### Science and Technology: Products and Services

| Stage 2 | Duration: 1 day |

### Program context
Stage 2, contextual, authentic, hands on science; based on food and fibre production, conducted on the grounds of Elizabeth Macarthur Agricultural Institute.

### Target outcomes
A student:
- **ST2-16P** Describes how products are designed and produced, and the ways people use them.
- **ST2–12MW** Identifies that adding or removing heat causes a change of state between solids and liquids
- **ST2-13MW** Identifies the physical properties of natural and processed materials, and how these properties influence their use.

### Unit overview
Designed primarily around the concept of food production, this learning program focuses on the processing of raw materials to produce goods for our consumption, and the integral role that farms play in the provision of these raw materials. Students will observe changes of state and comment upon the different processes required to bring about these changes. Students collect eggs from our chook pen and use them to cook scrambled eggs, identifying the application of heat as a catalyst for change and also learn about the processes involved in butter production and resultant by-products. Ice cream production is an alternative activity offered by request to Stage 2 students only, available only in the warmer months, due to the nature of the activity.

Other activities include a wagon ride and sheep handling with the program concluding with a visit to Number 9 Dairy where students assist with bottle feeding of young calves and also get the chance to experience the sights, sounds and smells of a real dairy during the afternoon milking session.
<table>
<thead>
<tr>
<th>Content – Products</th>
<th>Content – Material World</th>
<th>Teaching, learning and assessment experiences</th>
</tr>
</thead>
<tbody>
<tr>
<td>There are various processes involved in the ways products are designed and produced</td>
<td>Students: describe some everyday situations where solids and liquids change state by adding heat (heating) or removing heat (cooling) predict and observe the effects of adding heat or removing heat on a variety of everyday solids and/or liquids, e.g. butter, chocolate and water Natural and processed materials have a range of physical properties which influence their use Students: generate ideas about how the physical properties of some natural and processed materials influence their use</td>
<td>Welcome and Introduction Discussion of Belgenny Farm, wool production heritage and historical significance of site. Identification of the role of farms in producing raw materials that we use in our everyday lives Discussion of the role and type of process involved in the transformation of a raw product into something valuable to the consumer. Encourage students offer ideas Focus on the significance of wool as a valuable commodity and the many uses of wool Sheep Paddock – Sheep Handling Discussion of the need for farmers and wool producers to monitor health and wellbeing of animals in their care, in this case, sheep. The relationship between productivity and sheep health is identified. In smaller groups, students engage in sheep mustering/husbandry activities, moving sheep into a holding yard and physically inspecting wool and sheep with their fingers. Students are encouraged to describe how the wool feels, smells etc. <em><strong>Subject to Availability-Working Dog and Shearing Demonstrations</strong></em> Students view a demonstration of how working dogs are used on modern farms to contain and manage livestock, before moving to the shearing shed to watch an experienced shearer remove the wool from a sheep using a modern shearer’s hand piece.</td>
</tr>
<tr>
<td>2 Group Split Rotation – 45 minutes per session</td>
<td>Activity 1 – Scrambled Eggs Students seated in front of chicken pen. Brief discussion on chickens and the reason why farmers keep them. Location of egg boxes is identified and students are encouraged to offer ideas as to why these boxes are in that particular location In smaller groups, each student enters the pen, locates the egg boxes and collects 1 egg. Students waiting to enter the pen are able to handfeed both the chickens and residents pea cocks/hens through the wire of the enclosure. Carefully carrying egg, students move to the hall building for second part of activity Egg is identified as the raw product in this scenario, and students are quizzed over the necessary processes required to turn it into a consumable, this case, scrambled egg. Discussion of the application of different processes to bring about changes of state – Use the creation of ice as an easy example and to illustrate point. (Water needs to be frozen for it to become ice, therefore you need to apply a cooling...</td>
<td></td>
</tr>
</tbody>
</table>
There are various processes involved in the ways products are designed and produced.

- predict and observe the effects of adding heat or removing heat on a variety of everyday solids and/or liquids, e.g. butter, chocolate and water
- describe how a range of common natural and processed materials are used in everyday life
- observe the changes that occur in the physical properties of everyday materials when they are heated, cooled, bent

process and vice versa). Identification of heat as the change agent involved when cooking.

