

STEM Activity 1:

How does the condition the food is kept in affect food decay?

Background information and Science information



In the Food Waste stories, we are told that foods decay and then are not fit to be eaten. This experiment looks at how dried beans can decay.

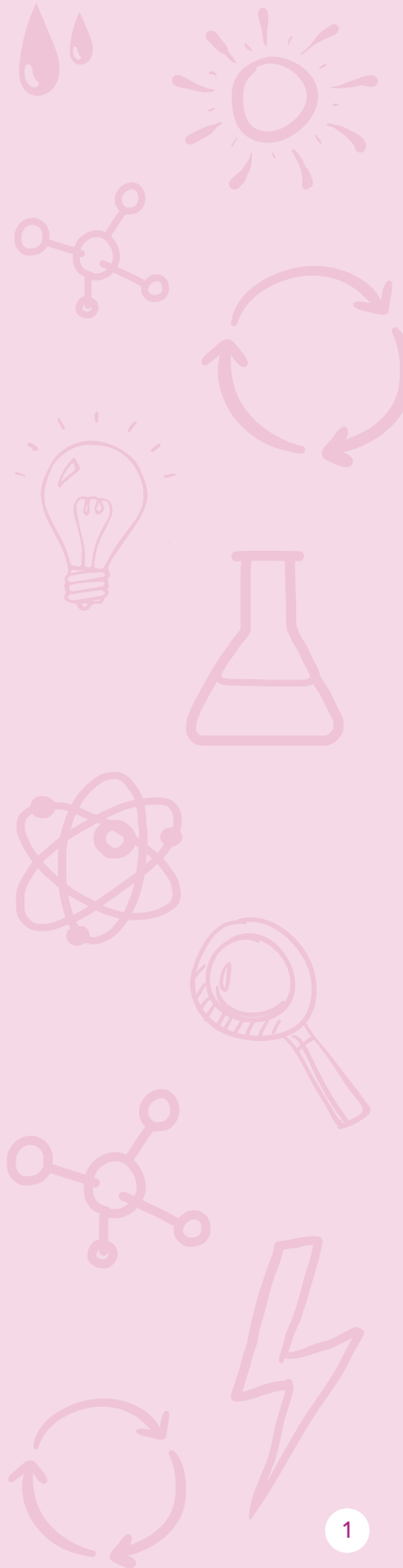
Fair testing is important in this type of investigation to get reliable comparable results. This involves keeping all variables the same except for the one that you want to test. In this case the variable we are testing is the condition the beans are kept in.

The other variables must be kept the same. They include:

- the type of beans;
- the quantity of beans;
- the type of ziplock bag;
- the amount of water;
- the length of time the beans are soaked in water for;
- the amount of air left in each bag; and
- the length of time the beans are kept in each area.

You may also want to look for the same sign(s) of decay on each bag of beans.

Take photos at key points during the activity. You can use these later for activities such as sequencing, recalling and improving vocabulary.



Method

Introduction

Show the learners different images of decaying food. You may choose to look at pictures from the internet or a book, or you may use previously collected food which has decayed. Discuss which signs of decay there may be, for example the smell, the feel and the look. Which is the easiest sign to detect? Which sign will you focus on for your experiment? (Mould can be the most obvious one, and the safest to observe).

Development

Setting up the experiment:

1. Create three control bags of dried beans each by placing 10 beans in each of three ziplock bags and set to one side. Make sure that when the bags are sealed, there is no air left in with the beans.
2. Take another 30 dried beans and soak overnight in water. (You may want to soak some extra beans as a backup.)
3. Place 10 of the previously soaked beans into each of the other three ziplock bags. Make sure that there is no air left in with the beans when the bags are sealed.
4. Place one bag of soaked beans and one bag of control beans in a warm, bright place such as a window sill.
5. Place one bag of soaked beans and one bag of control beans in a warm dark place such as a classroom cupboard that can be kept closed or an oven drawer.
6. Place the final bag of soaked beans and one bag of control beans into the refrigerator.

Observation and recording

Leave the bags in these locations for one week. Observe the various sets of beans over this period (once a day). Record what the learners see, smell and feel on each observation.

Scientific Inquiry

What makes food go bad (decay) faster?

Learning Intention

Heat, light and water can change the speed of food starting to rot or going bad (decay).

