



General Certificate of Education
Advanced Level Examination

General Studies (Specification A)

GENA4

Unit 4 A2 Science and Society

Specimen paper for examinations in June 2010 onwards
The question paper for this unit uses the [new numbering system](#)

Case Study Source Material

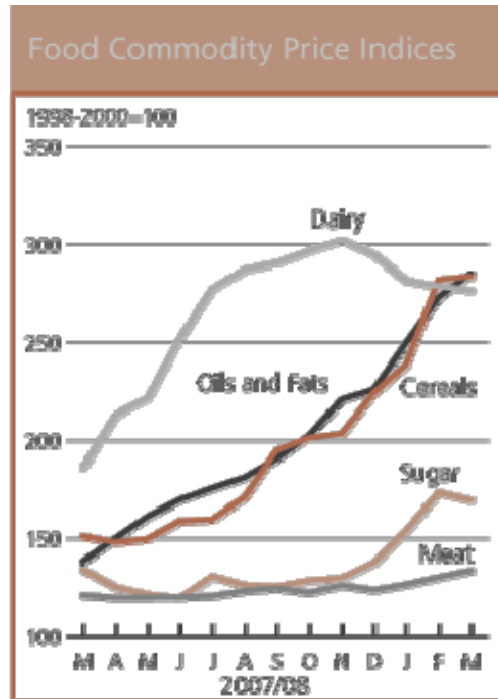
For use with **Section A**

- The material consists of five sources (A, B, C, D and E) on the subject of *World Food Supplies*. These extracts are being given to you in advance of the Unit 4 examination to enable you to study the content and approach of each extract, and to consider issues which they raise, in preparation for the questions based on this material in Section A.
- A further Section A source (F) will be provided in the examination paper.
- Your teachers **are** permitted to discuss the material with you before the examination.
- You may write notes in this copy of the Source material, but you will **not** be allowed to bring this copy, or any other notes you may have made, into the examination room. You will be provided with a clean copy of the Source Material at the start of the Unit 4 examination.
- You are not required to carry out any further study of the material than is necessary for you to gain an understanding of the detail that it contains and to consider the issues that are raised. It is suggested that three hours' detailed study is required for this purpose.
- In the examination room you will have approximately one hour and fifteen minutes in which to read a previously unseen extract and answer a range of questions based on all the source material.

Case Study Source Material on **World Food Supplies**

Source A

Figure 1: Food commodity price indices



Source: United Nations Food and Agricultural Organisation (FAO)

Figure 2: Global Food Crisis

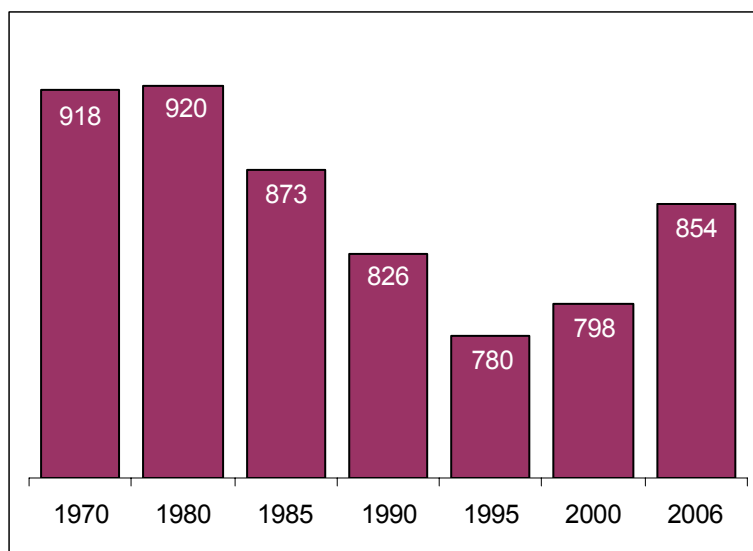
- Food riots have recently erupted in countries including Haiti, Egypt, Cameroon, Ivory Coast, Senegal, Burkina Faso, Ethiopia, Indonesia, Madagascar and the Philippines
- In Pakistan and Thailand, army troops have been deployed to avoid food being seized from fields and warehouses.
- Prices for foodstuffs in these countries such as rice and wheat have doubled.
- Causes of the crisis range from financial speculation on food commodities, desertification, population increases, China and India's economic growth and use of grains to make biofuels.
- Cost of funding projects enabling governments to tackle food crises could be up to \$1.7 billion.
- However, world cereal production in 2008 is projected to increase by 2.6% to a record 2164 million tonnes.

