MAKING & FERMENTING THE MASH
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# 1. Table of Ingredients for the Mash

The following table gives the quantities of ingredients needed per gallon of mash to ferment:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>To obtain 1 gallon of Mash</th>
<th>To obtain 5 gallons of Mash</th>
<th>To obtain 10 gallons of Mash</th>
<th>To obtain 25 gallons of Mash</th>
<th>To obtain 50 gallons of Mash</th>
<th>To obtain 100 gallons of Mash</th>
<th>To obtain 300 gallons of Mash</th>
<th>To obtain 1000 gallons of Mash</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pounds of Corn</td>
<td>2</td>
<td>10</td>
<td>15</td>
<td>40</td>
<td>75</td>
<td>150</td>
<td>400</td>
<td>1200</td>
</tr>
<tr>
<td>Pounds of Sugar</td>
<td>1</td>
<td>6</td>
<td>12</td>
<td>30</td>
<td>60</td>
<td>120</td>
<td>360</td>
<td>1200</td>
</tr>
<tr>
<td>Yeast (optional)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yeast if in Moist Block</td>
<td>1 teaspoon</td>
<td>1 tablespoon</td>
<td>1/5 cup</td>
<td>1/3 cup</td>
<td>1/2 cup</td>
<td>1 cup</td>
<td>3 cups</td>
<td>3 pounds</td>
</tr>
<tr>
<td>Yeast if in Dry Powder</td>
<td>1/2 teaspoon</td>
<td>1 teaspoon</td>
<td>1/15 cup</td>
<td>1/9 cup</td>
<td>1/6 cup</td>
<td>1/3 cup</td>
<td>1 cup</td>
<td>1 pound</td>
</tr>
<tr>
<td>Gallons of Water</td>
<td>1.25</td>
<td>5</td>
<td>10</td>
<td>25</td>
<td>50</td>
<td>100</td>
<td>300</td>
<td>1000</td>
</tr>
</tbody>
</table>

Starters in distillation should begin with:

1. 1 gallon of mash, with the quantities of ingredients indicated in the first column in grey of the table above.

2. A 5-gallon glass carboy container to ferment the mash.

3. A 2-gallon Pressure Cooker Still.
2. About Myths

There are many myths in the fermentation process. In what follows we explain what is strictly needed, without introducing any of those myths.

3. Making and Fermenting Mash from Whole Corn or Directly from Corn Meal

If you use whole corn:

1. In a container 20% to 30% larger than the quantity of corn to be processed, make a slow dripping hole.
2. Then place the corn in the container, and fill with hot warm water ½ feet above the corn level.
3. For 3 days or until the corn has sprouts 2 inches long, add warm water as necessary to maintain the water level in the container.
4. Once the corn has sprouted 2 inches, leave it dry and then grind it into corn meal.

Alternatively you can directly start with corn meal.
4. For Starters in Distillation

1. Buy supermarket corn meal.

2. Use a very clean 5-gallon water glass carboy container.

3. Make in the lid 12 holes of 1/8”, to allow for the carbon dioxide of the fermentation to escape, otherwise the container may burst.

4. The first column, in grey, of the table of the first page, gives the ingredients and quantities needed to obtain 1 gallon of fermented mash for this 5-gallon glass carboy container.

5. If you decide to use yeast, the water to pour into the container should not be warmer than about 83° F (28.3° C). The yeast dies at 104° F (40° C). Read about yeast in the section below.

6. After you put the ingredients, and before pouring the yeast (if you decide to use yeast), shake well.

7. Then add the yeast, leave the container a few minutes for the first carbon dioxide to escape.

8. Put the poked lid back on.

9. Keep the container with the mash in a warm place.
5. **Sugar**

You can make mash using regular grain sugar or, to reduce cost, using waste materials from bakeries or canneries, or plant a crop high in sugar content such as fruits or fodder beets and make your own molasses.

6. **Ethyl Alcohol Produced by Sugar**

Sugar will produce 51.1% of ethyl alcohol and 48.9% of carbon dioxide.

