

## Investigation 3

### Aim

Examining the stability of egg white foams.

### Equipment

- Digital scales
- Digital timer / stopwatch
- Large mixing bowl (needs to be very clean)
- Handheld electric whisk and whisk attachments
- Small measuring jug
- Digital camera
- Sticky labels and marker pen

### Ingredients

7 eggs, preferably left out of refrigerator overnight (need mostly whites)

Make sure eggs are all the same size, so that the test is fair. Keep yolks for other experiments, for example mayonnaise, hollandaise sauce, custard.

### Method

#### Control sample

Take your large and very clean mixing bowl, separate the egg from the white and place 30g of egg white into the mixing bowl (keep yolks for another experiment, for example to make custard, mayonnaise, hollandaise sauce, lemon curd, zabaglione etc). NOTE: it is important that the weight of the egg white stays the same.

Using the hand held electric whisk and whisk attachments, beat the egg white until it's at the stiff peak stage. Use the highest setting on the electric whisk.

Record the time it takes you to reach the stiff peak stage.

Transfer the beaten egg white into a measuring jug and record the volume of foam. Take a photograph too.

Leave to stand for 5 minutes, then 30 minutes and up to 1 hour, if you have time. Measure the volume of foam each time and take a photograph. Also, observe whether any liquid has formed at the bottom of the measuring jug.

**Variations** (follow same method as the control, so the only variable is change to the specified ingredient)

- **Variation 1** – use an egg straight from the refrigerator, and use 1 egg white. Whisk to stiff peaks
- **Variation 2** – add 1 tsp (approx. 5 ml) of egg yolk to the egg white before whisking
- **Variation 3** – add 1 tsp (approx. 5ml) cream of tartar or white wine vinegar to the egg white before whisking
- **Variation 4** – add 1 tsp (approx. 5ml) of cream of tartar or white wine vinegar to the egg white after whisking
- **Variation 5** – add 2 tbps (2 x 15 ml) of caster sugar to the egg white before whisking
- **Variation 6** – add 2 tbps (2 x 15 ml) of caster sugar to the egg white at the stiff peak stage. Whisk for up to 10 additional seconds to incorporate the caster sugar.

## Results

You are now going to compare the volume of each foam sample  
Create a table to record your results.

	Length of time it took to achieve stiff peaks	Volume of foam immediate after whisking  Comment on any 'free' liquid	Volume of foam 15 minutes after whisking  Comment on any 'free' liquid	Volume of foam 30 minutes after whisking  Comment on any 'free' liquid	Volume of foam 60 minutes after whisking  Comment on any 'free' liquid
Control					
Variation 1					
Variation 2					
Variation 3					
Variation 4					
Variation 5					
Variation 6					

## Conclusions

**Summarise your findings here. You should consider:**

How does the amount of time you spend whisking the egg whites affect foam stability?

What happens when egg yolk drops are whisked with the egg white?

What happens if acid is added to the egg white?

What happens when sugar is added to the egg white?

Which variation do you think will produce the best finished meringue?

Explain what changes take place when an egg white foam is produced.

Give examples of the use of egg white foams in cooking.

## Extension task

**Consider what other experiments you can conduct, here are some suggestions:**

Conduct the above experiment again, but this time cook the foam and compare the visual presentation. Conduct a taste test to determine the most preferred variation in terms of eating quality.

Investigate variations in the size of the bowl – how might this affect foaming?

Different types of beating equipment – how might this affect foaming? These could include a fo vfcvvvvvrk, rotary or hand beater, balloon whisk, handheld electric whisk, or free-standing food mixer with a balloon whisk attachment.

Conduct a timed experiment to determine whether foam needs to be used as soon as it's formed. Will a time delay before using the foam affect the quality of the product it is used in?

Conduct a variable of the experiment with salt. How might this affect foaming?

Explain what happens when foam is heated, for example when making a soufflé.

Experiment with cooking times and temperatures – does this have an effect in the colour, flavour and texture of the finished meringue?

Investigate why a pavlova recipe includes white wine vinegar and cornflour?

Conduct an experiment where you change the quantity of caster sugar – how will this affect the colour, flavour and texture of the finished meringue? What is the ideal ratio of egg white to caster sugar to produce a perfect meringue?

Conduct an experiment where you change the method for adding caster sugar – whisking or folding? All at once or gradually? How will this affect the colour, flavour and texture of the finished

meringue?

What is a perfect meringue?

Why do the mixing bowls have to be very clean before the egg white is placed in there?