

McKey Food Service Ltd

McKey Food Service Ltd is the exclusive supplier of hamburgers to McDonald's in the UK. The purpose-built factory in Milton Keynes was opened in 1980 and now produces 3.8m patties (regular hamburgers) and 1.52m quarter pounders every day for the 1000 McDonald's restaurants in the UK.

Customers expect the same quality every time they purchase a McDonald's hamburger and it is only possible to maintain this consistency of quality, taste and appearance by using carefully controlled systems and computer technology within the McKey factory.

Traceability of Inputs

All products used in the food industry must be traceable to the original suppliers. Every animal born after July 1996 must be given a passport. This has details of its birth, mother, health and farms. This passport follows the animal from when it is sold to when the carcass arrives at the abattoir. At the abattoir a carcass may be divided and go on to different customers. The passport number follows each part.

Similarly when the containers of meat arrive at McKey they will contain meat from several carcasses. Each container will have the name of the abattoir, a container number and the date. This information is transferred onto a barcode so it can be tracked throughout the manufacturing process. As McKey uses 8354 head of cattle a week - that is 10% of the weekly kill in Great Britain, the computer tracking systems are vital.

Checks on Input Arrival

(First Critical Control Point)

Documents	Veterinary and health certificates to ensure meat is boneless Slaughtered and boned according to EC regulations
Temperature	Fresh meat should be below +4°C, frozen below -18°C
Serological	A blood sample analysis to ensure the meat is all beef
Visual	For bruising, bone and foreign bodies

If it passes all checks the container is accepted and put into chilled storage

(Second Critical Control Point)

Frozen meat is stored in the freezers before production.

(Third Critical Control Point)

See page 5 for summary of Critical Control Points.

Student Activity

This activity is designed to enable students to understand how the meat is tracked, the importance of this and how computers are vital in recording the information (see photocopyable master entitled Inputs).

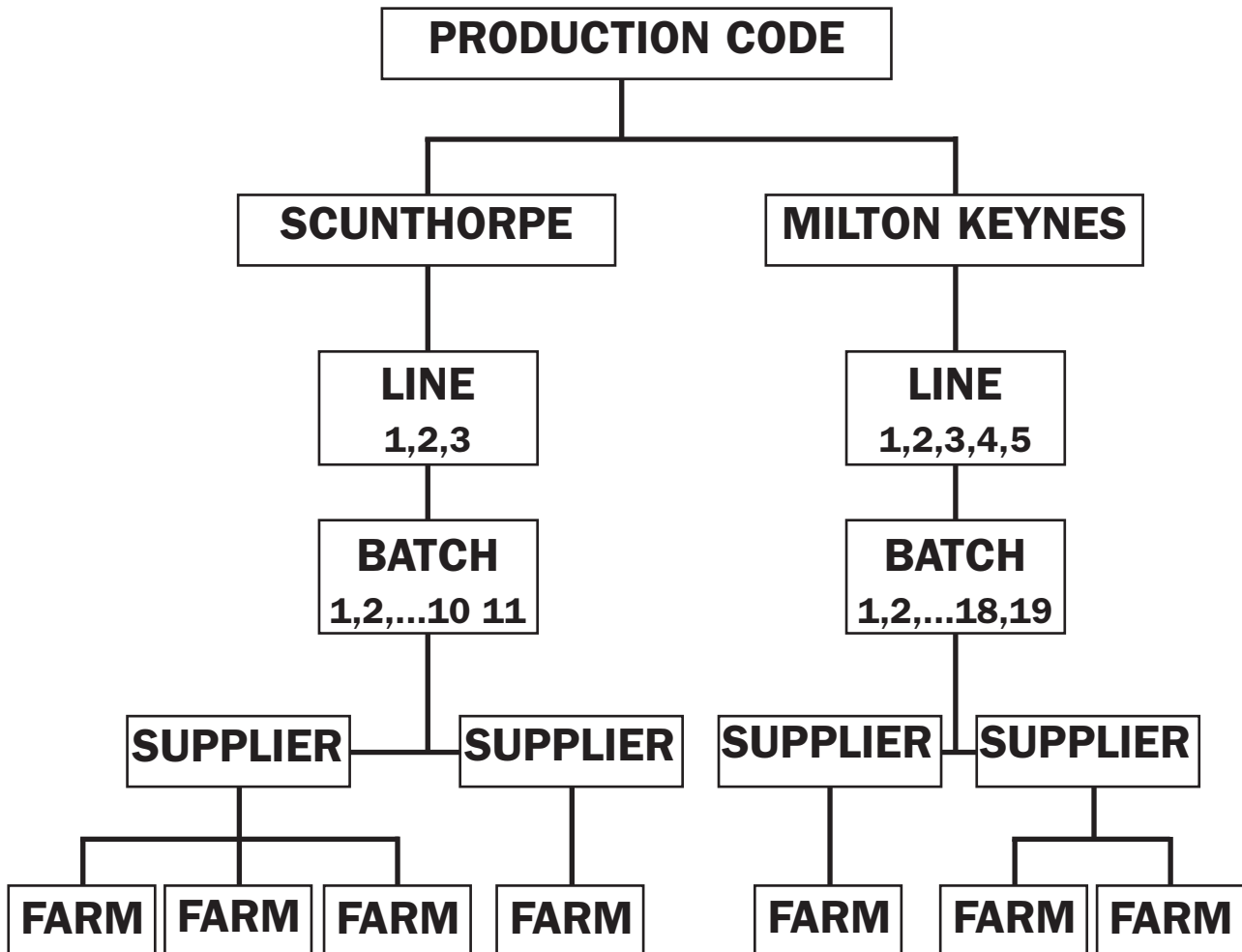
- Students identify the line of traceability from birth to arrival of the containers at McKey Food Service
- Students discuss why this process is necessary and identify circumstances when it might be needed.
- Students identify the importance of each specification for the raw product.

