5 lbs Kiln Coffee malt
0.5 lbs Roasted Barley
0.33 lbs Black Patent malt

1.25 oz Willamette pellets 4.6% @ 60
0.75 oz East Kent Goldings pellets 6% @ 30
0.75 oz East Kent Goldings pellets 6% @ 15

EC-1118 - Prise De Mousse yeast

Spring Water

Brewing Notes:

- Flaked oats were toasted at 300 °F for 1.5hr and left to sit overnight under a light cotton cloth.
- Cold steep dark grains in 1.5 gallons overnight and add liquor to boil kettle.
- Add macadamia nut blossom honey after temperature drops to 85 °F while chilling.
- Add honey slowly while stirring the wort, and bring gravity to 1.130.

Yeast Rehydration: Prepare a solution of 350 ml H20 @110 F + 25 g Go-Ferm. Add 20 g of EC-1118 when temperature drops to 104 F mix well being sure to eliminate clumps and let stand 15 minutes. Stir and allow to stand 10 – 15 minutes more. This should not exceed 30 minutes total. Ensure that your must temperature is within 10C (50F) of the rehydrated yeast. If it is not, you'll need to atemperate.

Add 175 ml of the wort to the yeast rehydration mixture, stir well and allow to stand for 10 minutes. Watch this mixture like a hawk! I have had it start to go crazy within a couple of minutes and start foaming over the top of the flask. If it starts to do so, go ahead and add it to the wort, and stir/aerate well. I use a lees stirrer to aerate/stir/blend mine once I pitch the yeast.

Cover your vessel with a sanitized cloth loosely and secure it in place with a large rubber band (in the case of a bucket) or with a smaller one if using a carboy. Remember, leave plenty of room for excessive foaming.

Check the vessel frequently for foaming which indicates the end of the lag phase

At the end of the lag phase add an additional 10 grams of Fermaid-K rehydrated in 100 ml H_20 and stir in slowly. Be very careful when stirring as the vigor of the fermentation and degassing can cause massive foaming and a volcanic eruption out the top of your fermenter. Stir twice a

day for the first two days, and then attach a blow off tube or airlock if the vigor of the ferment is not excessive.

Closing thoughts: This braggot generally has a very vigorous ferment so keep an eye on it. Make sure that your mixture "tastes" good before you pitch the yeast. That is, get a spoon and make sure each of the ingredients are represented well and add more if they are not. The first several days are usually marked by a very vigorous ferment so keep on top of it and change your sanitized cloth if necessary during the first couple of days. Once you get to the point of being able to put on an airlock, go ahead and rack after two weeks. Rack again after six months, and again at one year.

After a year this braggot is generally still a little feisty, so you may need to give it additional aging.

For a specialty braggot:

- Add 8 ounces finely ground cocoa nibs while blending in the honey.
- Add 6 organic Madagascar Vanilla Beans, split and scraped.
- Add 2 ounces Medium toast American Oak cubes that have been soaked in Kahlua for a week.

Remove the oak cubes after two weeks (which you can use to barbeque some nice pork tenderloins) and vanilla beans. Taste your must and add more vanilla beans/cocoa nibs if desired.

8.7. Historical and Experimental Meads

Historical and Experimental meads can feature any ingredient or technique, so listing them all is nearly impossible. However, most meads that are entered in this category fall into four groups: historical or indigenous meads, meads that are a combination of two or more mead styles, meads that use additional fermentables, and meads that have some kind of post-processing.

Historical or indigenous meads are very hard to describe, since the ingredients and techniques can vary widely. The most commonly known meads that are included in this group are Polish-style meads, which are typically very sweet and often intentionally oxidized. Ethiopian Tej is also quite well known, but not often encountered in homebrew competitions.

Meads that are a combination of two or more mead styles are made like those styles. It is common to have mead with both fruit and spices; in that case, the fruit are typically fermented along with the other fermentables, and the spices are added after fermentation. Look at the alternatives for melomels and metheglins for options.

Variations of a base style of mead are usually made just like that mead, but some extra ingredient is added to it. If the ingredient is fermentable, it is usually added during the primary fermentation. If the ingredient is a flavoring, it is usually added after fermentation. Meads that are fortified with liqueurs (Chambord, Grand Marnier, etc.) are usually blended once fermentation is complete and the mead has conditioned.

Meads that involve some form of post-processing include oak-aging and icing. Oak-aging is covered in detail in section 9.1. Icing is simply the concentration of mead by freezing and removing frozen water crystals, in the manner of creating an eisbock. Both techniques are

typically applied to a mead that has finished fermenting. Mead could be fermented in oak, but most meadmakers use this technique post-fermentation.

Other creative techniques can also be applied, but judgment and experimentation must be used to determine where they are best used.

Historical and Experimental Mead Recipes

Gordon Strong's Apple Pie Cyser
Winner of three best-of-show medals

3 gallons unpasteurized cider, preferably from local orchards
1 gallon reverse osmosis water
1 gallon (12 lbs.) fall wildflower honey
2 lbs demarara brown sugar
6 cloves
6 cinnamon sticks
1 whole nutmeg
1 vanilla bean
2 tsp DAP
1 tsp Fermaid-K
Lalvin 71B-1122

Ferment mead per normal instructions, saving spice addition for post-fermentation. Make a tea with the spices: break up spices, scrape seeds from vanilla pod, pour 1 pint boiling water over and let steep (covered) for 10 minutes. Strain out seeds and cool tea. Blend to taste with mead. Adjust mead to sweet, if necessary. Force carbonate (moderately).

Eric Anderson's Oaked Triple Berry Melomel
AHA NHC Gold Medal Winner 2009

OG: 1.160
FG: 1.050
Size: 5 gallons

24lbs clover honey
3.5 gallons water
1oz Hungarian Medium-plus Toast oak cubes
18lbs frozen triple berry mix (raspberries, blueberries, blackberries)
2 packets of Lalvin 71B-1122 (Narbonne yeast)

Fill a fermenter with 3.5 gallons of water, pour in the honey and mix well to combine. Once fully mixed add the berries, yeast, 4.5grams of Fermaid-K and 2 grams of DAP. Mix carefully and ferment at 67-70 °F until done (2 weeks max). Add 4.5g of Fermaid-K and 2g of DAP every other day for 1 week to ensure healthy yeast and good fermentation. Also, stir the contents of the fermenter every day of fermentation. Rack into secondary with 1oz of Hungarian Medium-plus toast oak cubes, let it sit for 9 months, or till you get the level of oak you want. Sweet, still, sack.

Byron Burch's "Sweethot Love" Chipotle-Lime Mead
Served at the AHA NHC 2009

18 lbs clover honey

5 gallons water
5¼ oz. fresh-squeezed lime juice
2½ oz. tartaric acid
2 oz. “The Beverage People” Yeast Nutrient for Mead
½ oz. pectic enzyme
1½ tsp Irish moss
7 grams Sparkolloid
10 grams Prise de Mousse wine yeast
3 oz dried chipotle hot peppers, soaked in enough vodka to cover – about 1 point – for about a week to make an extract.

Starting Brix 26
Total Acidity .65%

At bottling time, add chipotle pepper extract to taste. Byron finds it useful to add the pepper until he feels a perfect balance between the lime and the heat of the pepper, then add a bit more because of the cumulative effect of tasting peppers makes it seem hotter than it will be when you come back and taste it later.

9. Advanced Topics in Mead-Making

Beyond the basics of creating the various mead styles, there are additional process controls that mead makers might employ. This section explores these advanced (and generally optional) topics, including oaking, adjustment, stabilization, clarifying, aging, and blending. To develop a good understanding of the various techniques, processes, products and methods, we discuss how they are used, the pros and cons of using alternatives, and how they affect the final product.

9.1. Oaking

Oak aging can be applied to any mead style. Oak additions do not have to be specified (but may be at the entrant's discretion); oaking is acceptable in every mead style. Excessive oaking is a fault, just as in wine; any use of oak should be balanced and complimentary. The declared use of oak should not be interpreted as requiring the oak to be a primary flavor. Pyments (particularly red pyments) can have a more prominent oak character if the grape variety is commonly handled in a similar way when making wine.

What makes oak desirable in mead?

Exposing mead to oak imparts structure, complexity, additional sensory elements and of course new and exciting flavors. While oak adds many different elements to mead and wine (more than 70 volatile aroma and flavor compounds), many of the recognizable characteristics are identified with vanilla, spice, sweet, spicy and woody. Breaking it down a bit, we can group oak into its basic aroma and flavor composition.

Cis-oak lactones and *trans-oak lactones* are characters imparted by the untoasted oak (yes, even though the wood is toasted on the surface, there is still the soft white-oak underbelly lurking below). Trans-oak lactones impart a woody, earthy, almost chocolaty aroma and some flavor character, while the more intense cis-oak lactones impart more of a coconut floral aroma and some small taste. If you've ever chopped down an oak tree, you'll recognize these aromas very distinctly.

Furfural and *5-methylfurfural* contribute wood sugars and in turn body. As the oak is seasoned (exposed to air), those natural polymers begin to break down into simple sugars. When oak is exposed to higher temperatures (about 300 °F) during the process of toasting, more simple sugars are formed. As these sugars caramelize, butterscotch and mocha-like aromas emerge. Smoky, toasty characters develop as the oak passes 420 °F.

As lignin (a complex organic molecule that binds wood fibers together) is degraded by heat, it releases *vanillins* which are a group of mead and wine complementary chemical compounds. Vanillin (yup, that's the nice vanilla-like flavor) is predominantly released during the oak lignin breakdown. During the seasoning process, lignin is broken down by the sun, rain and various microflora. The process of breaking down the lignins is also sped up by the heat applied during the barrel toasting process. In the wine industry, there has been extensive research devoted to the scientific analysis of this process in order to impart more and richer flavors.

Eugenol and *isoeugenol* are related to both raw oak (eugenol) and the degradation of lignin by heat (isoeugenol). Reduction of lignins by heat leads to spicy flavors apparent in the aroma and flavor. Once toasted, the isoeugenol imparts a clove flavor and aroma.

Guaiacol and *4-methylguaiacol* impart a smoky, charred character as part of the process of the pyrolysis of the lignins in the oak. As the oak is more toasted, the smokier and more charred the flavor becomes.

Cellulose and *hemicellulose* are natural polymers that comprise about half the total solids in white oak. Cellulose provides the structural integrity in wood, and participates only minimally in the actual influence on the character of wine or mead during barrel aging. That's a good thing because you don't want your chips, cubes, staves, etc. to fall apart and dissolve into your mead. Hemicellulose contributes significant vanillin during the breakdown of lignin. As wood is heated, the action on the hemicellulose forms wood sugars that contribute sweetness and caramelized flavors. As the heat rises and persists, toasted flavors are released.

Tannins comprise about 1% of American oak and 8% of French oak. Tannins are also a key player in the aging process. Tannins are found in the radial rays of oak trees and are governed by seasoning, stave shaping, toasting times and temperatures (tannins are heat sensitive and undergo cellular lysis when exposed to water).

What kinds of oak can I use in my mead?

There are several species and sub-species of oak that are used in cooperage, but there are four species that are widely used for oak aging: American white oak (*Quercus alba*), and three European species (*Q. robur*, *Q. peetraea* and *Q. sessilis* – the latter being arguably the most sought-after for oak aging and cooperage).

For the home mead and winemakers, there are generally three types of oak available: American, French and Hungarian. Because barrels are expensive and the footprint for storage is considerable, most home meadmakers use oak chips, cubes, dominoes, and staves.

American oak infuses more quickly and imparts more vanilla, woody, sugary and toasty character than its European cousins. It is used mainly in red wines but is growing in popularity with meadmakers because it tends to be less expensive, is widely available, and can be found in a wider range of toast levels. American oak is harvested from several locations including Missouri, Minnesota, Oregon, Virginia, and Pennsylvania.

Hungarian oak (from oak trees in Hungary, Slovenia, Slovakia, Croatia, Lithuania, Russia, Romania, and Ukraine) is more expensive than American oak but less expensive than French oak. It imparts its flavor slower than American or French oak, and is less intense because the trees grow slower and are smaller, creating a fine grain which in turn lends itself to very subtle extraction. The hemicellulose in Hungarian oak breaks down more easily and imparts a unique array of toasted, vanilla, spicy, woody, sugary and caramel-like flavors.

French oak is most expensive and sports the highest tannin level of the common oak varieties. It is more porous, so it presents more types of extracted characters for mead and wine including those from caryophyllene (sweet, woody, spice, clove, and dry flavors) and copaene (dry and spicy flavors). French oak is highly prized for barrels and aging because of the complexity and variety of character that it adds to wine. It extracts more quickly than most other oak types, and can quickly overpower mead if not monitored closely. French oak is found in several forests

including Nevers, Troncais, Limosin, Allier, Centre, Vosges, Bertrange, and Jupilles located mostly in central and eastern France.

