

2020 VCE Food Studies examination report

General comments

The 2020 examination was based on the *VCE Food Studies Adjusted Study Design for 2020 only*. It assessed students' knowledge and understanding of Areas of Study 1, 2 and 3 of Units 3 and 4. All key knowledge and skills that underpin the outcomes were examinable.

The examination consisted of two parts: Section A contained 15 multiple-choice questions and Section B contained 11 questions, including one extended-response question.

The multiple-choice questions were well answered.

In Section B, many students did not focus on the information provided in the stem of the questions and this often resulted in non-specific responses. Some students were unable to tailor the content of their responses to the focus of the question, read and use the data provided in question stems, or demonstrate the key skills linked to related areas of study.

Specific information

Student responses reproduced in this report have not been corrected for grammar, spelling or factual information.

This report provides sample answers or an indication of what answers may have included. Unless otherwise stated, these are not intended to be exemplary or complete responses.

The statistics in this report may be subject to rounding resulting in a total more or less than 100 per cent.

Section A – Multiple-choice questions

The following table indicates the percentage of students who chose each option. The correct answer is indicated by shading.

Question	% A	% B	% C	% D	Comments
1	2	14	83	1	
2	0	2	97	1	
3	74	2	0	23	
4	5	2	22	71	The use of the words 'viable commercial production' indicates a large-scale operation found in the food industry when looking for new opportunities to introduce different food items. Vegetarians would not necessarily support harm to insects (a type of animal). There is no evidence that people would replace meat with insects, as people find a change in their food choices hard to make. Some insects found in home gardens may not be safe to consume.
5	3	31	4	62	Steak is a source of protein (amino acids) and reducing sugars. Dextrinisation is the browning of food that contain starch using dry heat. The Maillard reaction occurs when a protein and sugar or starch are present together and dry heat is applied. Grilling is an example of dry heat.

Question	% A	% B	% C	% D	Comments
6	25	26	49	0	Radiation is the transmission of heat energy in the form of rays from a heat source such as an electric element, gas flame or glowing charcoal or wood, which are all examples of a method used to barbeque steak. Conduction relies on molecules transferring heat from one molecule to another by movement or collision and convection results when gases move from a warmer area to a cooler one.
7	0	85	9	6	
8	88	2	6	4	
9	8	2	1	89	
10	22	4	73	2	There is an increase in consumer concern for animal welfare and the environment. There is no evidence of large amounts of sugar in plant-based protein alternative foods and it is unlikely that organisations advocating meat consumption would promote any alternative to their own product.
11	1	5	0	93	
12	17	74	6	3	
13	74	10	2	14	Fad diets often restrict the intake of certain food groups or encourage the focus on consuming a specific food or food group, which results in the omission of some key nutrients. The Australian Dietary Guidelines recommend a wide range of foods from all five food groups to provide essential nutrients and energy that can support normal growth and good health. Fad diets are unlikely to align with these recommendations.
14	1	99	0	0	
15	11	1	88	1	

Section B

Question 1a.

Marks	0	1	2	3	4	5	6	Average
%	48	3	6	9	9	6	18	2.2

A suitable response could have included two of the following:

- Education
 - Community members can use their knowledge and understanding of growing food to plant seedlings from the cart and then give it freely back to the cart for others in the community to benefit. This ensures the success of the program with produce made readily available.
 - Community members can be introduced to new products and share knowledge of fresh ingredients and how to prepare and cook them, ensuring the long-term success of the program.
 - This program does not rely on formal education to be successful. The community can share food, ideas and recipes, building knowledge within the community to ensure its success.

