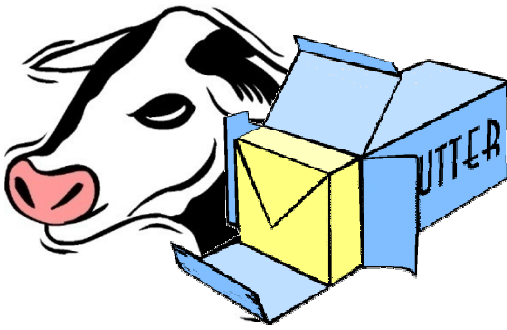


CORK BUTTER MUSEUM

Science Lesson Short Activity Sheets Answers



The Science of Butter



Lesson Four		
Science	Strand:	<ul style="list-style-type: none"> Materials.
	Strand Unit:	<ul style="list-style-type: none"> Materials and change. Properties and characteristics of materials.
	Scientific Skills:	<ul style="list-style-type: none"> Questioning, observing, investigating and experimenting. Recording and communicating.

What will I learn?	<ul style="list-style-type: none"> The procedure for making butter before the development of modern technology. The processes involved in butter production: Separation, Pasteurisation, Churning, Washing, Draining, Working, Packaging and Storage. Make your own butter and record the steps involved in making the butter. The characteristics of various types of butter: Blended, Clarified, Whipped and Whey butter.
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The Butter Museum Dictionary!



Match the word with the correct meaning. Use your dictionary to help you.
There is one answer done for you. Match up the rest!



Butter spades or paddles	To divide something from another, as found in the separation of cream and skim milk.
Separation	To heat for a certain length of time. Food and drinks are pasteurised in order to kill most of the harmful bacteria.
Raw milk	Bacteria are microscopic living organisms, usually one-celled, that can be found everywhere. They can be dangerous, such as when they cause infection, or beneficial, as in the process of fermentation (part of the wine-making process).
Pasteurisation	Grease proof packaging used to protect food from spoiling.
Bacteria	Wooden spade shaped tools that were used to work and shape butter by hand.
Buttermilk	The forming of the butter into the desired spreadable texture using paddles or butter workers.
Agitated	Milk in its purest state. This milk that has not been treated or changed in any way.
Butter working	To cause to move in a quick, tumbling motion or with force; shake.
Butter workers	A thin metal packaging used to protect food from spoiling.
Vegetable parchment	The liquid left over after the butter has been formed into a solid block. Buttermilk is commonly used in baking.
Foil wrapping	Past machines that were used to drain the buttermilk from the butter and to create the ideal butter texture.
List of butter types	Blended butter, clarified butter, whipped butter, whey butter.



In the not so distant past, the people who lived outside the city often owned a plot of land and a cow. It was therefore not unusual for these people to make their own butter. This butter was very different from the kind we eat today. It was made by hand, without the help of machines and often with little knowledge of the science



behind butter-making. Unlike the butter we eat today, it was made with cream, water, a little salt and using the very simplest of equipment, such as butter churns and **butter spades or paddles**.

It took a lot of work and effort to make a perfect block of butter. There were many stages that the butter-maker had to go through in butter-making. Today we have machines to make the process much easier and faster.

Find out about the entire butter-making procedure by following the stages below!



The Butter-making stages

1. **Separation** is one of the first stages of butter production, after the collecting of the **raw milk** from the cow. In the past cream needed to be left for a long time to naturally separate from the milk. The cream being lighter than the milk, naturally rises to the top. This could be skimmed off after a few hours. Nowadays machines are used to speed up this process.

2. **Pasteurisation** is the next stage after separation. It is an important process for keeping dairy products fresh. It is a process that removes **bacteria** by heating it to a high temperature. The cream itself can be pasteurised after it has been separated from the milk. Afterwards, the pasteurised cream can be made into butter.



Pasteurised dairy products are much safer to eat than raw dairy products. These have the ability to be stored for longer without spoiling because the bacteria have been removed. This is an advantage for dairy products that must travel greater distances to be sold. Pasteurising dairy products also helps reduce the spreading of certain diseases that are found in raw milk.

