

[C045/SQP174]

Advanced Higher
Home Economics
Health and Food Technology
Specimen Question Paper

Time: 3 hours

NATIONAL
QUALIFICATIONS

100 marks are allocated to this paper.

This paper consists of **two** sections.

Candidates should answer the following:

Section A — **ALL** questions

Section B — Question 1 and any other **two** questions

SECTION A

You should spend approximately 1 hour in total on this question.

Read the report carefully.

Using the information in the report and your own knowledge, answer the questions below.

Marks

- | | | |
|-----|---|--------------------------|
| (a) | The report indicates that the UK leads the growth in sales of organic food.
Explain the reasons for the growth in sales. | 5 |
| (b) | Discuss the role of
(i) the Advertising Standards Authority
(ii) the Soil Association
in providing protection and advice for the consumer in relation to organic food. | 10 |
| (c) | There is much controversy over the “beneficial” effects of organic foodstuffs on sale.
Critically discuss the main arguments in this debate. | 10
(25) |

SECTION B

Answer THREE questions from this section. Question 1 and any other TWO questions.

You should spend approximately 40 minutes on each question.

Marks

1. One of the aims of the Scottish dietary targets for 2005 is to achieve a reduction in coronary heart disease.
 - (a) Discuss the Scottish dietary targets in relation to this aim. **10**
 - (b) Critically discuss the factors which may hinder the achievement of the Scottish dietary targets for 2005. **15****(25)**
2. “Better health is for life, but better health must start early.”

2010—Towards a Healthier Scotland, News Release 1999

Discuss this statement with reference to the role played by micro-nutrients in the health and development of individuals. **(25)**
3. Discuss the properties of protein with reference to the manufacture of food products. **(25)**
4. Discuss the precautions which should be taken throughout the food chain to prevent the micro-biological contamination of ready-cooked chicken. **(25)**
5. Discuss the use of additives in manufactured foods, brought about by developments in food technology and changes in consumer demands. **(25)**

[END OF QUESTION PAPER]

[C045/SQP174]

Advanced Higher
Home Economics
Health and Food Technology
Specimen Report

Time: 3 hours

NATIONAL
QUALIFICATIONS

REPORT
For use with SECTION A

Read the following report carefully and then answer the questions in SECTION A of the accompanying question paper.

You should spend approximately 1 hour in total on Section A.

The growth industry that still has a lot of explaining to do.

Organic food ought, by definition, to be a good thing. Adding chemicals to the process of production—pesticides to inhibit weeds and kill pests, fertilisers to aid growth in cereals and hormones to increase muscle in cattle—has run out of control. By stripping these additives out of the chain we will give the land a chance to recover its natural balance and prevent residual traces from entering our bodies.

But imagine feasting on organic roast beef and Yorkshire pudding, washed down with organic beer, rounded off with an organic coffee and a nice post-prandial organic cigarette. Put this way, our embrace of the organic way suddenly seems contrary.

The reaction of the British consumer to the recent food scares, by plunging into a spending frenzy on anything with the word “organic” stamped all over it, would seem to suggest that as a group we are still unable to distinguish between the truth and the barely concealed motives of a few powerful vested interests.

It is revealing that the magazine *Profit* included in its “best businesses to go into now” cover story last month not only the internet, but also organic food, especially in Europe. “It’s going to rocket,” said Eric Clark, a retail consultant.

According to a *Which?* survey this week, more than one person in four now eats some form of organic food, although it also found that many were put off by the relatively high prices. Consumers rate it as healthier, safer and tastier than products produced by mainstream farming methods. The BSE crisis and the perceived risk from genetically modified food were cited as important factors in this shift of opinion.

But can anyone agree on a definition of organic food? How important is it now as a business and as an issue for the consumer, and can we trust what we are being told by the experts?

The answer to the first question is no, as best illustrated by the example of eggs. Around 80 per cent of organic eggs sold in British supermarkets come from production systems which are not certified by the Soil Association. According to the Association’s director, Patrick Holden: “Consumers who buy them are being misled.” Among other things, loopholes in the regulations allow huge colonies of chickens, up to 8000 birds, to be farmed together.

“It seems a great irony that after some 25 years of confusion in the conventional poultry world about the meaning of free range—which is a term that has been used and abused to the point where consumer confidence has been eroded—that organic production should be following down exactly the same road,” said Holden.

As a business, it has become very big indeed. Last September, Heinz paid \$100 m for a stake in an American company called Hain which had made its name producing “natural” food products. The big breakfast cereal manufacturers are moving in as well; Kellogg recently paid \$307 m for a firm which makes soy-based foods and will soon introduce a soy cereal. “They paid a high price because they have high hopes,” said a business analyst. “The betting is that natural is ultimately going to be mainstream.”