Oak products come in a range of toast levels and generally can be found in American, French and Hungarian varieties. The toast levels generally include light toast, medium toast, medium plus toast, and heavy toast. There are other variations offered by different manufacturers, but those four are the most commonly available ones. The toast levels can be described as:

Light toast adds a light coconut (American) or vanilla (French) character. Might be appropriate in dry meads where a light oak character is needed, along with a little sweetness.

Medium toast adds more bouquet than tannin, so will impart more aroma than flavor. It has a warm, sweet character with strong vanilla overtones. It might be used for traditional meads and light melomels.

Medium plus toast adds honey, roasted nuts, and light coffee flavors. It is a popular toast level for red wine, so might be used in red pyments, bold melomels, and braggots.

Heavy toast adds highly caramelized, carbonized and toast flavors quickly; be careful about the contact time. It's most often used in big, bold red wines and doesn't have much use in mead.

Layering oak additions in phase is a common practice in both wine and mead production. You can use different toast levels for additional complexity. Be careful about adding so many different flavors that the resulting product has clashing flavors or tastes muddy.

So how do I get the wood into the mead?

Oak comes in a variety of shapes and sizes for many different fermentation, aging and storage vessels, but chips and cubes are the easiest to find. Some other oak forms include strips, spirals, stave segments, powder and oak essence. Powder is often included in wine kits, and is essentially sawdust. Essence is a liquid extract and can be very harsh. Neither are recommended.

The different oak products might not be available in all varieties and toast levels. Chips and cubes tend to have the most variants available for sale, and are commonly used. Spirals and strips are easier to work with, and are newer products. Of course, traditional barrels (new or used) can always be used.

The key factors in imparting oak character to mead (other than selecting different varieties and toast levels) are the surface area of the oak in contact with the mead and the total contact time. Smaller oak products (chips, powder) saturate rapidly and the wood effect is imparted quickly; however, it can be somewhat one-dimensional. Cubes, staves, spirals and strips will not saturate and can add character more slowly, and can add a more complex character.

Oak can be added during fermentation or afterwards. Most add it afterwards so that the alcohol has an antimicrobial effect on the wood. Some steam or boil wood before using, but that can leech out oak character, flavor and tannin. Winemakers might rinse oak in a sulfite solution. Oak can add particulates to your mead, so you may need to repeat any clarification processes after the oak has been added.

Once added, oak cannot be removed. It may mellow over time, but that is not guaranteed. It's always better to add a little oak and then repeat the process, then to make a strong addition and hope it balances.

What else does oak do to mead?

Depending on the variety and toast level, oak can add noticeable flavor and aroma character, most typically oaky, woody, toasty and vanilla flavors. More strongly toasted oak will add more toasty, caramelized and charred character.

Oak can add color to mead. The higher the toast level and the longer the contact time, the more color will be added – usually with amber tones. The color addition might be less noticeable in more deeply colored base meads.

Oak can add tannins, which contribute a fuller mouthfeel and drier finish. Tannins can make a mead seem drier than it is, and can balance sweetness just as acidity can. In higher levels, tannins can cause astringency. Tannins add structure to the mead, and can help a mead store longer. Red wines with higher tannin levels age gracefully, yet may take several years before they peak. A similar impact may be seen with mead. Tannins soften over time.

9.2. Adjustment

Most mead recipes describe the basic ingredients and process involved in making a mead, but that isn't always the full story. Experienced meadmakers know that mead will often have to be adjusted to achieve a pleasant final balance, whether it is adding sweetness, acidity, tannin, or other components. These adjustments are usually done to personal taste, rather than relying on analytical tools.

Most adjustments to mead are done after fermentation is complete, when the results of the adjustment can be readily determined by taste. Adding acids prior to fermentation can have a negative impact on fermentation. The pH can be adjusted upwards and buffered prior to fermentation by using potassium carbonate or potassium hydroxide, but this is to make the fermentation healthier, not to affect the finished profile of the mead. Likewise, increasing the amount of honey fermented is part of the recipe formulation and not an adjustment.

Refer to the chapter on *Balance in Mead* (Section 6) for necessary background for this discussion. Within this section, we are discussing balancing properly fermented mead. If the mead has a stuck fermentation or other fermentation fault, refer to the chapter on *Troubleshooting* (Section 10) for help. As fermentation is finishing, checking the final gravity and calculating the alcohol level will help determine if a fermentation problem exists.

If the fermentation has finished (not stuck) but the **alcohol** seems low, more honey can be added to extend the fermentation. The yeast may need to be roused, but avoid introducing oxygen at this stage. An alternative (and somewhat unorthodox) approach to increasing the alcohol would be to ice it. Slowly freeze the mead around 25-28 °F until about 10-20% of the volume is frozen, then remove the ice. The frozen ice will be water, which concentrates the remaining alcohol. This approach can also concentrate flavors (and off-flavors), so only use this on a cleanly fermented mead. When removing the ice, take care to avoid oxidizing the mead.

Sweetness is the most common element to adjust, since most meads will ferment dry but most people prefer to drink sweeter meads. Consider stabilizing the mead first (read section 9.3 on *Stabilization*), unless yeast have been removed, the mead has an alcohol content at the limit of the yeast's alcohol tolerance, or the mead will be stored cold (well below the fermentation temperature range of the yeast).

Sweetness is typically increased by back-sweetening the mead. This can be done with any sugar solution, but using the same type of honey as used in the mead is the preferred option since it will reinforce the varietal honey character. The honey can be added to the base mead in its raw form, it can be dissolved in solution and then mixed in, or an intentionally sweet mead can be blended with the base mead.

The hard part about using raw honey directly in the base mead is that it is difficult to get it fully incorporated. Stirring aggressively could oxidize the mead, so it may work better to draw off a portion of the mead and incorporate the honey into that portion then blend the solution back into the base mead. Heating the raw honey before combining it with the mead may help, although the full solution may need to be heated. Just keep in mind that ethanol boils at 173 °F, so keep the temperature low and stir frequently.

Blending the raw honey with water can help incorporate it into solution. Keep the temperature low to preserve the honey aromatics, and stir (not whisk) to combine. Avoid incorporating oxygen as you don't want to carry it over into the base mead. The only downside to this approach is that the water will be diluting the base mead slightly.

Be careful about over-sweetening, since adding a large amount of unfermented honey can give a raw, unfinished flavor to the resulting mead. Raw honey also tends to add more haze to the mead, which may need to be removed later through clarification techniques.

Some prefer to keep overly sweet meads around for blending. The advantage to this approach is that the honey will have a fermented (not raw) flavor, that the base mead won't be diluted as much, that no heat is involved, and that combining the two meads is much easier. Of course, this requires that a suitable sweet mead be available and not introduce any undesirable varietal character of its own.

If a mead is too sweet, consider pitching a yeast strain with a higher alcohol tolerance and seeing if it can be dried out. Look at Section 10.2 on *Troubleshooting Stuck Fermentations* for guidance on the process. Mead that is too sweet can be balanced by adding acids and tannin, or by force carbonating it. Adding carbonation will create carbonic acid which can balance the mead. Acids and tannins balance sweetness, although if the sweetness level is very high then the resulting mead may seem too intense. Keep in mind the scenario described above; an overly sweet mead may have additional life as a component in blending.

Once the sweetness level is correct, adjust **acidity** and **tannin**. These components add *structure* to the mead, enhancing complexity. Mead that is sweet but lacks balancing acidity is said to be *flabby*. Flabby mead is not the same as a stuck fermentation; it could be appropriately fermented, but just lacking in balancing acidity.

If a melomel was made, adding additional fruit might be desired to give a greater fruit intensity or a more layered flavor. Adding raw fruit should only be done after considering stabilization, since additional fermentables are being incorporated. Fruit often add acidity and tannin of their own, so don't adjust the acidity and tannin of the mead before adding the fruit. Get the fruit balance right first, then return to the acidity and tannin.

Similarly, if a metheglin was made, the spice balance might need to be increased. Typically, this is done by either adding spices to the mead and letting them sit for several days or weeks, or by making a tea of the spices and blending. The blending approach gives more immediate results,

although there can be a slight dilution by adding water. Note that some spices can add tannins, so the spice adjustment should be made before the final acid/tannin balance is set.

The use of acids such as citric, malic, tartaric, or a combination of the three (typically called acid blend) can be used to adjust the final acidity, as can lemon juice or other naturally acidic flavorings (but these can add additional flavors that might not be wanted). To use acid blend (the most typical approach), dissolve ½ tsp of acid blend in ¼ cup water and blend to taste. Performing a test blending using a smaller sample is recommended, so the general scaling can be estimated. But the final adjustment must be done to taste. Enough acidity should be present to give the mead a bright flavor without seeming acidic. The acidity should support the sweetness.

If you judge the acidity level to be high enough but the sweetness still seems unsupported, then try adding some tannin. The two typical sources of tannin for mead are grape tannin and strong brewed tea. While tannin is frequently used at the start of fermentation, it also can be added at the end. Make a solution of grape tannin and water (similar to what was done with acid blend); don't use more than ¼ to ½ tsp per gallon. Tea is blended in to taste, but you don't want to carry over flavor. Grape tannin is easier to work with and has less issues, although it may not be fully soluble. It will tend to settle out (particularly if it binds with proteins), so another racking may be required. Using oak-aging is another method for introducing tannin, although it usually adds flavor as well (see Section 9.1on *Oaking* for more details).

If there is too much acidity, then sweetness can be added in the same manner of back-sweetening. If the sweetness level is high enough, then the acidity can be lowered using additives such as calcium carbonate, potassium carbonate or potassium hydroxide. Malo-lactic fermentation (MLF) could also be attempted to raise the pH. MLF can convert the harder-tasting malic acid to the softer lactic acid, which is more pleasant to the taste. This is difficult to do, and not all fruit have malic acid (apples, currants, blackberries and raspberries do). A MLF will raise the pH of the mead, but will continue until all malic acid is converted. It is possible to overshoot the pH and make the mead seem less bright tasting. MLF should be avoided if the mead has been stabilized since it can react with sorbate to produce a geranium-like off-flavor.

When all adjustments are made, evaluate the finished mead for clarity. You may need to repeat the clarification process if some of the adjustments introduced haze. Allowing additional time could solve that problem, and would also allow the adjustments time to properly meld flavors. The adjustment process can be repeated several times until you are satisfied. However, be careful about making too many adjustments as the mead can easily be ruined just as adding too many spices to a meal can ruin dinner.

Finally, if you are unsure about what adjustments to make, take a measured sample of your mead and experiment with it. Apply measured adjustments and see if you like the improvement. When you have something you like, scale it up for the full batch. This way, you don't ruin a full batch of mead while tweaking the final balance.

9.3. Stabilization

Stabilization means attempting to keep the character and composition of a mead stable over time. Mead can primarily change through continued fermentation (whether through the primary yeast strain or through other micro-organisms). Age-related changes are normal and are covered in a separate discussion under Aging. Obviously keeping oxygen out of contact with the mead will

enhance stability. Haze-causing particles may contribute to a lack of stability and shelf-life, but these are typically removed during normal clarification processes (see section 9.4 on Clarifying for a more detailed discussion).

It is important to note that microflora may be present and capable of activity beyond the point at which the yeast cease fermentation. In musts that may finish with considerable residual sugar, with low alcohol levels (below 10 percent), with high pH (above 3.9), or with any combination of the three, it is critically important that the amounts of nutrients used do not exceed that which will be consumed by the yeast during growth and fermentation. Excess nutrient at that point will simply serve to nourish organisms that may harm your mead.

Reliable methods of stabilization all start with ensuring fermentation has completed. As was discussed in the Fermentation section of Process Options, the best way to stop fermentation is to let it finish naturally. Removing yeast or inhibiting yeast from restarting fermentation will then stabilize the mead. Once stabilized, the mead can be sweetened to the desired level without restarting fermentation.

Some choose to let **time** and multiple **rackings**, possibly assisted by clarifying agents (particularly those positively-charged ones that will precipitate yeast). This can work, although it takes quite some time, causes volume loss with each racking, and isn't guaranteed to work every time (some yeast can always remain and restart fermentation if sugar is added).

Filtration will remove yeast, but can also remove color and flavor components. Most yeast can be removed with a 3 μm (micron) filter, with total yeast removal at 0.8 to 1.2 microns. Spoilage bacteria can be removed with a .45 micron filter. All bacteria can be removed with a .2 micron filter, and is considered true sterile filtration. However, the tighter the filtration, the more color and flavor can be removed from the mead.

Flash pasteurization is a "high temperature, short time" method of heat pasteurization for perishable beverages. The liquid is moved in a controlled, continuous flow where it is subjected to 160-165 °F temperatures for 15-30 seconds, then rapidly cooled. Most home meadmakers do not possess the carefully controlled heat exchangers necessary to perform this process. Attempting to pasteurize finished mead can result in loss of color, flavor, aroma, and possibly alcohol. Cooked flavors can also result. With current technology, this process is best left to commercial operations.

