LMC INTERNATIONAL

The World Cocoa Market Outlook

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22 May 2000

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INTRODUCTION

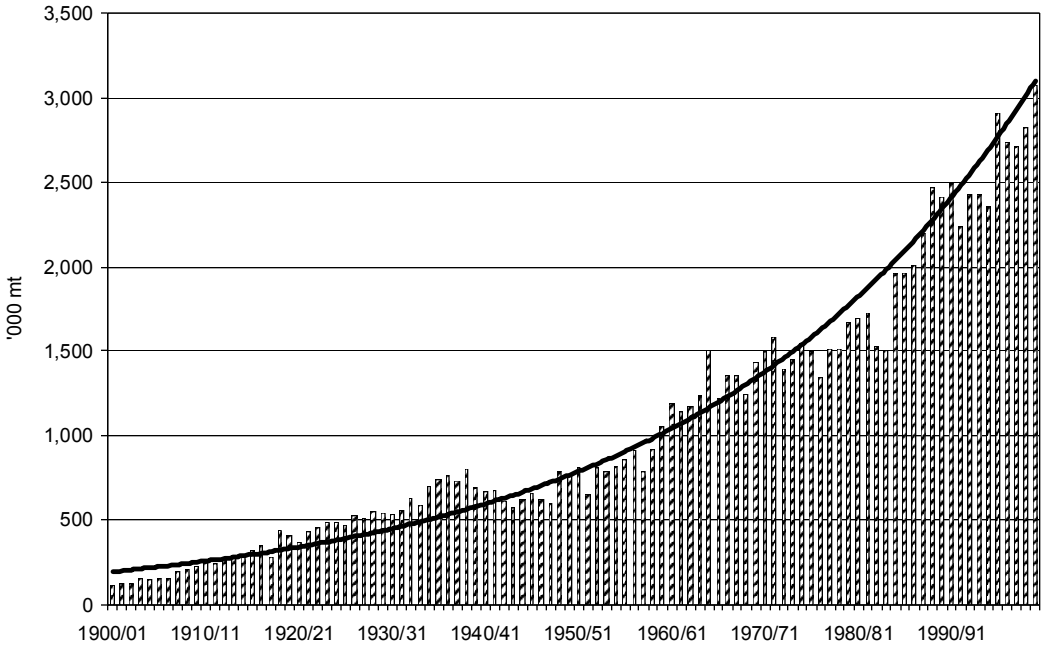
In this report, LMC provides an overview of the world cocoa situation and examines the potential threats and opportunities facing the industry over the next ten years. There are three areas of concentration in the study:

- Trends in global cocoa production
- Trends in global cocoa consumption
- And, using the resulting supply/demand balances, international cocoa prices

GLOBAL SUPPLY

World production of cocoa increased rapidly over the course of the twentieth century, prompted by rising demand, as is illustrated in Diagram 1. From annual production of less than 125,000 tonnes in the early twentieth century, annual global output rose to reach a record 3.1 million tonnes in the 1999/00 cocoa year (October to September) — an annual average growth rate of 3.5%.

Diagram 1: World Cocoa Production, 1900/01-1999/00

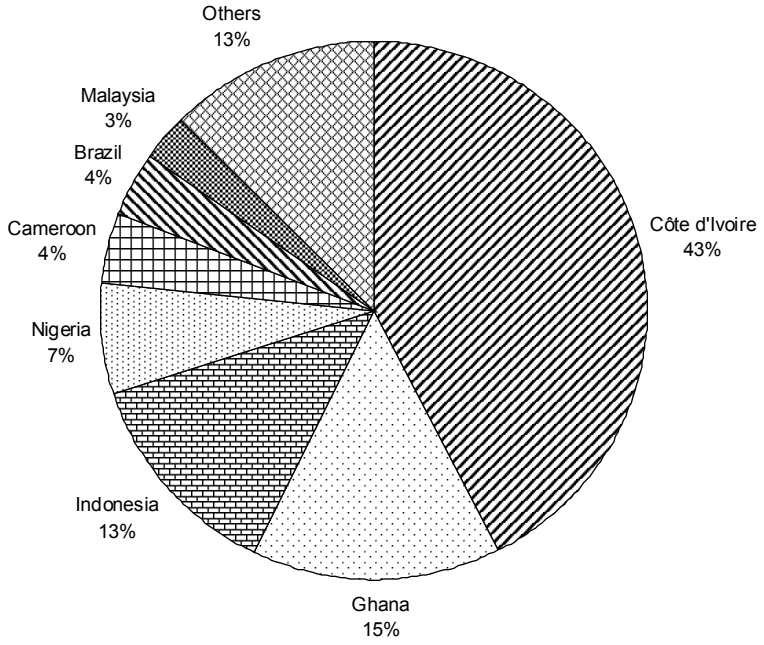


Cocoa is grown in more than 50 countries world-wide, mainly occurring within ten degrees latitude of the equator. Production is limited to three main growing areas: West Africa, Latin America and South East Asia. West Africa is the major producing region, with a market share of around 69%. The increasing dominance of Côte d'Ivoire as the world's largest producer has perhaps been the most spectacular development in the cocoa industry in recent times. The country now accounts for around 43% of world output compared to just 15% in 1975/76. Latin America has seen its share dwindle to just 13%, while Asian production has expanded rapidly since the mid-1970s and now accounts for around 17% of global output.

Despite the large number of producing countries, production is extremely concentrated. As Diagram 2 shows, in 1999/00, 70% of output was produced by just three countries — Côte d'Ivoire, Ghana and Indonesia. The success of these countries in producing cocoa lies in their low costs of production, the comparative advantage of cocoa over competing crops within these countries, and the relative success in limiting the incidence of disease. During the last ten years the share of world cocoa production accounted for by Côte d'Ivoire has risen from 30% to 43%. This leaves global production extremely vulnerable to potential supply problems in that country.

Outside these three countries, Nigeria, Brazil, Cameroon, Malaysia and Ecuador are the other substantial producers, accounting for slightly more than 20% of output, with the remaining forty or so countries producing just 10%.

Diagram 2: Share of World Cocoa Production by Country, 1999/00

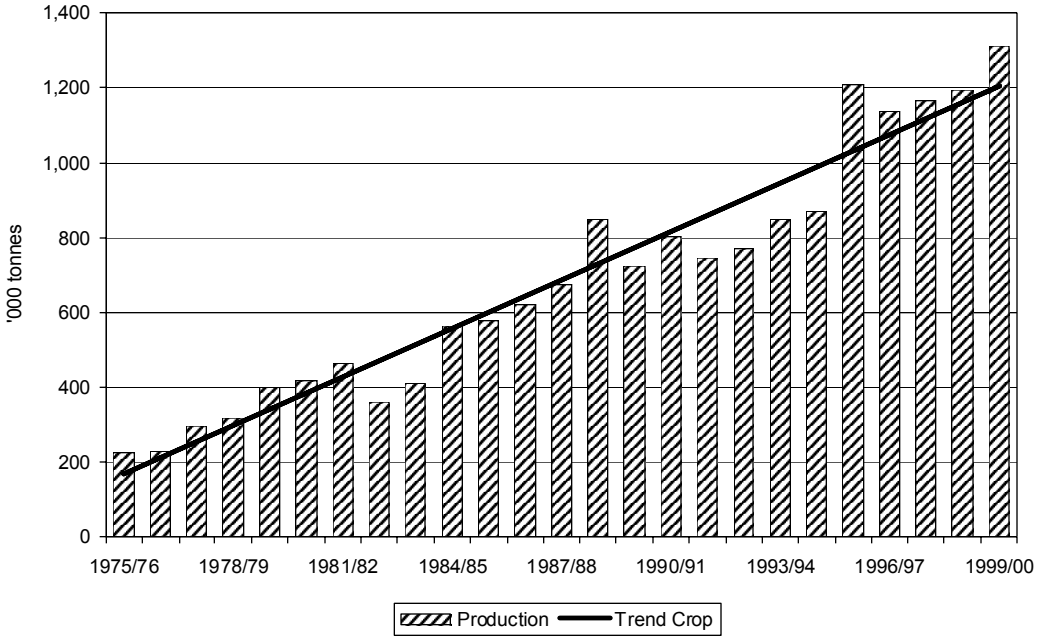


Production in West Africa is characterised by smallholder type production on a low-input, low-output basis. The tree stock is typically old, with a significant proportion above the economically viable age of 40 years. Another potential problem is the age of many farmers. Currently, a large proportion of growers in West Africa are over 50 years old, with younger generations not keen to continue working the land.