When the UK government last year announced £1.6 billion in subsidies over the next seven years for farmers to diversify, £140 m was earmarked for converting land to organic production. In 1999, more than 1000 farmers joined the scheme; before that a mere 400 had done so in the previous five years. Last December, students enrolled in Aberystwyth for Britain's first degree in organic farming.

Can we rely on the powerful supermarket and agriculture lobbies not to deceive the consumer? Indeed, should even the promotion of organic food by the Soil Association, which in the past has been accused of making exaggerated claims, be taken with a pinch of sea salt?

Recently, the Advertising Standards Authority upheld a complaint against Seeds of Change, an organic supplier, which claimed that "intensive farming with chemical pesticides can strip food of much of its natural goodness . . . organic food . . . is not only kinder to the environment but is also delicious food you can trust." It also suggested conventionally reared farm animals were routinely injected with growth hormones and antibiotics. The company had to accept that its generalisations were wrong.

Unfortunately, even on the fundamental issue of whether organic food is any better for you, opinion is divided. The Soil Association says it undoubtedly is: it contains more secondary metabolites, part of the plant's immune system which also help fight cancer in humans; and it contains a higher level of vitamins.

But some scientists claim that there is no evidence of any nutritional benefit from eating organic food, and there are some who say it can be positively dangerous because of the use of sewage to fertilise the land. Others insist that many of the natural pesticides produced by plants were potentially more of a risk than the synthetic ones used in conventional agriculture.

Professor John Hillman, director of the Scottish Crop Research Institute, delivers a dire warning, saying organic farming poses considerable risks to human health: "It raises risks of faecal contamination, not only of food but also of waterways, food poisoning, high levels of natural toxins and allergens, contamination by copper and sulphur-containing fungicides, production of diseased food, low productivity and the creation of reservoirs of pests and diseases."

Whoever is correct, the organic bandwagon is already rolling, even to the extent that two supermarket chains, Iceland and Asda, have announced that they will sell organic food at the same price as equivalent conventional products. But Holden, at the Soil Association, warns: "The economic climate in which farmers operate enables intensively produced food to be sold at low prices. So how are supermarkets proposing to finance their organic price-parity policies? Presumably either by reducing their margins and selling organic products as loss-leaders, or by buying cheaper organic products from countries where organic production is subsidised or lower organic standards are in operation."

Holden argues that one of the main reasons we have run into so many food safety problems is precisely because we have had a cheap food policy.

"The average UK family spends a smaller proportion of its disposable income on food than ever before. Instead of perpetuating this trend, supermarkets should make an extra effort to explain to customers why it is worth paying more for organic foods. The retailers that will benefit most out of developing the organic market will be those that show a commitment to supporting the development of the organic movement, rather than cutting prices for short-term competitive advantage."

But even in this, the supermarkets can take advantage. A recent survey comparing the price of an organic and non-organic shopping basket of food found that the former attracted a premium of between 70 per cent and 80 per cent. In one case, potatoes were 285 per cent more expensive. The supermarkets said the prices would fall once the organic market had been established, but a spokesman for the researchers commented: “When people suggest that the price will fall as demand increases they are missing the point. Supermarkets are able to exploit huge consumer demand with excessive price hikes.”

Perhaps, then, if you really want to go organic, you may just have to grow your own—safe in the knowledge of what has gone into the ground, without the middleman.

A few organic food facts

- Value of organic food and drink sales in Western Europe, the US and Japan was £6562m in 1997, but will hit £12 500m this year.
- The biggest growth is in the UK, followed by the US, Germany, France and Italy.
- Fifteen of the world’s least developed countries are now producing certified organic food.
- Annual organic milk supply in Britain is now 30 million litres, and production is projected to be 155m litres by 2003.

William Peakin, *The Scotsman*, 9 February 2000

[*END OF REPORT*]

[C045/SQP174]

Advanced Higher
Home Economics
Health and Food Technology
Specimen Marking Instructions

NATIONAL
QUALIFICATIONS

SECTION A

- (a) *The report indicates that the UK leads the growth in sales of organic foods.*

Explain the reasons for the growth in sales.

5 marks

Public perception of organic foods is that they are:

- Healthier—natural product “full of goodness” as it is grown naturally without chemicals, this indicates it is less damaging to health.
- Safer—as no chemicals used in the production of the food and only natural fertilisers etc used it is believed by many that naturally occurring products have less potential in terms of danger. Some insecticides etc linked to cancer.
- Tastier—as food not forced or manipulated by science, natural flavours are allowed to develop fully during growing and ripening.