The most common method of stabilization for meadmakers (other than the "do nothing" option) is to use a combination of **potassium metabisulfite** and **potassium sorbate**. These preservatives stun any remaining yeast and prevent them from reproducing. They will still be present, but will be unable to restart fermentation. Drawbacks from this approach is that some people are allergic to sulfites, and that a geranium odor can be created if a malo-lactic fermentation subsequently occurs.

The **do nothing** alternative relies on taking steps to cause yeast to precipitate (time, finings, rackings), followed by cold storage and (possibly) rapid consumption. Higher-gravity meads that are closer to the alcohol tolerance of the primary yeast strain are less likely to restart fermentation, as are meads with a lower pH level. Obviously, meads that are fermented dry are unlikely to continue to ferment, but many prefer the taste of sweeter meads.

9.4. Clarifying

Clarifying agents work to remove haze from mead. Haze can be the result of suspended yeast, particles of protein, pectin haze, starch haze, polyphenols (tannins) in the mead, or perhaps a metallic contamination. Proteins are positively charged, while yeast are negatively charged. Clarifiers bind electrostatically to the proteins and other compounds and precipitate them out. Because they each work differently, no one fining agent can remove every possible cause of haze. In most cases, one agent on its own will provide satisfactory results. For difficult musts, the most effective approach is to use positively charged and a negatively charged clarifying agent successively. Super-Kleer has both positively and negatively charged components, or a combination of bentonite (negatively charged) and sparkolloid (positively charged) can be used.

Most meads that have finished fermenting will naturally clarify on their own given enough time and appropriate rackings. However, many meadmakers do not want to lose the volume of mead that multiple rackings would entail. Before attempting clarification, make sure that the fermentation is complete; a stuck fermentation will not clear. Assuming the mead has finished fermenting, cooling the mead may be attempted first; a 10-20 °F drop is generally sufficient. If fruit was added, some pectic enzyme can help clear up any pectin haze. If these steps don't produce results, fining agents can be used (they are generally more effective at cooler temperatures). As a last result, mechanical filtration can be used. However, filtration can also remove color and flavor compounds, and may unintentionally oxidize the mead if not done properly.

Following are some common clarifying agents, how they work, and when they are added:

Super-Kleer K.C. is a two-stage liquid clarifier from Europe, containing kieselsol (silica gel) and chitosan (derived from shellfish). The two components create a negative and a positive charge, which enhances the clarifying action. Stir in one packet of liquid, wait an hour, dissolve the second packet of liquid in 1 oz of warm water, stir in the second mix, then wait 12-48 hours. One package treats 5-6 gallons of mead, wine or beer. This method is fast-acting, reliable, and highly regarded in the wine industry.

Sparkolloid is a proprietary material manufactured by Scott Laboratories. It contains a polysaccharide substance dispersed in diatomaceous earth, and comes in hot-mix and cold-mix forms. The hot mix form is preferred for mead clarification. It is relatively benign, seldom strips flavors and aromas, and works fairly quickly. It is positively charged, and is sometimes used as a secondary treatment after the negatively-charged bentonite. A disadvantage of sparkolloid is that it produces very fine lees that tend to settle out slowly and not compact well. Allow sufficient time for the lees to settle, or volume could be lost in racking or additional sedimentation could be observed in the packaging. Normal dosage is about 1g (or 1 tsp) per gallon of mead, boiled in 2 cups of water. The dry sparkolloid powder is boiled in water for 5-15 minutes, stirring or whisking constantly until creamy in consistency (the powder will not completely dissolve). The hot solution is immediately added to the mead and stirred in carefully; do not allow it to cool before using.

Bentonite is a gray clay with high montmorillonite content, mined in Wyoming and South Dakota. There are many kinds and preparations of bentonite, but only a few of them are suitable for wine and mead. Do not use bentonite sold for any other purpose than as a wine additive. Bentonite is a hydrated aluminum silicate with a negative charge, and reacts with positively-

charged particles such as proteins. In solution, it behaves like a series of small, absorbent plates. It is often used for protein removal and clarification in wines, although red wines with a high tannin content are more stable. In general, low pH meads need less dosage than high pH meads. It is normally added after fermentation and natural settling, and at least one racking. It is normally prepared in a hot slurry. Mix 3 Tbsp bentonite with 1 cup boiling water, blend in a blender for 1-2 minutes or until creamy, let the slurry rest for an hour to become fully hydrated, and then use 1-2 Tbsp of the slurry for each gallon of mead to clarify. Stir carefully, and allow to settle. It works best if the mead is cool in temperature.

Gelatin is an animal protein-derived substance that is positively charged. It is colloidal, so it bonds to yeast and tannins, and then causes other compounds to then bond to them. However, it can remove some flavor. Use ½ tsp per 5 gallon batch, mixed with water and stirred in well.

Pectic enzyme. Pectin is the compound in fruits that will gel when heated. Different varieties of fruit have more pectin than others. Pectinase breaks down the long polysaccharide chains that form the pectin. It is generally added at the start of fermentation, but may be added after fermentation if a pectin haze is noted. Formulations and usage rates vary, so be sure to check manufacturer's recommendations.

9.5. Aging

At one time, most meadmakers thought that meads had to be aged for a significant length of time in order to be drinkable. However, with modern fermentation practices this is no longer the case. While it is true that some meads will be ready to drink sooner than others (due to fermentation health, alcohol strength, ingredients and honey variety), mead can still be matured to reach its peak flavor.

Aging normally reduces esters, bitterness, alcohol sharpness, color, and intensity of flavors. Proteins, tannins, yeast and other particulates tend to precipitate from solution, enhancing clarity. The most noticeable positive change from aging is typically a smoothing and melding of flavors. Those who prefer big, bold flavors will often enjoy younger meads, but well-aged mead can develop a layered quality and complex character that is rarely seen in young mead. The presence of tannins does help stabilize mead and increases the ability of mead to age for a longer period of time, just as with wine.

Note that aging does not imply oxidation, although some oxidation is inevitable unless all but the best handling and packaging procedures are followed. Some dip their bottles of mead in wax for long-term storage as an oxygen barrier. This is a good solution, provided that oxygen wasn't introduced into the mead during handling prior to bottling. Natural corks will allow some oxidation, but synthetic corks can be an effective barrier. Traditional crown-type bottle caps are probably the least effective for long-term storage. Having clean mead that is free of faults is important for long-term storage, but keeping oxygen away from it is the most important factor for successful storage.

Aside from oxidation, other factors that can degrade a mead during storage are heat, light, and mechanical agitation. If oxygen is present, all of these factors will increase the rate of oxidation. However, they can also degrade an oxygen-free mead. They speed up the rate of chemical reactions, and can cause flavor and color to become more muted.

Oxidation generally causes colors to become duller and darker, causes the clarity to lose its brilliance, and causes fruit flavors to move from tasting like fresh fruit to tasting like dried fruit; in essence, it tastes stale. Oxidation may create aldehydes, which can increase the bitterness level. Oxygen can allow aerobic bacteria, such as acetobacter, to flourish. Finally, oxidation is responsible for aromas like paper and wet cardboard, almond/nutty.

Not all oxidation is bad, since oxidation can produce interesting complexity in mead. The organic chemistry is fairly complicated and involves multiple reactions, but oxygen, alcohols and acids can react slowly to produce esters. Oxidation can also produce nutty, sherry-like aromatics. Intentional oxidation is a part of some historical mead styles, such as Polish meads.

The main choice in aging is whether to bulk age or to bottle age. Bulk aging is simply aging in anything other than the final bottle, typically a carboy or keg. Anything inert and gas impermeable will work. Bottle aging is transferring the finished mead to a bottle after fermentation is complete, the mead is stabilized, and any final adjustments are made.

Bottle aging is the traditional method for most home meadmakers. It provides the best protection against oxidation since it is not kept in an intermediate container, and is likely to involve less rackings. The disadvantages are that the mead may change while aging, and adjustment becomes much more difficult. Differences may exist from bottle to bottle.

Bulk aging is a more relaxed approach, since it allows the mead to mature and change as a full batch. It may sit on lees, or it may not. If it does, this can add additional nutty, toasty, bready yeast flavors, as well as providing minor stabilizing effects. The advantages of bulk aging are that the mead can be adjusted and blended over time, that fermentation is more likely to be completely finished, that clarification is enhanced, and that the final product will likely have more consistency from bottle to bottle. The disadvantage is that multiple rackings might be required, and that introduces a higher chance of oxidation and spoilage. If bulk-aged in a carboy, care must be taken to prevent the airlock from going dry. Any transfers should be done after purging containers with CO_2 to minimize oxidation.

9.6. Blending

Blending can be thought of as another form of mead adjustment, although it can be used to create a totally new beverage. Blending is the mixing of mead with another beverage (usually another mead, but it could be something else). It can be used to create consistency between batches, to correct flaws in a batch, or to create a new concept. Sometimes it is easier to blend than to attempt to correct a problem by using direct adjustment with additives.

Some common scenarios for blending include:

- Blending a sweet mead with a mead that is dry or acidic to create a more balanced mead. Sweetness balances acidity, or takes the edge off dryness. Note that it is possible to add sweetness to a very dry mead and have it still seem dry. Yet the palate can seem softer, which makes the mead much easier to drink.
- Blending a traditional mead without strong flavors (except perhaps a compatible varietal honey character) with a mead that has an overdone character (such as too much fruit, spice, alcohol, oak, etc.). If blending mead has strong flavors as well, they shouldn't exacerbate problems in the base mead. A blending mead with a strong varietal character

can sometimes add a pleasant complexity to the base mead, allowing the honey to match strength-with-strength with the other strong flavors.

- Blending an overly sweet mead with other meads needing to be back-sweetened. While the overly sweet mead might be unpalatable on its own, it is a very useful mead to have on hand. If the sweet mead is clean, it will always be useful as an alternative to adding raw honey as a sweetener.
- Blending different batches of the same mead to get a more complex character. Similar to making a gueuze, blending old and young mead can give an interesting character. Older mead will have a smoother character while younger mead will have fresher flavors. Balancing the two characters can often give quite interesting results.
- Blending different types of mead (say, a melomel with a metheglin) can be done to create another type of mead. This doesn't have to be done with the entire batch; it can be done to yield three different meads from two fermentations. This can be a fun way to test concepts without making a full batch.
- Blending mead with other beverages (such as beer, wine, cider, fruit wine, or something else) to create braggots, pyments, cysers, melomels, and other interesting meads. Meads are often better if all the fermentables are fermented together, but this can be a technique used to quickly create another style of mead if needed. Sometimes you might want to test different combinations of ingredients, such as testing ideas for different pyments by varying the honey and grape varieties. Making separate batches of mead and wine and then blending them creates more combinations without having to manage as many fermentations. If one combination is particularly pleasing, you then know to repeat that in future full-scale batches.
- Finally, blending can be done to get rid of a defective batch of mead. This is not really recommended, but some people cannot bear to part with an expensive batch of mead even if it has issues. Blending small amounts of it can extend other batches and hopefully keep defective flavors below the sensory threshold. Dumping it or finding someone to distill it (assuming they have a distiller's license, of course) are probably better options.

To successfully blend mead, you first need to understand the profile of the meads (or other beverages) that you will be blending. Taste them and record their characteristics. Think about the relative intensities of the different flavor components. Then develop a concept of what blending experiment you'd like to try. Start on a small scale, using samples from each source in a separate container. If you find something you like, you can scale it up. But if you make an abomination, then at least you can dump it without having ruined your full batches.

Tasting is critical at every stage in the blending process. You won't necessarily know what ratios to use, so blending is best done in small increments. Make changes, then taste again. Keep iterating until you're satisfied. Keep track of the amounts you are blending so you can scale up. But remember that if you are tasting as you go, the quantities being blended are changing. When scaling up, you should still use less than you'd expect and keep tasting. Your palate is your best guide. Endless tweaking is rarely successful, so be prepared to stop when you are satisfied with the result.

10. Troubleshooting Mead

Not all mead is well made. A good mead judge should be able to identify, describe, and diagnose common problems in mead, and provide feedback to the meadmaker on possible solutions to the problems. A judge should be careful about becoming a fault-finder by looking for problems where none exist.

This section describes common mead faults and then discusses the more detailed topic of troubleshooting fermentation problems. Some other troubleshooting topics are discussed in the ingredients and process control sections of this document.

10.1. Common Mead Faults

Not all possible faults are listed, just the faults listed on the BJCP Mead Scoresheet and the BJCP Mead Exam. Each fault is described in a common format: definition, perception, causes and controls. The definition is the technical definition of the fault. Perception is a description of the fault and the perceptual cues it triggers. Causes and controls describe how the problem can be introduced, and how it might be fixed. Most faults have several possible causes, so judges should resist excessive speculation about how a particular problem was introduced unless the cause is very clear.