Students follow the following procedure –

- Wash/rinse egg to remove any materials from egg box
- Crack egg into large ceramic bowl
- Place egg shell in bucket
- Wash hands

Eggs are then whisked and poured slowly into the frying pan, allowing students to hear the sound as the mixture hits the heat.

During this stage, the teacher is constantly talking to the students, remarking on the changes taking place, showing that the liquid exposed to heat, in this case, is fast becoming a more solid material. Students are shown the changes in the egg at various stages during the cooking process.

Once cooked, students sample the scrambled eggs in a small bowl. During this, the entire procedure is discussed for reinforcement, from raw product, to process, to end product.

**Activity 2 – Wagon Ride/Butter Churning/Felt Making**

**Wagon Ride**

Under the guise of looking for some missing livestock, students are taken to various vantage points on the property where a greater appreciation of the sheer size of a working farm can be attained. From these vantage points, different crops can be seen and identified, as well as livestock.

**Butter Churning**

Students participate in a discussion on dairy products and the role of cows on farms. Dairy products are identified that form part of the students lives, highlighting butter as a common thread. The major ingredient for butter is identified, and using an old butter churn, students churn thickened cream until they produce butter.

Various key points of changes of state are emphasised and discussed over course of activity –

- The appearance, consistency and colour of the main ingredient (cream)
- The process provided by the butter churn (mixing/churning)
- The gradual change in the sound of the butter churn as the properties of the cream starts to change
- The resultant change in appearance, consistency and colour once the churning process is finished

Students are then able to taste the butter, offering inferences as to why it might taste differently to the products available in supermarkets.
<table>
<thead>
<tr>
<th>Content – Products</th>
<th>Content – Material World</th>
<th>Teaching, learning and assessment experiences</th>
</tr>
</thead>
</table>
| There are various processes involved in the ways products are designed and produced | Students: generate ideas about how the physical properties of some natural and processed materials influence their use observe the changes that occur in the physical properties of everyday materials when they are heated, cooled, bent, stretched, folded and twisted | **Felt Making**  
Revisit the many applications and uses of wool, indicating that wool is one of many products that we can use to create an entirely different material.  
Supply students with small sheets of coloured felt and ask them to pass around, trying to identify the material.  
Once identified, discuss various uses of felt, and ask students for ideas on how wool can be made into felt  
Explain that felt is simply individual fibres tangled and twisted around each other  
Indicate that in this case, a change of state is encouraged not by a property, but more an action.  
Students are then provided with a small piece of clean wool, which they then dip into warm soapy water, and proceed to roll between their palms for several minutes.  
Ensure students are watching the changes taking place as the wool becomes more like the sheets of felt in texture and appearance, rather than a ball of wool.  
Students keep the felt that they create. |
| People use products in a variety of ways | Students: examine how people use applications of science and technology in their work, e.g. builders, farmers and graphic designers | **Visit to Number 9 Dairy**  
Students board buses to travel to Number 9 Dairy, also located on the EMAI property, about 5 minutes from Belgenny Farm.  
Half of the students to alight at calf shed to assist with bottle feeding of calves, while the rest of the students go to the dairy complex.  
**Dairy Technology**  
While in the calf shed, describe the various technologies at work in the calf shed, and ask for ideas regarding the need for the application of such technologies in dairying and farming in general.  
Students observe the automatic calf feeders and provided a description of how they work. The link between technology, healthy and well cared for livestock and productivity is to be emphasised, while maintaining student awareness that ultimately, animal welfare responsibilities lie firmly with a farmer.  
When at the dairy complex, important features such as silos and vats are identified and their respective uses discussed.  
Students enter the dairy, walking down into the dairy pit, observing the afternoon milking session.  
Important features identified such as individual cow identification systems, IR tag readers, data storage systems, milk yield data  
Students observe the placement of cups on udders, individual screens showing cow details and milk yields, and can also see the network of pipes that carry milk from inside the dairy building, through a cooling core(identify the importance of this process) and into the external vat, where it is stored for collection by milk tankers.  

*Groups rotate after approx. 15 minutes* |
<table>
<thead>
<tr>
<th>Links to other KLAs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>English</strong></td>
</tr>
<tr>
<td>EN2-1A</td>
</tr>
<tr>
<td><strong>History</strong></td>
</tr>
<tr>
<td>HT2-2</td>
</tr>
<tr>
<td>HT2-4</td>
</tr>
</tbody>
</table>