- Income
 - There is no money exchange needed; it is a giving and sharing idea so people can access the cart as they need. This idea does not favour anyone in the community; it is inclusive of all incomes, ensuring it is successful.
 - Income significantly affects a person's capacity to access fresh and healthy foods. This initiative provides fresh and healthy food for free in the community, thereby diminishing the role that income has on access.
- Location
 - The location of the cart would need to be a central location within communities for all to access as a space where people feel welcome and can contribute to and take from the cart as they require.
- Available time
 - You would need to have advocates in the community who have time to look after the cart and keep an eye on its cleanliness, refill water, stock pamphlets, etc. You would need to have community members willing to share and contribute produce to enhance the success of the movement.
- Cultural norms
 - The program's success would require like-minded community members to engage with the aims of the program to ensure its success. Communities would need to create a giving and sharing culture to enhance the success of the program for the whole community. This could be through promotion, contribution to or care of the cart.
- Accommodation
 - Living in small spaces means less room for growing a variety of your own food, including fruit and vegetables. This type of program creates the ability for communities to have access to home-grown food together.
 - The cart provides a meeting point for community members to gather, network and exchange food/cooking information and build new social connections.

Question 1b.

Marks	0	1	2	Average
%	22	44	34	1.1

A suitable response could have included some of the following:

- The program is an opportunity for people with or without formal education to come together for mutual exchange, even beyond an interest in growing food.
- The Grow Free program enables different cultural groups to share their own food ideas, knowledge and skills by exchanging traditional foods offered in the cart.
- The Grow Free program is about sharing food with an attempt to foster the overall health and wellbeing of the community in which the program is offered. The opportunity to both receive and share attempts to build community and build a sense of belonging and connectedness.
- The Grow Free program allows communities to work together to promote connection and sharing through food and plant seedlings. They aim to make fresh food free. By using food as a medium, people are connecting with their community through giving, sharing and receiving. Community members can grow their own food and give it freely to someone else, without need for reciprocation or acknowledgment. The aim of the program is to encourage fresh/home-grown food and good health and wellbeing. The program is for anyone in the community, which provides access and equity to all.

Responses must be promotion (positives) of connectedness.

The following is an example of a high-scoring response.

Grow free promotes the idea of the community sharing food and seedlings. Here individuals both young and old from different cultures are able to connect and bond with each other by sharing their produce. Their sense of connectiveness will be strengthened by this.

Question 2a.

Marks	0	1	Average
%	40	60	0.6

Emulsification.

Question 2b.

Marks	0	1	2	3	Average
%	55	19	15	11	0.8

A suitable response could have included one of the following:

- This is an example of an emulsion. Normally oil and vinegar do not mix but when egg yolk/lecithin is added it is able to hold the oil and vinegar molecules in suspension so it does not separate.
- On their own, oil and vinegar do not mix, they will separate. By adding an egg yolk to the mix, you add an emulsifying agent that works to create a stable emulsion. This is because the particles from the egg yolk surround the vinegar and oil droplets to prevent them from separating.

The following is an example of a high-scoring response.

Immiscible substances are combined with an emulsifying agent (lecithin in egg yolk) slowly, and with vigorous whisking to allow these items to mix permanently, as the emulsifier – lecithin prevents the ingredients from separating again by surrounding the vinegar and oil.

Question 2c.

Marks	0	1	2	Average
%	74	19	7	0.3

A suitable response could have included one of the following:

- This mayonnaise belongs in 'Eat in small amounts every day' because of its fat content.
- Olive oil is plant based and is low in saturated fat and may have health benefits.

The following is an example of a high-scoring response.

It contains olive oil which is low in saturated fat and can be eaten in small amounts.

Question 2d.

Marks	0	1	2	Average
%	17	36	47	1.3

A suitable response could have included one of the following:

- As the egg white is whipped, air is being incorporated into the liquid egg white, increasing its volume.
- As the egg white is whipped the trapping of air changes its colour from translucent or opaque to white.

Question 2e.

Marks	0	1	2	Average
%	58	23	20	0.6

A suitable response could have included: The protein in the egg white coagulates. As the egg white is cooked, there is a permanent structural change in the protein molecules. The protein in the egg white denatures and becomes set and firm.

Many students did not relate their answer to 'after whipping' and 'chemical change', which was information given in the question stem.

Question 3a.

Marks	0	1	2	3	Average
%	56	5	19	21	1.1

A suitable response could have included one of the following:

- Prescribed name of the food:
 - Purpose is to provide accurate and specific advice to the consumer on exactly what the product is.
 - This allows the consumer to easily identify what they are purchasing and to avoid any confusion when choosing different products.
- Weight/measure of contents/quantity measures:
 - Provides the consumer with the accurate amount of product to help work out how many serves are in the packet.
 - Provides an accurate metric weight and measure of the product for the consumer to know exactly how much they are getting. (This is a legal requirement of fair trading.)