10.1.1. Acetic

Definition:	Acetic acid, vinegar. Also known as volatile acidity in winemaking.
How Perceived:	Sharp sourness, vinegary aroma/flavor.
Causes:	Acetobacter infection in the presence of oxygen.
Controls:	Check process and ingredients for sources of infection. Check health/purity of yeast strain. Check for post-fermentation oxidation sources (acetobacter is aerobic). Check handling of fruit additions, since bacteria may be introduced on the fruit skins. Check sanitation of any ingredients added post-fermentation.

10.1.2. Acidic

Definition:	Low pH.
How Perceived:	Tart, sour (basic taste sensation), often with an indication of tart sharpness in aroma.
Causes:	Acid additions, acid level in honey, use of fruit, infection.
Controls:	Check level of acid additions. Check acid levels in honey. Check acid levels in any fruit used (some fruit have higher acid levels, unripe fruit has higher acid levels). Check for infection, particularly lactobacillus. Check sweetness levels and attenuation (an over-attenuated and drier mead than expected might seem

acidic if less sweetness is present than what was planned).

10.1.3. Alcoholic

Definition:	Ethanol and higher alcohols.
How Perceived:	Hot, spicy, vinous aromas and flavors, warming or burning mouthfeel and aftertaste, increased bitterness.
Causes:	Too warm a fermentation, insufficient aging and conditioning, unhealthy fermentation, too high a starting gravity or too many fermentables added, over-attenuation, infection.
Controls:	Lower fermentation temperature. Let mead age longer before consuming. Use less fermentables. Use a less attenuative yeast strain. Check yeast health. Use sufficient yeast nutrients. Check for possible infection, which could have caused more attenuation. Stabilize mead to prevent further fermentation.

10.1.4. Cardboard

Definition:	Oxidation.
How Perceived:	Stale, papery, wet cardboard aroma and flavor.
Causes:	Post-fermentation exposure to oxygen.
Controls:	Check for oxygen being introduced into mead post-fermentation. Don't splash when racking/bottling. Check caps and/or keg seals for good fit. Purge bottles/kegs with CO_2 prior to filling. Store mead cool. Drink mead when fresh.

10.1.5. Chemical

Definition:	Chemicals in the mead above taste threshold levels, presence of undesirable chemical substances.
How Perceived:	Chemical, vitamin, nutrient flavors, possibly with bitterness or saltiness.
Causes:	Excessive nutrient use, contaminated water.
Controls:	Use less nutrient additions, check purity and cleanliness of water sources, check use of cleaning chemicals.

10.1.6. Cloudy

Definition:	Obscured with visible particles (of any source).
How Perceived:	Hazy appearance, obscuring particulates, floating flakes (floaties).
Causes:	Yeast remaining in suspension, unfermented honey, clarifiers not working completely, pectin haze.
Controls:	Fine with clarifying agents, troubleshoot stuck fermentation, try different clarifying agents, allow sufficient time for clarifying

agents to work properly, add pectinase, mechanically filter.

10.1.7. Cloying

Definition:	Excessive sweetness unbalanced by acidity or tannin. Also known as "flabby" in the wine-tasting world.
How Perceived:	Overly sweet, syrupy flavor. Heavy body, tongue-coating mouthfeel. Lack of acidity or tannin in flavor. Sometimes accompanied with a raw honey flavor, but this isn't required.
Causes:	Incomplete fermentation, not enough acid/tanning to balance sweetness.
Controls:	Ferment more completely (troubleshoot fermentation), use less honey or sugary adjuncts, add balancing acid and/or tannin.

10.1.8. Floral

Definition:	Flower-like aromatics.
How Perceived:	Flower blossom, perfume-like aroma and flavor.
Causes:	Honey variety choice.
Controls:	Select a honey variety with the desired varietal characteristics. Not typically a fault, unless in a variety that shouldn't have these characteristics.

10.1.9. Fruity

Definition:	Estery.
How Perceived:	Fruity aroma or flavor (may include apple, banana, pear, grape, strawberry, citrus, or others).
Causes:	High fermentation temperature, yeast strain, weak or nutrient-deprived fermentation, high gravity, honey variety.
Controls:	Lower fermentation temperature. Try a cleaner yeast strain. Oxygenate must sufficiently. Reduce original gravity. Pitch a sufficient quantity of yeast (avoid yeast stress). Bottle condition and age mead longer at cellar temperatures to reduce esters. Try a different variety of honey.

10.1.10. Harsh

Definition:	Rough, unpleasant flavor and finish.
How Perceived:	A rough, biting or stinging sensation in the mouth, often with excessive bitterness.
Causes:	Excessive acids, alcohols, and/or tannins.
Controls:	Look at sources of acids, alcohols and tannins (see Acidic, Alcoholic, and Tannic descriptions for specific controls).

10.1.11. Metallic

Definition:	Containing metallic ions, especially iron.
How Perceived:	Flavor of iron, copper, coins, or blood.
Causes:	Contaminated water supply, excessive additives, corroded equipment, equipment not properly cleaned and rinsed.
Controls:	Check water for metallic ions. Reduce water salts. Reduce nutrient additions. Check equipment condition for rust. Make sure stainless steel equipment is properly passivated. Fully rinse sanitizer. Try using reverse osmosis water and add salts as needed.

10.1.12. Moldy

Definition:	Mold-like character. TCA (cork taint).
How Perceived:	Stale, moldy, musty cellar-like, earthy, compost-like, mushroom-like aromas and flavors. Wet cardboard and old rag flavors.
Causes:	Oxidation, mold growth, stale water and ingredients, sealing with cork, storage in musty barrels or containers.
Controls:	Avoid oxidation. Check sanitation. Check water for freshness and taste. Use fresh ingredients. Check for mold in corks or use artificial corks.

10.1.13. Phenolic

Definition:	A large group of organic chemicals often having plastic, medicinal or tar-like aromatics.
How Perceived:	Spicy, smoky, plastic, band-aid, medicinal, clove, or vanilla aroma and flavor.
Causes:	Infection with wild yeast. Some honey varieties (eucalyptus, buckwheat, black mangrove) might have some of these flavors. Some spices can be phenolic. Fruit and spices can be an infection source. Oak-aging can introduce phenolics. Water sources.
Controls:	Check for infection. Check yeast strain and health. Check honey variety. Check for oak usage. Check cleanliness of water source.

10.1.14. Sherry

Definition:	Post-fermentation oxidation.
How Perceived:	Sherry, nutty, almond aroma and flavor, possibly with an increased bitterness level.
Causes:	Oxygen introduced into mead post-fermentation.

Controls: Check for sources of oxygen being introduced after fermentation is complete. Check airlocks to make sure they haven't dried out. Don't splash when racking/bottling. Check caps and/or keg seals for good fit. Purge bottles/kegs with CO_2 prior to filling. Store mead cool. Drink mead when fresh.

10.1.15. Solvent

Definition: Fusel alcohols, ethyl acetate.

How Perceived: Hot burning on palate, harsh finish and aftertaste. Headaches. Nail polish remover or solvent.

Causes: High fermentation temperatures, stressed fermentation, acetobacter infection, insufficient nutrients.

Controls: Lower fermentation temperature. Pitch a sufficient quantity of healthy, active yeast. Check for infection. Try a different yeast strain. Ensure sufficient nitrogen-based nutrients are available.

10.1.16. Sulfury

Definition: Hydrogen sulfide, sulfur dioxide.

How Perceived: Rotten eggs, burning matches, and other sulfur-based aromas and flavors. Generally unpleasant.

Causes: Yeast, either a by-product of fermentation or autolysis. Insufficient nutrients (especially nitrogen) can cause the yeast to expel hydrogen sulfide. Sulfur compounds in water supply or in additives. Oxidized sulfur compounds. Excessive sulfite additions.

Controls: Provide sufficient nitrogen-based nutrients. Check for infection. Check water for excessive sulfates. Check yeast health. Check for yeast autolysis (mead left on yeast too long at warm temperatures). Try another yeast strain. Cut back on sulfite additions.

10.1.17. Sweet

Definition: Basic taste associated with sugar or honey. Too much sweetness is referred to as a syrupy or cloying quality.

How Perceived: Sugary or honey-like flavor and aroma.

Causes: High original gravity, incomplete fermentation, low attenuation. Some honey varieties (e.g., orange blossom, clover) have higher perceived sweetness.

Controls: Use less honey, encourage a more complete fermentation, aim for a lower finishing gravity, try other honey varieties.

10.1.18. Tannic

Definition:	Polyphenolic. Astringent, bitter plant polyphenols that either bind and precipitate or shrink proteins.
How Perceived:	Astringent, mouth-puckering mouthfeel, lingering harshness, grape skin character, increased bitterness, dry finish.
Causes:	Extraction of tannins from fruit, spices or other ingredients. Excessive tannin additions. Use of oak. Use of tea.
Controls:	Avoid use of raw spices, fruit pith and fruit skins. Reduce tannin additions. Use less oaking.

10.1.19. Thin

Definition:	Lacking in body (also generally lacking in honey flavor impact).
How Perceived:	Thin palate, mouthfeel, and finish. Watery palate impression and body. Insipid character.
Causes:	Over attenuation, poor quality honey, over filtration or excessive fining.
Controls:	Reduce attenuation, back-sweeten with honey, use fewer adjuncts, try a different honey variety, add glycerine (glycerol syrup, wine finishing formula).

10.1.20. Vegetal

Definition:	Smell or taste of plants or green vegetables.
How Perceived:	Cooked, canned or rotten vegetable (cabbage, celery, onion, asparagus, parsnip) aroma and flavor.
Causes:	Bacterial infection in the must.
Controls:	Encourage a fast, vigorous fermentation (use a healthy, active starter to reduce lag time; this is often due to bacterial contamination of must before yeast becomes established). Check sanitation. Check for aged, stale, or old ingredients.

10.1.21. Waxy

Definition:	Characteristic flavor of beeswax.
How Perceived:	Wax-like, tallow, fatty flavor and aroma.
Causes:	Some varieties of honey, oxidized or low quality honey containing excessive fatty acids.
Controls:	Try a different variety of honey. Filter honey. Avoid oxidation.

10.1.22. Yeasty

Definition:	Yeast-like character.
How Perceived:	Bready, sulfury, yeast-like aroma and flavor.
Causes:	Yeast in suspension.
Controls:	Use a more flocculent yeast strain. Allow yeast sufficient time to flocculate. Filter mead or use clarifying agents. Avoid carrying over as much yeast. Age the mead longer. Try another yeast strain.

10.2. Troubleshooting Fermentation

The challenge of making mead is achieving the perfect honey fermentation—one that is clean, with zero or absolutely minimal off-flavors. It optimizes the character of a spectacular honey, and yields aromatics and flavors reflecting its finest properties. Simply put, it comes down to a series of steps: pitching a vigorous, healthy yeast population, low lag times, effortless and robust yeast reproduction, successful competition (or K-factor activity), and a steady, healthy fermentation to completion.

A major issue that confronted (and confounded) meadmakers until recently was notoriously long fermentation period. Modern research has shown that this is not a normal part of the meadmaking process, but rather an expected result of not providing an adequate fermentation environment or not providing a sufficient quantity of viable yeast. Although the fermentation rate is somewhat dependent on the honey variety, proper selection of yeast strains, agitation during fermentation, yeast nutrition, and control of pH can dramatically increase the fermentation rate. Avoiding a sluggish fermentation has a major positive effect on flavor.

Even when a fermentation appears healthy at start (and almost always when it doesn't), a fermentation can stop before it is fully complete. This is known as a "stuck fermentation" and is often characterized by a high specific gravity, a hazy appearance that doesn't clear over time, a taste of raw honey, a strong sweetness, and a lower-than-expected alcohol level. Fermentations that falter and stick can be extremely difficult to restart, making the maintenance of appropriate fermentation conditions all the more important.

A stuck (or sluggish) fermentation can be caused by one or more of the following factors:

- Not enough **viable yeast** were pitched. This can occur by not starting with enough yeast, or by damaging the yeast by not adequately handling it before pitching (e.g., failing to rehydrate dry yeast, pitching dry yeast directly into the must, adding the wrong chemicals or additives too early, adding ingredients or additives containing preservatives, etc.).
- Failure to maintain the fermentation in a **correct pH** range, particularly if the pH drops too low (below 3.2). This can be a natural occurrence, and can result from the use of acidic fruits, the premature use of acid blend, or the failure to buffer the pH with potassium.
- Not providing **adequate nutrients** for the yeast. Honey is notoriously deficient in nutrients, particularly nitrogen. Yeast also requires many other micronutrients, vitamins,

and minerals for proper health. Not adding yeast nutrients, or adding them at the wrong time, can essentially starve the yeast.