Côte d'Ivoire

Ivorian production has risen from under 230,000 tonnes in 1975/76 to 1.3 million tonnes in 1999/00. The impetus behind this large increase in production has been the high level of new plantings carried out between 1975 and 1985 when world prices were considerably higher than they are today. Much of these varieties were of a higher yielding hybrid variety rather than the traditional species.

Diagram 3: Côte d'Ivoire — Cocoa Production, 1975/76-1999/00



The expansion of Ivorian production occurred despite the fact that the marketing system that existed before the sector was liberalised in the 1999/00 cocoa year provided the lowest producer price of any major producing country, receiving less than 50% of the world price. Despite this, the country's profitability of production is enhanced by low land and labour costs combined with yields of around 500 kg/ha, which result mainly from a low incidence of pests and diseases.

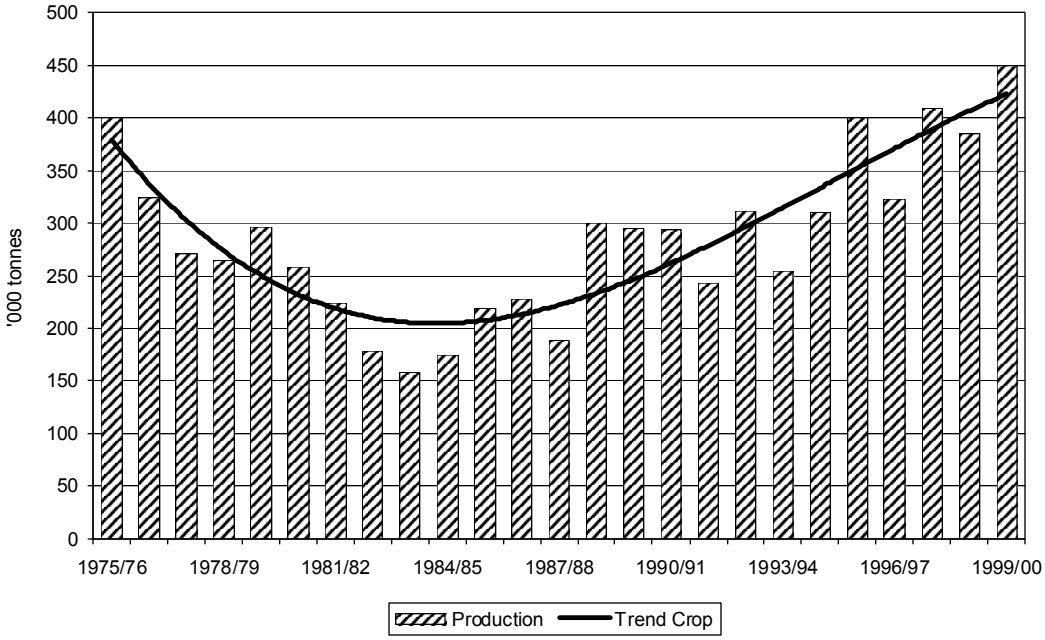
Since the liberalisation of the sector in 1999/00, the world price has fallen dramatically. However, as the experience of other recently liberalised countries shows, growers will receive a higher proportion of the export price than was the case under the government controlled marketing system.

The low prices recently is likely to reduce the level maintenance of the crop, which will mean that production is unlikely to increase at current rates. Furthermore, Côte d'Ivoire has been relatively free of pests and diseases up to now. With diseases present in neighbouring Ghana, it is only a matter of time before the Ivorian crop also becomes affected. The limited availability of land for further expansion of planting reduces the possibility of continuing to expand production in the way that has occurred in the past. Most new expansion in the past has occurred on forest soils, and new areas no longer exist.

Ghana

Ghana is the world's second largest producer of cocoa beans, accounting for approximately 15% of global output. Cocoa production in Ghana has seen a resurgence in recent years following an extended period of declining output. After producing a record crop of 566,000 tonnes in 1964/65, production fell to just 159,000 tonnes in 1983/84. As Diagram 4 shows, since the mid-1980s production has recovered strongly, reaching 400,000 tonnes in the mid-1990s. Higher producer prices and a government led rehabilitation scheme have succeeded in regenerating the industry.

Diagram 4: Ghana — Cocoa Production, 1975/76-1999/00



The widespread planting of new hybrids in the Western Region of Ghana has been the major contributory factor in the expansion of Ghana's production over the last decade or so.

Higher producer prices particularly since 1993, until recently, provided farmers with greater incentives. However, the price received was still only around 65% of the world price despite the fact that Ghana produces the world's highest quality bulk cocoa. Furthermore, the recent low prices have reduced the price to farmers in dollar terms to similar levels to 1993. The producer price is fixed annually by the Government in consultation with the Ghana Cocoa Board, although Ghana is planning to take the first steps towards liberalising the sector.

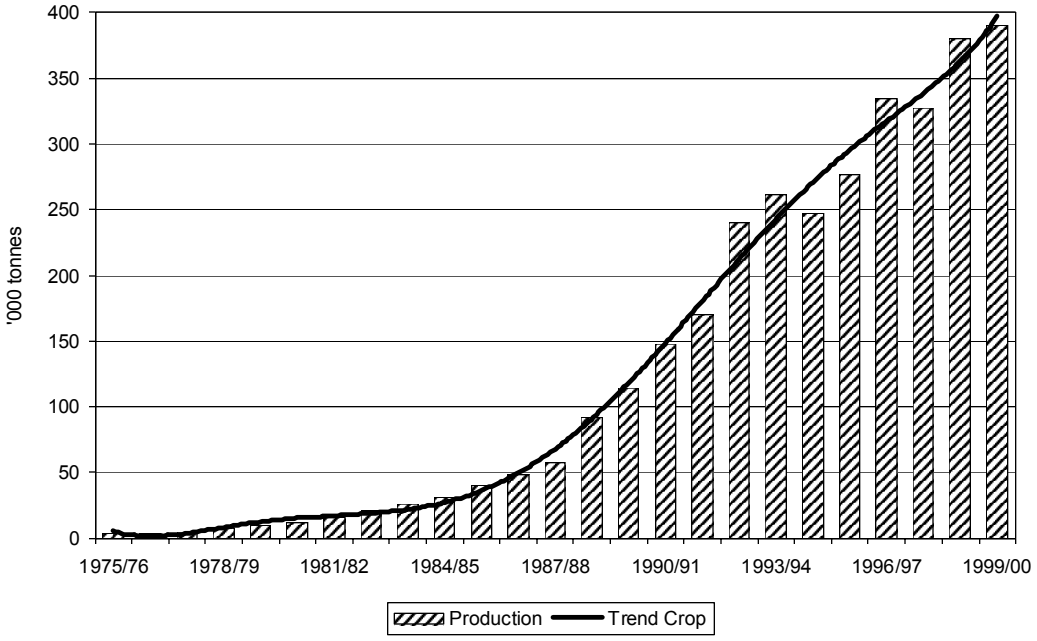
The old age of many trees in Ghana, together with their susceptibility to disease, has led to yields being considerably lower than in neighbouring Côte d'Ivoire. The losses arising from pests and diseases in Ghana are considerable: Capsids and Cocoa Swollen Shoot Virus have long been a problem for farmers, while Black Pod disease also causes considerable losses.

Indonesia

The growth of Indonesia's cocoa production over the past two decades has been remarkable, rising from just 4,000 tonnes in 1975/76 to around 390,000 tonnes in 1999/00 — an annual average increase of over 20%. The majority of this increase has come from smallholders producing at very low costs. Smallholders now account for approximately 82% of production, compared to just 10% in 1980. In addition, the country's infrastructure combined with minimal government intervention has created a highly efficient marketing system that results in growers receiving more than 75% of the export price.

Currently, Indonesia has the lowest production costs of the world's major producers.

Diagram 5: Indonesia — Cocoa Production, 1975/76-1999/00



Indonesian smallholder yields are considerably higher than their West African counterparts, reaching levels as high as 2,000 kg per hectare in areas with a low incidence of pests and disease. A major factor is the age of the tree stock, with as much as half under ten years old, thus providing sufficient potential for the further expansion of production. On average, however, yields are much lower, at 1,000 kg per hectare. There are substantial areas of suitable land still available for new planting, together with a plentiful supply of labour.