In addition the following have also promoted their popularity:

- BSE crisis—linked to cows, which are herbivores being fed animals, which with the aid of technology and chemicals have been made into feed. The image of the grass fed cow eating “natural” foodstuffs appeals to those who fear BSE.
- Bad press of genetically modified foods—scientists seem divided on the merits of GM foods and this had been aired publicly and resulted in a fear of using genetics to manipulate foods. As public are not always aware of which foods are GM, eating organic is the only way of avoiding them completely.
- E Coli—outbreak linked to food manufacture, so buying unadulterated, natural foods can give the image of food which is less harmful in relation to food poisoning.
- Greater availability of organic foods—now stocked by mainstream supermarkets in ever increasing quantities so it is much more accessible to a wider section of the public—this encourages sales.
- Environmental concerns re animal welfare, effect of pesticides.

1 mark for each well explained point

A—4–5 marks

Candidates are able to develop a full and coherent discussion on the reasons for growth in sales of organic food. The discussion shows good analysis and the identification of the majority of the points with full explanation.

B—3 marks

Candidates are able to develop a discussion on the reasons for the growth in sales of organic foods. Most of the main points will be identified with explanation.

C—2 marks

Candidates are able to identify some of the main points with limited explanation.

- (b) *Discuss the role of*
 (i) *the Advertising Standards Authority*
 (ii) *the Soil Association*
in providing protection and advice for the consumer in relation to organic food.

10 marks

Advertising Standards Authority

- prevents false/misleading advertisements promoting organic food
- investigates complaints against advertisements/advertisement claims
- ensures a standard of advertising that consumers can trust
- protects consumers from advertisements which aim to mislead them into buying the food
- investigates advertisement claims to ensure they are truthful

Soil Association

- the leading certification body in the UK—certifies approximately 70% of organic food produced
- endorses organic produce allowing producer to display Soil Association sticker informing consumers that the product has been organically produced
- consumer is reassured that food displaying the symbol is of an organic nature
- audits and certifies production systems are of an organic nature
- investigates farming methods and advises consumers on organic methods
- promotes organic produce/methods to consumer publishing information to help them make wise choices in supermarkets
- operates its own set of standards which are more specific and generally stricter than those laid down by UK ROFS
- publishes a wide range of briefing papers and its own journal—*Living Earth*—all giving information to the consumer

1 mark for each well detailed point

A—8–10 marks (to include a minimum of 3 marks per area of question)

Candidates are able to develop a full and coherent discussion of the role of the organisations in relation to organic food and consumer protection and advice. The discussion shows good analysis and the identification of the majority of the main points with full explanations.

B—6–7 marks (to include a minimum of 2 marks per area of question)

Candidates are able to develop a discussion of the role of the organisations in relation to organic food and consumer protection and advice. Most of the main points will be identified with some explanation.

C—4–5 marks (to include a minimum 1 mark per area of question)

Candidates are able to identify some of the main points with limited explanation.

- (c) *There is much controversy over the “beneficial” effects of organic foodstuffs on sale.*

Critically discuss the main arguments in this debate.

10 marks

Positive Aspects

- Some consumers believe that organic food tastes better—as yet little evidence to support this
- It is thought that intensive farming with chemical pesticides can strip foods of much of its natural goodness
- The food is free of hormones and antibiotics, which may be injected into some farm animals
- They contain more secondary metabolites (part of plants immune system) which also help fight cancer in humans
- Thought to have a higher vitamin and mineral content
- People buy organic because they believe it is free from chemicals or pesticide residues and therefore better for health—fewer side effects or allergies
- Eating organic meat reduces the risk of exposure to BSE—there are strict controls over cattle feed—a likely source of BSE contamination
- Organic food regulations stipulate that no GM technology can be used so consumers who wish to avoid GM foods may wish to buy organic

Negative Aspects

- Some scientists claim there is no nutritional benefit
- Use of sewage as a fertiliser can be potentially dangerous—not only contamination of the food itself, but also water-ways as the result of seepage
- Natural pesticides produced by plants more harmful than synthetic ones
- High levels of toxins and allergens in organic food could be hazardous to health
- Contamination by copper and sulphur containing fungicides
- Creation of reservoirs of diseased foods

There is still no definitive argument.

1 mark for each well explained point

A—8–10 marks

Candidates are able to critically discuss the main arguments in the debate demonstrating a clear understanding of both sides of the debate and are able to analyse how they have developed. Ideas are expressed clearly.

B—6–7 marks

Candidates are able to critically discuss the main arguments in the debate demonstrating an understanding of both sides of the debate and any analysis is not fully developed. Ideas lack clarity at times.

C—4–5 marks

Candidates are able to critically discuss the main arguments in the debate demonstrating a limited understanding of both sides of the debate. Little analysis.