Source: United Nations Food and Agricultural Organisation (FAO) 2008

Figure 3: Food in Figures

Figures	Comment
93 000 000	Acres of corn planted by US farmers in 2007, up 19% on 2006
8 kg	Amount of grain it takes to produce 1 kg of beef
20%	Portion of US corn used to produce five billion gallons of ethanol in 2006-07
50 kg	Quantity of meat consumed annually by the average Chinese person, up from 20kg in 1985
10%	Anticipated share of biofuels used for transport in the European Union by 2020
\$500 million	The UN World Food Programme's shortfall this year, in attempting to feed 89 million needy people
9.2 billion	The world's predicted population by 2050. It is currently 6.6 billion
130%	The rise in cost of wheat in 12 months
16 times	The overall food consumption of the world's richest 20% compared with that of the poorest 20%
58%	Jump in the price of pork in China in the past year
\$900	The cost of one tonne of Thai premier rice, up 30% in a month.

Source: CAROLINE DAVIS, 'Food in Figures', *The Observer*, 13 April 2008

Figure 4: Number of undernourished people in developing countries (millions)

Source: United Nations Food and Agricultural Organisation (FAO) 2008

Figure 5: Food Facts

- 852 million people still go hungry. In 1990 the figure was 824 million
- Six million children die from hunger each year
- We have enough food to provide everyone in the world with at least 2 720 kilocalories per person per day
- Rich countries provide \$330 billion (£1.78 billion) in subsidies annually – six times the money the rich countries give in aid.

Source: PHILIP THORNTON, 'More are hungry despite world leaders' pledge', *The Independent*, 16 October 2006

Figure 6: Bread facts

Average price for 800g white sliced loaf in UK

Date	Price
Feb 2005	£0.69
Feb 2006	£0.78
Feb 2007	£0.85
Feb 2008	£1.13

Variation in bread prices in Britain and around the world

Location	Bread price
Manchester	£1.11 / kg
London	£1.45 / kg
Japan	£3.29 / kg
United States	£3.37 / kg
Russia	£3.51 / kg
Austria	£4.22 / kg

Average UK bread consumption

Date	Weekly consumption
1960	1300 g
1980	950 g
2000	800 g

Source: Office for National Statistics 2008

Source B

Our hunger for biofuels is starving the poor

We drive, they starve. The mass diversion of the North American grain harvest into ethanol plants for fuel is reaching its political and moral limits. "The reality is that people are dying already," said Jacques Diouf, of the United Nations Food and Agriculture Organization (FAO). "Naturally people won't be sitting dying of starvation, they will react," he said.

The UN says it takes 232 kg of corn to fill a 50 litre car tank with ethanol. That is enough to feed a child for a year. Last week, the UN predicted "massacres" unless the biofuel policy is halted. We are all part of the drama whether we fill up with petrol or ethanol. The substitute effect across global markets makes the two morally identical.

Mr Diouf says world grain stocks have fallen to a 25-year low of 5 million tonnes – rations for 8 to 12 weeks. America – the world's food superpower – will divert 18% of its grain output for ethanol this year, chiefly to break the dependency on oil imports. It has a 45% biofuel target for corn by 2015. Argentina, Canada and Eastern Europe are joining the race.

The European Union has targeted a 5.75% biofuel share by 2010, though that may change. Europe's farm ministers are to debate a measure this week ensuring "absolute priority" for food output.

The global fuel bill has risen 57% in the last year. Soaring freight rates make it worse. The cost of food "on the table" has jumped by 74% in poor countries that rely on imports according to the FAO. Roughly 100 million people are tipping over the survival line. The Malthusian crunch has been building for a long time. We are adding 73 million mouths a year.

Asia's bourgeoisie is also switching to an animal-based diet. If they follow the Japanese, protein intake will rise by 9 times. It

takes 8.3 grams of corn feed to produce 1 g of beef, or 3.1 g of pork. China's meat demand has risen to 50 kg per capita, from 20 kg in 1980. However, this has been gradual.