- Ironically, **too much nutrient** can over-stimulate the yeast and drive higher fermentation temperatures that can kill off yeast and create off-flavors.
- Insufficient **oxygen** in solution during the yeast growth phase. Yeast require oxygen as well as nutrients during the growth phase. If they are unable to find oxygen, they can still ferment but at a drastically reduced rate.
- Failing to maintain an appropriate **temperature** range for yeast, particularly if the temperature is too cold for the particular strain of yeast. Too cold a temperature will shock the yeast into dormancy, while too hot a temperature can kill off yeast or create off-flavors.
- Too much **CO_2** can kill off yeast and reduce overall yeast viability. Failing to stir the must or punch down the fruit cap (in melomels) can lead to toxic CO_2 levels.
- Failing to keep the must **properly mixed** can result in stratification of the must with different fermentation environments, some of which could be deficient for the yeast. If this occurs early in the fermentation, the results are more pronounced.
- General **yeast stress** caused by high gravity fermentations can cause fermentation problems (failing to start, sluggish, finishing prematurely). The high osmotic pressure caused by large amounts of honey can press on the cell walls enough to negatively affect fermentation.

Correcting the root cause can help restart the fermentation, but if the yeast are not viable then fresh yeast might need to be introduced. Follow the following process to troubleshoot the fermentation:

1. Check the ambient fermentation temperature and compare against the requirements of the yeast strain being used. Try moving to a 10 °F warmer location and see if the fermentation restarts.
2. Check the pH of the must. If it is below 3.5, adjust upwards using calcium carbonate ($CaCO_3$), potassium carbonate (K_2CO_3) or a solution of potassium hydroxide (KOH). Adjust until the pH reaches 3.8.
3. Verify that adequate nutrients were added. If not, add more. Start with ¼ tsp Fermaid-K and ½ tsp DAP.
4. Stir the must to make sure it is not stratified and to release CO_2. If making a melomel, punch down the cap.
5. Check the specific gravity of the must. Calculate the alcohol level and verify that it is not above the alcohol tolerance of the yeast.
6. If the specific gravity is not below 50% sugar depletion, then try adding oxygen. However, adding oxygen too late in the process will simply oxidize the finished mead and is not desirable.
7. If none of these methods work, then try repitching fresh yeast. However, don't just toss it in. A strong fermenter with high alcohol tolerance (like Pasteur Champagne) might be

necessary, but following good fermentation management practices is a must. Rehydrate the yeast using GO-FERM. Start feeding the yeast with a weak honey solution and yeast nutrients. Step up the starter twice using must from the stuck fermentation, along with yeast nutrients. Finally add the actively fermenting starter back into the stuck must and stir thoroughly. Cross your fingers and hope for the best.

Troubleshooting Other Common Fermentation Problems

Fermentation never starts. Make sure you pitched a viable starter (it foamed) and provided adequate nutrients. If so, possible problems are: mead is too high a gravity for the yeast, pH is too low for the yeast, or sanitizers, preservatives or other yeast-killing/inhibiting substances are present.

Prolonged, slow fermentation. Probably has insufficient nutrients. People used to think this was normal; it's not. Can add nutrient and oxygen, then stir. Also check for low pH.

11. Judging Mead

Mead judging differs from mead drinking in that the judge is thinking about the full range of perceptions and how a mead fits against idealized standards, rather than just hedonistically enjoying it. That isn't to say that mead judges don't enjoy their work; to the contrary, most mead judges love to judge mead. However, mead judges won't just say that they like a mead; they will be able to explain why. They will also be able to compare one mead against another, or against idealized standards and decide relative merit. This is the skill of judging, and it must be practiced as with any other skill.

This section on judging mead discusses how to evaluate mead characteristics, how to judge mead in a competition setting, how to complete the BJCP scoresheets, and how to handle issues that arise while judging.

11.1. Evaluating Mead

Evaluation is a systematic, structured assessment of something, or a determination of merit, worth or significance against a set of standards. Good mead judges will perform an evaluation of every mead they sample, even if it isn't for a competition. This evaluation can be performed silently and as a mental exercise, or it can be written down as notes. Regardless, this is the basic practice needed to develop the skill of assessing mead as a judge.

The structured method of evaluating mead closely follows the sequence used when filling out a scoresheet. Aroma, appearance, flavor, mouthfeel and overall impression are considered. The evaluation process focuses on capturing accurate sensory perceptions, and then comparing them against style guidelines. If used on a more recreational level, just the sensory assessment could be performed.

11.1.1. Assessing Mead Aromatics

In the wine-tasting world, there is a big difference between *aroma* and *bouquet*. *Aroma* is the smell of grapes, while *bouquet* is the complete smell of the wine. *Aroma* describes the raw ingredient and *bouquet* describes the character added by the winemaker. *Nose* is used to describe the total experience (aroma and bouquet). This is a fairly subtle distinction, since in the beer tasting world *aroma* generally means the total smell experience. When discussing mead, we will generally use *aroma* in the beer sense, although when *bouquet* is used it specifically includes the fermentation and age-related character. Either usage is valid.

Why are we discussing wine? Well, mead has more to do with wine than it does with beer, particularly in sensory assessment. Much of the bouquet of wine is due to the yeast used. Since mead is often made with wine yeast, the yeast-derived components will be similar. Wine evaluation techniques are also more well-developed and formalized than mead evaluation techniques, so we lean more heavily on the work of the American Wine Society in developing the framework for discussing mead.

To assess the aromatics of the mead, swirl the glass and tilt it towards you. Inhale deep in the glass, which is the lower side of the glass near the surface of the mead. Be careful, you're judging aroma not nosefeel. Use a deep inhale lasting a few seconds, which should get heavy aromatics. Then consider what you've smelled. Swirl again, stop swirling, then tilt and smell again – this time towards the upper side of the glass (furthest from the mead). This will get lighter aromatics. Repeat again, smelling in the middle of the glass using a series of short, quick sniffs. Finally, keep the glass level and smell a few inches above the glass. Each of these sniffing techniques may give you a different impression.

You are looking to pick up as many different aromas as you can find. You will definitely want to assess the **honey** character. How strong or intense is it? Is it sweet? Does it have a noticeable and identifiable varietal honey character? Is it floral, herbal, fruity, spicy, or something else? Can you give those specific aromatics a name? Honey is to mead as grapes are to wine; you need to describe the character of the primary ingredient, and relate it to any expectations you may have given how the mead was described.

Now assess the **fermentation** character. Did the yeast add any interesting aromatics (fruit, spice, etc.)? Is there alcohol noted? Are there any fermentation faults? If a certain type of yeast was mentioned (Flor sherry, for example), does it have the characteristic aroma? Alcohol can definitely be sensed. If it is sharp and aggressive to the point where it overwhelms other components, it is a negative. **Alcohol** level should match the style of mead. Refer to section 10 on Troubleshooting Faults for a list of common mead characteristics; many of them are detectable by aroma. Do they persist or do they blow off quickly? Characterize the overall fermentation character: is it clean, fresh, dirty, yeasty, sulfury, or something else?

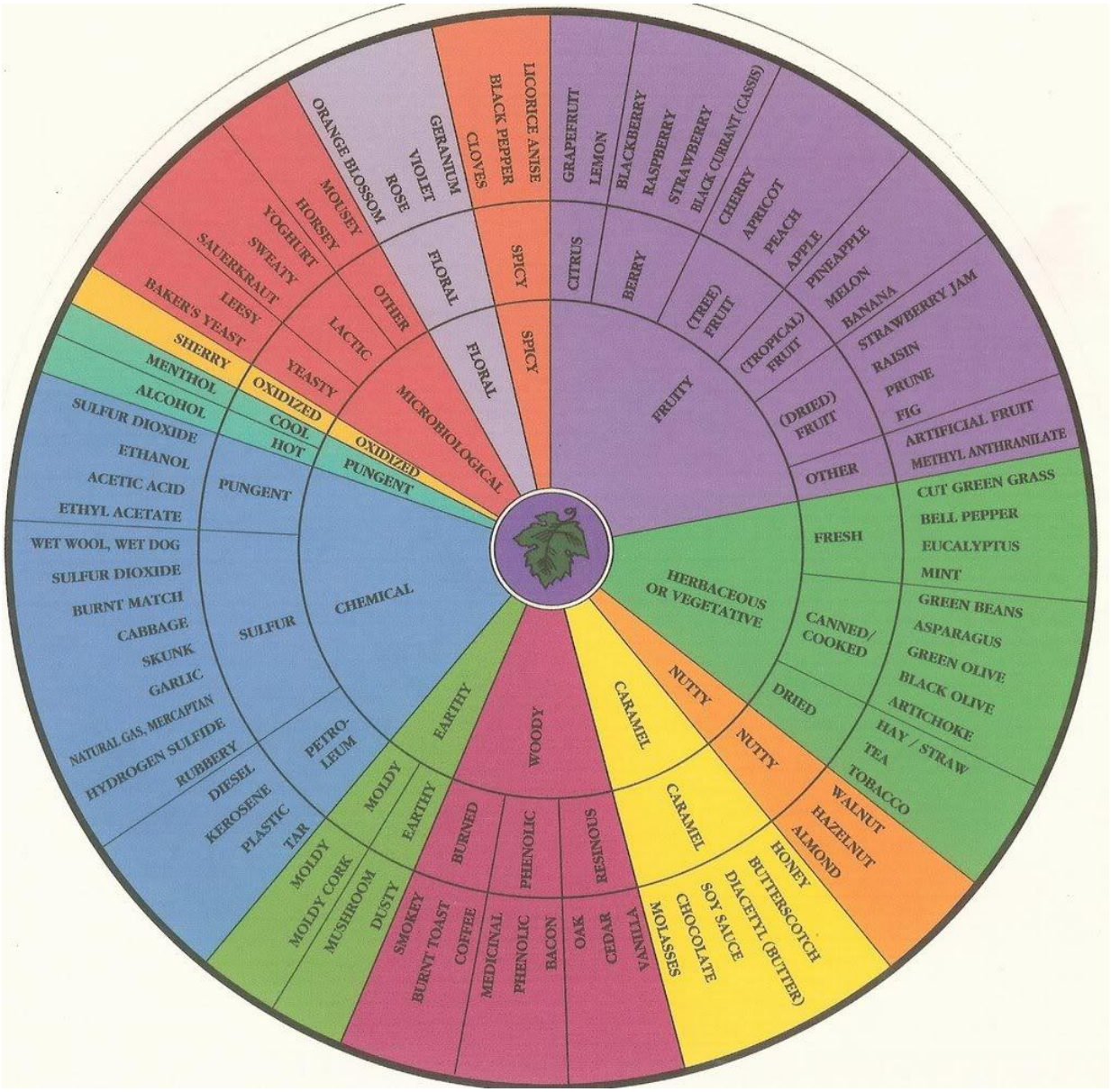
Were there any **special ingredients** (fruit, spice, malt, etc.) used in this mead? If so, do you detect their presence? If a special ingredient is fermentable (e.g., fruit), then the character might not have the same impression as the fresh ingredient. For example, wine does not smell like grapes, it smells like fermented grapes – don't expect fruit in a mead to always smell like the raw fruit, the fermented character can be different. The amount of residual sugar in the mead can affect the impression of fruit, since fruity aromatics are often found with sweetness in fresh fruit. Declared special ingredients should be noticeable, but balanced and in harmony with other ingredients.

Acidity can often be sensed in the aroma, but tannin cannot (unless tied to oaking). Acidity that comes from fruit or yeast can often be sensed more readily in the aroma than those made by acid blend additions. Carbonation often will play up the nose since the bubbles help volatilize aromatics.

Was there any **special processing** (e.g., oak aging) used in this mead? If so, do you note the character? Oaking will often impart a woody, toasty, vanilla character. Other special handling techniques will produce aromas as well. Icing will concentrate aromatics. Intentional oxidation (e.g., for Polish meads) will obviously introduce an oxidation character.

Finally, you want to consider the overall **balance**, harmony and pleasantness of the mead. Do the ingredients complement each other? Are they in balance *given the style and declared attributes* (strength, carbonation, sweetness, special ingredients) of the mead? What is your overall impression of the quality of the mead? Is it well-made and use good ingredients? Does it have an off odors? Is this something that you are eager to now taste?

The Wine Aroma Wheel is a tool commonly used in the wine judging community. While wine does not have exactly the same aromatics as mead, there is a substantial overlap. Until such time as an equivalent mead tool is developed, it is probably the most useful descriptor aid we have. As you progress from the center to the outside of the wheel, the descriptors become more specific. Use this to help you better describe your impressions. You are likely to initially pick up the characteristics closest to the center. See if you can further characterize them by moving outward on the wheel. Not all possible aromatics are listed; just those that are commonly found in wine. Do not feel constrained to use only these terms. If you note something that can be accurately described using equivalently-descriptive words, by all means go ahead.



Wine Aroma Wheel

Widely used by the wine judging community, buy one at *www.winearomawheel.com*

11.1.2. Assessing Mead Appearance

Assessing the appearance of mead is easy, right? Just note color, clarity and carbonation and then move on. Not so fast. Again, assessing the appearance of mead is more akin to evaluating wine than beer. We will use the techniques of wine judging to give us insight into mead, by assessing color (hue, saturation and purity), reflectance, clarity, legs, carbonation (mousse, cordon, size of bubbles, persistence of bubbles).