Total 25 marks

SECTION B

1. *One of the aims of the Scottish dietary targets for 2005 is to achieve a reduction in coronary heart disease.*

(a) *Discuss the Scottish dietary targets in relation to this aim.*

10 marks

reduction in fat consumption to no more than 35% of total energy intake

- fat higher in calories—concentrated source of energy—easier to consume excess calories
- excess energy converted into body fat leads to obesity—strain on heart
- reduction in total fat consumption will reduce consumption of transfatty acids which act like saturated fatty acids causing an increase in cholesterol levels and increasing the risk of CHD

saturated fat intake to reduce to no more than 11% of total energy intake

- saturated fat raises levels of cholesterol in blood
- cholesterol produced in liver—if blood levels rise then excess cholesterol is deposited on artery walls causing them to narrow and restrict blood flow
- CHD and heart attacks caused by this.

increase NSP intake through measuring consumption of wholemeal breads, breakfast cereals

- NSP combines with cholesterol and bile salts preventing the cholesterol from being absorbed—reducing risk of CHD
- increased NSP intake promotes feeling of fullness and reduces risk of snacking on high fat foods thus increasing fat intake and risk of obesity

increase fruit/veg intake

- these foods are high in NSP and low in fat—same benefits as increasing NSP
- source of ACE vitamins—role in prevention of CHD

increase Total Complex CHO intake

- provides a steady supply of energy helping blood sugar levels to remain stable thereby preventing snacking on high fat foods
- often good source of NSP and therefore associated benefits

increase oily fish consumption

- oily fish high in omega 3 may reduce the risk of heart attacks by inhibiting the formation of blood clots or reducing blood pressure

reduce salt consumption

- role of salt as a contributor towards high blood pressure and CHD

reduce intake of NME sugars in children by half

- prevents overweight from a younger age and lessens risk of CHD

1 mark for each well detailed point

A—8–10 marks

Candidates are able to develop a full and coherent discussion of the relationship between the dietary targets and CHD. The discussion shows good analysis and the identification of the majority of the main points with full explanations.

B—6–7 marks

Candidates are able to develop a discussion of the relationship between the dietary targets and CHD. Most of the main points will be identified with explanation.

C—4–5 marks

Candidates are able to identify some of the main points with limited explanation.

1. (b) *Critically discuss the factors which may hinder the achievement of the Scottish dietary targets for 2005.*

15 marks

The candidate should relate the answers to the dietary targets, some answers may relate to a specific dietary target.

Access to shops

- large supermarkets usually out of town, the least healthy 10% of the population live in communities which do not have access to supermarkets—this is mainly in inner city areas but is also a problem in rural areas, public transport is often expensive and difficult to use
- availability of acceptable fresh foods at an appropriate cost is often a problem. As a result, parents have a reduced opportunity to acquire a taste for healthy foods and development of skills for preparing and serving them, so in turn their children also receive a limited range of foods which influences future food choices

Culinary Skills

- lack of skills generally means a reluctance to try and prepare fresh foods eg fish (where smell and fear of bones is also a problem), fruit and veg. If skills are limited and both parents working there is less time and ability to pass on skills from one generation to another, thus exacerbating the issue

Cultural conventions

- poor diet is now a historical fact, thus difficult to change, even if there is a willingness. If there is not, even more difficult as often accompanied by the “it won’t happen to me” syndrome of the potential well publicised health risks of poor diet, many people have a general unwillingness to change

Cooking Facilities

- poor housing and limited finances often equal poor cooking facilities. Improving them often not seen as a priority as item such as TVs and videos are more appealing to the whole family
- poor facilities reduce ability and willingness to prepare fresh foods

Awareness of what is/isn’t healthy

- messages often confusing and contradictory. Opinions change frequently regarding food and health and are often highly publicised making the consumer unsure of what to believe—the end result is often to stick with what is familiar
- a general lack of appropriate education means people don’t really know how or what to change

Resources

- lack of money discourages experimentation with new foods through “fear of waste”. “Healthier” options are often more expensive
- fresh foods have a limited shelf life therefore also more prone to waste

Advertising

- advertising of foods is a multi-million pound business and vast majority of it is for high fat, salt, sugar foods which are also low in NSP etc (diet foods perhaps the exception)
- very little advertising on “healthier” alternatives or the healthy eating messages themselves
- promotion of convenience foods is high and they appeal to those with limited skill/time/facilities/money (waste is minimal)

Manufacturers

- slow progress at adapting products to make them healthier as cost and taste problems of changing foods make them reluctant to try. Problem of sweet weaning foods set tastes for life
- Labelling also confusing for customers

School Meals

- no statutory nutritional guidelines requirement in Scotland. Removal of local authority subsidy to school meals means poor quality, cheap products are often used to make profits

Consumer Attitudes

- not all changes to products to make them “healthier” are in fact so, and as a result may be a health concern to consumers themselves eg use of additional preservatives to fat reduced products, side effects of products such as olestra

1 mark for each well detailed point

A—12–15 marks

Candidates are able to critically comment on the factors which may hinder the achievement of the Scottish dietary targets giving full analysis of these factors.