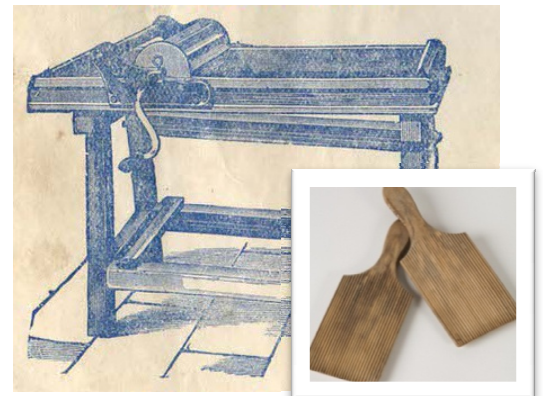
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3. **Churning** is the most important stage in butter production. In modern times, this occurs after the cream has been pasteurised. At this point the cream begins to form the texture and colour that we recognise as butter. Also, the liquid part of the cream separates from solid butter into **buttermilk**.



In the past, churning involved whipping the cream by hand. The cream was stirred or beaten until the butter formed. Normally, butter was produced in a butter churn. The cream was stirred quickly or '**agitated**' using a stick or paddle. The cream thickened as it was stirred and eventually separated into butter and buttermilk, which was the remaining liquid. Nowadays machines are used to speed up this process.

4. After churning, the **butter working** stage begins. This process either involved using butter workers or butter spades or paddles. **Butter workers** were large wooden structures with a tray and rollers attached. These were used to work large amounts of butter, unlike butter spades.

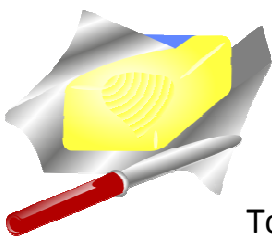


The block of butter was squeezed to remove any liquids. The butter was turned around and the process was repeated again. This continued until the butter block became solid and smooth in texture. Salt was then added at this stage and mixed evenly throughout. The butter was then shaped into a perfectly square block.

5. The last stage of butter-making is the **packaging** of the butter. The old method of packaging butter was by firkin. Firkins were wooden



barrels made to store large amounts of foods, like butter for long periods of time. Firkins helped prevent food from spoiling and were used before refrigeration had been invented.



Today **vegetable parchment, foil wrapping** and plastic containers are used to package butter. Like the firkin, these help to protect the butter from spoiling. These packages are also used as a form of advertising for different butter brands. In the past, the firkins and the blocks of butter were marked with various brands.





Activity



Follow the teacher's instructions to make butter in the old-fashioned way. Take notes as you follow the procedure for making the butter?

Aim:	Make your own butter using the old fashioned method.
Materials required:	<ul style="list-style-type: none"> • 1 large carton of cream. • 100ml of cold water with ice. • A few pinches of salt. • A few slices of bread. • 2 large jugs. • 1 large jar with lid- pasta or curry jar. • 2 strong, flat, wide wooden stirrers. • 1 chopping board. • 1 deep baking tray. • 1 sieve. • 1 butter knife. • 1 sheet of tinfoil. • 1 small pointy tool.
Step One: Preparation	Take the cream out of the fridge. Leave it out for 1 hour, until it is at room temperature.
Step Two: Churning	Pour about half the cream into the jar. Screw on the lid. Notice that the cream is very runny. Begin shaking the cream. Shaking the cream will agitate it in the same way as churning. Continue shaking it for about 15 minutes. During that time you can pass the jar around from person to person. You will notice that the cream starts to change.
Step Three: Observation	Observe the cream changing. It will change from runny, to frothy, to soft whipped cream, to heavy whipped cream, to slooshy. Pause every few minutes to check to see what stage the cream is at. Once you hear the slooshy stage, stop. Notice that you now have a large lump of butter in the jar. The pale yellow liquid around it is buttermilk.
Step Four: Washing	Pour a little of the cold water into the jar. Use the wooden stirrers to prevent any ice falling in. Now shake or swish the jar. Empty any of the remaining liquid into the spare jug. Repeat this process 4-5 times, or until the liquid runs clear.