The component needed to be evident on the label presented in the stimulus.

Question 3b.

Marks	0	1	2	3	Average
%	35	12	27	26	1.4

A suitable response could have included one of the following:

- Bar code
 - Codes are used at the retailer's checkout to scan for cost.
 - Food manufacturers and food retailers benefit from information that can be gained through scan technology using the bar code, such as batch number, country of origin, pricing, date of manufacture, etc.
- Health/Star rating
 - Ratings are used by consumers to compare the nutrition content of packaged foods with similar products.
 - This rating system allows a food manufacturer to apply a rating to their product that describes the nutrition content of the product and gives the product an overall rating of healthiness that can be compared with similar products and enables consumers to make informed food purchases.

- Serving suggestion
 - Suggestion guides consumers in how they might use the product in their cooking.
 - This can be included to help a consumer use the product effectively/the way it was intended. It can let them know the different ways the product can be used.

The following is an example of a high-scoring response.

An example of optional food information is the health star rating, which provides an overall rating out of 5 of the nutritional content of the product and helps consumers to make a quick judgement on the products' healthiness.

Question 3c.

Marks	0	1	2	Average
%	28	40	32	1.0

A suitable response could have included one of the following:

- Misleading claims about products such as the health benefits of a product can have consequences on the consumers' health. Labels have a responsibility to ensure accurate information is given so informed choices can be made.
- Accurate labelling is there to not mislead consumers when purchasing a product. It allows consumers to trust what they are purchasing is going to be what is stated on the label and have confidence to consume (without fearing it may not be said product).
- Consumers can use food labels to make informed choices based on their values and beliefs, such as avoiding ingredients that include animal products, or are the result of factory farming or genetic modification; or choosing products because they use free-range animals or are purchased through Fairtrade practices.

Question 4

Marks	0	1	2	3	4	5	6	7	8	Average
%	1	1	2	4	8	11	18	24	31	6.3

A suitable response could have included:

Suggested action	Waste hierarchy level	How the action has an impact on food waste and/or the environment
Supermarkets make coleslaw salad out of oddly shaped vegetables.	re-use	<ul style="list-style-type: none"> • Finds a purpose for vegetables that would otherwise be thrown out.
Supermarkets put excess food that is past its 'best before' date into the rubbish bins.	dispose	<ul style="list-style-type: none"> • Contributes to landfill.
Controlled use of waste-to-energy incinerators generates heat that is used for heating buildings.	energy recovery	<ul style="list-style-type: none"> • Novel ways of reducing the amount of rubbish going to landfill. The heat generated can be used for heating buildings. • Can decrease greenhouse gases from rotting food going into the environment thereby decreasing environmental impact/impact on ozone layer.
Families put their vegetable scraps in compost bins.	recycle	<ul style="list-style-type: none"> • Foods composted to fertilise vegetable garden. • Allows families to decrease waste/landfill that contributes to greenhouse gases. • Can contribute to improving soil health by increasing moisture retention, thereby reducing need for water.

Suggested action	Waste hierarchy level	How the action has an impact on food waste and/or the environment
Advertising campaigns promoting the use of food already in the fridge.	avoid	<ul style="list-style-type: none"> Could provide consumers with information about the waste of resources required to grow and produce the food, such as water, fertilisers, fuel for transportation and energy to make packaging. Educate people to understand how to substitute ingredients in a recipe.

Question 5a.

Marks	0	1	2	3	4	Average
%	56	26	12	4	1	0.7

A suitable response must include the principles of research terminology from the study design and could have included two of the following:

- Recognition of credible source
 - Kate would have looked to check whether the information on the Facebook pages were provided by someone who is credible and/or backed up with qualifications in nutrition (such as an accredited practising dietitian) or a federal government agency.
- Evidence-based information
 - Kate would have looked to see if the information provided on the Facebook pages was accurate, reliable and based on the Australian Dietary Guidelines.
 - Kate would have looked to check whether the information provided on the Facebook pages was peer-reviewed by an independent qualified expert group with no conflict of interests.
 - Kate would have looked to see if the information used on the Facebook pages was checked and came from scientific evidence with no conflict of interests.
- Accurate analysis of data
 - Kate would have looked to ensure the information provided on the Facebook pages had been developed through rigorous research methodologies, such as appropriate sample sizes.