B—9–11 marks

Candidates are able to critically comment on the factors which may hinder the achievement of the Scottish dietary targets giving some analysis of these factors.

C—7–8 marks

Candidates are able to critically comment on the factors which may hinder the achievement of the Scottish dietary targets giving limited analysis of these factors.

Total 25 marks

2. *“Better health is for life, but better health must start early.”*

Discuss this statement with reference to the role played by micro-nutrients in the health and development of individuals.

25 marks

Note to Markers

Candidates should link their responses to the fact that health starts early ie in the womb through all stages of life until elderly.

Calcium

- formation of bones and skull in form of calcium phosphate needed at all stages of life
- plays a part in the formation of the enzyme trypsin and activation of rennin which is important in the digestion of milk—necessary for babies to digest milk and extract nutrients for well being
- calcium is not fixed—bones are living structures which act as stores of calcium for use elsewhere in the body—good stores are required later in life
- foetus—used for developing skeletal structure
- children/teenagers—rapid growth period required for developing skeleton and building bone mass for adulthood
- adults—a lack of calcium in the diet will cause thinning of the bones and depletion of bone density
- elderly—poor bone density leads to osteomalacia/osteoporosis

Zinc

- essential for tissue growth—forms part of a number of enzymes
- some evidence that zinc is concerned with some of the processes involved with foetal development

Potassium

- plays an important part in maintaining the body’s internal environment—held within the body’s cells
- symptoms of deficiency—mental apathy, muscular weakness, associated with attacks of paralysis lasting 24 hours or more
- potassium levels are thought to be linked with sodium levels in the prevention of hypertension—important factor for middle aged/elderly blood
- prolonged diarrhoea (cholera) may lead to potassium depletion which may result in heart failure
- very old people whose muscles waste away may become short of potassium

Sodium

- diet low in sodium is advisable from early life to avoid developing a liking for salt and encouraging high blood pressure and CHD in later life

Phosphorus

- occurs in the body and food as phosphates
- plays an essential part in the basic biomechanical mechanism by which energy is obtained for the processes of life—necessary for all
- essential component of the blood and a constituent of certain enzymes and hormones which control the working body
- required in conjunction with calcium for bone formation essential that adequate supplies are available at times of bone growth eg young children/teenagers
- elderly must also have adequate supply to ensure strong bones offset osteoporosis/osteomalacia

Iron

- component of complex protein, haemoglobin, pigment of red blood cells. Haemoglobin carries oxygen from the lungs to the tissues of the body for the processes of metabolism
- lack of iron results in anaemia—tiredness; listlessness
- foetus builds store of iron in its liver from the mothers blood for use during its early stages of life (6 months approx). This is to supplement milk which has no iron in it
- teenagers require good sources of iron as their blood supply increases as they grow and develop
- female teenagers are at particular risk of developing anaemia when menstruating due to the increased blood loss
- elderly often do not eat an adequate diet and this can cause a shortage of iron resulting in them feeling even more lethargic than they do through old age

Vitamin A

- necessary for good eye sight especially night vision—important for elderly with failing sight
- has anti-oxidant properties—important for middle-aged/elderly who may be at risk from cancers/disease
- can be toxic in large quantities especially for foetus—pregnant women should avoid foods high in Vitamin A

Vitamin B complex

- allows the chemical reaction to occur which releases the energy from CHO
- especially important for very active people eg teenagers
- elderly must ensure adequate supplies to obtain energy from their food otherwise they will be lethargic

Folic Acid

- importance for women intending to become pregnant and in the first 3 months of pregnancy—to prevent spina bifida in baby and megaloblastic anaemia in mother

Vitamin B12

- importance in a vegan diet to prevent pernicious anaemia

Vitamin C

- necessary for healing of wounds/sores, prevents scurvy
- anti-oxidant properties beneficial to middle aged/elderly at risk from cancers/disease
- assists with absorption of iron—essential that teenagers have adequate amounts in diet
- babies being weaned must have adequate amounts of vitamin C to assist with absorption of iron from foods

Vitamin D

- works with calcium and phosphorus to build strong bones and teeth
- readily available by the action of sunlight on the skin
- young babies and children who are protected from the sun must have adequate dietary supplies to allow skeletal development
- elderly who may be less mobile or house bound must also ensure adequate dietary supplies to keep bones strong and prevent osteoporosis/osteomalacia

1 mark for each well detailed point

A—18–25 marks

Candidates are able to develop a full and coherent discussion of the role played by micro-nutrients in the health and development of individuals. The discussion shows good analysis and the identification of the majority of the main points with full explanations.