**Step Five:
Draining**

Lay out the baking tray and place the chopping board on top at an angle. This helps drain any remaining liquid from the butter. Scoop out the block of butter. Take out the wooden stirrers. Press them gently to the sides of the butter to squeeze out the water. Turn the butter around and squeeze again. Dip the stirrers into the cold water. This is to prevent the butter from melting during this stage. Continue squeezing and dipping the stirrers in the water until the butter has a more solid form.

**Step Six:
Working and
Shaping**

Now use the stirrers to gently shape the butter into a perfect square. At the same time sprinkle a little salt over the butter. Press the butter slightly from both sides with the stirrers. Turn the butter carefully around and then upside down and do the same. Continue doing this until you are happy with the shape. The salt is mixed evenly through the butter in this way. Be careful not to over-work the butter, as it will start to melt!

**Step Seven:
Branding**

Take out the pointy tool and use it to draw your own brand on the butter! Brands are used to tell the difference between various types of butter.

**Step: Eight
Tasting**

Take out a few slices of bread and spread your own homemade butter onto it. Delicious!

**Step Nine:
Packaging and
Storage**

Wrap the remaining butter carefully in tinfoil to store in the fridge. It will last for about 1-2 weeks.

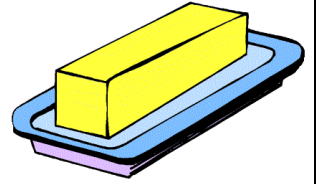
Conclusion:

You have successfully made your own butter using the old-fashioned method. You have followed all the various stages; churning, washing, draining, working and shaping, branding and packaging and storage. Your butter should look very yellow in appearance, be slightly salty to taste and be formed into a perfect firm square block.

**Activity****Draw some pictures of your favourite butter stage.**

A large, empty rounded rectangular box with a blue border, intended for drawing.

Butter Types



Now that you have made your own butter, think about all the other types of butter out there! There are many varieties of butter that you can buy nowadays. From spreads and blended butters, to clarified butter, to whey butter, to the good old fashioned churned butter. These are among some of the many different types of butter that we can buy today.

Blended butter or butter spreads are produced by mixing real butter with liquid oil, like canola. This spread tastes like real butter but can be spread straight away after being refrigerated. An example of this variety is margarine.

Clarified butter is formed when the liquid and the milk solids are removed from regular butter. Removing these allows for the butter to remain unspoiled at room temperature for longer than other butters. An example of this variety is **ghee**.

Whipped butter is created to produce a lighter and more spreadable butter. The whipping process introduces air into the butter that changes the texture of the butter. This variety can often be found in restaurants for spreading on bread rolls.

Whey butter is made using the separated whey from cheese-making. This butter has a much stronger flavour than regular churned butter because of the salty cheese-like flavour it has. This variety can often be found at health stores and farmers' markets.

There are many more types of butter too, such as low-fat butter or butter that has been sweetened or without any added salt. In other butters, extra flavours have been introduced, such as garlic and sometimes friendly bacteria can even be added to give it a taste almost like yoghurt.



Activity

Ask the teacher to bring in a couple of types of butter to compare.

Can you describe the different butters? Which butters had:

- 1. A strong taste or smell: Whey butter tastes strong and spoiled butter tastes even stronger!**
- 2. A more yellow colour: Pure Irish butter, like Kerrygold is very yellow in colour.**
- 3. A smoother texture: Spreads, like flora are smooth. They are specially made to be spreadable.**
- 4. A low fat content: Most spreads or blended butters have a low fat variety. Pure butter does not.**
- 5. Added flavours: Garlic butter is the most common type. Others include, chilli and four cheese.**



What have I learned?

Record four new facts that you didn't know before!



Fact 1:

A light blue tray containing a yellow butter block and a yellow butter wedge. To the right of the tray is a large yellow rectangular box with the text "Fact 1:" written inside it.

Fact 2:

A light blue tray containing a yellow butter block and a yellow butter wedge. To the right of the tray is a large yellow rectangular box with the text "Fact 2:" written inside it.

Fact 3:

A light blue tray containing a yellow butter block and a yellow butter wedge. To the right of the tray is a large yellow rectangular box with the text "Fact 3:" written inside it.

Fact 4:

A light blue tray containing a yellow butter block and a yellow butter wedge. To the right of the tray is a large yellow rectangular box with the text "Fact 4:" written inside it.