The following is an example of a high-scoring response.

Accurate analysis of data: On the Facebook pages Kate could check if the nutrition advice provided is based on reliable case studies that have a large sample size, taken over an adequate time period and were performed by reputable institutions.

Evidence-based information: If Kate is able to find the data the nutrition advice is based on, and check to see if it has been peer-reviewed and analysed by qualified scholars in nutrition.

Question 5b.

Marks	0	1	2	Average
%	21	30	49	1.3

A suitable response could have included one of the following:

- The purpose of the study is to assess the nutrition and diet information provided on popular Facebook pages against the Australian Dietary Guidelines.
- The purpose of the study is to determine which popular Facebook pages provided advice that was consistent with the Australian Dietary Guidelines

Question 6

Marks	0	1	2	3	4	5	6	Average
%	27	23	19	15	9	5	3	1.8

The following key points could have been included in the response:

- Implications of climate change could be:
 - increasing sea temperatures and rising sea levels
 - increased extreme weather events
 - increased risk of drought
 - land degradation as soils become drier increasing wind and water erosion
 - increased soil acidification due to reduced water supplies
 - changing rainfall patterns
 - increased salinity with more groundwater being used.
- Some traditional crops may no longer be viable in areas where they are currently grown because of implications of climate change, such as increased risk of droughts or changing rainfall patterns.
- Genetic modification may ensure crops/food production are more suitable for tolerance to extreme weather conditions.
- Foods grown can be manipulated to suit the changing environmental conditions.
- The opportunity to protect current and future land use should be considered against further climate change environmental effects.
- Reduced need for fertilisers and pesticides can decrease the environmental impact of primary food production.
- Genetic modification may be able to contribute to the development of different capacities of animals so that less intensive farming processes/practices will be required.
- There may be other features of primary food production that also require attention if we are to successfully reduce its environmental footprint. For example, new technologies can be developed and harnessed to make the primary production of food less energy intense and therefore less harmful.
- Organic farming may have potential to be part of the solution.
- There are ethical, social and environmental concerns about genetic modification, such as:
 - could have a negative impact on biodiversity – local insects, wildlife and natural crops
 - potential to produce more widespread, resilient weeds
 - can reduce the effectiveness of antibiotics or cause new allergens.

The following is an example of a high-scoring response.

The statement is not entirely true. Genetic modification is an effective way to combat the effects of climate change, but not the only one. Climate change can involve increasing temperatures, reduced rainfall and poorer quality soils. Genetic modification includes altering the genetic material of an organism to improve certain characteristics of them. Hence this technology could be used to produce crops with an increased yield and drought tolerance or livestock which has meat which stays high in quality even when temperatures increase. However there are other alternatives. By employing low impact farming methods soil health is retained, and capacity to retain water and nutrients is increased keeping soils viable for longer. Additionally by planting more crops than livestock methane emissions are reduced and global warming will slow down. Organic farming methods can also retain the health of soil with less use of artificial pesticides and fertilizers, reducing the impact these can have on the land. Crops produce greater yields, have less environmental impact so by planting crops that are highly suited to the changing climate, primary food production can be addressed without the need to use Genetically modified foods as there are some concerns about their impact on biodiversity impacting on local insects and natural crops and causing stronger and weeds to grow.

Question 7a.