Is there any more land? Yes, in Russia, Ukraine and Kazakhstan, where acreage planted has fallen 12% since Soviet days. Existing grain yields are 2.4 tonnes per hectare in Ukraine, 1.8 in Russia and 1.1 in Kazakhstan, compared with 6.39 in the United States. Investment would do wonders here. But the structure is chaotic.

Brazil has the world's biggest reserves of "potential arable land" with 483 million hectares but it currently cultivates only 67 million, and Colombia has 62 million – both offering biannual harvests. The catch is obvious. "The idea that you cut down rainforest to actually grow biofuels seems profoundly stupid," said Professor John Beddington, Britain's chief scientific adviser.

Goldman Sachs says the cost of ethanol from corn is \$81 a barrel (oil equivalent) with wheat at \$145 and soybeans \$232. New technology may open the way for the use of non-edible grain stalks to make ethanol, but for now the only biofuel crop that genuinely pays its way is sugar cane (\$35). Sugar is carbohydrate: ideal for fuel. Grains contain proteins made of nitrogen: useless for fuel but vital for people.

Whatever the arguments, politics is intruding. Food export controls have been imposed by Russia, China, India, Vietnam, Argentina, and Serbia. We are disturbingly close to a chain reaction that could shatter our assumptions about food security.

The Philippines – a country with ample foreign reserves of \$36 billion (Britain has \$27 billion) – last week had to enlist its embassies to hunt for grain supplies after China withheld shipments. Washington stepped in, pledging "absolutely" to cover Philippine grain needs. A new Cold War is taking shape, around energy and food.

Source: Adapted from AMBROSE EVANS, 'Our hunger for biofuels is starving the poor', *Daily Telegraph*, 14 April 2008

Source C

How the rush to biofuels has driven up the price of food

The world's most powerful finance ministers and central bankers are meeting in Washington tomorrow; but as they preoccupy themselves with the global credit crunch, another crisis, far more grave, is facing the world's poorest people. A dramatic rise in the worldwide cost of food is provoking riots throughout the Third World where millions more of the world's most vulnerable people are facing starvation as food shortages grow and cereal prices soar. It threatens to become the biggest crisis of the 21st century.

This week crowds of hungry demonstrators in Haiti stormed the presidential palace in the capital, Port-au-Prince, in protest over food prices. And a crisis gripped the Philippines as massive queues formed to buy rice from government stocks. There have been riots in Niger, Senegal, Cameroon and Burkina Faso, and protests in Mauritania, Ivory Coast, Egypt and Morocco. Mexico has had "tortilla riots" and, in Yemen, children have marched to draw attention to their hunger.

The global price of wheat has risen by 130% in the past year. Rice has rocketed by 74% in the same period. It went up by more than 10% in a single day last Friday – to an all-time high as African and Asian importers competed for the diminishing supply on the international markets in an attempt to head off the mounting social unrest.

Rising prices have triggered a food crisis in 36 countries, says the UN Food and Agriculture Organization.

The hike in prices means the World Food Programme is cutting food handout rations to some 73 million people in 78 countries. The threat of malnutrition on a massive scale is looming.

Governments have begun to negotiate secretive barter arrangements as the price of agricultural commodities leaps to record highs. Ukraine and Libya are close to a deal on wheat. Egypt and Syria have signed a rice-for-wheat swap. The Philippines has just failed in a rice deal with Vietnam. Prices are likely to remain high for at least 10 years, the Food and Agriculture Organisation is projecting.

A complex interaction of factors has provoked the panic in international markets. Diets are changing radically in nations such as China, India, Brazil and Russia and the demand for meat from across all developing countries has doubled since 1980.

The new market for biofuels has raised grain prices. Corn is being used to produce energy and the market is anticipating increased production in the coming decade with George Bush wanting 15% of American cars to run on biofuels by 2017 – which will mean trebling maize production. Europe has set a transport fuels target of 5.75% from biofuels by 2010. As a result, the price of corn has begun to track that of oil quite closely. Last week a barrel of oil topped \$105 (£53) for the first time.

Climate change is taking its toll and so is increasing demand from a growing world population. Worldwide, an area of fertile soil the size of the Ukraine is lost every year because of drought, deforestation and climate instability. World population is predicted to grow from 6.2 billion to 9.5 billion by 2050.