Photocopiable Master

Inputs

All products used in the food industry must be traceable back to their original suppliers.

- Identify on the flow chart the farms that supplied the meat in batch container 18.
- Explain why it is important to be able to trace the inputs.



Checks are made when the containers of meat arrive at McKey Food Service.

- Complete the grid below with the details of these checks.
- Why is each check important?

Documents	
Temperature	
Serological	
Visual	

Photocopiable Master

Burger Experiments

Aim: *To assess the effect of fat content on the cooking characteristics of burgers*

Food needed:	Equipment needed:
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Method:

Results:

Burger code	Size before cooking	Depth before cooking	Size after cooking	Depth after cooking	Fat release during cooking

Conclusions:

Photocopiable Master

Sensory Analysis of Burgers

The Quality Assurance Department at McKey Food Service checks regular patties every hour and quarter pounders every 20 minutes. As well as assessing the shape and size they are cooked under the same conditions as in a McDonald's restaurant.

Use the attributes on the grid to assess your burgers.

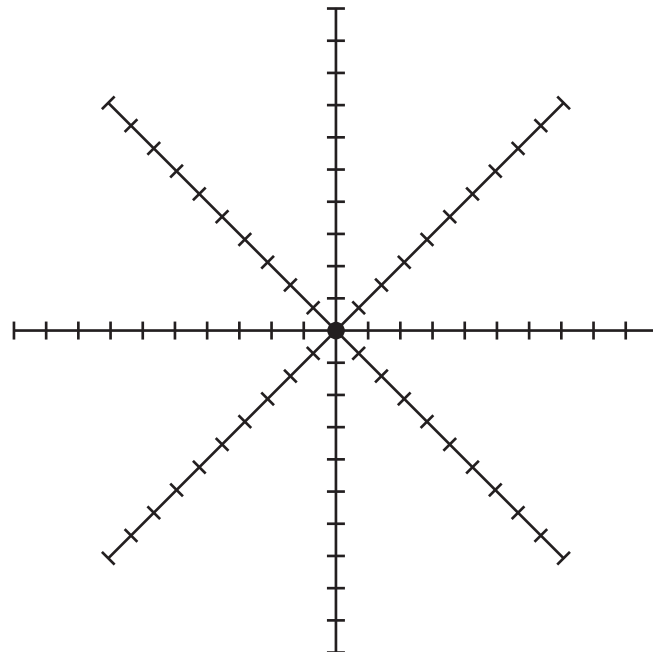
1= little of the attribute

10= a lot of the attribute

Use a different colour to record the results of each sample tasted.

Attribute	
Blandness	1 2 3 4 5 6 7 8 9 10
Beefy	1 2 3 4 5 6 7 8 9 10
Chewy	1 2 3 4 5 6 7 8 9 10
Greasy	1 2 3 4 5 6 7 8 9 10
Loose texture	1 2 3 4 5 6 7 8 9 10
Clean mouthfeel	1 2 3 4 5 6 7 8 9 10

Produce a star diagram showing a profile for each sample. Keep your colour coding the same.