Equipment

- Images of decayed food/previously collected food which has decayed
- Packet of dry beans/peas
- 6 ziplock bags
- Water
- Refrigerator

Discussion

- Did the learners notice how the beans changed over the time they were observing the beans?
- For the beans that started to go bad — did this happen on different days or at different rates? Do some of the beans display more signs of decay, for example mould?
- Was there a difference between the bag of dry beans and the bag of wet beans in each condition tested? (The bag of dry beans should not be showing any sign of food decay.)
- Did soaking the beans shorten their life or lengthen it? What signs told the learners this?
- Ask the learners where they think is the best place to keep food like the beans to help them last longer? (The refrigerator.)



Extension

Explore all the words that can describe decay.

Ask the class:

‘Can you think of any other conditions or places you might test?’

This experiment can be repeated with different foodstuffs.

STEM Activity 2:

What can we use to slow the process of decay?

Background information and Science information

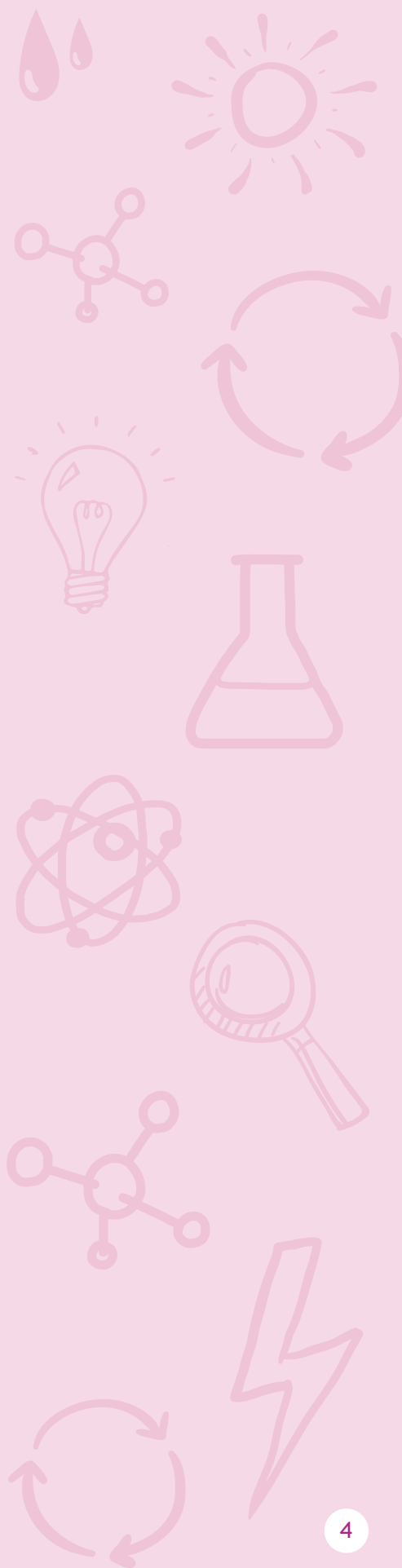


In the Food Waste stories, we are told that foods decay and are then not fit to be eaten. In this session we reinforce some of the knowledge and science skills from the previous activity. This activity looks at how correct storage can be used to prevent decay.

Fair testing is important in this type of investigation to get reliable comparable results. This involves keeping all variables the same except for the one that you want to test. In this case the variable we are testing is the container the food is kept in.

The other variables, such as the type of food and the time the experiment is started should all remain the same.

Take photos at key points during the activity. You can use these later for activities such as sequencing, recalling and improving vocabulary.



Method

Introduction

Review the images of decaying food from previous lesson with the learners. Discuss again which signs of decay there may be, for example the smell, the feel and the look. Which sign of decay should the class look for in this lesson?

Development

1. As a class, prepare the storage containers and bags for testing. Check for cleanliness and make sure there are no holes or tears.
2. Choose the food the class are testing. It should be a food that will not last long without proper storage. Longer lasting fruits and vegetables may take more than a week to show signs of decay. If you wish, you can split the class into groups and each can test a different food.
3. (Soft fruits are good because they have a short shelf life. However, these can be expensive. Another option is to choose a vegetable such as carrots. Peeling and chopping will reduce their expected shelf life and therefore speed up the time required to complete adequate observations.)
4. Put the same amount of the same fruit or vegetable into the three selected containers.
5. Place them in a refrigerator. Make observations daily and record by taking a photo using a tablet device.
6. Record the number of days until the food becomes decayed and is no longer edible.
7. Compare the results for each container.