There is an increasing gravity of all this among the leaders of the industrialised world. In Britain, there is increasing concern about the rush to biofuels. Britain's new chief scientist, Professor John Beddington, has said that cutting down rainforest to produce biofuel crops was "profoundly stupid" and found it hard to imagine "how we can see a world growing enough crops to produce renewable energy and, at the same time, meet the enormous increase in the demand for food".

Lennart Bage, president of the UN's International Fund for Agricultural Development, suggested that those opposed to GM crops should take another look at the productivity gains they can unleash and bring changes as massive as the "green revolution" of the 1960s, when crop yields in India and other developing nations jumped because of better seeds, fertilisers and improved irrigation.

Source: Adapted from: PAUL VALLELY, 'How the rush to biofuels has driven up the price of food', *The Independent*, 12 April 2008

Turn over for the next source

Source D

Free trade can stop world food crisis turning into a tragedy

Protectionism has failed people in poor countries, but getting rid of tariffs will boost production and cut prices. Rising food prices have caused street protests from Mexico to India to Senegal. But this could be a blessing in disguise if it makes governments eliminate the trade barriers that exacerbate high prices: the poorest countries will benefit most from dropping their own tariffs.

Economics expert Gary Becker estimates that a 30% rise in food prices over five years would cause living standards to fall by 3% in rich countries and by more than 20% in poor countries. A few countries have already temporarily eased tariffs on agricultural imports to soften the blow for consumers. Thailand is considering a cut of 50% for maize, soy beans and other animal feed.

These tariff reductions will offset price increases, not just by lowering prices, but by increasing supply. Increased trade in agricultural goods (not just food) could even help avert famine where produce is subject to intense government control, such as North Korea, Ethiopia, Kenya and many others. But many countries resist free trade in food – domestically, or with neighbours.

In Africa, 200 million people are underfed, according to the United Nations Food and Agriculture Organization. They have borne the brunt of counter-productive state management of agriculture that has damaged farmers and economies.

For years, governments in Africa forced farmers to surrender their crops to state-run marketing boards at below market rates. Some of these corrupt

and inefficient institutions have been weakened or abolished but many other restrictions on agriculture remain.

Many development analysts are obsessed with subsidies paid to farmers in rich countries, now extended to biofuels, and the damage it inflicts on the world's poor. But it is the world's poorest countries that impose the highest barriers to trade with each other: agricultural exports between sub-Saharan countries face an average tariff the highest of any region. A whopping 70% of the world's trade barriers are imposed by governments in poor countries on people in other poor countries.

High food prices are a clear and immediate reason to cut tariffs but that does not mean that it will happen. For decades, protectionism has been imposed against the interests of local consumers, because of an unholy alliance between western activists and local vested interests.

Trade barriers of any kind, including "green" subsidies, tariffs and quotas, harm both consumers and producers. They artificially increase costs, leading to unnecessary waste of scarce natural and human resources. Consumers and producers spend more to purchase the same goods and services, so have less to invest in the new technologies or to save for the future.

Although some claim trade barriers would help the environment, they are actually counter-productive. They favour the status quo by rewarding inefficient producers and thus delaying the adoption of cleaner, resource-saving technologies.

Under the slogan “Make Trade Fair”, groups such as Oxfam and Christian Aid claim that protecting local industries and agriculture with tariffs will allow them to grow and become competitive – with local consumers, especially the poorest, suffering higher prices. But decades of protectionism have done little for sub-Saharan Africa.

It is no surprise that crop yields – like income and life expectancy – have steadily decreased across much of Africa since the 1980s. The technologies that could turn their fortunes around, such as fertiliser, irrigation and genetically-modified crops, remain largely out of reach. Worse – and contrary to trends in Asia and Latin America – fertiliser use has actually fallen in many African countries in the past two decades.

Whereas an average of 107 kg of fertiliser is used per hectare in the developing world as a whole, African countries use only 8 kg. The consequence has been disastrous: 70% of the continent’s workforce is still in agriculture, mainly subsistence farming, contributing only about 25% of gross domestic product.

Demand and prices for food are rising, so freeing trade would be the best remedy for the world’s poor, cutting prices at a stroke and boosting production. High food prices are putting pressure on protectionist governments to free their trade or face angry mobs. The choice is obvious – lest a crisis turn into a tragedy.