The devaluation of the rupiah in mid-1997 provided a massive boost to local producer prices, providing further impetus to the expansion of output. Producer prices in local currency terms rose from an average of less than 2,500 rp/kg in 1996/97 to more than 9,000 rp/kg in 1997/98 and even reached 19,000 rupiah/kg in June 1998, coinciding with the peak harvesting period. Indonesian beans are of relatively poor quality and sell at a discount on the world market. As a result, grower's share of the ICCO price is relatively low despite receiving a high share of the f.o.b. price.

A potential obstacle to the continued expansion of Indonesia's cocoa production is the Cocoa Pod Borer — a type of moth. This insect was responsible for the decline in Indonesian production in the early 20th century and still affects production in several key growing areas. Without sufficient methods of control, the Cocoa Pod Borer has the potential to destroy the Indonesian cocoa sector. Regular use of certain cultural methods and pesticides would limit the moth's damage but this would only be truly effective if carried out over a wide area, which, according to some estimates, could raise production costs by up to 30%. Currently, only a small part of the 530,000 hectares under cocoa have been infested, but the moth has the ability to spread very rapidly and therefore several research efforts are being conducted to curtail the pest. If these are successful, Indonesian output could rise above 500,000 tonnes in the next few years. However, if they fail, the Cocoa Pod Borer could cut the size of Indonesian output by as much as half.

Other Producers

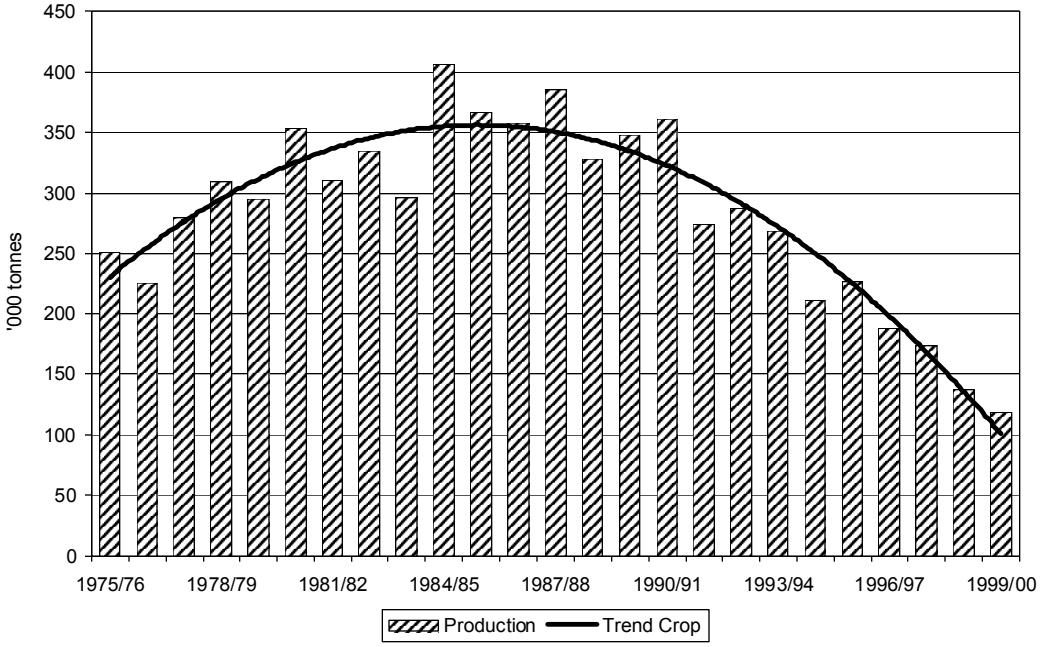
Outside the three main producers, no other producers have been able to sustain high levels of cocoa production.

Brazil

Up until the present century, Latin American producers (namely Mexico, Venezuela, Ecuador and Brazil) dominated global cocoa production.

However, the arrival of Witches' Broom in Brazil's main cocoa growing region of Bahia has resulted in a dramatic decline in production. As Diagram 6 shows, production has declined from 378,000 tonnes in 1990/91 to an estimated level of 118,700 tonnes in 1999/00. Witches' Broom appeared in the late 1980s and has spread rapidly to the extent that it is now present in 99% of the region's growing area.

Diagram 6: Brazil — Cocoa Production, 1975/76-1999/00



Witches' Broom has affected production volumes in two ways:

- Yields of producing trees have been drastically reduced
- The number of producing trees has fallen as farmers have abandoned loss-making farms.

In line with this, average yields in Brazil are estimated to have declined to under 300 kg per hectare in 1998/99.

The control of Witches' Broom requires pruning and burning of infected branches and significantly increases labour requirements. With labour costs in Brazil already significantly higher than those of its main rivals, this has placed the cocoa sector at a competitive disadvantage. With low world prices and higher income alternatives, cocoa production has become increasingly unprofitable despite an efficient marketing system that results in the farmer receiving around 80% of the export price.

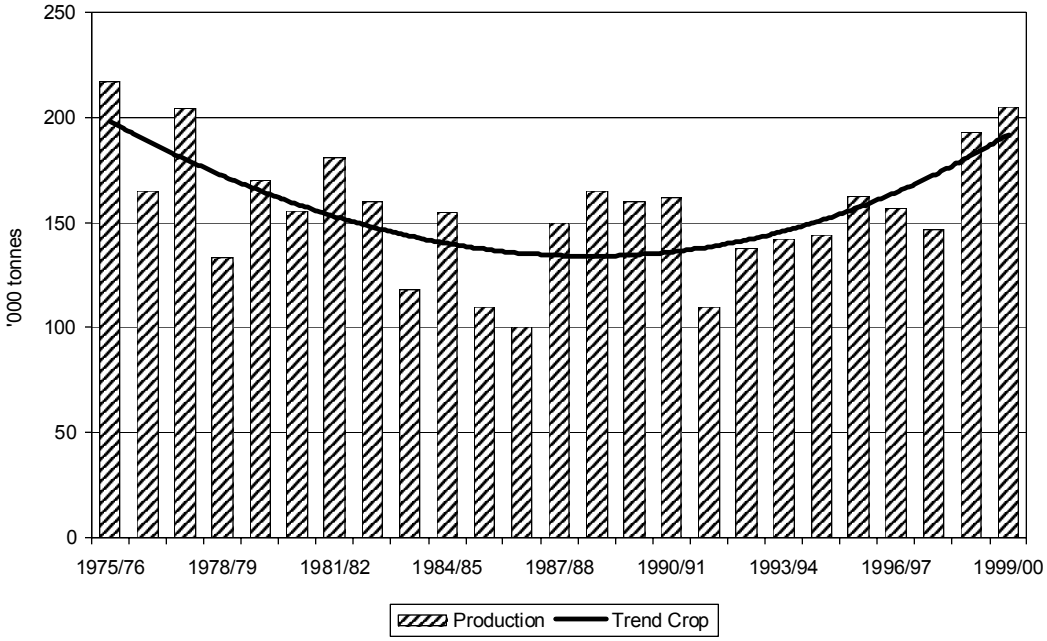
Considerable efforts have been made in Brazil to combat the threat of the disease. Around one third of farms, particularly in the centre and south of the country, appear to have started to use trees grafted on witches' broom resistant material, which is showing signs of success in curtailing the disease. However, while such efforts may be successful in stabilising production, there is unlikely to be an increase in production.

Nigeria

Diagram 7 shows that Nigerian cocoa production declined rapidly from a peak of 300,000 tonnes in 1970/71 to just 100,000 tonnes in 1986/87, due to a combination of labour shortages and low producer prices. Since liberalisation in 1986, grower prices rose significantly and production responded, reaching an estimated 205,000 tonnes in 1999/00.

However, the age of the tree stock and the incidence of pests and diseases continues to be a major constraint to Nigerian production. An estimated 60% of trees are more than 30 years old, while black pod disease is thought to reduce production levels by as much as 70% in some areas.