Scientific Inquiry

What can we use to slow the process of decay?

Learning Intention

We can reduce food waste by making good choices about how we store food.

Equipment

- A selection of chopped fruit and vegetables
- Food storage containers or bags:
 - ziplock bags (remove air from bag when storing the food)
 - punnets that fruit is purchased in
 - lettuce keeper with specially designed air holes
- Refrigerator

Discussion

- Did the learners notice how the food changed over the time they were observing it?
- Did it change colour? Grow mould? Become slimy? Smell?

(Expected results should be that the lettuce/vegetable keeper preserves the food the longest, followed by the airtight bag, and then the punnet the fruit is bought in.)

- Ask the learners: 'Which is the best way to store strawberries?'
- Does any of the information from the experiment help the learners decide?



Extension

Ask the class:

'Can you think of any other containers or materials you might test?'
Examples might include cling film or tinfoil.

You can repeat this experiment with other containers and other food types. This will help to consolidate the learning on good food storage.

Research some information on how much food waste is created in Northern Ireland in one year.

STEM Activity 3: Oxidation experiment

Background information and Science information



What is air?

It is the invisible gas surrounding the earth, which we breathe in and out every day. A mixture mainly of oxygen and nitrogen.

What is oxygen?

It is a colourless, odourless gas that our body uses when we breathe.

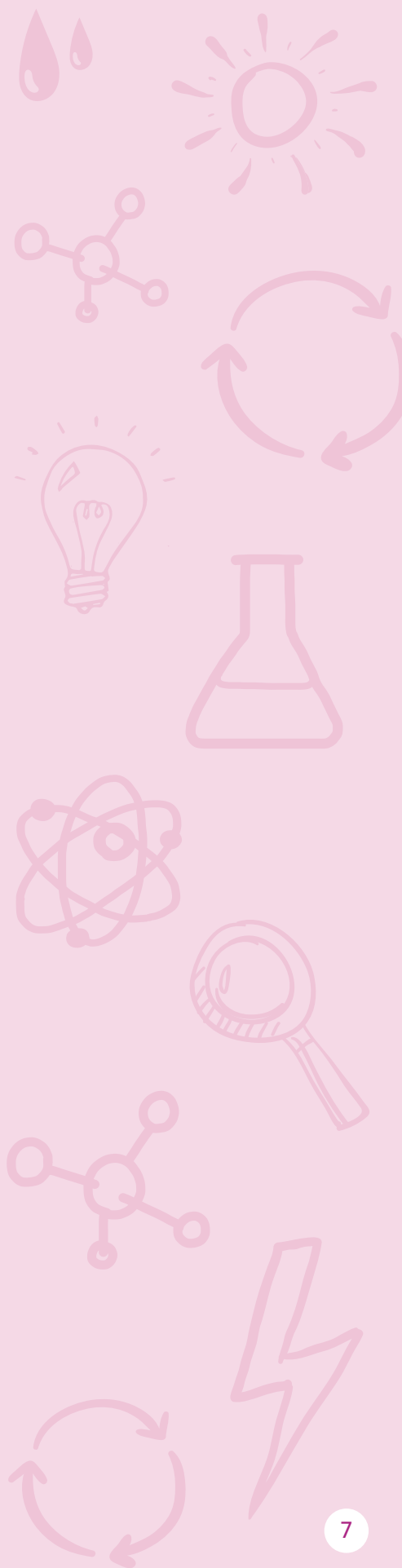
What is oxidation in apples?

When an apple is cut (or bruised), oxygen from the air is introduced to the damaged plant tissue. The oxygen reacts with colourless plant cells/tissue in the apple to form a brown-coloured product.

How does lemon juice work?

Lemon juice contains vitamin C (an acid) which reacts with the oxygen before it reaches the apple tissue, therefore stopping the browning taking place. When the vitamin C is all used up, then the apple will start to brown. Lemon juice's low pH level (because it is acidic) also helps prevent browning. The apple cells (Polyphenol oxidase) involved in the browning process works best when the pH level is between 5.0 and 7.0. However, below a pH level of 3.0, the cells stop working. The pH of lemon juice is in the 2.0 range, making it very effective against browning.

Take photos at key points during the activity. You can use these later for activities such as sequencing, recalling and improving vocabulary.



Food Waste:

Why do Apples go Brown?

ACTIVITY
3

Method

Introduction

Talk with the learners about air.

