

[1] Effect of sugar on egg whites

The more runny the egg white, the less the sugar granules are dissolved. Whisking until a foam is formed and then adding sugar gradually was most effective as the meringue was stiff. This is because the egg white had a chance to expand and incorporate air so by the time the sugar went in slowly, it could focus on dissolving the granules rather than incorporating air and dissolving the sugar. So the key to the perfect meringue is to form soft peaks first so it has air in the egg whites and to slowly add the sugar so it has a chance to mix around in the mixture and dissolve a little before more is added. The reason why adding the sugar at the beginning failed was because the egg white hadn't got any air in it yet and it was all added at the same time. Because it got added at the start, it had time to dissolve so it worked better than B when I added the sugar at the end. This failed because all the sugar got added at the same time and it was at the end so it wasn't given a chance to dissolve. Adding sugar gradually from the start was alright but the egg white hadn't gotten any air in it before the sugar was added.

[2] When making pies, it is important to get the right crust to filling ratio. Too little filling will make the pie taste boring. Too much filling will ooze out of the pie when cooking or eating. Preparing too much filling is a waste. The depth and width of the pie shell have to be taken into consideration to get the ratio right.

One way of trying to get this ratio right is to try to add up the volume of the different ingredients that will go into the filling. As things like sugar will dissolve, this gets tricky. So some experimenting might be necessary to work out the exact volume of filling needed for a particular pie crust shell size. This could be used for future pies.

In industry, automated filling systems are used in pie making (or for quiches, cheesecakes etc). These systems deposit exact-weight portions of filling in to the pastry shell. They can be used on fillings of a range of viscosity. They can transport and place the filling gently, to prevent crushing or smearing.

[3] It is important that food safety programmes of a high standard are established.

The main concerns around contamination in pie making include:

- cross contamination of cooked and uncooked ingredients during storage time. Cooking destroys harmful bacteria, so if cooked products come into contact with raw products, they may take up that harmful bacteria.
- When the same utensils etc are used (without cleaning) to process raw, uncooked foods and also cooked foods. This can cause food poisoning bacteria (eg salmonella) to develop. (for the same reasons as above)
- Unhygienic practices (open cuts, not washing hands, sneezing etc) can cause food poisoning bacteria to be transmitted to the food
- washing meat (eg chicken) and eggs can cause the spread of bacteria onto benches etc
- Making sure that flour is not in contact with rodents and insects and foreign bodies.
- Not cooking at high enough temperature or for long enough. Safe cooking time guidelines should be followed for meat, poultry, seafood, eggs.
- Not correctly defrosting frozen pastry. This should be done in the fridge
- Not getting pies chilled when they are in the danger zone—ie straight after cooking.

Some industries use cooling conveyers to reduce the core temperature of the pie before they are frozen.

[4] The lemon meringue pie filling goes through a process called gelatinisation. This is dependent on the sugar and the corn flour. Adding heat to both these elements, along with liquid (ie water and lemon juice) thickens the mixture. It is actually the cornflour (a starch) that will cause gelatinisation when heated to the proper temperature. Flour would also work—but more would be required (as it is not just purely starch, like cornflour) and it would possibly give a floury taste. There needs to be the right amount of liquid to allow the cornflour to absorb the liquid and swell. The mixture becomes more viscous (thicker) and gluey,

Sugar and acid (lemon juice) will affect the thickness of the gelatinised starch mixture and the rate at which it gelatinises when heat is applied. The starch in the sugar ends up competing for the water, the acid breaks down the starch molecules—both contribute to thinning the mixture.

Adding butter and egg yolk will also make the mixture thicker.

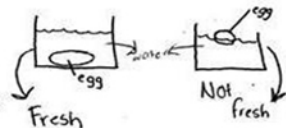
An efficient boiling point is needed, without burning the starches.

[5] In the classroom situation, meringue can be effectively piped by hand. Disposable plastic bags are often used—they can be thrown away, and contamination avoided. The bag should be twisted, to make sure there are no air bubbles. Different angles are used to achieve different shapes (eg 45 degrees—spirals, 90 degrees—stars). Pressure should be applied evenly for a particular count, depending on the shape being created.

In industry, machines are used to extrude even amounts of meringue mixture. The beating phase (required in the classroom, or at home) is eliminated. This makes it possible to reuse the granular mixture (which you can't do in the domestic situation).

[6] Before you process an egg, float it in water to test for freshness. If it floats, the air pocket has expanded and it is off.

You can also crack the egg onto a plate. The thicker the albumin (egg white) is, the fresher the egg is. If the amount of thin white is greater than thick white, the egg is possible off. The egg yolk should also be in the centre and it should be firm. The egg in the photo is not very fresh as the yolk is off centre and the thick part of the white is smaller than the thin part. It is almost off, so I wouldn't use it in my processing. This is an important test as making meringue is best with not so fresh eggs. The older whites are thinner and easier to peak, but unfresh eggs create a risk of illnesses such as salmonella.



<p>Add sugar at the beginning [7]</p>	<p>Very glossy texture but quite runny and the sugar granules hadn't completely dissolved into the mixture</p>	
<p>Add sugar at the end</p>	<p>Very runny and the texture was very very gritty so sugar had barely dissolved into the mixture, making it very unsatisfying. This was also the sweetest egg white.</p>	
<p>Add sugar gradually from the start</p>	<p>Firmer than A & B and the sugar granules had dissolved a lot more into the egg.</p>	
<p>Whisk until foam formed, then add sugar gradually</p>	<p>Very very firm, sugar granules were almost unnoticeable when rubbed between fingers. Meringue was able to be held above the head</p>	

[8] A visual check should be done to make sure there is no egg yolk or oil in the egg white (it won't beat properly otherwise). Plastic bowls are not good to use as fat/oil residue can stick to it. Copper bowls are perfect. Egg whites contain protein and no fat—the protein provides the strength to form the peaks. Egg yolks contain fat, so any bit of yolk will stop the whipping. Before the next lot of sugar is added to the meringue mix, some of the mixture can be rubbed between the thumb and forefinger to make sure the sugar is dissolved. It should feel completely smooth. Beating should continue until the whites are glossy and stand in stiff peaks. The sugar helps to stabilise the foam, so does an acid (ie cream of tartar, vinegar, lemon juice). When the beaters are taken out, test for thick, glossy, stiff peaks. Also, tip the bowl on the side—the mixture should stay in place and not slide.