To describe the **color** of a mead, start with the **hue** (also known as shade). This can range from nearly water-white all the way to dark brown, although added fruits, spices, malts, and other ingredients can introduce a new color spectrum. The vast majority of honeys ferment to a water-white to dark amber range, with straw to gold being the most common. Common color descriptors include water-white, straw, yellow, gold, and amber, with some ranging into copper and brown. Each color descriptor can be further described within its range by using the adjectives *light* or *pale*, *medium*, and *dark* or *deep*.

Melomels can take on more vibrant yellow/orange, red and purple colors, using descriptors such as pink, salmon, orange, red, ruby, crimson, purple, and brick. Almost any color variation is possible, so draw upon your vocabulary to think of the appropriate color (channel your inner child to recall your Crayola 64 box) – give the color a name. Accurately describing the color provides a linkage to the ingredients used; if the color is not suggestive of the declared ingredients, there could be a problem. View against a white sheet of paper to get an accurate color reading.

Saturation or **intensity** is the depth of the color of a mead, and describes the lightness or darkness of the hue. For example, scarlet is a saturated color, while pink is not. Describing the intensity of a color might give clues into how much of an ingredient was used, or be indicative of certain ingredients. Some colors are described as deep or inky, which indicates greater intensity. If the mead is dark or intense in color, tilt the glass and view the shallow edge of the liquid. View against a white sheet of paper or in front of a light source to view the saturation level.

The **purity** of a mead is described as the correct or appropriate color for its age, showing no water edge (meniscus), and no oxidation. Brownish, dull or muted colors might be suggestive of oxidation. The color at the meniscus (rim of the mead when tilted in a glass) is indicative of concentration, maturity and richness. The more variation in color, the older the mead. An evenly colored meniscus usually indicates a younger mead. More intense colors can indicate a greater saturation, while dulled colors can indicate oxidation.

Reflectance describes the mirror-like surface of the mead, which is a positive attribute. If the mead surface is dull or has a flat appearance, it can suggest a lack of fining or filtering, or of possible spoilage.

Clarity describes the ability to transmit, absorb, or reflect light. It is often a measure of a mead's health, or of the care taken by the meadmaker. Descriptors range from *brilliant* (perfect crystal clarity), *bright* (slightly less than brilliant), *clear* (acceptable clarity), *dull* (minor clarity problem), *hazy* (serious clarity problem), to *cloudy* (unacceptable clarity). Check the mead for uniform clarity or the presence of crystals, flakes, particulates, or other "floaties" that can detract from the visual presentation. Stronger meads can have a gem-like depth to their clarity. Higher degrees of clarity are more desirable, as is the absence of any floating particulates.

Note that chilled meads can produce condensation on a glass and may seem like cloudiness. If the glass feels wet, wipe away any condensation before attempting to judge clarity (or other appearance attributes).

Assessing **legs** gives an indication as to the body, alcohol level and sweetness of a mead; it has nothing to do with quality. Swirl the glass gently and then let the swirled liquid glide slowly down the side of the glass. Look for rivulets or tearing that may appear; these are the legs. Meads with legs have higher alcohol, sugar, or body. The rate that the legs glide down the glass gives further information (the slower the tearing, the higher the alcohol, sugar or body). Wine judges often call legs by the names *tears* (the kind from crying, not ripping) or *arches*.

The final observation is about the **carbonation**. Not all meads are carbonated, so there might be nothing to describe. Note the height of any head that forms (quantity), how fast the bubbles form (rate), and how long the head persists (duration). Note the size of the bubbles. Did the bubbles form a mousse (head) or a cordon (bubbles around the rim)? Are there bubbles on the bottom of the glass, and do they rise? Characterize the carbonation (still, petillant, sparkling), realizing that still meads can have a few bubbles and sparkling meads do not have to be fizzy like soda pop.

11.1.3. Assessing Mead Flavor

When assessing the flavor of a mead, look for similar characteristics as in the aroma: honey character, sweetness, alcohol, acidity, other ingredients, and special processes. Also look for additional flavors such as bitterness, sourness and the mouthfeel of tannin, particularly as it relates to the flavor balance. Flavor, mouthfeel and aftertaste and typically considered together in mead rather than separately, as they may in a beer evaluation.

Even though you may look for individual components and try to accurately describe them, keep in mind the overall balance. The primary concern is the balance and harmony of the mead, both the acidity-sweetness-tannin balance and the balance between the honey tastes and the other tastes (such as fruit or spice) that are present in the mead. The individual components are important, but not as much as the overall impression and how well the mead relates to the expectation established by the mead style and the declared attributes (sweetness, carbonation, strength, special ingredients).

Before we talk about tasting, we first have to clear up a huge misconception about taste: the tongue map. (You know the one; it shows the tongue as tasting sweetness at the tip, bitterness at the back, and sour/salty at the sides.) While the tongue taste map has been debunked, it still frequently appears in literature. Flavor receptors exist all throughout the tongue and all tastes can be sensed in all areas. There are localized regions of higher sensitivity to certain tastes, but that does not imply that other areas do not sense those tastes. The maps also leave out the fifth basic taste, *umami* or savoriness. The bottom line is that to properly taste something, you should involve your whole mouth, tongue, and palate.

To assess the flavor of a mead, there are several techniques that can be used. All involve taking small sips; mead can be quite strong, so taking gulps is a quick way to shorten your effectiveness as a judge. Take a sip into the front of your mouth and swish the tip of your tongue through it. Take a sip and move your tongue side-to-side to swish it through your mouth. Take a sip and let it rest on the top of your tongue. Take a sip and aerate the mead by breathing over it in your mouth (it will make a slight slurping or gurgling sound). Take a sip and swallow, focusing on the

aftertaste. After swallowing, keep your mouth closed and exhale through your nose. You may pick up additional aromatics this way. These techniques can be combined. They each involve different areas of your mouth and may give you additional flavor impressions. As you develop your tasting skills, you may decide to use different tasting techniques to look for different flavor or mouthfeel elements.

The first task is to characterize the **honey** flavors and **sweetness**. Do you get a distinct, clean honey flavor or is it muddy and indistinct? Is there a varietal honey character you taste? Is it distinct and unmistakable, or rather generic? How well does the honey flavor blend in with the other flavors? How strong or intense is the honey flavor? How would you describe the honey character? Is it floral, fruity, spicy, herbal, or some other flavor?

What is the level of sweetness? Common descriptors include: bone dry, dry, off-dry, slightly sweet, moderately sweet, moderately-high sweet, sweet (or high sweetness), very sweet, or cloyingly sweet. Do not confuse sweetness with fruitiness or honey flavor – sweetness is only a measure of residual sugar.

Next look for the structural elements of **acidity** and **tannin**, which balance the honey flavor and sweetness. Acidity is the tingle, tartness, zing or liveliness in a mead. It can be described as flat or flabby (not enough acid), pleasant (balanced), tart (acidity is forward) or sour/acidic (high acidity). Low acidity is soft, plump, smooth, while high acidity, is crisp, tangy, tingly, and mouthwatering. The level of acidity usually isn't described in absolute terms, but rather in the balance when compared to sweetness. Tannin can be described in low to high terms (see Mouthfeel for specific descriptors). The overall balance of acidity and tannin to sweetness and honey flavor should be noted.

Alcohol flavors and **bitterness** can be described next. Alcohol does have a taste but it is usually sensed as a warming (good) or burning (bad) mouthfeel, if noted at all. Higher alcohol levels can introduce bitterness. Bitterness is not very common in mead, although there are ingredients that might introduce some. Alcohol and bitterness can affect the overall balance, and should be noted if detected. As with strong beer and wines, the best meads often have a "sneaky" quality to them where the alcohol is often felt more than it is tasted.

The **special ingredients** and processes can add another whole realm of flavors: fruit, spice, malt, oak, etc. Some honeys and yeast can produce flavors that mimic those from fruit and spices. However, if there are special ingredients declared, those should be noticeable and generally identifiable but well balanced and harmonious with the other ingredients (relative to the style and intent of the mead). Entire books have been written on characterizing flavors such as these. Try to generally describe the character and strength of each flavor component you detect. See if you can give it a name (e.g. cinnamon) or at least a general description (e.g., spicy), and an intensity (light, moderate, strong). The more descriptive you can be, the more information you are passing along.

Normally, **yeast**-derived flavors are mentioned along with discussions of fruit, spice or alcohol. However, if there are fermentation **flaws**, those should be noted. See the list of characteristics in Troubleshooting Common Faults for more information – most of the faults can be tasted. If no fermentation issues are noted, identify the mead as having a *clean* fermentation.

The **aftertaste** of the mead is the flavor impression you get once you have swallows the mead. You can describe the length (short, medium, long, memorable) of the aftertaste, which is the

duration it takes for the flavors to dissipate. What kinds of flavors are you getting in the aftertaste? Are they different from flavors noted when tasting the mead? Are they pleasant and balanced? Is there anything off?

Note that taste perceptions can be influenced by mouthfeel textures. Alcohol enhances the perception of sweetness, reinforces acidity, can mask odors, and may cause a burning sensation. Astringency may have a rough, gritty character and can mask bitterness and reduce the perception of sweetness. Bitterness is often confused with astringency (bitterness is a taste, astringency is a mouthfeel).

The overall **balance** of the mead should be described. Balance is relative to the specific style of mead and its attributes (sweetness, strength, carbonation, special ingredients). Balance does *not* mean that flavors are in equal proportions or intensities – a sweet mead will definitely have more sweetness than a dry mead, yet both can be balanced. A sweet mead requires sufficient acidity and/or tannin, or it will seem flabby. Balance describes how well the individual components complement each other in the intended style of the meadmaker.

When discussing balance, identify if any components are too strong or weak. Does any individual component overshadow the mead, even when taking style into account? Is there any component that is lacking (e.g., not enough alcohol in a sack mead)? Are the special ingredients identifiable yet not overly dominant? The best meads are not one-dimensional; they have interest and character. They do not all have to be complex; dry, delicate, restrained meads can be wonderful. Do not attempt to equate a dry hydromel to a sweet sack mead in complexity and character; judging them each on balance relative to their intended style is the best way to level the playing field.

Keep the aroma in mind when evaluating the final taste of the mead. Do the flavors you get match what you expected given the aroma? Do the flavors mirror the aromatics? For example, if you smelled blackberries, did you taste them as well? Are there any additional flavors? If so, what are they? Is the mead balanced? Are the tastes present in the proper proportion given the style and declared attributes? These questions often will give you the best idea of the overall impression of the mead.

An example of a flavor wheel for describing wine was found online (the original source was in Australia), but it is not widely used in the wine judging community. However, the basic idea is sound and can be applied to mead. This is less of a guideline than merely an example of how flavor descriptors can be organized. Use it when developing your own lexicon and when learning the various flavor elements in mead. Start with a broad characterization of the flavors you sense, and then see if you can give them specific names. The names don't have to be fancy; whatever mental association you have with the flavor is sufficient if it conveys information.

Wine Flavor Wheel
(Not widely adopted)

11.1.4. Assessing Mead Mouthfeel

Mouthfeel describes the non-flavor sensations in your mouth when you taste something. It includes the tactile sensations, the textures, and the feelings associated with drinking. The sparkle of carbonation, the warmth of alcohol, the sharpness of acidity, and the roughness of tannin are all mouthfeel characteristics. The body of the liquid provides weight on your tongue, and may coat your mouth. Tingling, numbing, drying, cooling, warming and coating are all mouthfeel sensations. Mead can be described in textures such as smooth, soft, velvety, rough,

hard, or harsh. Since the tannin level of mead is important to the overall balance, it is not as easy to separate flavor from mouthfeel as it is in beer. Flavor, mouthfeel, and aftertaste are best judged together.

The most straightforward components of mouthfeel in mead are the same ones used in beer judging: body, carbonation and alcohol warmth. Body is a measure of the relative viscosity of mead (weight of the mead on your tongue), and can range from light/thin to medium to heavy/full. These are the normal ranges for body, but a mead could have lighter or heavier body as a fault. A very light body is described as watery, while a very full body is viscous, thick or syrupy. As a very general analogy, light body is like skim milk, medium body is like whole milk, and full body is like cream. The perception of body is influenced by alcohol and sweetness levels; stronger and sweeter meads will seem to have a fuller body.

Carbonation describes the level of dissolved carbon dioxide in solution, and ranges from still (lightly carbonated) to petillant (moderately carbonated) to sparkling (highly carbonated). Still does not imply totally flat, a light level of carbonation is acceptable. Sparkling has a fairly wide range as well, with *spumante* being used for the highest level of carbonation. High levels of carbonation could also be described as effervescent, while fizzy and gassy are typically negative terms implying too much carbonation. Bubbly and Champagne-like are more positive terms, when applied to sparkling meads.