By way of example: 1 pound of sugar will produce 0.511 pound of alcohol. Converting to gallon multiplying the pound by the coefficient 0.125, we obtain $0.511 \times 0.125 = 0.064$ gallon of ethyl alcohol at 40% alcohol. This under ideal fermentation conditions. But in the practice of a home operation that yield will unlikely be more than 70% of the ideal. Consequently, 1 pound of sugar will yield about $0.064 \times 0.70 = 0.045$ gallon of ethyl alcohol. In other words: **1 pound of sugar will yield about 1/20 of a gallon of ethyl alcohol.**
7. Yeast

Yeast is not strictly necessary, unless you want to accelerate the fermentation. If you do not use yeast the fermentation process may take 12 days or longer. If you use yeast the process will be shortened in half because yeast acts as a catalyst (= facilitator and accelerator of the process).

When using yeast the water should not be warmer than 83° F (28.3° C), because the yeast dies at 104° F (40° C), and some room must be left for the heat produced by the initial fermentation. If for large volumes of fermentation the temperature increases over that threshold, then you should add tap or cooled water. For very large fermentation volumes this could not be enough and you will have to use a cooling system. But we are not concerned with such large volumes.

Yeast considered here is baker’s yeast, whether in moist block or in dry powder. The dry powder is recommended because it is about 3 times more active (reason: it has more surface exposed to the fermenting reaction). Consequently you have to use 3 times less yeast than in the case of moist blocks. If the cost of the dry powder is less than 3 times per pound the cost of the moist block, then use the dry powder yeast. Use fresh moist block or fresh dry powder yeast, otherwise the yeast could be inert or useless. Block yeast should be mixed with water and turned into a cream before mixing it with the other mash ingredients.

8. Turbo Yeast and Nutrients

We do not recommend the use of turbo yeasts if you can wait for the fermentation process to evolve normally. Turbo yeasts cannot produce more alcohol than chemically allowed by the sugar (= glucose) molecules. The claims that they produce more alcohol in percentage (15% alcohol instead of the 12% to 13% with baker’s yeast) is because with turbo yeasts you use less water and,
consequently, the percentage of alcohol in the mash increases. But the water will be evaporated in
the distillation process anyway.

If you decide to use yeast to accelerate the fermentation, and you use the amounts of yeast
indicated in the table, you do not need to add nutrients, unless you want to further accelerate the
process. Nutrients is what turbo yeasts have to accelerate the process.

9. Carbon Dioxide Shield and No Need of Air Locks

You may have heard about the need to use an airlock if you use yeast.
The conversion of sugar to alcohol by means of yeast is a process that occurs in the absence of air (=
an aerobic reaction). In the presence of air the yeast will multiply and grow instead of producing
alcohol. But the quantities of carbon dioxide produced by the sugar will form a protective shield
against the air, and consequently there is no need for an airlock.

10. Tap Water and Distilled Water

Distilled water is not necessary for the fermentation process. Tap water suffices. To reduce
chlorine content, that may hinder the fermentation, let the tap water in the fermenting container
for one day before pouring the other ingredients, and stir the water from time to time, or
oxygenate with and aquarium bubbler. To initially oxygenate the water, run it from a shower head
or, better, from a hose with a sprayer.

Distilled water is only necessary when the distilled alcohol has to be diluted.
11. Fermentation Process: Obtaining the Sour Mash, Wash or Beer

The optimum temperature to speed the fermentation of the mash is about 91.4° F (33° C).

1. Add warm water to the corn meal, and keep the mash warm during the fermentation process. Add the yeast if you decide to shorten the time of the process.

2. With or without yeast, the mash will start to bubble.

3. Once the mash stops bubbling and foam disappears, the fermentation process has ended: the mash has been converted into ethyl alcohol and carbon dioxide. The mash is now called sour mash, wash or beer.

You can also judge the completion of the fermentation using an hydrometer to measure the specific gravity of the beer: the original sugar solution had a specific gravity of 1.06, and when the sugar has been converted to alcohol, the hydrometer’s specific gravity reading decreases to about 0.99 because of the appearance of the alcohol with the lower specific gravity of 0.82.

4. After the fermentation has been completed let the beer stand for several hours for the solids to settle to the bottom of the container.

5. After settled, the beer is ready to be extracted for distillation. Try to extract just the beer without the solids. You can connect a valve and a hose to the bottom of the fermenting container to drain the beer through a filter into an intermediary container, before pouring the beer into the boiler (in the case of the Pressure Cooker Still, the boiler is the pressure cooker itself).