Marks	0	1	2	3	4	5	Average
%	6	18	29	26	14	8	2.5

The following key points could have been included in the response:

- There are many marketing terms used in the media that aim to influence parents' preferences and knowledge of this product. For example, the evocative language – fun, playful, secret parents' business, 'shhh ... don't tell them it's good for them' – may appeal to parents who want to provide healthy food to their children.
- Use pictures of fresh produce – showing that the food is a healthy and fresh choice for parents and children.
- Employ images of happy and smiling children – showing children of various ages will like and enjoy eating mandarins.
- Show children of various ages being able to peel the mandarin easily by themselves and enjoying the mandarin independently.
- Emphasise 'Grown in Australia' – local produce has fewer food miles and/or supporting local farmers/communities.
- 'Easy peel' – they are a good size, suitable for children, children can peel mandarins independently.
- Quick getaway – they are convenient for parents and/or good for lunchboxes, no fuss to eat as all is consumed.
- 'Yum' – using child-positive language to show that children like eating them.
- Looks natural, fresh and healthy.
- The language used is evocative – fun, playful, secret parents' business, 'shhh ... don't tell them it's good for them' are all examples of evocative language.
- Use of emoji to communicate with parents and influence their decisions.
- Use of explicit reference to healthy eating by using 'full of vitamins'.

Question 7b.

Marks	0	1	2	Average
%	32	23	44	1.1

A suitable response could have included one of the following:

- Parents/family members using Aussie mandarins in their family meals and eating with their children may increase the consumption of Aussie mandarins.
- Parents/family members including children in meal or lunchbox preparation using Aussie mandarins could see them incorporating Aussie mandarins into more meals.
- If parents/family members eat Aussie mandarins their children may be more likely to eat Aussie mandarins, increasing consumption by children.

Question 7c.

Marks	0	1	2	Average
%	50	16	34	0.8

A suitable response could have included one of the following:

- A sense of pride that their children are eating Aussie mandarins, which is a healthy food choice.
- Satisfaction as a parent that a nutritious snack has been provided for the child.

- Confidence in their parenting skills for providing fresh food and getting children to eat it.
- A sense of certainty as these mandarins are grown naturally in Australia, thus contributing to the Australian economy, which will help their children in the future.

The following is an example of a high-scoring response.

It suggests that parents will feel good about feeding their children a healthy food -mandarins and also proud that they are using a fruit grown in Australia.

Question 8ai.

Marks	0	1	Average
%	42	58	0.6

A suitable response could have included one of the following:

- habitat deterioration, including crop clearing/deforestation
- loss of biodiversity
- use of pesticides/chemical drifts from spraying
- environmental impacts
- pollution
- predators or competing species
- threat to biosecurity and increase in diseases
- human impact.

Question 8aii.

Marks	0	1	2	Average
%	44	21	36	0.9

A suitable response could have included one of the following issues:

- Habitat deterioration such as crop clearing/deforestation
 - This will cause a decline in bee population as there will be fewer flowering plants available in Australia.
- Loss of biodiversity
 - Same crops planted in the area will have impacts on bees, who are restricted to pollinating specific plant species in Australia.
- Use of pesticides
 - In Australia, the use of pesticides will destroy bees as well as destructive insects such as locusts and mites.
- Environmental impacts
 - Droughts and floods can destroy crops and food sources of pollen for bees.
- Pollution
 - Pollution and subsequent waste and fallout of CO₂ emissions will have an impact on crop productivity and bee population.
- Competing species
 - Competition will deplete pollen available for local bee populations or predatory insects, such as wasps, thereby lowering bee populations.

- Threat to biosecurity and increase in diseases
 - If there are threats to biosecurity, this can then cause plants to be threatened by infection and disease in Australia. If this is the case, the bees may not be able to complete their pollen transfer effectively and as a consequence plants will not be pollinated and could die off.

Question 8b.

Marks	0	1	2	3	4	Average
%	19	23	31	14	14	1.8

A suitable response could have included two of the following explanations related to the benefits selected.

Benefit	Suitable response
Help 75 per cent of crops producing fruits and seeds to pollinate	If bee populations are maintained, food crops will continue to be pollinated. This will support food security as a continual supply of fruits and seeds are produced, thereby protecting food supply.
Increased biodiversity	Bees pollinate other nectar-producing plants that support the food supply of other living creatures besides humans, thereby protecting biodiversity. These creatures might also be a food source for humans, such as deer.
Increased food production	By maintaining and even increasing bee populations, even more food can be produced to contribute to food security.
Provide micronutrient-rich foods	Germination of plants relies on bees collecting pollen and transporting genetic material between male and female plant parts. Without germination, plants cannot reproduce and grow, therefore food security is threatened. With increased bee populations, there is increased prevalence of healthy plants, rich in nutrients.
Maintain ecosystems	With increased or preserved bee populations there is an ecosystem balance in nature between pollination, plant germination, adequate photosynthesis in the presence of sunlight and water availability for bees and plants.