B—15–17 marks

Candidates are able to develop a discussion of the role played by micro-nutrients in the health and development of individuals. Most of the main points will be identified with explanation.

C—12–14 marks

Candidates are able to identify some main points with limited explanation.

3. *Discuss the properties of protein with reference to the manufacture of food products.*

25 marks

- non-enzymic browning ie *Maillard Reaction*
- known as Carbonyl-Amine browning
- occurs when protein and carbohydrate exist together in foods
- is a reaction between free amino groups or free amino acids and carbonyl group of a reducing sugar eg glucose (not sucrose)
- factors affecting Maillard reaction are pH, temperature, moisture content as well as sugars and amino acids available
- carbonyl-amine browning occurs at high temperatures and at pH values of 7 or above
- produces desirable changes in flavour, colour and aroma during dry cooking methods eg roasting, baking and grilling
- important for baked goods such as bread, biscuits and cakes; nuts and coffee beans (roasting); flavour in biscuits, breakfast cereals and meat extracts; roasted or grilled meat/poultry
- *denaturation*—may be brought about by controlling pH and occurs most readily at the isoelectric point when proteins are least stable
- isoelectric point varies for each protein—occurs when the pH is neutral
- many proteins are denatured by heat ie they coagulate
- coagulation results in loss of solubility or change from fluid (sol) to more solid state to formation of gel
- example: eg egg white (ovalbumin) begins to coagulate at 60 °C; egg yolk begins coagulation at 65 °C
- as temp rises coagulation continues until whole mass is solid
- different proteins coagulate at different rates
- if cooking temperature is kept below 100 °C coagulation is slow and coagulated protein is not too firm ie is more digestible, important when cooking meat and products containing eggs
- if cooking temperature is above 100 °C coagulation is rapid and denatured protein forms a hard solid mass
- particularly important when stewing/casseroles meat—if cooked at too high a temperature and/or for too long can become tough
- *coagulation of proteins* is responsible for the thickening effect eggs have in products eg custards, quiche, lemon curd
- coagulation of egg custard produces a gel
- overheating would result in syneresis where protein becomes hard and separates from liquid in product producing “holey” open textured product
- firmness of custard/final product depends on the proportions of ingredients eg eggs to milk and addition of other ingredients
- for example: addition of sugar raises the temperature for coagulation and produces a softer texture
- salts are necessary for the gelatin of egg custard mixtures—present in milk or by addition of salt (NaCl)
- *partial coagulation* occurs when eggs are whisked into a foam eg egg whites for meringues, whole eggs and/or yolks for sponge cakes

- heating results in further coagulation and the formation of a rigid structure due to denaturation of the protein
- foaming occurs most readily at the isoelectric point
- when whisking eg egg whites foaming may be promoted by the addition of acidic substances (vinegar, cream of tartar) which lowers the pH value nearer to the isoelectric point (eg pavlova)—this makes the foam more stable
- overbeating—too much air incorporated; protein is denatured too much; protein film around bubbles or air becomes too thin and less elastic; foam “collapses” resulting in loss of volume
- addition of salt reduces stability of foam—decreased volume
- addition of sugar retards denaturation of egg white foams; better to add sugar after egg whites are beaten
- addition of sugar produces a softer foam eg sponge cakes
- *enzymic coagulation* or clotting of milk is used in the production of cheese
- the protein casein is coagulated by the addition of rennin (or other enzyme)—forms a continuous mass initially; breaks into curds when agitated ie gel structure is broken down
- coagulation time decreases as pH decreases and temperature increases—relate to above re-conditions for denaturation of protein
- proteins can be used to produce *gels* in cold desserts eg mousse, table jellies and in savoury pies/aspic jelly
- gelatin produced from the protein collagen—commercial product gelatine—used as a stabilising agent for emulsions eg ice cream
- on cooling gelatin sol (ie protein in water) will set to form a gel—this is semi-rigid but is not coagulated by heat
- unlike egg custard gel this type of gel is reversible ie on heating it will liquefy
- if gelatin sol is cooled until viscous but not set it can be beaten into a foam to incorporate air—gelatin would have a degree of elasticity at this stage and would be able to stretch and surround air bubbles and is used in whipped cream and gelatin desserts

1 mark for each well detailed point

A—18–25 marks

Candidates are able to develop a full and coherent discussion of how these properties can be applied to the manufacture of food products. The discussion shows good analysis and the identification of the majority of the main points with full explanations.

B—15–17 marks

Candidates are able to develop a discussion of how these properties can be applied to the manufacture of food products. Most of the main points will be identified with explanation.

C—12–14 marks

Candidates are able to identify some of the main points with limited explanation.