Conclusion:

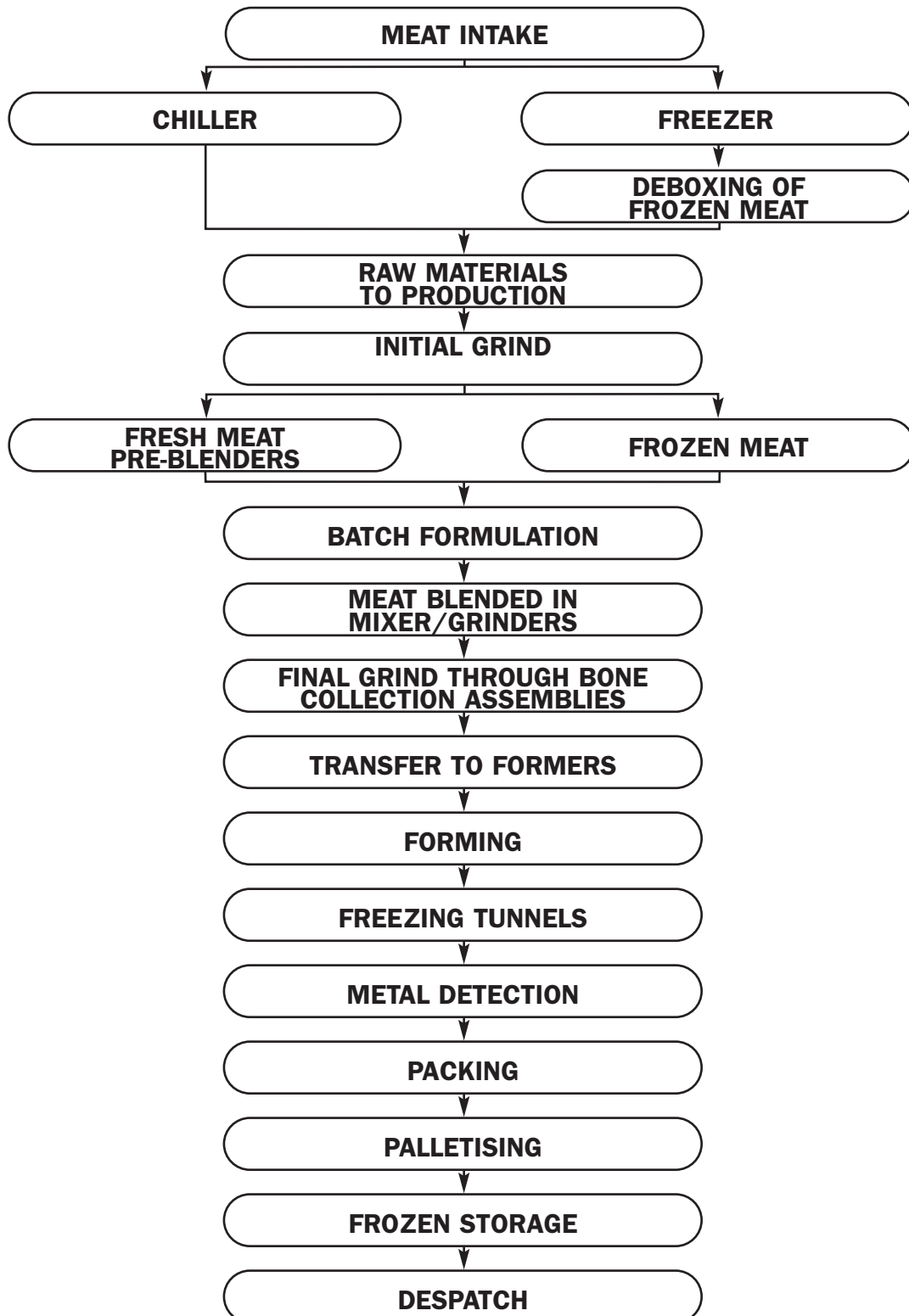
Photocopiable Master

Manufacturing System: Repetitive Flow

Label the diagram to show where computer control is used.

Also, identify the six Critical Control Points (CCPs) during beef patty production.

What happens at each CCP and why is it important?