- What is air?
- How do we know it is there? (We can feel it, for example wind, blowing, or a fan).
- What does air do? (We breathe it.)
- Does air do anything else?

Development

1. Place three plates on the table.
2. Place the two labelled containers at two of the plates with a food brush in each container. (It's essential to have two brushes.) Fill one container with lemon juice and one with water. Label the third plate as the control.
3. Then take an apple and cut it into quarters. Place one quarter on each plate. You will have a spare quarter.
4. Cover the pieces of apple with the liquid that has been placed at that plate. Make sure you use different brushes for different liquids, otherwise you will contaminate the results.
5. You should end up with two pieces of apple covered in different liquids, and the control piece of apple should have nothing on it.
6. Set a timer and observe the apples at 10 minute intervals on three occasions. Record each observation by taking a photograph.
7. Allow the apples to stand to the end of the day or overnight. Observe again and record by taking a photograph.

Scientific Inquiry

How can we stop food from going brown after it is cut?

Learning Intention

Lemon juice stops/slows food from turning brown.

Equipment

- Apples
- Cutting mat
- Knife
- Plates
- Water
- Lemon juice
- 22 labelled containers for the water and lemon juice to be tested
- 2 food brushes

Discussion

What did the learners observe at the 10 minute interval?

The control piece should have browned the quickest and the most, followed by the one with just water. The lemon juice piece of apple should have browned the least, or not at all.

What did the learners observe at the end of the day or the following morning?

It is possible by this time that there is less of a difference between the apples. However, the one covered with lemon juice should still be less brown than the others, due to the reasons stated in the background information.



Extension

Encourage the learners to predict which liquid(s) will prevent the apple from turning brown.

Repeat the experiment again using a different type of apple.

The test can also be repeated using different liquids. Other juices that have a low pH are lime, cranberry, grape and grapefruit.

Extend the experiment to find out which of these juices are the tastiest. Try several of these juices and find a tasty way to serve sliced apples while preventing them from browning.

STEM Activity 4:

Processing food can help reduce food waste but it changes the food

Background information and Science information



Fresh food has a relatively short shelf life. We have looked at ways to extend their shelf life by a few days, but are there any other ways we could get it to last for weeks or months?

Humans have used different processes for hundreds of years as a way to extend the shelf life of food. In older times we salted, smoked, and dried food. We also made jams, pickles and preserves. We have also used tins and vacuum-sealed bottles and jars. In recent times we have used fridges and freezers. More background information on preserving food can be found at:

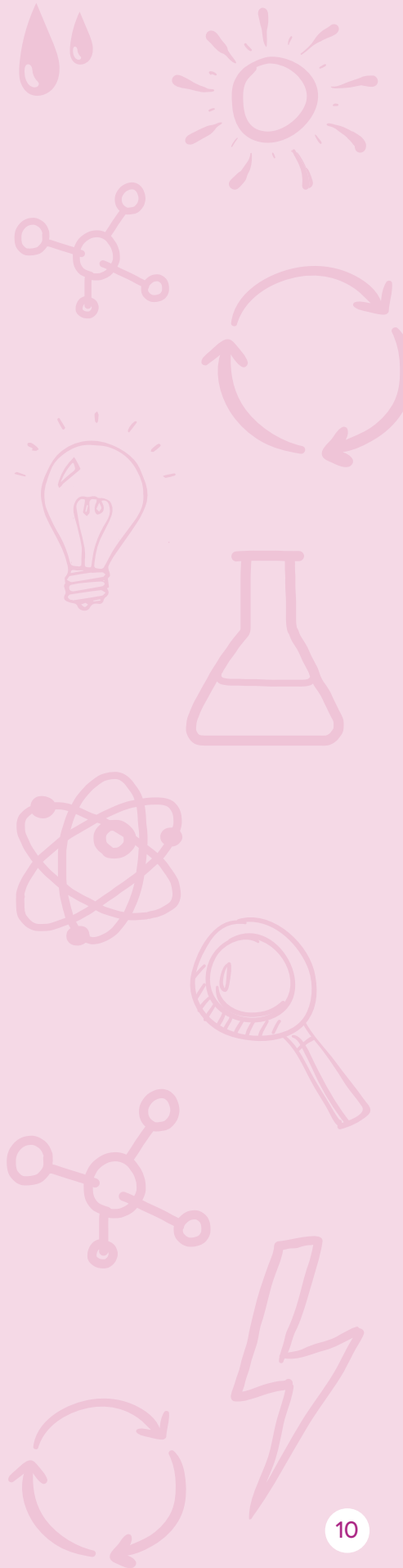
[BBC Bitesize](#)

[Canned Food UK](#)

[National Geographic](#)

[National Center for Food Preservation \(USA\)](#)

Take photos at key points during the activity. You can use these later for activities such as sequencing, recalling and improving vocabulary.