Total 25 marks

4. *Discuss the precautions which should be taken throughout the food chain to prevent the micro-biological contamination of ready-cooked chicken.*

25 marks

- The 1990 Food Safety Act requires that food throughout the food chain must not:
 - be rendered injurious to health
 - be unfit, or
 - be so contaminated that it would be unreasonable to expect it to be eaten
- as a result, at each stage of the food chain, it is essential to ensure the possibility of micro-biological contamination is kept to an absolute minimum

Farmer

- the condition which the hens are kept in must be good to reduce risk of E coli or campylobacter
- eggs can be infected with salmonella before hatching

Transportation

- spread of infection due to cramped conditions is possible, especially, campylobacter
- cleanliness of lorry is vital, sanitised between trips

Slaughter

- the slaughterhouse must comply with the Poultry, Meat, Farmed Game Bird and Rabbit Meat (Hygiene and Inspection) Regulations 1995. The hygiene in the slaughterhouse, temperature control, how the carcasses are stored and for how long will all contribute to the prevention of micro-biological contamination, particularly salmonella (optimum temperature 37 °C) and E coli (optimum temperature 37 °C). Danger of cross contamination when gutting

Manufacturer

- the storage, preparation and cooking of the birds—a proper HACCP system should be set up to minimise the risk of micro-biological contamination
- as chickens are “high risk” products, a structured system, using written records of hazard analysis, should be used to set up effective control
- all controls must be monitored rigorously to ensure they are working effectively and that the food is safe
- specific points may include, separate storage areas for raw and cooked foods, and the use of rapid cooling—chill blasting to enable foods to be stored at low risk temperatures quickly
- salmonella and E coli are the main ones to watch as well as clostridium (optimum temp 43–37 °C) during “bulk cooking”
- a minimum centre temperature of 75 °C required to ensure bacteria is killed and this should be checked with a food probe
- the importance of staff training in general hygiene practices and specifically in relation to personal hygiene, particularly the prevention of staphylococcus aureus food poisoning

Distribution

- temperature of transport system very important, refrigerated lorries with temperatures below 5 °C and a system of monitoring temperature control essential
- products must be kept free of dust, moisture, unsuitable temperatures, odours, rodents and insect pests
- to help ensure this happens, packaging should not be physically bruised, broken or bent
- all transportation vehicles should be clean, damp, mould and odour free to help prevent contamination from insects etc and clostridium perfringens.

Retailer

- the retailer must ensure all foods received are within use by date and that all packaging is intact
- temperature of transportation is also vital (less than 8 °C—the Food Safety (Temperature Control) Regulations 1995)
- once in the store they must be kept from raw meats (E coli) and if chilled, below 8 °C or if hot, above 63 °C (listeria/staphylococcus aureus)
- these regulations also stipulate that cold food must be kept in a cool place/fridge, although no temperature is given, 5 °C or less would be seen as good practice
- the Food Hygiene Regulations 1995 should be followed in relation to cleanliness, maintenance and repair of food premises, layout and design, prevention of cross-contamination, accessibility to wash basins, ventilation, toilet facilities, lighting and personal hygiene facilities

Consumer

- the consumer should buy chilled food towards the end of shopping and use cool bags to get it home as quickly as possible. This reduces risk of food being above 8 °C for too long
- it should then be stored in the fridge (less than 8 °C ideally 4–5 °C), on the top, covered and well away from raw foods to prevent cross-contamination
- use by dates should be strictly adhered to as should any reheating instructions. It should not be reheated more than once

1 mark for each well detailed point

A—18–25 marks

Candidates are able to develop a full and coherent discussion of the precautions that should be taken throughout the food chain. The discussion shows good analysis and the identification of the majority of the main points with full explanation.

B—15–17 marks

Candidates are able to develop a discussion of the precautions that should be taken throughout the food chain. Most of the main points will be identified with explanation.

C—12–14 marks

Candidates are able to identify some of the main points with limited explanation.

Total 25 marks

5. *Discuss the use of additives in manufactured foods, brought about by developments in food technology and changes in consumer demands.*