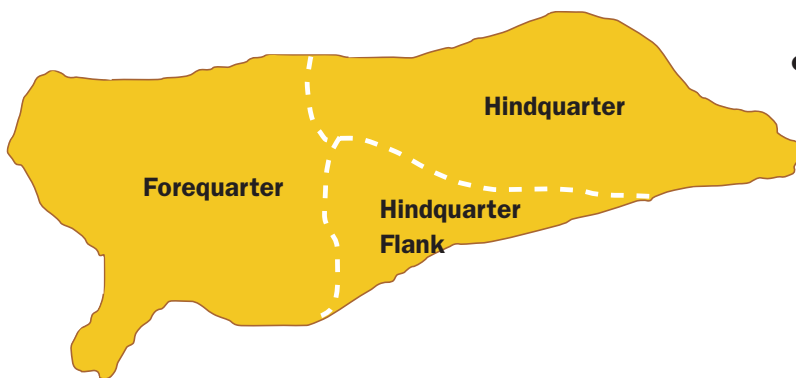


100% Pure Beef

McDonald's hamburgers are a single commodity product, ie they contain 100% beef with no binders or fillers added. Hindquarter flank and forequarter cuts are used and each are graded according to their visual lean.

'Visual lean (VL) is a visual assessment of the natural lean content of boned out cuts of beef'. (McKey Food Service)

The meat specification at McKey states that forequarter cuts are to be 90% VL and hindquarter flank cuts 75% VL. Every container is analysed for fat content and the results entered into the computer. The computer then works out the appropriate amount of each type of meat to make a perfect batch. McKey also uses frozen meat of 90% and 75% VL.



Frozen meat is used because:

- It keeps the ambient temperature of the batch (meat) low during processing
- It assists in the binding process

Blending the meat

Fresh and frozen meat of 90% and 75% VL is initially blended by the mincers and then the fat content is analysed in an Infratech machine. If the batch is within 1% of the product specification the computer allows it to move to the next stage. If it is outside the specification the computer works out how much extra meat needs to be added of either 90% or 75% VL to adjust the batch correctly. It is then re-tested.

The fat content is important as it affects the taste, texture and cooking properties:

- Too little fat may cause under-cooking problems.
- Too much fat will result in excessive fat on the grills and the burger may shrink on cooking.

Student Activity

These activities have been designed to enable students to relate the cuts of meat they are familiar with in the shops to those used in burgers and assess what visual lean means. The experiment will allow students to analyse why the fat content is an important specification in the burger-making process.

- Identify the names for the cuts of meat used in the burgers.
- Carry out a survey of cuts of beef to assess for visual lean. This could be done at a supermarket or local butchers.

- Worksheet (Photocopiable Master: Burger Experiments). Practical experiment to assess the effect of fat content on the cooking characteristics. This could be done using ready-made burgers of differing fat content or students could make their own using differing grades of beef mince.

ICT

- Draw up a report of the survey and/or experiment.
- Analyse different cuts of beef for nutrient content, particularly fat, using a nutrition program.

Shaping and Forming

Once a batch has met the fat specifications it moves into the grinders. The computer in the control tower monitors this process and tracks the progress of each batch of meat stage by stage.

See floor plan of production plant.

A second computer screen shows data about the batch - the meat used, the barcode identification, times it entered and left each processing stage and the fat analysis. This is a core part of the traceability process.

The bore size on the grinders is very small and this helps the patties stick together. There is also an elimination point here where any meat that will not go through the small bore and any small pieces of bone are rejected.

(Fourth Critical Control Point)

The Formax Machine

Once ground the meat is transferred to the formax machines. These produce 600 beef patties and 300 quarter pounders per minute. Pressure at 150lbs per square inch is used to force the ground meat into mould plates, which determine the shape, size and weight of the final product. Quarter pounders weigh 4oz/110g and regular patties a little under half this.

The patties hold together because:

- Of the frozen meat in each batch
- The small bore size used during grinding
- The pressure applied in the formax machine

As the quarter pounders leave the moulds they are stretched to create small holes which help the meat cook faster. To meet specifications they must be 12-14mm thick. Experienced operators carry out visual checks on the shaped burgers and will make adjustments to the machinery if necessary.

Student Activity

It is possible to replicate the process in the factory with equipment familiar to students. Students could set-up the process as a production line with different groups doing different stages, followed by a class analysis and discussion of the results.