Diagram 7: Nigeria — Cocoa Production, 1975/76-1999/00

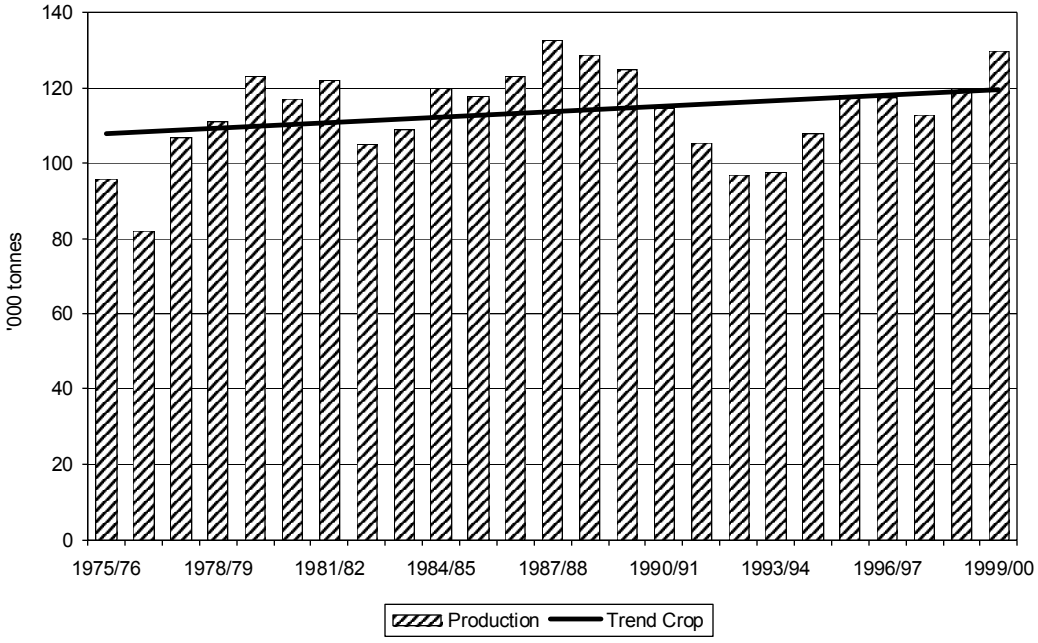


There is little land suitable for cocoa production in Nigeria and, therefore, any future expansion in cocoa production will have to come from the rehabilitation and replanting of existing lands. A shortage of rural labour is also a major constraint to expansion, and the average age of the cocoa farmer is also high. However, on the positive side, the fully liberalised marketing system in Nigeria and the minimal taxes placed on the sector ensures that farmers receive a very high and consistent share of the f.o.b. price.

Cameroon

Diagram 8 shows that cocoa production in Cameroon has been fairly stable, falling below 100,000 tonnes only twice since 1977/78, while never rising above 133,000 tonnes. The story behind the country's cocoa industry has tended to be one of wasted potential. The country has one of the world's lowest average yield levels, as a result of a high incidence of pests and diseases and a very old tree stock.

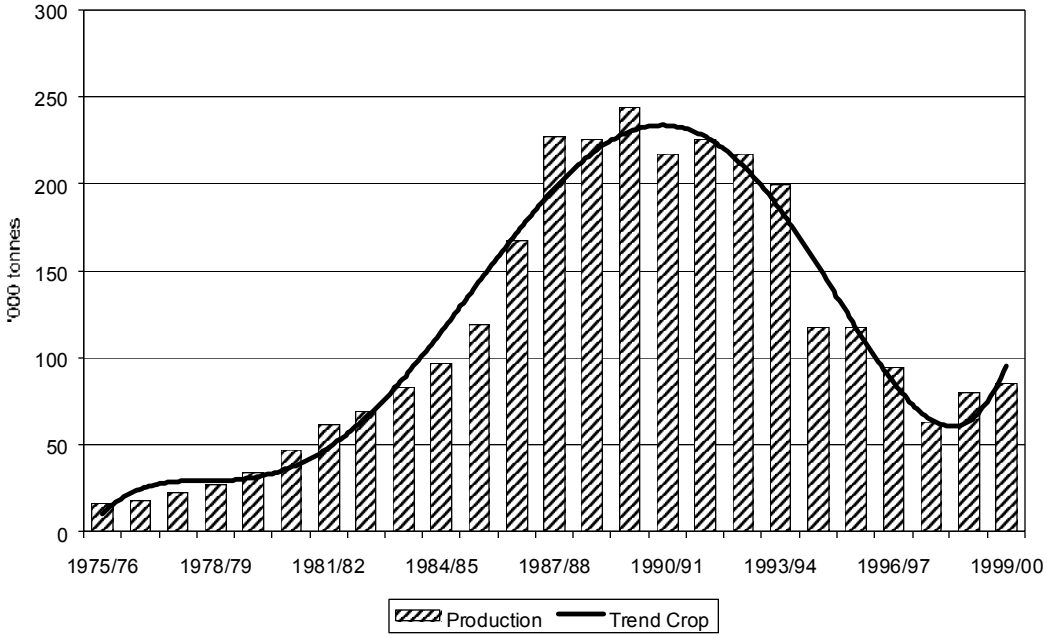
Diagram 8: Cameroon — Cocoa Production, 1975/76-1999/00



Malaysia

The Malaysian cocoa sector has suffered in the 1990s, although some recovery was apparent towards the end of the decade. Low world prices, higher labour costs and a change in the relative competitiveness of other crops (particularly oil palm) have reversed the trend of the 1980s, when production grew at a rapid rate. As Diagram 9 shows, between 1975/76 and 1989/90, production in Malaysia increased from 16,200 tonnes to over 243,000 tonnes, as relatively low production costs and an efficient marketing structure made cocoa production and extremely profitable venture. However, since then, prices have fallen and production costs have risen significantly, leading to output falling to an estimated 63,000 tonnes in the El Nino hit 1997/98 season. Malaysian cocoa farmers receive a very high share of the international price as a result of low taxation and an efficient marketing system. Prices in local currency terms were given a boost by the devaluation of the ringgit during 1997 and 1998. As a result, grower prices rose from an average of just over 3,000 ringgit per tonne in 1996/97 to more than 5,000 ringgit per tonne in 1997/98. However, with falling international prices, grower prices fell back to under 4,000 ringgit per tonne in 1998/99.

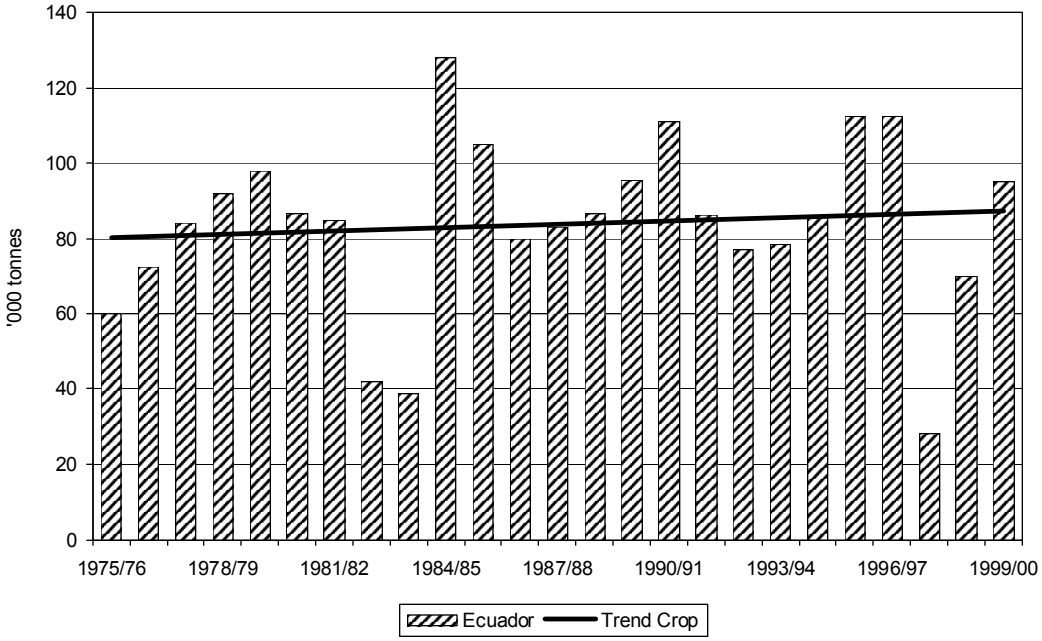
Diagram 9: Malaysia — Cocoa Production, 1975/76-1999/00



Ecuador

As a result of some extreme weather conditions, cocoa production in Ecuador has been arguably the most variable of any of the major producing countries in recent years. As Diagram 10 illustrates, production has varied between 30,000 tonnes and 130,000 tonnes since 1975/76, with the strong El Nino's of 1982 and 1997 responsible for the very low crops in those years. There is, however, a very slight upward trend in production, which is expected to continue, and possibly accelerate, in coming years.