The following is an example of a high-scoring response.

Benefit 1: Fruit and seed crops will continue to be pollinated if the bee populations are kept and protected. This means the supply of these foods will continue and communities will have access to these foods therefore supporting food security.

Benefit 4: Pollinated plants provide more micro-nutrient rich foods. individuals gain the necessary nutrients from these foods therefore with increased bee populations there will be more healthy plants and this will support food security.

Question 9a.

Marks	0	1	2	Average
%	20	40	39	1.2

A suitable response could have included one of the following:

- If healthier options have prominent placement in the vending machine, students will see the healthy options first, which will encourage them to purchase and consume the healthier foods.
- Students will see the healthy snacks, which could allow them to purchase this over a discretionary food, giving them options, rather than only unhealthy food being available and having no choice.
- If students have late classes with no access to food venues on campus, they can still access healthy food through vending machines, whereas before they would have only had access to discretionary food.

Question 9b.

Marks	0	1	2	Average
%	22	37	40	1.2

A suitable response could have included one of the following:

- Students might start to purchase their main meals from vending machines and eat it alone rather than bringing food from home or purchasing from a café and eating with someone else.
- Students still have access to discretionary foods but may still purchase the unhealthy option out of habit, lack of education about health issues or lack of desire to eat more healthily.

Question 10a.

Marks	0	1	2	Average
%	29	33	38	1.1

A suitable response could have included some of the following:

- Consumers may be more likely to drink due to the 'fun' associated with the product through the AR.
- AR may be more likely to appeal to people with a low literacy level who can listen to the packaging.
- AR could be linked to sensory properties, for example describing what the milk will taste like, encouraging people to purchase.
- Consumers may be excited by the prospect of AR and hooked by the new technology, wanting to try all four flavours and hear the different voiceprints.

The following is an example of a high-scoring response.

Consumers maybe more likely to purchase the milk if they are intrigued by the technology. Also if they are a fan of the singer used 'Han Lu' and recognise his voice they will be more likely to purchase this milk.

Question 10b.

Marks	0	1	2	3	Average
%	48	27	18	7	0.9

A suitable response could have included one of the following:

- AR could provide verbal indication of when the milk is going to expire, reducing the risks of food poisoning.
- AR could have a message to ensure people store the milk correctly, below 5C, for food safety.

The following is an example of a high-scoring response.

The AR could easily give the use-by/best before date to the consumers, so that consumers wouldn't consume an expired product. The AR could also give instructions on how to store the product eg. in the refrigerator and consuming within a certain number of days once it was opened.

Question 10c.

Marks	0	1	2	Average
%	14	44	41	1.3

A suitable response could have included one of the following:

- Dairy food is an important source of calcium and protein for growing adolescents.
- Growth of bone mass during adolescence (14–18 years) to prevent osteoporosis in later life.
- Peak bone mass forms during the period of adolescence, which is why increased serves of dairy are required.
- Increased calcium intake during youth is essential to achieve peak bone mass and reduce susceptibility to osteoporosis in later life.
- During adolescence (14–18 years) there is a period of growth that will require more calcium in the diet for healthy development of bones. Adults do not require extra calcium as they do not go through this period of growth.

Question 10d.

Marks	0	1	2	Average
%	38	33	29	0.9

A suitable response could have included one of the following:

- Women aged 51 years and older are at greater risk of developing osteoporosis than men and women aged 19–50, particularly after menopause, because their oestrogen levels are reduced.
- Women who are aged 51 years or older are likely to be experiencing or have experienced menopause. As a result of decreasing levels of oestrogen in the body, women's bodies are less able to retain calcium from dietary sources. This means women are more susceptible to osteoporosis after this age. Eating more serves of calcium rich foods can help prevent this.
- Older women require more calcium in their diet than men and women aged 19–50 years because they need to maintain bone strength during menopause, which can decrease bone strength and lead to osteoporosis.

