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Opening extract from  
**How We Make Stuff**

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# Who invented factories?

Every day, we use an awful lot of stuff – from clothes and food to books and computers. So where does all this stuff come from? Just a few hundred years ago, everything was made using simple tools in homes or small workshops. But in 1769, a British wig-maker called Richard Arkwright invented a machine for spinning cotton, and constructed a large building filled with workers to operate these machines. This was the first factory.

## Artisans

Before skilled workers called artisans could make more complex objects by hand, but most of the stuff that we buy today comes mass-produced in factories by machines.

## The story of stuff

### 1 Extraction

Whether we're talking about a piece of timber or a machine part, the story of our stuff always begins with us taking raw materials from the earth.

We harvest metal and grain from the land and grow them. Some materials can't be replaced once they've been used.

### 2 Manufacturing

Raw materials are taken to factories where they are processed into useful products.

### 3 Shopping

Our stuff is packed and shipped all around the world to warehouses and shops by plane, train, boat or truck. The cost of lots of energy.

### 4 Using our stuff

We pack our stuff into bags and bring them home, where we use them every day.

### 5 Recycling

Some stuff can be recycled and turned into new products. It is often taken to recycling plants around the world.

### 6 Dumping

Some stuff can't be recycled and is dumped in landfills or incinerated. Recycling helps reduce the amount of stuff that ends up in landfills.

Most of our rubbish ends up buried in the ground in landfills. But we can get a lot of energy from the waste that ends up there. This is called energy from waste. It is used to generate electricity.



**The water frame**  
Richard Arkwright's water frame could spin lots of cotton threads at once so it became faster and cheaper to make clothes.

**The rotary steam engine**  
James Watt invented a steam engine that could run clockwise and power machines in factories by turning coal.

**The rolling mill**  
Henry Cort found a way of making high-quality rolled iron sheets, iron plates and bars by rolling them between rollers.

**Gas lighting**  
William Murdoch developed gas lighting for homes, streets, theatres, hospitals and streets using the gas, replacing candles and oil lamps.

**The steam locomotive**  
Richard Trevithick built the first steam locomotive, but it was too small to be useful. George Stephenson built the first practical steam locomotive in 1825.

**The internal combustion engine**  
Nicola Otto invented an internal combustion engine powered by gas. This was soon adapted to burn petrol and power the first car.

**The motorcar**  
Karl Benz built the first motorcar. It had three wheels and an engine that ran on petrol.

**The electric light bulb**  
Joseph Swan in Britain and Thomas Edison in the USA both developed electric light bulbs. Electricity made it easier to power homes.





# Where do burgers come from?

## The meat



The beef in your burger may well have come from a cow that grazed on Irish potatoes for about 2 years before being sent to an abattoir. The meat is then packed in a processing plant, then transported to your local shop.

Toby, there are 1.3 billion cows being killed for meat. Do you know how we feed them all?



It can take up to 75,000 litres of water to make 1 kilogram of beef!

## The bun



The flour to make the bun might have come from wheat grown in vast fields in Canada. Chemicals are sprayed to add nutrients to the soil and get rid of unwanted bugs and weeds. The grain is harvested by machine and ground into flour.

## The cheese



The cheese could have been made from the milk of dairy cows in the USA. The animals are kept in sheds and fed grass, hay and silage. They are milked by machine every day.

What is processed at home with a blender? Do you know?



## The sesame seeds

The seeds on the bun come from the sesame plant, which grows in warm countries such as Venezuela. When the seed pods are ripe, they burst open. The harvesting is often done by hand.



## The pickles

The pickles might be from the UK. Fresh, small cucumbers are washed in water, weighed, salt and spices then packed in airtight jars for your local shop.



## The black pepper

The pepper comes from a vine that grows in tropical countries such as India. The fruit containing the pepper seeds is picked by hand and dried in the sun.

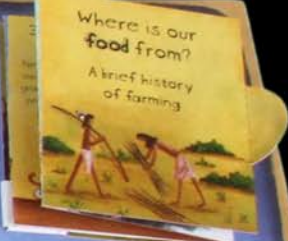


## The tomatoes and lettuce

These started life as seeds sown on a farm, perhaps in sunny Spain. Machines are used to water the plants and spray chemicals to protect against weeds and veggie-munching bugs.



## Where is our food from? A brief history of farming



## Or is your burger from...

a local farm, where cows feed on local pastures, manure is used to feed the soil, vegetables are carefully watered, fresh buns and homemade pickles are produced and hedges are home to ladybirds that feast on unwanted bugs!



When you eat a burger, do you ever wonder where all the different ingredients have come from? They might well have started off on the other side of the world, travelling thousands of kilometres by plane, ship and lorry to reach your plate. Why? Because we like to buy our favourite foods all year round, as cheaply as possible, so we often import them from other countries. When Oscar Weber Bilby served the first burger on his farm in Oklahoma in 1891, he had no idea that years later over 35 million burgers would be eaten every day in the USA alone!