Diagram 10: Ecuador — Cocoa Production, 19756/76-1999/00



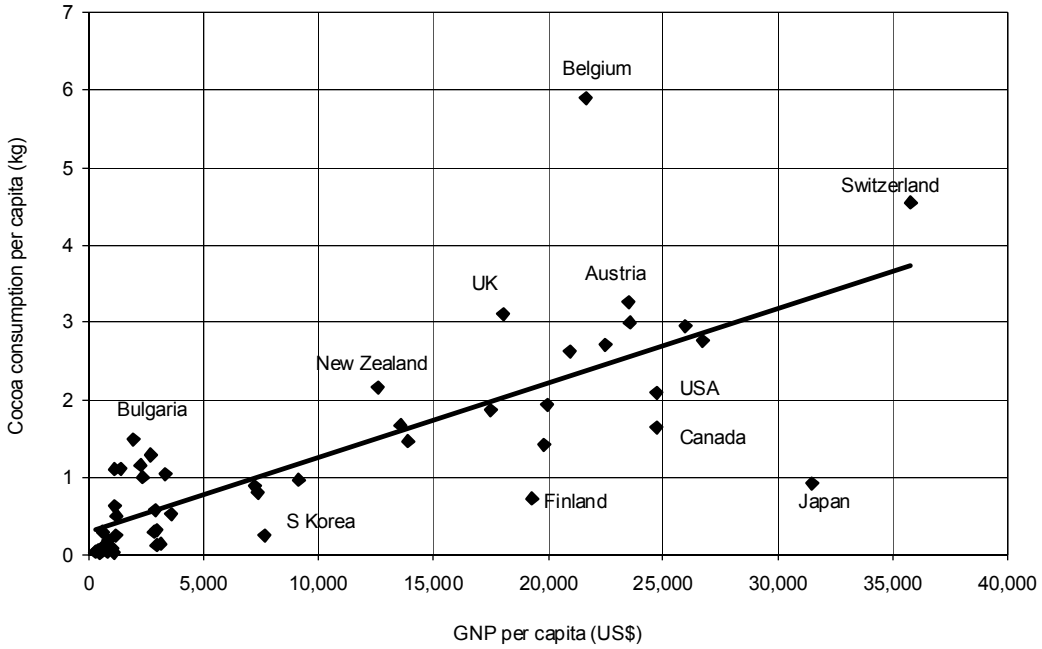
Summary

- Global cocoa production is highly concentrated
- Significant expansion limited to the three largest producers
- Continued concentration in production therefore likely
- Resulting in increased risk to global supply
- The threat from cocoa pests and diseases is increasing

CONSUMPTION OVERVIEW

- Looking at consumption itself, global demand for cocoa has grown rapidly during the twentieth century as a direct result of the growth in demand for chocolate.
- Higher demand has been achieved by a combination of rising incomes and populations, together with falling real retail prices — although lower import duties, improved transportation methods, modern advertising techniques and a much wider choice of chocolate products have also played a significant part. Per capita income is an important determinant, with countries with higher per capita income levels generally enjoying higher per capita consumption. In general, a US$1,000 increase in income leads to 100g rise in annual per capita consumption (Diagram 11).

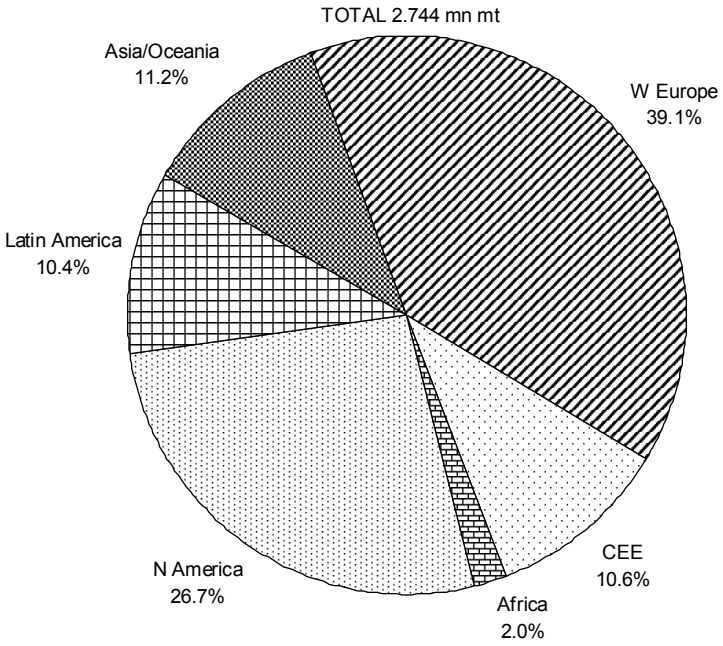
Diagram 11: Per Capita Cocoa Consumption versus GDP per capita



Major Chocolate Markets

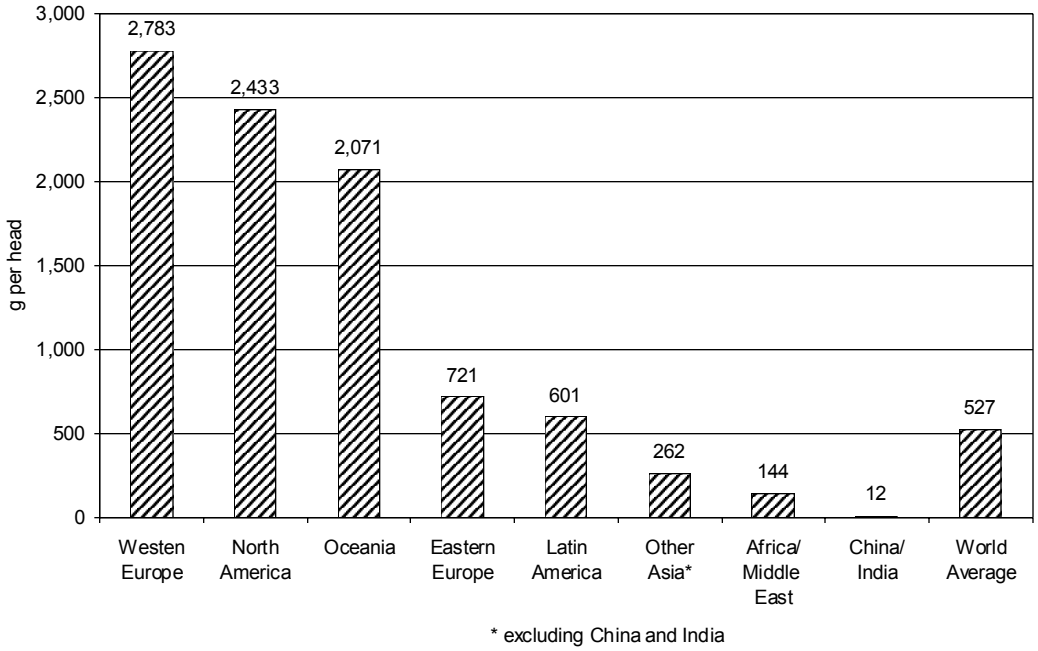
- Diagram 12 breaks cocoa consumption down by region. The largest cocoa consuming regions are Western Europe (approximately one million tonnes) and North America (approximately 730,000 tonnes), which, combined, consume around two-thirds of global cocoa consumption.

Diagram 12: Cocoa Consumption by Region, 1997/98



- Diagram 13 illustrates estimated per capita cocoa consumption in each region in 1997/98. Per capita consumption levels are highest in Western Europe and North America. In Western Europe, Belgium has the highest per capita consumption of 5kg per annum.

Diagram 13: Estimated Per Capita Cocoa Consumption, 1997/98



- Growth in chocolate consumption has continued unabated in recent years due, in part, to the continuing development of new products. The rise in European chocolate consumption, in particular, has been the result of rapid growth in consumption of filled chocolate products. The cocoa content in such products is typically only 10%-15%, but they account for almost 70% of the total chocolate product market and have proven to be very popular; seven out of the top ten European brands are filled chocolate products. In contrast, the market for chocolate with a high cocoa content is thought to represent less than 1% of the market. This illustrates the success of chocolate manufacturers in introducing a wide variety of brand-supported products with varying levels of cocoa content.