- Meat can be minced in the classroom or ready prepared beef mince can be used.
- The mince then needs to be ground finely using the metal blade in the food processor.

- 50g portions are weighed and then shaped in a burger maker.

- The final product is assessed for consistency of:

weight
thickness
clean edges
even pressing
overall shape

Packaging

Once the beef patties are formed they move directly into the freezer tunnel. This contains liquid nitrogen and has an average ambient temperature of -100°C so that the hamburgers are frozen in the shortest possible time. Once frozen the product must be within -18°C to -23°C and it remains at this temperature until cooked in the restaurant.

Temperature Control

The temperature of all the chilled/freezer areas in the factory is monitored by sensors that read and record the temperature every hour. If the temperature rises then alarms are activated. It is vital that the correct temperatures are maintained all the time to inhibit bacterial growth and prevent dehydration in the final hamburgers.

Metal Detection

There are two points where the product passes through metal detectors. The first is at the end of the freezer tunnel before packing and the second is once the boxes have been filled and sealed.

(Fifth Critical Control Point)

Packaging

The beef patties are manually packed into boxes lined with polythene liners which help to keep moisture in. Electronic scales are used to indicate when a box is complete, it is then sealed and coded with the date, time and production line used. This data will be stored on the computer and gives the final

stage in the line of traceability. Each carton has a 90 day shelf life and once it has passed the final metal detector it is stored in the finished product freezer.

(Sixth Critical Control Point)

Quality Assurance

Regular patties are checked every hour and quarter pounders every 20 minutes by the Quality Assurance Department. They are checked against the specifications and all data is recorded on hand-held data loggers before being transferred to the mainframe computer.

Hamburgers are cooked under the same conditions as in a McDonald's restaurant. Timings are carefully controlled - regular burgers cook in 42 seconds and quarter pounders in 120 seconds. The internal temperature must reach 70°C .

Training Restaurant Managers

The Quality Assurance Department also runs sessions for the restaurant managers. They compare hamburgers that have been stored correctly at below -18°C with those which have been allowed to rise above -14°C . The attributes used include: 'blandness', 'beefy', 'chewiness', 'greasy/fatty', 'loose texture' and 'clean mouthfeel'.

Each night all machinery in the plant is thoroughly cleaned.

(Seventh Critical Control Point)

Student Activity

Students analyse hamburgers using McKey's attributes. Two methods are possible here:

- Students cook and analyse different burgers.
- Students analyse the same burger using one sample that has been stored at below -18°C and a second sample that has been allowed to defrost a little.

Worksheet:

Students use grid (Photocopiable Master: Sensory Analysis of Burgers) to record their findings during tasting. Results are transferred onto the star diagram. Results are analysed and conclusions drawn.

ICT

Students record results onto Excel and produce a star diagram by selecting Radar on the chart wizard.