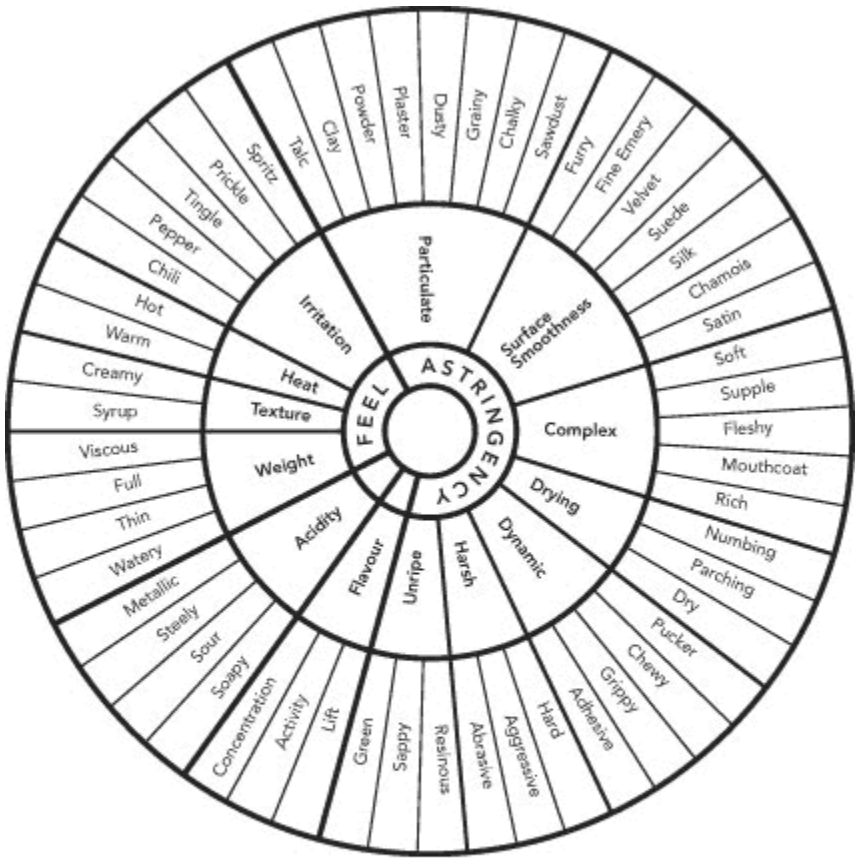
The alcohol in a mead can be unnoticeable, or provide a pleasantly warming sensation to a hot burn. A smooth warming quality is a positive character in a stronger mead. Hot, solventy, burning sensations are always a negative. Stronger meads should have noticeable alcohol, but the alcohol should be well-blended and balanced with other flavors. Higher alcohol generally is perceived as having increased body, more warmth, and perhaps a bit more bitterness.

The acidity in a mead might be noted, particularly if it becomes sharp, puckering or tingly. A well-balanced acidity is more commonly noted in the flavor section. High levels of acidity might affect mouthfeel in a generally negative way.

Tannins in mead definitely affect mouthfeel. Astringency, dryness and puckering are common characteristics, particularly when tannins are over-used; note any of them. A pleasant balance might not be noted in mouthfeel, but excessive tannins should always be mentioned. Oaking the mead can introduce tannins in addition to flavor elements.

When describing mouthfeel, try to separate the flavor components from the mouthfeel components. The astringent, mouth-puckering qualities are what should be described in the mouthfeel section. The range of terms used to describe astringency includes: not astringent, smooth, soft, velvety, slightly rough, moderately astringent, rough, harsh, very rough, coarse, tannic, and highly astringent. Astringency tends to moderate over time as the mead ages.

An example of a mouthfeel wheel for describing red wine was found online (the original source was in Australia), but it is not widely used. However, the basic idea is sound and can be applied to mead. This is less of a guideline than merely an example of how mouthfeel descriptors can be organized. Use it when developing your own lexicon and when learning the various mouthfeel elements in mead.



Mouth-feel Wheel
Terminology for Communicating the Mouth-feel of Red Wine

Source: Gawel, R., Oberholster, A. and Francis, I.L. (2000)
Australian Journal of Grape and Wine Research, 6(3), 203-207

Wine Mouthfeel Wheel
(Not widely used)

11.2. Basic Mechanics of Mead Judging

Mead judging is slightly different from mead evaluation in that it is a structured evaluation of mead in the context of a competition. The basics of evaluation are still present, but the perceptions are recorded in a structured manner on a scoresheet along with feedback to the meadmaker. Numerical scores are assigned, as are relative rankings that determine awards. Entrants pay for this feedback and scoring, so it is your duty to give the judging your best effort.

As a mead judge, you have been called upon to give your impression and objective critical opinion of the meads in the flight placed before you. Just how is this accomplished? If you have judged beer in the past, you already have most of the basic skills and knowledge necessary to judge mead because the procedures to judge beer and mead have much in common. However, mead judging does have its own idiosyncrasies and deserves its own discussion.

11.2.1. Getting Ready for the Flight

Before the meads are brought to the judging table, look over the information provided by the competition organizer. This should include a set of style guidelines explaining the standards against which the meads are to be judged. Make yourself familiar with the specific styles in your flight, and discuss the characteristics you will be looking for with the other judges at the table.

There should also be a list of the meads to be judged in your flight, along with the specific modifiers (variety of honey, strength, sweetness and carbonation level) for each mead. Go over this list and decide on the order in which you would like to judge the meads. In general, start with meads that are drier and lower in alcohol than ones that are sweeter and stronger. Think about the overall palate impact of all the ingredients in the mead (including fruits, spices and other ingredients), and judge them in increasing order of intensity. This helps preserve your palate so it won't get overwhelmed by strong tastes early in the flight, and so that you will be able to fairly judge each mead.

Discuss the judging order with your steward, as well as the serving temperature. Depending on how the meads have been stored, you may wish to pull some or all of the meads so they can warm up. Ask if any of the meads have corked bottles; if so, make sure a corkscrew is available.

Finally, take note of the number of meads to be judged in the flight. If there are a large number, remember to take smaller sips so you can avoid becoming intoxicated. Pace yourself and remember to drink water between meads to clear your palate and to stay hydrated. If you start feeling the effects of the alcohol, slow down and have some bread and water. Take a break and stretch your legs if necessary.

11.2.2. Judging a Single Entry

Most judges develop a personal method for judging mead through experience. Here we outline a general process that is known to work and that may be used as the basis of your personal judging regimen. The process is somewhat independent of the scoresheet used, since that aspect of judging concerns capturing your perceptions, opinions and judgments rather than conceptualizing them. This process ensures that you will give a complete evaluation to each mead you judge.

1. Fill in the scoresheet header, including information about the mead and yourself. Use pre-printed labels if provided, or your personal judging labels if you brought them.
2. If possible, do a bottle inspection before serving each mead, looking for fill level, bacterial rings (a rarity in mead), and sediment level. Green or clear bottles are fine, as skunkiness shouldn't be a problem in meads (unless it is a hopped braggot). Don't prejudge the mead; simply note the information in case you need it to help diagnose a problem.
3. Open the mead and pour one to three ounces. Decant slowly off any sediment that may be present. Note that sediment in mead may not be as tightly packed as in beer, so be careful in agitating the bottle. Pour all glasses before righting the bottle; tilting the bottle back and forth will certainly rouse sediment if present.

4. After pouring a sample, quickly inhale the aromas. Use long, deep sniffs or short, shallow sniffs – whatever works best for you, as long as you are consistent for all meads judged.
5. Write down your initial impression of the aroma and bouquet. Comment on the honey character, the fermentation character, the presence of other ingredients, and the overall balance, harmony and pleasantness of the mead. Use the methods described in Assessing Mead Aromatics. Try to be specific when describing your perceptions, and be sure to quantify them (i.e., how strong are they?). Talk about the relative balance of the perceptions. Comment on any expected perceptions for the style that are present or absent. Use descriptive language rather than personally subjective terms (e.g., "strong, floral, orange blossom-like aroma" rather than "good aroma").
6. Move on to Appearance. Comment on the mead's color – try to name it specifically: water-white, pale straw, deep golden, medium amber, etc., and relate it to the style expectations. Note the clarity: cloudy, turbid, clear, brilliant, opaque. Again, what does the style require? Finally, note any carbonation. A still mead with slight carbonation should not merit a big deduction, but in general the carbonation level should match what was declared by the meadmaker. Be sure to make notes of everything you detect about the appearance.
7. Now smell the mead again and take a slow sip. Form an initial impression from the first taste, and allow it to linger a few seconds before swallowing. Note the finish (as you swallow) and aftertaste (a few seconds later). Consider the factors described in Assessing Mead Flavor. As with aroma, try to be specific about describing what you are tasting and identifying the relative strength. Where in your mouth are you tasting it? How does it feel on your tongue? Note the presence or absence of any required style characteristics. Describe any faults if present. Be sure to note the balance from start to finish and into aftertaste.
8. Assess the mouthfeel of the mead. Consider the factors described in Assessing Mead Mouthfeel. Be complete and describe body, carbonation, alcohol, astringency and other sensations. Note whether the attribute is appropriate for the style.
9. In the Overall Impression section, give your general impression of the mead. Give objective comments on how the mead fits the intended styles. If flaws are noted, point to possible causes.
10. Make sure to cleanse your palate between entries with water, bland bread or a cracker. Do your preliminary judging and scoring in silence so that you do not influence the other judges. The entrant will benefit more from several independent judgings than from several version of the same outspoken judge's opinions. Regardless of how you assign scores, put the most emphasis on giving complete and thorough written comments, because they will matter more to most meadmakers than the overall score.

There are several important points to keep in mind throughout the judging process. First off, avoid negative comments. Emphasize the mead's positive attributes, even if it is awful. Diplomacy is a valuable skill as a mead judge. Also, try not to be too specific, since you do not know how the mead was made.

Make sure any checkboxes describing the mead are appropriately checked, whether it involves identifying off-flavors, or simply describing your view of the stylistic, technical and intangible merits of the mead.

Note that an experienced mead judge should be able to completely perform a written evaluation in about ten minutes. The scoresheet should be completely filled in, legible, and added correctly. The assigned score should agree with the comments, and should make sense when compared against the Scoring Guide.

Finally, the most important thing is that a good mead evaluation should provide a thorough sensory evaluation. Make sure the entrant understands what attributes the mead has (or doesn't have) that justify the score. Opinions are best kept to yourself, but if you can offer any constructive advice, it is worthwhile to do so. Just keep in mind that you don't know what the meadmaker did, so you are at best making educated guesses when you offer advice.

11.3. Preparing Scoresheets at Competitions

While the prior section is adequate to describe how to judge mead by yourself, competitions aren't run like that. You will always be assigned to a judging team, and you will have to interact with other judges. The manner in which you assign a score and then work with your team will in large part determine your success. While you will not judge meads as a team on the exam, your scoring will be assessed against the proctor panel of high-ranking judges. Your scores will also be compared against other examinees. If you haven't had the opportunity to judge with other BJCP judges and develop a sense of scoring calibration, the following discussion will be of value to you.

11.3.1. The Standard BJCP Scoresheet

Although evaluating mead is an inherently subjective task, preparing high-quality scoresheets is not. This section is not about how to gain better perception skills, how to describe what has been perceived, or how to provide feedback to the meadmaker. Rather, this discussion is focused on how to score a mead, and how to calibrate scoring with other judges, and how to reach a consensus during judging. These skills often distinguish an effective mead judge from simply being a knowledgeable taster. A good judge should be able to tactfully apply judging techniques in practical situations to produce accurate and helpful scoresheets.

Scoring Methods

There are generally three approaches to scoring meads. The first technique assumes that a mead starts with a perfect score of 50. Points are then deducted for style and technical issues to get to the target score. The second method starts by assigning the mead zero points, and then adds points for each positive characteristic to reach the target score. The third approach starts in the middle, and then adjusts upward or downward based on comparison to an average mead.

A problem with the first two approaches is that there is no defined specific point allocation for each potential characteristic, whether present or not or in the correct percentage. There is some general guidance but it is not at a granular enough level to be applicable. For example, under Flavor there are 14 points allocated to "balance of acidity, sweetness, alcohol strength, body, carbonation and other ingredients as appropriate" – OK, how do you assign points for that?

Judges who successfully use one of these two methods generally create an allocation points for each of the cues (as is done well in the Appearance section, where color, clarity, and carbonation are each allocated two points). The judges then add or deduct points based on how well each cue is represented in the mead. This approach requires significant judgment and experience to do properly, but is often the most analytical solution.

The Aroma section is worth 10 points but only has two cues: expression of honey, and expression of other ingredients. What about traditional meads? There are no "other ingredients" – does that mean that you can only give a traditional mead five out of ten points? Of course not. Judges think about what components belong in a perfect example of the given mead (e.g., honey varietal character, esters, fermentation character, alcohol, sweetness, complexity, etc.) and assign points accordingly.