Source: Adapted from: CAROLINE BOIN and ALEC VAN GELDER, ‘Free trade can stop world food crisis turning into a tragedy’, *The Scotsman*, 19 April 2008

Turn over for the next source

Source E**Fields of gold**

Call it the revenge of Marie Antoinette, the French queen, who on being told that her subjects had no bread suggested they eat cake instead. She has gone down in history as callous, unworldly and fully deserving of the guillotine. Last year, however, farmers in Pennsylvania began following her advice.

Since standard animal feed had become too dear, they started giving their pigs and cows chocolate – and banana chips and cashews and yoghurt-covered raisins, any of which were cheaper than run-of-the-mill corn and beans. One farmer even supplied his cattle a special ‘party mix’ of popcorn, pretzels, cheese curls and crisps. This, he told reporters, saved 10% on feed costs.

From hogs in the US to shoppers in the UK, we are all being hit by higher food costs. Bread, milk and other foodstuffs which consumers think of as basic are nothing of the sort; instead they are subject to a complex range of pressures stretching from London to China, from America to Australia. The price of the daily loaf is fluctuating according to what happens on the Minneapolis Grain Exchange, or the outlook for the Indian economy.

What all that means is that if you think bread is already pricey, think again: it will almost certainly go higher. A loaf of Hovis Classic White, the staple of school lunchboxes, now goes for around £1, already far above what it fetched a year ago. But the company behind Hovis, Premier Foods, warned last month that it would have to raise prices again. Premier also admitted that its profits from bread sales had nearly halved, thanks to what it termed ‘an exceptional level of cost inflation’.

Where shoppers see a loaf of sliced bread, experts think of US hard red winter wheat. But the basic picture is stark. Wheat prices, which were already creeping up, have doubled in the past year. And some types of the crop have risen more than that: spring wheat (a protein-rich variant that apparently goes into the better class of sandwich) has shot up from \$220 (£110) a tonne last April to \$578 (£289) now. The most immediate reason for the rise is a traditional one: poor harvests. There was barely any rain in Australia in 2006 and 2007 so stockpiles of wheat have hit a 30-year low. This year’s harvest, however, is set to be a lot better, but that in itself would not account for such a dramatic surge in prices.

Another factor is more recent: biofuels. As of yesterday, 2.5% of all petrol and diesel sold in the UK must be made from plants. And that will rise to 5.75% by 2010. This is part of the government’s push to combat climate change. In comparison with fossil fuels, energy derived from plants is touted as cleaner and greener. The problem is that they take up land and crops that might otherwise feed people.

It’s not just the UK that has got on the biofuel bandwagon. America is easily the biggest country on board, as it looks to reduce demand for petrol. The result has been that 20% of the American maize crop has gone not into feeding people, but fuelling machines. Some experts claim that the effect of this on prices has been minimal. Others feel that the impact on prices has been far greater.

So, if you want to bring down food prices, one obvious thing to do is to call a halt to biofuels. But that would probably not reverse the trend. The long-term reason why prices are going up is simply that more people are eating more - especially in the increasingly prosperous developing countries such as China and India.

There are two responses to this. One is to quote Thomas Malthus and to argue that a rising population always means scarcity of precious resources. But that is probably melodramatic. The truth is that, for a long time, the west has had access to cheap resources. Once you strip out inflation, what we paid for wheat dropped by more than 80% between 1973-2000. Even now, after the record rises for wheat prices, what we pay for wheat is still below the levels of the 1970s.

In an ideal world, we would simply adjust for the new wealth of the east by adjusting our spending: eat slightly less meat, or not throw away our leftovers. But this transition is unlikely to be so smooth. For one, while British shoppers have to pay more at the till, poor countries such as Bangladesh are struggling to feed themselves. And the consequences could be brutal.

Joseph Gazzano owns an Italian delicatessen in London. He says that one of his suppliers, who had been in the business for 50 years, has said that he's never seen an inflationary period like this. "All the stuff I buy has gone sky-high. I can absorb some of the price rises, but not all. And it worries me: it doesn't matter if the price of petrol goes up – you can bike it. But food going up matters because you have to eat."

Source: Adapted from: ADITYA CHAKRABORTY, 'Fields of gold', *The Guardian*, 16 April 2008

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