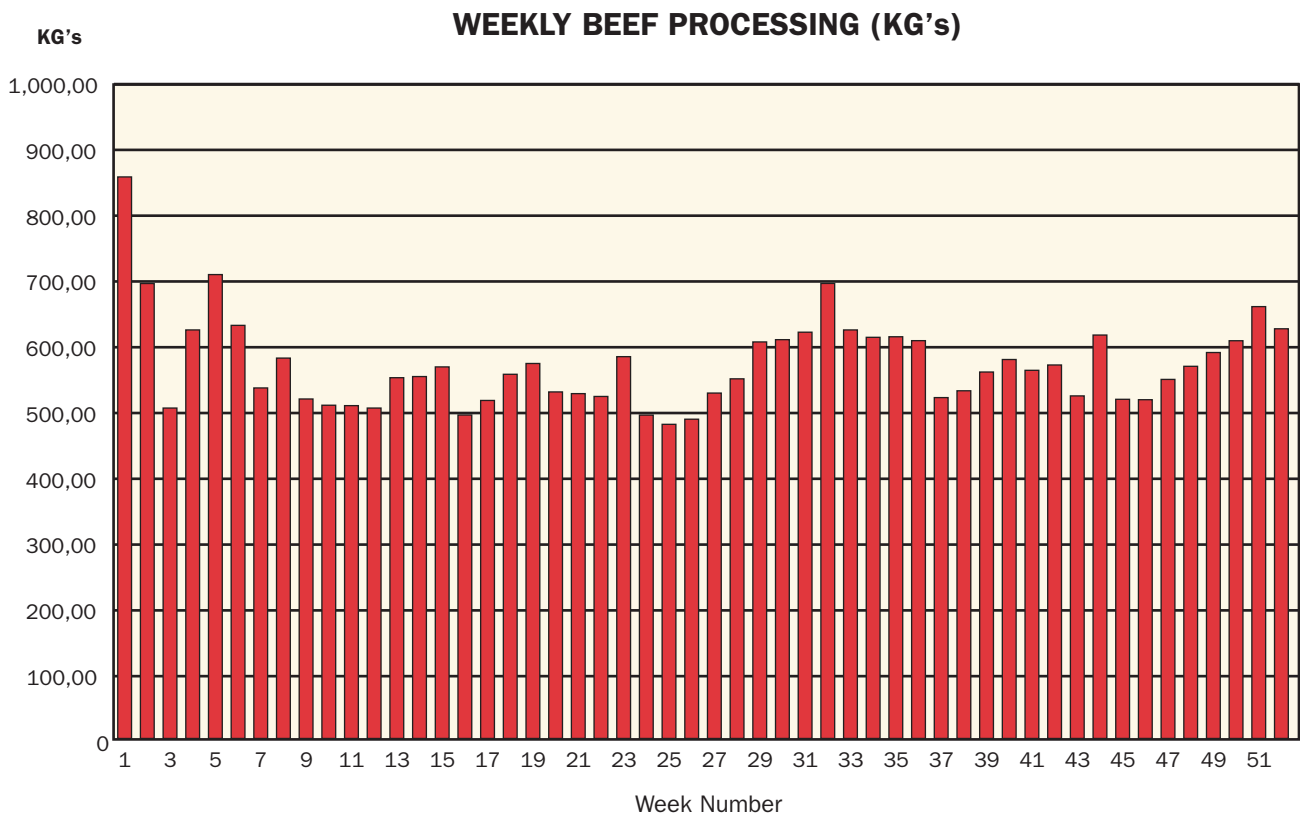
Despatch

The boxed product is held for a maximum of 10 days at McKey before going to one of three distribution centres located in Manchester, Hemel Hempstead and Basingstoke. Before the boxes leave Milton Keynes they are checked to ensure they are in perfect condition and then travel in temperature controlled vehicles for distribution. This ensures the product remains at below -18°C during transportation.

McDonald's Restaurant

Restaurants operate an electronic point of sale (EPOS) system which is used for stock taking and enables McKey to calculate production needs for the following week.

The chart shows weekly beef processing for a year in kilograms.



Student Activity

- Using the bar chart of weekly beef processing, identify the weeks when production was at its highest, that is above 650,000KG.
- Record the weeks when production was on or below 500,000KG.
- In groups discuss:
 - Why does it peak above 600,000KG on some weeks? What could be the reason for the sharp decrease in production in week 3?
- What marketing promotions could (or do) McDonald's employ to raise sales on other weeks of the year and to a wider range of customers?

Summary of Critical Control Points

CCP	Critical Limits
1. Meat Intake	<ul style="list-style-type: none"> ● Meat must be from a current audited and approved supplier ● All vehicles must be sealed on delivery ● Vehicles must be clean, without off-odours, fit-for-purpose, and free of other materials ● Fresh meat temperature : Target <+4°C ● Frozen meat temperature : Target <-18°C ● Fresh meat less than 6 days from kill-date ● Packaging fully protects meat against possible contamination risks ● Meat is bright red colour, no off-odours, free of any slime or contamination
2. Raw Material Storage	<ul style="list-style-type: none"> ● Chiller temperature operating between 0°C to +5°C
3. Frozen Meat Storage	<ul style="list-style-type: none"> ● Freezer temperature operating between -15°C to -25°C
4. Defect Eliminators	<ul style="list-style-type: none"> ● Defect eliminators fitted to all final grinding heads to remove bone and gristle fragments
5. Metal Detection	<ul style="list-style-type: none"> ● In-line metal detectors fitted with automatic rejection systems at freezing tunnel exits. Detector sensitivity set at 1.2mm Ferrous, 1.5mm Non-Ferrous
6. Product Storage	<ul style="list-style-type: none"> ● Product kept at <-18°C
7. Factory Hygiene	<ul style="list-style-type: none"> ● Daily strip-down and clean of all manufacturing equipment ● Foam detergent followed by sanitiser ● Daily visual inspection ● Microbiological swabbing

McKey Production Plant Floor Plan