25 marks

Use of additives

- preservatives eg sorbates, benzoates, sulphur dioxide, nitrite, nitrate, propionates—they prevent or limit the growth of micro-organisms which cause decay in foods and thus help ensure it is safe to eat for longer—**consumer demand** for more and varied convenience foods. In most cases a particular preservative is most effective in a particular product as they all have optimal impact at specific concentrations. Reduces wastage of food at home
- foods have a longer shelf life so the consumer can store products for a longer time—convenience factor/prevents having to shop daily due to extended storage times
- antioxidants eg BHT, BHA—they stop fatty acids going rancid and stop fruit browning through oxidation. Particularly useful nowadays due to high consumption of polyunsaturated fats/oils (**consumer demand** for more foods high in polyunsaturates and low in saturates) which are more susceptible to oxidation. Link to health benefits to consumers as it is thought they can reduce risk of heart attack, some cancers and arthritis
- stabilisers and emulsifiers eg alginic acid, carrageen, tragacanth—they help to blend two substances which do not normally mix easily. They disperse tiny droplets of one throughout the other to give a smooth texture which is more appealing to **consumers**. They increase the shelf life of products such as low-fat spreads where a greater than normal water to fat ratio is required. Health aspects of these products—many new lower fat products would not be available without the use of additives
- thickeners and gelling agents eg pectins, lecithin, guar gum, celluloses—depending on the amount used, these texture modifiers can be used as emulsifiers, stabilisers, thickeners or as gelling agents. They give structure, make food thicker or help food which have been through a variety of production processes retain physical and textural properties—**consumer demand** for processed foods of high quality
- anti-caking agents/free flow agents—added to food usually when in powdered form to ease the processing of foods and therefore improve production efficiency. Also improve the “flow” characteristics of products eg Vending machine powders to ensure dependable machine operation. They stop crystals and powders like salt or cocoa sticking together **consumer demand** for high quality products
- flour improvers eg ascorbic acid—they make dough in breadmaking stronger and more elastic, thus improving the baking quality and final product reflecting **consumer demand**
- flavour enhancers—taste and smell of foods vital for food products therefore they are added to foods to give, enhance or intensify a flavour making foods more palatable thus pleasing the **consumer** and potentially improving sales

- colours—appearance of foods is vital to the **consumer** in terms of their desire to buy products, therefore colours are used to improve overall appearance eg anthocyanins, tartrazine. Can be used to enhance natural colours, ensure uniformity of colour or to replace colour lost during processing. Some safety issues in relation to synthetic food colours and links to hyperactivity, asthma and other allergic reactions
- sweeteners—used to provide a sweet taste. Although sugar still very important, intense sweeteners—aspartame, saccharin and bulk sweeteners—sorbitol, mannitol also used particularly as a result of increased **consumer demand** for low calorie foods and for diabetic foods
- additives have opened up the area of packaging of foods and so aids the consumer in terms of choice and storage
- foods are more consistent with additives so that the consumer can buy standard products
- acidulents—contribute to sharp characteristics taste to foods eg in processed foods such as soft drinks, jams and sweets. Also used to preserve foods by creating an acid environment, which prevents the growth of many micro organisms. Also assist in the setting of gels. All these factors contribute to a higher quality, longer lasting product which is more likely to satisfy consumer demands
- additives have allowed the development of a wide variety of new foods that would previously have been unable to be developed

Consumer demand is such that customers have demanded justification for their use, however their removal has consequences that must be borne in mind.

Consequence of removing additives

- without them consumers would lose many foods currently found in a varied diet
- many “convenience” foods would be lost
- much more time would be spent on food preparation to ensure the diet did not become monotonous and less appetising

More specifically

- removing preservatives could put consumers at risk, some foods would have a much shorter shelf life
- reducing anti-oxidants would be possible if foods were vacuum packed or packed in an oxygen free gas but this might mean a price rise
- colours could be reduced if consumers would accept less highly coloured foods
- sweeteners could be reduced if consumers would accept either less sweet foods or foods sweetened with sugar

However, customers have made it clear through letters and lobbies, that they would like food manufacturers to use fewer additives in our food

Action

- most major stores have reviewed use and have produced leaflets explaining the role of additives and how they have reduced their use whenever possible
- packets now have to carry more information than they used to about contents, so better labelling helps, although it could still be improved upon
- many have stopped using artificial flavours and colours, using natural ones instead

- most manufacturers have stopped using MSG and the antioxidants BHA and BHT
- most manufacturers consider they have a policy to constantly review whether additives are necessary, and promise to dispense with them if they can

By example

- Boots PLC have removed 50 commonly used additives from food, drink and confectionery
- Safeway claim to only use permitted additives where they are necessary “to help keep food wholesome, available and acceptable”
- Sainsbury’s whilst not abolishing additives, do tend to use safe natural compounds rather than synthetic ones

1 mark for each well detailed point

A—18–25 marks

Candidates are able to develop a full and coherent discussion on the use of additives in manufactured foods, brought about by developments in food technology and changes in consumer demands. The discussion shows good analysis and the identification of the majority of the main points with full explanation.

B—15–17 marks

Candidates are able to develop a discussion of the use of additives in many coloured foods, brought about by developments in food technology and changes in consumer demand. Most of the main points will be identified with explanation.

C—12–14 marks

Candidates are able to identify some of the main points with limited explanation.

Total 25 marks