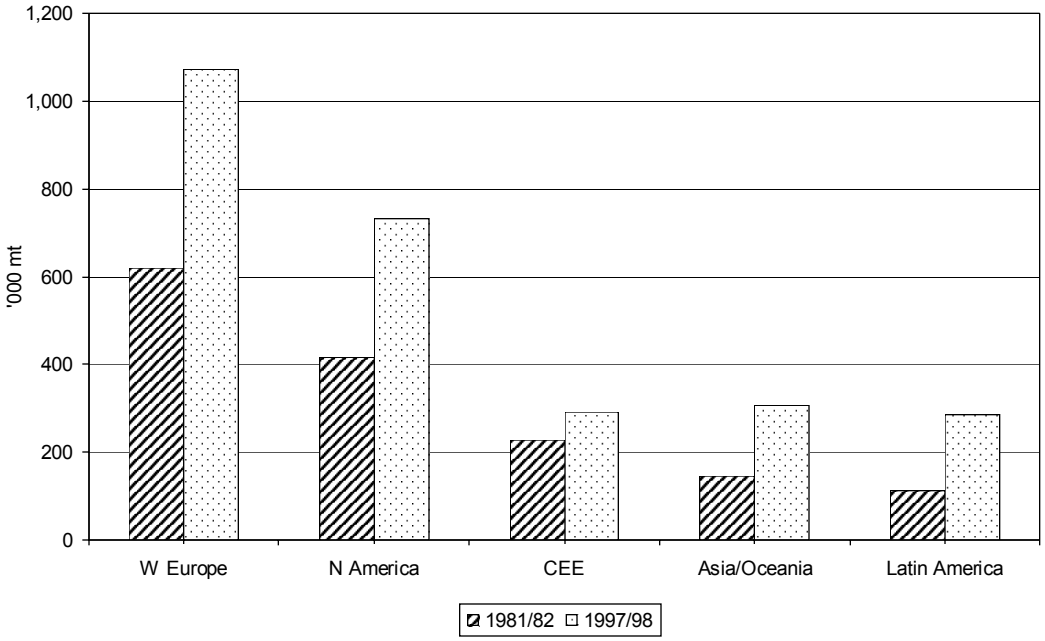
- A direct result of this concentration has been the need for companies to innovate, chiefly through creating new products and packaging, but also through catering for a broad range of retail outlets. Consequently, industry advertising is high, at around 3% of sales revenues. Each year, an estimated US$15-20 million is spent on new product launches alone.

Emerging Chocolate Markets

- Partly as a result of the intense competition in the near-saturated markets of Western Europe and the USA, confectionery manufacturers have been increasingly investing in the so-called "emerging" markets of Asia, Central and Eastern Europe (CEE) and Latin America. The financial crisis that began in Asia in 1997 set back consumption, and grindings fell, particularly in the Former

USSR. These countries are now recovering from the crisis and have excellent growth potential.

Diagram 14: Growth in Regional Cocoa Consumption, 1981/82-1997/98



- Asia, Africa and Latin America account for 75% of the world's population, and yet consume just 20% of the world's cocoa. The potential in Asia is undoubtedly great. Currently, some three billion consumers account for just 8% of global consumption. As a result, even a slight increase in per capita consumption would equate to a large expansion in demand for cocoa. The countries with the highest growth potential must be China and India. Between them, the two countries have a combined population in excess of 2.2 billion — and this is expected to reach almost 2.5 billion by 2005. With economic growth rates approaching double figures, and a growing middle and upper class, higher incomes should lead to higher cocoa demand.

- Asian per capita consumption is currently very low, at around 75g per person, compared to around 2.8kg in Western Europe. It is also considerably lower than per capita consumption in other emerging markets, such as Eastern Europe (0.7kg per person) and Latin America (0.6 kg per person). If Asian consumption rose to 0.2 kg per person (around a third of the level in Eastern Europe and Latin America) then the total *increase* in demand for cocoa would be 374,000 tonnes per annum, 14% of current world consumption. If Asian per capita consumption reached the level seen in Latin America (0.7kg per person), then current demand would more than double, with an extra 1.8 million tonnes consumed each year. Although, historically, products sold in emerging markets have been of relatively low quality, the arrival of the multinational chocolate manufacturers has led to considerable improvements, albeit with higher unit prices. Cadbury, M&M Mars and Nestlé are all involved in joint-venture operations producing chocolate within China. Cadbury and Nestlé also have sizeable operations in India.

- The key to higher average per capita consumption in Asia, is to raise demand in China and India from their current virtually non-existent level. How likely is a significant increase in per capita consumption in China, for example?

- Chocolate consumption in a given country can be considered to be a function of three main factors: income, climate and culture. Therefore GDP growth has in important impact on changes in consumption. India and China are forecast to see healthy GDP growth of 5.6% and 4.9% per annum respectively over the next ten years.

- However, cultural factors and the tropical climate will to some extent limit the growth of chocolate demand. While the population in China is very large, only an estimated 180 million people have a sufficient level of income to be able to afford new products. Furthermore, while a higher per capita consumption assumed above of 0.2 kg is small relative to the rest of the world, to reach such a figure, each consumer in China would have to increase consumption by over two and a half times. To reach the level in Latin America, Asian consumers would have to increase consumption ninefold. While this is not impossible in the long term, it is highly unlikely that such levels will be reached during the next ten years.

- The main fear of many in the cocoa industry with regard to emerging markets such as China is that any sustained, significant increase in the price of cocoa will lead to consumers in emerging markets establishing consumption patterns that do not include chocolate or at best include chocolate with a low cocoa content. The failure to meet market needs, resulting from a high price of cocoa could have a significant negative effect on future demand. The resulting loss in market potential for both cocoa and chocolate could have serious long term implications.

- In Central and Eastern Europe, all of the major manufacturers (except Hershey who have moved out of the European sector) have built up a presence since the collapse of communism at the beginning of the 1990s. In particular, Nestlé, Kraft, Cadbury and M&M Mars have factories in a number of countries in the region. Rising incomes, a more innovative range of products and marketing should ensure that consumption in the region has a very bright future.

- Central and Eastern Europe's growth looks less impressive during the sixteen year period shown in Diagram 15, although it should be remembered that the consumption as recently as 1991/92 was just 146,000 tonnes. The Russian Federation is the main market in the region, with consumption of 119,000 tonnes in 1997/98. As a result of reduced incomes following the financial crisis, consumers have been moving to locally produced goods, which tend to be cheaper. While Russia's macroeconomic performance was substantially better than had been anticipated, with GDP growing by 3%, prospects remain uncertain as to whether growth can be sustained at the same level.

- Prospects for Growth in Africa and Latin America are more limited than in Asia mainly because of the smaller populations in these regions — 414 million in Africa and 474 million in Latin America. Brazil is the main Latin American market In Africa, where per capita consumption is currently very low, even if each consumer in Africa were to double consumption of chocolate, this would lead to a relatively small increase in demand of 56,000 tonnes, 2% of current world demand. If this were to occur in Latin America, the effect would be more significant, with demand increasing by 285,000 tonnes (10% of current demand).