For each defined characteristic, the judge would assess how well it meets the style guidelines or whether it contains faults. A full score is given to a component that is properly represented, while a low score is given to a characteristic where there is a problem. The component scores are summed to get the overall section score.

The third approach starts at a neutral point of scoring in each section, especially Aroma, Flavor and Overall Impression sections, and then adds or subtracts points depending on whether the characteristic is better or worse than an "average" example of the mead. For example, if the aroma of a specific mead in a stated style has stylistic or technical faults, then subtract from the mid-point of six. If there are positive qualities to the aroma that exemplify the style, then add points until you approach the ideal score of 10.

This approach works well for the Flavor section as well. A mead that has neither faults nor particularly good qualities could earn the mid-point score of 12. As the flavor more exemplifies the qualities of the style, award points to approach the ideal score of 24. If technical or stylistic faults are present that detract from the flavor expectations, then subtract points from the mid-point score of 12.

For the Overall Impression section, the same approach is also successful but can be modified by considering how the mead ranks in one's experience and desire to drink more of the mead. A mead that is nearly perfect and commercial quality would receive a score closer to the ideal 10, while a mead that is just undrinkable might receive a score closer to the bottom of the scale. In the middle is the mead that isn't particularly good, but not terrible either.

The choice of approach often depends on the personality and experience of the individual judge. Very experienced judges can often quickly assign a "top-down" or holistic score based on overall characteristics. Very analytical judges (of any experience level) will often the "bottoms-up" method of assigning and totaling individual component points. Each can be effectively used in practical situations, provided the final assigned score accurately represents the quality and style conformance of the mead.

Regardless of scoring method used, there is a need to perform an overall scoring sanity check after the initial score has been determined. Experience will enable a judge to quickly assess an appropriate score for a mead within the first few sniffs and sips. Until that skill is learned, the Scoring Guide printed on the scoresheet provides a reference for the score range of meads of varying quality. After adding up the total score from the individual sections, check this against

the Scoring Guide listed on the judging form. If there's a discrepancy, review and revise the scores or the descriptions so that the score and the description in the Scoring Guide are aligned.

Scoring Calibration

Since we don't want to completely discourage a meadmaker, most judges will skew scores away from the very bottom of 50 point scale with an unofficial minimum of 13. It is acceptable to go below 13 for extremely infected examples or meads that are essentially undrinkable, but this should be done only in rare circumstances. Many judges, particularly ones who learned using older versions of the scoresheet, use a practical minimum of 19 for all but the most horrific examples.

Likewise, many judges don't award scores high into the 40s because they either tend to find faults when there are none, desire to reserve space for a higher score should a better mead in the flight be presented, or are fearful of having to defend the bold position of awarding a high score to their judging partners.

These self-imposed constraints mean that the full 50 point scale often isn't used. Don't worry excessively about that; there are few absolutes in scoring. In competitions, the scoring and ranking are not only subjective, but more importantly, relative. Give the mead an honest and thorough organoleptic assessment and make sure the best meads get the highest scores. Strive to keep the scores of individual meads aligned with their relative rank within the flight. If you maintain scoring calibration throughout the flight, you won't need to go back and retaste meads once the flight has concluded.

Many judges develop certain heuristics for assigning scores to meads with certain problems or characteristics. The Scoring Guide on the scoresheet gives a general feel to these categories, but the specifics are rather sparse due to space limitations. Some judges use a system such as:

- A clearly out-of-style mead is capped in score at 30
- A clearly out-of-style mead that does not have technical faults bottoms out at a score of 20
- A mead with a single bad fault is capped in score at 25
- A mead with a bad infection is capped in score at 20

These simple rules help a judge move a mead into the right scoring range quickly. Within these ranges, meads with more faults or with worse faults score at the lower end of the range. In general, meads with technical faults score lower than mead with style faults since technical faults usually affect overall drinkability and enjoyment to a greater extent. Meads with fermentation faults are often punished the most, since fermentation is at the heart of creating mead.

Scoring Reconciliation

This brings us to the reconciliation of scores between judging partners. Some organizers will ask judges to score within seven points of each other, while others will target a less than five point spread. Three points or less is really the ideal target; it provides the best feedback to the meadmaker in terms of confidence in the evaluation.

Simply calculating the arithmetic mean of the scores will result in an average score that conveys information as the consensus for the mead. However, the variance (distance of individual scores from the arithmetic mean) implies additional information. Higher variances indicate greater

dispersion in scores, and imply a larger disagreement about how the mead should be valued. When judges have a low variance in score, the meadmaker will see a more consistent message and believe the final assigned score is more credible.

Regardless of the desired point spread, there are frequently occasions where judging partners must decide on a consensus score for a mead about which they fundamentally disagree. There are many different techniques for reaching a consensus score, and several best practices for resolving disputes.

First of all, remember that judging is subjective. Differences of opinion can exist for a variety of reasons between skilled judges with good intentions. If judging was truly objective, then a score could be determined solely by lab analysis. Remember, there is not necessarily a "right" score for a given mead.

Judges should strive for a common understanding of both the mead being judged and the style guideline against which it is evaluated. If judging partners are in agreement as to the style and to the mead, then they should be able to agree on scoring within a small range. Use the Scoring Guidelines printed on the scoresheet as a reference.

Differences of score usually are derived from a disagreement on the style or more typically on the perceptions and faults in a mead. Seek to narrow down the basis of disagreement and see if those points can be resolved. If opinions change as a result of discussion, then scores and comments on the scoresheet should be adjusted accordingly.

If judges are far apart in score, try to understand the basis for the difference. The judges should ask each other what they perceived that caused them to score the mead the way they did. Compare the basis each judge used for assigning their initial scores. See if you can isolate the reasons for the difference in scoring.

If the differences are based on conformance to style, refer to the Style Guidelines and see if you can agree on the style definition using the Guidelines as the referee. They are really quite detailed and specifically designed to help in this purpose. If all judges have tried commercial examples, discuss your memory of them. Compare the mead being judged to classic examples of the style. If one of the judges has an incomplete understanding of the style, try to resolve that knowledge gap and then rescore the mead. Tact is critical, as a judge whose knowledge level isn't up to the top level may become defensive.

If the differences are based on a perception of an attribute of the mead, or perception of a fault, try to come to a common agreement on whether that attribute/fault is present in the mead being judged or not. Maybe one of the judges has a higher threshold for perceiving the attribute (for example, a sizable portion of the population cannot sense diacetyl.) Maybe one of the judges isn't familiar with how to perceive a certain fault. If one of the judges realizes their perception is wrong, then recalculate the score based on that new understanding.

If the judges agree on the presence of a technical or stylistic fault, ask how each judge weighted the fault. Some judges may deduct more for faults than others. Simply entry errors in sweetness or carbonation, such as describing a mead as sweet when it is really medium, should not merit much of a deduction. These levels are often fairly subjective. Reserve major deductions for real issues in the mead, not trivial issues.

If you discuss the mead with your judging partner and find that your perceptions differ, you might note on your scoresheet that the other judge got <fault> and you didn't. The entrant might

be able to infer that different judges have different perceptions and they can take that for what it's worth. Believe me, entrants are used to judges saying contradictory things. If you address it head on, at least they will understand what happened.

If the judges can't agree whether a fault is present or not, they may ask for another opinion. This is not something that should be done very often, but they could ask a highly regarded judge from another panel (or an organizer or staff member) to confirm if something is there or not. Be sure to ask that judge if they have an entry in the flight before their opinion is sought, however. This is just about the last resort for resolving a difference.

If judges still can't agree on a consensus, then it's best to agree to disagree. Keep each scoresheet as originally written and just average the scores for the consensus. See if the judges then agree with the assigned score. That will usually work. The meadmaker will see that a strong disagreement existed and perhaps conclude that their mead was either a "love it or hate it" experience.

If you consider that advice extreme, consider the following actual case: A high-ranked BJCP judge once was partnered with a professional brewer in a homebrew competition. The pro brewer listed few comments on the scoresheet, wrote in pen, and wouldn't accept anyone else's opinion. The judge tried several times to engage the brewer in discussing meads, but the brewer wouldn't budge and didn't really care about other opinions. The judge simple wrote off the flight, and decided further discussion was pointless. Each judge wrote their scoresheets and assigned their scores. The scores were averaged regardless of the difference, and the next mead was brought. Reconciliation was essentially impossible in this scenario. The senior judge did speak with the competition organizers afterwards, in the hopes that the stubborn brewer would not be invited back in the future. A more confrontational approach would have the senior judge speak with the organizers as soon as the incident started, but this isn't always practical. This case is mentioned simply to illustrate the extremes of what can actually happen in judging, and the need to keep a flexible approach in reconciling scores. Hopefully, most judges will be able to talk to the other judges and not run into that situation.

One critical item to remember is that you might be the one who is wrong. Don't be so overconfident in your skills and rank that you won't listen to other views. Don't be like the pro brewer in the previous anecdote: keep an open mind. When your judging partners say they detect something, try to find it—you might have missed it the first time. Ask your judging partners where and how they detected the characteristic you missed (e.g., was the flavor detected in the initial taste, mid-palate, or in the finish?). It's possible your judging partner is misperceiving something; however, give them enough respect to re-taste. Judging is subjective, and different judges have different sensitivities.

Finally, if a score has been changed significantly as a result of a discussion, make sure the comments on the scoresheet have also been adjusted to match. It is very confusing for an entrant to read a scoresheet where the score and comments seem unrelated. Sometimes it may be best to make note of the reason for changing your score in the Overall Impression section so that the entrant understands that your score may not completely reflect your initial perceptions. It's much better to have comments be consistent with the score on a scoresheet than to have scoresheets from multiple judges have suspiciously identical scores.

11.4. Thoughts on Mead Judging

This essay by Kristen England contains observations about mead judging that don't fit elsewhere. These tidbits cover various situations that can arise while judging and how one judge chooses to handle them. While not hard-and-fast rules, these thoughts should be considered best practices. Similar discussions can be found online in the ***Advanced Judging FAQ*** *in the BJCP Forum (found on the BJCP website).*

Just as wine does not taste like sweet grapes, mead should not simply be a cloyingly sweet honey cocktail. While honey character should be evident, the mead should also be balanced and drinkable. Inasmuch, judges should consider all of the following aspects when evaluating a mead:

On bias

Most people prefer sweet meads to dry, carbonated to still, and sack strength to hydromel. You must understand your own preference in order to keep it from biasing your judgment. Point short, do not let your mead *liking/wanting* to influence your mead *judging*.

On quantitative levels

Although the entrant must specify the carbonation level, sweetness and strength, judges often place too much emphasis on these indicators during evaluation and scoring. It would serve a judge well to be aware that a person's perceptions of sweetness and carbonation levels are extremely subjective. Give the entrant the benefit of the doubt and take everything with a grain of salt. If the entry is completely off the mark, the following point deductions should be made off the top of the total score:

- -3 points = Two levels off (e.g., sweet but entered as dry, sparkling but entered as still)
- -1 point = One level off (e.g., sweet but entered as semi, petillant but entered as dry)

On drinkability

First and foremost, ensure that the mead is readily drinkable. Lighter, drier meads will be more delicate and quaffable. Sweet meads, which are more like dessert wines, will be much "heavier" and not as refreshing. In either instance, both should be finished products (properly fermented or attenuated, properly aged or conditioned, and readily drinkable).

On honey varietals

Each varietal should reflect its monofloral description. It's very important to note that there is always some variation due to source region, year/season collected, and climactic conditions during the growing season. Just ensure that the mead is following the "theme" of the variety. Sweeter meads will always have more varietal character simply because more honey was used in their making. If possible, a description of the honey variety should be provided. If one isn't, do your best by looking for common floral markers, and seeing if a noticeable varietal character is present (even if you don't recognize it).

On adjuncts

Be sure you understand what adjuncts are present, and what character they provide to mead. When in doubt, ask other judges and keep asking until you find the answer. There are so many

things that can be added to a mead that it does the entrant an injustice if you don't ask a simple question.

- Pyment specific: Grape varieties are not always to be thought of as wine varieties. For example, chardonnay grapes are not inherently buttery even though a lot of chardonnay wine is buttery.
- Levels: The adjunct should never completely overpower the mead. The levels can be very high but one should be able to detect either the honey (varietal) or the fermented honey character.

On balance

There are three components that need to be addressed when thinking about balance in a mead: sweetness, acidity and tannin. These vary by the type of mead. Sweeter meads will need a greater amount of acid to balance them than drier meads. Traditional meads will have nearly no tannin as honey doesn't naturally possess it. Grapes, berries and stone fruits usually contain quite a bit of tannin from their skins. Same theme goes for acidic fruits. Importantly, there should be a crispness to the finish of every mead no matter the sweetness to keep it from being flabby. Finally, no mead should have a "raw" or unfermented honey flavor.