Method

Introduction

Ask the learners to think of food that they have in their cupboards at home (this could be an idea for homework). Write down any foods that they suggest. Prompt them to think about frozen, tinned, jarred foods.

Show learners the selection of food you have gathered. As a class, examine the packaged food.

Ask them: 'Which food do we each like?'

Which will last longest?

How do we know? Encourage the learners to check best-before dates.

Development

1. If you are going to produce the jam and pickles with your class, have these made earlier in the week. You can follow the instructions provided or use a preferred recipe of your own.
2. Alternatively, you may choose just to compare one type of processed berries with the fresh berries.
3. Start with observations and a taste test. Record what the blueberries look like in each state. You can do this by taking a photograph. Give each learner a chance to contribute to the observation.
4. Then allow each learner to taste the different forms of the fruit. Record if they taste the same or different. Introduce words such as sweet, salty, tart, smoky, spicy and bitter.
5. Get the learners to check the best-before dates. Do they differ between fresh/jam/pickled?
6. Then place the same amount of each product into a ziplock bag or similar food bag in the fridge for a week. (Remove all air from ziplock bags before sealing.) Also keep the food in its original packaging/jar and place in the fridge.
7. Observe them daily for a week. Record each observation with a photo. Have there been any changes in any of the products? The fresh berry should have started to become mouldy. Record the date when you noticed this change.

Scientific Inquiry

Will turning blueberries into jam or pickles give them a longer edible life?

Learning Intention

We can lengthen the life of some foods by processing/mixing them with other foods, but this may change the taste and look of the food.

Equipment

- Fresh ready-to-eat blueberries
- Either homemade blueberry jam (recipe attached) **or** bought blueberry jam, and/or homemade pickled blueberries (recipe attached)
- Food bags (airtight if possible)
- Forks for tasting pickles
- Spoons for tasting jam
- Fridge
- Recording sheet
- Digital tablet
- A selection of packaged food

8. You may choose to leave it for a further week to see if any other changes occur. If you use the recipes I have provided, the jam should be ok for approximately two weeks, and the pickles should be good for several months as long as they are stored in an airtight container in the fridge.

Discussion

Discuss with the learners how we can do things to the fruit to help it to last longer, such as making it a jam or a pickle; however, these can change the taste and look of the product and this is not suitable for everybody. Also, the amount of sugar added in the jamming process turns a healthy food into an unhealthy food. However, it prevents food waste.

Ask the class: 'Was there any difference between using the food bag and the original container?'

Removing the berries from the pickling liquid may speed up the decaying process. The jam may take longer to go mouldy if the food bag is airtight.



Extension

Making pickled berries or jam with your learners will help them to get a better understanding of what is added to the fruits or what happens to it during the processing.

As a class, follow a recipe (see overleaf) to fairly investigate which form of preservation processes preserve the fruit for longest: is it pickling, jamming, or no process?

Blueberry Pickles

Ingredients

Enough berries of your choice (gooseberries, blueberries, cherries or even grapes) to fill a Mason jar.

3/4 cup sugar

1 cup water

2 tablespoons light honey

1/4 cup white wine vinegar

Spices to add flavour:

1/2 teaspoon fennel seed, lightly crushed

1 tablespoon black mustard seed, lightly crushed

2 cloves

Alternatives include cinnamon, allspice, black pepper, nutmeg and anise

Special Equipment

1 pint Mason jar (a wide-mouthed glass jar with an airtight screw top, used for preserving fruit and vegetables)

Method

Combine sugar and water in a small saucepan, bring to the boil. Add berries and return to boil. Simmer until just soft, approximately one minute.

Remove berries with a slotted spoon and place in Mason jar. Add remaining ingredients to the saucepan and simmer until syrupy (about five minutes).

Pour syrup into jar directly over berries. Cap jar immediately, let cool and place in fridge. Berries will be ready to eat in three days.

These berries will last for months in the fridge.

Blueberry Refrigerator Jam

A simple recipe may be found at www.recipegirl.com