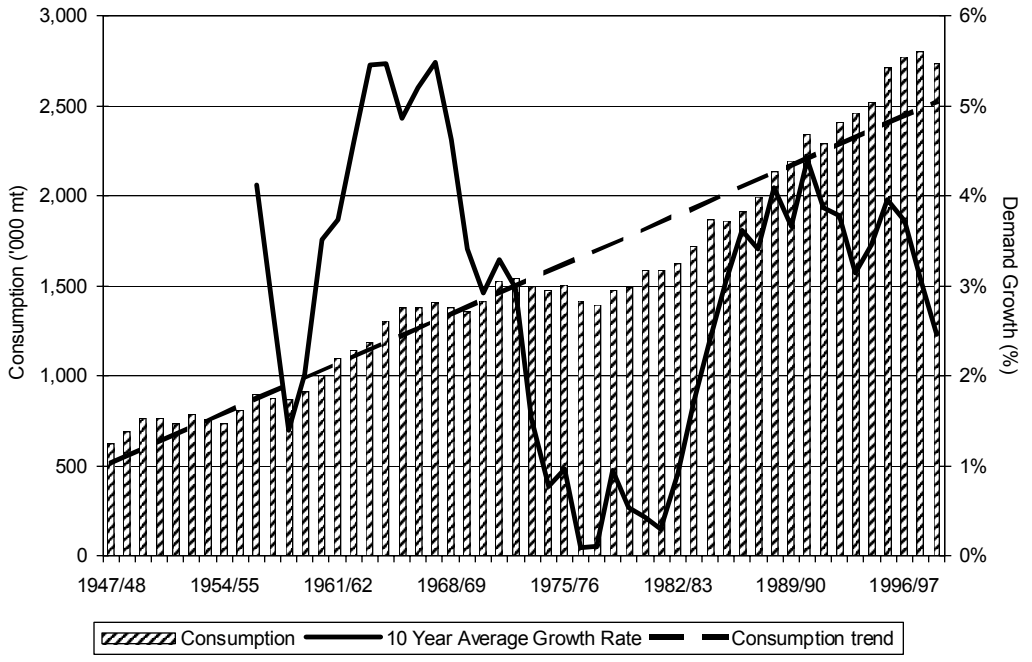
Summary Points

- Global cocoa consumption has grown rapidly throughout the 20th century, primarily due to rising incomes and populations
- Growth has traditionally come from the major markets of Western Europe and North America and these remain the drivers of consumption
- But increased impetus for future growth will come from emerging markets (Latin America, CEE and Asia)
- Economic crises have slowed growth in these regions but long term prospects remain very bright
- Nonetheless, the timescale for significant increases in Chinese demand are very long term, significant increases are not expected over the next decade — only around 180 million people considered to have income to consume chocolate
- Russia has large potential, although the macroeconomic situation remains uncertain
- Brazil is increasing consumption

Future Supply and Demand Balances

Demand growth for cocoa is highly variable. Diagram 16 plots the growth in demand since 1947/48, together with a ten year moving average of the growth rates. From this we can see that annual average demand growth during any ten year period has ranged from 5.5% to 0.4% during the previous fifty years, with the lowest growth occurring during the peak price levels of the late 1970s. On average over the period, consumption has increased by 3%.

Diagram 15: Growth in Global Cocoa Consumption 1947/48-1998/99



Next, this report considered the effect on supply and demand balances and prices over the next ten years from three scenarios: moderate annual consumption growth of 3%, high annual consumption growth of 4.5% and low annual consumption growth of 1.5%. The fourth scenario demonstrates what is likely to happen to supply and demand balances in the event of a serious supply shock to a major producer.

For each scenario, LMC's forecasting model works in the following way:

Production is derived from area and yield estimates which based on the average cocoa price during the previous season (most of the decisions concerning the level of replanting, intensity of maintenance efforts etc. will be made during the previous crop year). The calculation of area harvested is based on the previous year's area and the elasticity of new plantings. This relates the change in the area under cocoa to the profitability of cocoa production. Production cost estimates are based on results from LMC's unique cocoa cost of production model. In some countries where there is perceived to be a limit on the expansion of cocoa, e.g. due to physical restrictions on land availability or other planting constraints we have placed an upper limit on the area. Yield is calculated using the yield elasticity. If the current farmgate price is higher than the average of the previous four years then yields increase and vice versa.

Having calculated global production, a new consumption estimate is made — based on our assumed growth rates — and the resultant change in global stocks is presented as a stock-consumption ratio. This stock-consumption ratio is used to determine a new price. The new price level is then fed back into the model to determine production in the following year and so the process continues over a number of iterations.

This model of the cocoa economy can therefore be used to estimate price levels based on a range of assumed demand growth rates. It should be noted that production costs and the relationship between prices and the stock-grind ratio have been developed using real (i.e., inflation adjusted) price levels.

As a result of assuming a constant demand growth rate and with certain weather shocks already built into our trend estimates of area and yields, a fairly stable supply and demand picture evolves with relatively small surpluses and deficits in comparison with those seen in reality. The model does not attempt to forecast future weather shocks. Production estimates are based on trend crop levels and the impact of events such as El Niño and La Niña are averaged over the entire period rather than the model attempting to forecast exactly in what year they will occur. Consequently, actual surpluses and deficits are likely to be more extreme than the model's predictions, with the average of these fluctuations serving as a better comparison.

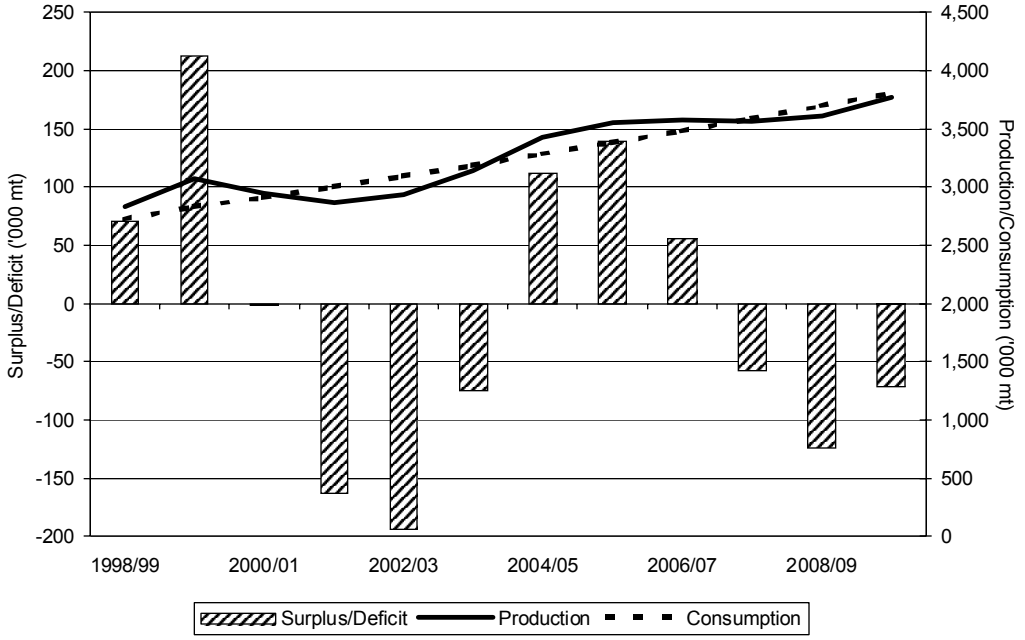
Scenario 1: Moderate Demand Growth of 3% per annum

For our moderate demand growth scenario we have assumed an average growth rate of 3% per annum. A growth rate of 3% would imply more rapid expansion in emerging markets (in excess of 5%) with slower growth in the mature markets of North America and Western Europe (around 2% per annum). Under the current GDP outlook, we would expect a consumption growth rate of 3% to be a reasonable assumption. Price and GDP growth are important determinants of consumption, although in the past two years we have been witnessing an unusual scenario of stagnating consumption despite the existence of a healthy macroeconomic outlook in the US and UK. Nonetheless, a positive macroeconomic outlook in most consuming countries is likely to support and sustain the increase in consumption that is evident from recent grindings figures. This purports to a healthy outlook for cocoa consumption in the medium term. The interest rate rises that were implemented in early 2000 in most of Europe and North America

reflect a global economy that is growing faster than at anytime since the late 1980s. Of the advanced industrial nations, only Japan still risks stagnation, and even there demand is being propped up by big public spending packages. The emerging economies are recovering rapidly from the turmoil that began in 1997 and 1998.

