

# STEM



## Discover Dairy

### Making Butter

#### Plan

1. Investigate sources, components, and products of dairy including discussion around what sorts of animals produce milk. As a challenge, try to find the most obscure dairy product you can – for instance yak butter or camel milk.
2. Investigate emulsions and how this applies to cream and butter. You can investigate emulsions using water and oil. It is also good to consider what other products you can find emulsions in. You can find out more about emulsions in food here: <https://www.foodrepublic.com/2015/10/29/what-is-an-emulsion/>
3. Hypothesise what other products might be made from the cream during and as part of the butter making process.
4. Collect required equipment:
  - small jar that seals tightly
  -

#### Do

1. Set up the experiment and record initial observations of the ingredients.  
Note: The cream should be at room temperature.
2. Make sure everyone is aware of the safety rules.
3. Pour cream into jars and ensure that the lid is on tight.
4. Make butter in jars using the method shown here or similar methods available: <https://www.scientificamerican.com/article/bring-science-home-shaking-butter/>.  
Make sure to discuss observations as the butter is being produced – eg. sound, feel, look, etc.
5. Taste the butter on some cracker or bread. You may like to include sprinkles to make fairy bread.

## **Review**

1. Evaluate your hypothesis. What products were made? What could these other products be used for.
2. Consider if your butter tastes like butter from the shops. If not, why not? What is present in shop butter that isn't in your butter?
3. Consider what other utensils or methods could be used to make butter? How is butter made to get to the shops?
4. Consider what conditions (temperature, type of cream, etc) work best for making butter.

## **Safety**

- Allergen warning: This challenge card involves the use of dairy and may not be suitable for individuals who are lactose or milk protein intolerant.
- Sharps risk – Glass jars may be used as part of this challenge card and, as such, there is a risk of breakage and cuts. Be careful and ensure that any broken glass is handled appropriately.

## **Variations**

- Add some extras – such as salt or flavouring – to the butter.
- Try different types of cream – i.e. lactose free cream, coconut cream, goat cream, etc. Do these also make butter? Consider why or why not?

# Making Ice Cream

## Plan

1. Investigate sources, components, and products of dairy including discussion around what sorts of animals produce milk. As a challenge, try to find the most obscure dairy product you can – for instance yak butter or camel milk. What is the most obscure type (or flavour) of ice cream you can find?
2. Investigate what is required to make ice-cream considering both ingredients and processes, including discussion around where these can be sourced from on both an industrial and homemade scale.
3. Investigate melting points and the effect of additions – such as salt – to the states of matter of water. Based on this, hypothesis the effect of adding salt to the ice and how this may help make your ice cream.
4. Investigate what effects the texture of ice cream and hypothesis what texture your ice cream might have.

## Do

1. In a small zip-lock bag, combine 60 mL thickened cream, 60 mL milk, 1 teaspoon sugar, and a few drops of vanilla essence.  
Note: This challenge works best when the milk and cream are cold.
2. Make sure that the small zip-lock bag is tightly sealed and place the small zip-lock bag in a larger zip-lock bag with 2 cups of ice and 6 teaspoons of salt before sealing the large zip-lock bag.
3. Gently shake the zip-lock bags to move the ice around the small zip-lock bag for even freezing until frozen.
4. Taste your ice-cream with desired toppings.

## Review

1. Consider if your ice cream tastes and feels like ice cream from the shops. If not, why not? What is present in shop ice cream that isn't in your ice cream?
2. Consider what other utensils or methods could be used to make ice cream? Consider how this might affect the texture of your ice cream?

## Safety

- Allergen warning: This challenge card involves the use of dairy and may not be suitable for individuals who are lactose or milk protein intolerant.
- Temperature warning: This activity involves ice and extreme temperatures. Care should be taken to avoid prolonged, direct skin contact.

# Making Cheese

## Plan

1. Investigate different types of cheese and what determines the flavour and texture of different cheeses.
2. Investigate the science behind cheese-making and the reactions that are occurring: <https://www.sciencelearn.org.nz/resources/827-the-science-of-cheese>
3. Hypothesis what other products may be made during and by the cheese-making process and what these could be used for.

## Do

1. Make your home-made cheese as per the instructions: <https://food-hacks.wonderhowto.com/how-to/easiest-way-make-quick-cheese-home-using-only-3-common-ingredients-0161183/>
2. Taste your cheese and record your observations regarding taste, texture, colour, etc.

## Review

1. Consider if your cheese tastes like cheese from the shops. If not, why not? What is present in shop cheese that isn't in your cheese? If you have access to a shop, have a look and see if you can find a cheese that has the same colour and texture as your cheese.
2. What could be done differently to improve your product? Does the type of vinegar effect the product?
3. What other sources of heat could be used for your cheese? Would this effect the product?

## Safety

- Allergen warning: This challenge card involves the use of dairy and may not be suitable for individuals who are lactose or milk protein intolerant.
- Temperature warning: Heating is required. Be careful to avoid burns and other heat related injuries.

## Variations

- Depending on factors such as time limit, budget, and age group, you can investigate other types of cheese making and cheese making kits such as those listed here: <https://cheesemaking.com/collections/recipes> and <https://www.culturesforhealth.com/learn/cheese/beginning-cheesemaking-recipes-where-to-start/>