The following is an example of a high-scoring response.

Women aged 51 or older are likely to go through menopause than men and women aged 19–50 years. Estrogen is no longer being produced which can effect bone density through the hormones absence which may cause osteoporosis. Calcium from the foods in this group may help with keeping their bones strong.

Question 11

Marks	0	1	2	3	4	5	6	7	8	9	10	Average
%	11	12	17	16	13	9	7	6	5	3	2	3.6

Responses could have included some of the following information that relates to each of the four dot points in the stem:

- sensory appreciation
- contribution to satiety
- process of eating
- digestion of micronutrients in the hamburger.

The following is an example of a high-scoring response.

The sensory appreciation of the burger means the overall sensory experience that occurs during the consumption of the food. First of all looking at the burger would trigger the stomach pangs and the production of saliva as the body prepares for digestion. Our senses work together to help us to enjoy food. The olfactory cells in the nose would be triggered and the tantalising aroma would increase the appetite. As the consumer places the burger in their mouth, they would experience an array of textures such as the soft dough of the bun and the crunchy lettuce as well as flavour such as the cheese or acid of the tomato. These would all work towards the formation of a positive memory, encouraging the consumer to want to eat a burger again in the future.

High protein foods would contribute most to satiety, which is defined as a state of fullness, and when there is no longer a desire for food. As the burger contains a grilled beef patty and cheese which are high protein rich foods this burger would contribute to a relatively high level of satiety. Furthermore low-glycaemic index foods, such as the wholemeal bun, contribute to satiety as they prolong digestion.

The process of eating the hamburger would involve placing it in the mouth, where the teeth grind the burger into smaller pieces, to increase the surface area and hence increase digestion efficiency. Saliva would combine with the food to create a bolus to assist with its passage down the oesophagus. The ring-like muscles lining the oesophagus would contract and relax in wave-like motions (peristalsis), until the food enters the stomach. This is now called chyme and is released into the small and large intestine where digestion of nutrients occur.

The macronutrients in the burger include fat (present in the cheese and meat), protein (cheese and meat) and carbohydrates (present in the wholemeal bun). Fat digestion occurs in the duodenum of the small intestine where bile emulsifies fat into smaller molecules. Pancreatic lipase secreted from the gall bladder (produced in the liver) then catalyses the enzymatic hydrolysis of triglycerides into fatty acids and glycerol.

Protein digestion begins in the stomach, where hydrochloric acid provides a harsh acidic environment, denaturing the protein. It activates enzyme Pepsin then begins the hydrolysis of polypeptides into smaller polypeptides. In the small intestine, the digestive juices secreted from the pancreas contain protease which catalyses the breakdown of protein molecules into individual amino acids and peptides.

Finally, carbohydrate digestion occurs in the mouth, where the enzyme salivary amylase begins to break down the starch into smaller polysaccharides. Pancreatic amylase is secreted in the duodenum of the small intestine digesting polysaccharides into disaccharides maltose, sucrose and lactose. Finally digestive enzymes are secreted from the epithelial cells in the small intestine. Sucrase breaks down sucrose into monosaccharides fructose and glucose, maltase breaks into two units of glucose and lactase into glucose and galactose. These units of fats, carbohydrates and proteins are all ready for absorption into the body.

The small intestine is lined with finger-like projections called villi. These villi absorb the amino acids (from protein digestion) into the bloodstream and they are transported around the body to cells and used for things like growth and repair of cells, making bones and hormones. The villi absorb the glucose (from carbohydrate digestion) into the blood capillaries then into the bloodstream via veins and arteries. It is carried around the body to the cells. The body uses carbohydrate as energy. The villi also absorb the fatty acids and glycerol (from digestion of fat via the lacteal which is connected to the lymphatic system). They move around the body via the lymphatic system and eventually enter the blood stream.

Once the nutrients have been absorbed the remaining food which cannot be digested moves into the large intestine and is excreted from the body as faeces.