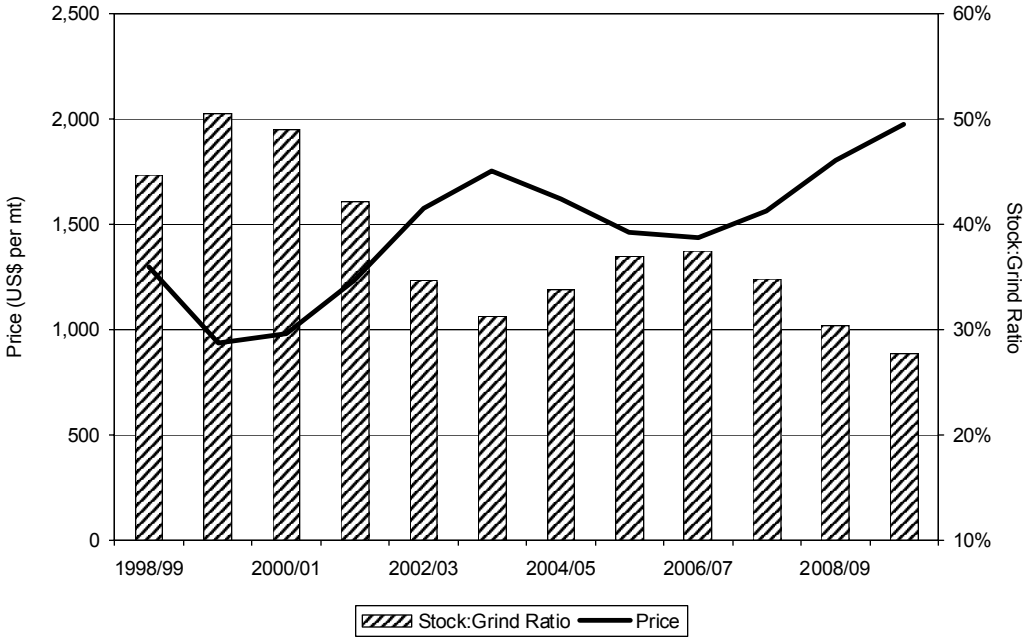
Under the scenario of a 3% annual increase in production, we see a relatively balanced supply-demand outlook. Following the surplus during the 1999/2000 crop year, a relatively balanced market is expected in 2000/01 followed by three years of deficit (Diagram 17). This is expected to reduce global stocks to a low of 998,000 tonnes by 2003/04 and raise prices (in real terms) to over US$1,750 per tonne. These relatively high price levels are expected to revitalise production resulting in three surplus years between 2004/05 and 2006/07, pushing global stocks back up to 1.3 million tonnes. Three deficits are expected to follow in the final three years of our analysis pushing prices to a peak of US$1,979 per tonne in 2010.

Diagram 16: Supply-Demand Balance Forecasts to 2010 Assuming Demand Growth of 3% per Annum



By 2010, production and consumption will have risen to around 3.8 million tonnes, around one million tonnes above current levels. With production in Latin America likely to remain close to current levels, growth in production is likely to be met by larger crops in West Africa (particularly Côte d'Ivoire, Ghana and Indonesia) and Asia. With consumption rising, the stock-grind ratio is expected to fall to around 28% in 2010.

Diagram 17: Forecasts of Price and the Stock-Grind Ratio to 2010 Assuming Demand Growth of 3% per Annum



Under this scenario, LMC would expect prices (in real terms) to increase from the 1999/00 level of around US$935 per tonne to US$1,979 per tonne by 2010 (Table 1 and Diagram 18).

Table 1: Supply and Demand Balances to 2010 Assuming Demand Growth of 3% per Annum ('000 mt)

	Average Cocoa Price (US$)	Global Grindings	**TOTAL**	Global Production Africa	Americas	Asia	Surplus/ Deficit	Global Stocks	Stock:Grind Ratio
1998/99	1,298	2,726	**2,825**	1,931	*381*	*512*	70	1,217	44.7%
1999/00	935	2,832	**3,075**	2,137	*408*	*531*	213	1,430	50.5%
2000/01	983	2,917	**2,944**	2,063	*368*	*513*	-2	1,429	49.0%
2001/02	1,230	3,004	**2,870**	2,028	*341*	*502*	-163	1,266	42.1%
2002/03	1,574	3,094	**2,929**	2,073	*338*	*519*	-194	1,072	34.7%
2003/04	1,756	3,187	**3,144**	2,209	*366*	*569*	-74	998	31.3%
2004/05	1,618	3,283	**3,428**	2,393	*403*	*633*	112	1,109	33.8%
2005/06	1,459	3,381	**3,557**	2,475	*414*	*668*	140	1,249	37.0%
2006/07	1,434	3,482	**3,574**	2,484	*405*	*685*	56	1,305	37.5%
2007/08	1,566	3,587	**3,565**	2,471	*394*	*700*	-57	1,248	34.8%
2008/09	1,807	3,695	**3,607**	2,488	*391*	*728*	-124	1,124	30.4%
2009/10	1,979	3,805	**3,771**	2,584	*406*	*781*	-72	1,053	27.7%

Scenario 2: High Demand Growth

An examination of consumption data during the previous fifty years reveals that demand growth in any ten year period has averaged around 4.5% per annum during times of strong consumption growth (Diagram 16). One factor which may lead to a higher probability of achieving 4.5% growth is recent research which reveals that cocoa powder and chocolate are rich sources of high quality polyphenol antioxidants, called flavonoids, compounds similar to those found in fruits, vegetables and red wine, that may have positive health benefits. Such antioxidants eliminate free oxygen radicals — compounds that are linked to heart disease, certain cancers and physical degeneration maladies associated with the ageing process.

Table 2 shows the oxygen radical absorbance capacity (ORAC), which measures the ability of foods to subdue harmful oxygen free radicals that can damage our bodies. It shows that dark chocolate is rich in antioxidants. Furthermore, research on the potential health benefits of polypheonols in cocoa and chocolate has proven that they are absorbed in the bloodstream.

Table 2: Antioxidant Foods

	ORAC Units per 100g
Dark Chocolate	13,120
Milk Chocolate	6,740
Prunes	5,770
Raisins	2,830
Spinach	1,260
Broccoli	890

Note: ORAC = Oxygen Radical Absorbence Capacity

Source: USDA and Journal of American Chemical Society

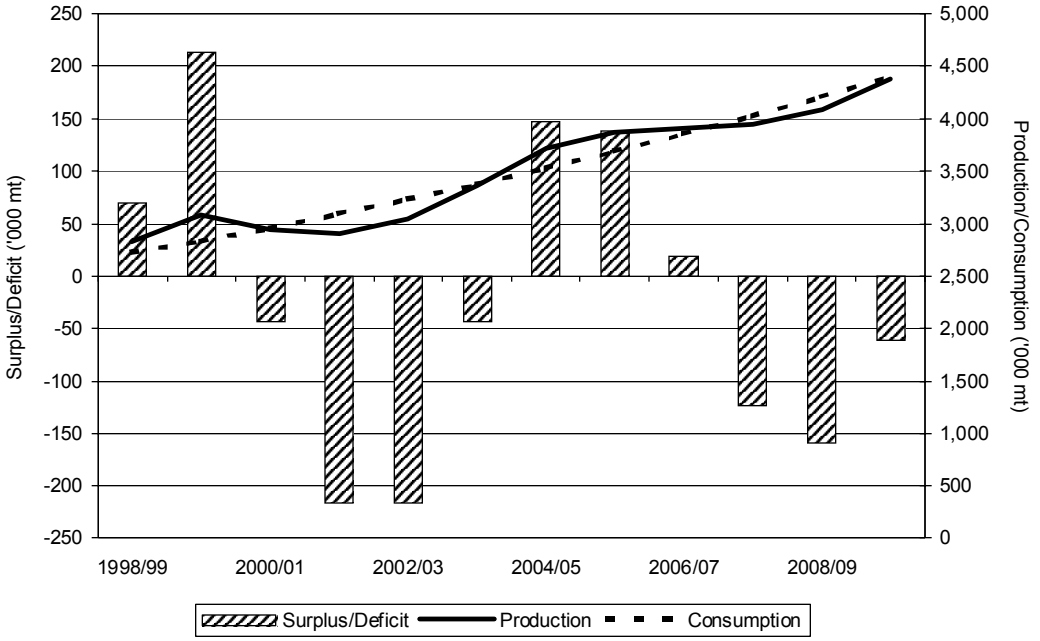
These studies are prompting manufacturers to re-evaluate how they make chocolate, since some techniques unintentionally eliminate flavonoids. Mars, Inc., recently developed a proprietary process to preserve flavonoids, producing products marketed under the brand name Cocoapro.

Consumers, particularly in the West, are becoming ever more discerning about the effects of diet on health. Research that persuades consumers that chocolate can be a healthy snack rather than junk food will undoubtedly boost consumption. If consumers are persuaded by the research into antioxidant properties, then we may see demand growth closer to the 4.5% level, with the resultant impact on prices as shown in scenario 2.

If such research were to boost consumption levels, we may see consumption growth of 4.5% over the next ten years. The effect this would have on supply and demand balances is illustrated in Table 2 and Diagrams 19 & 20.

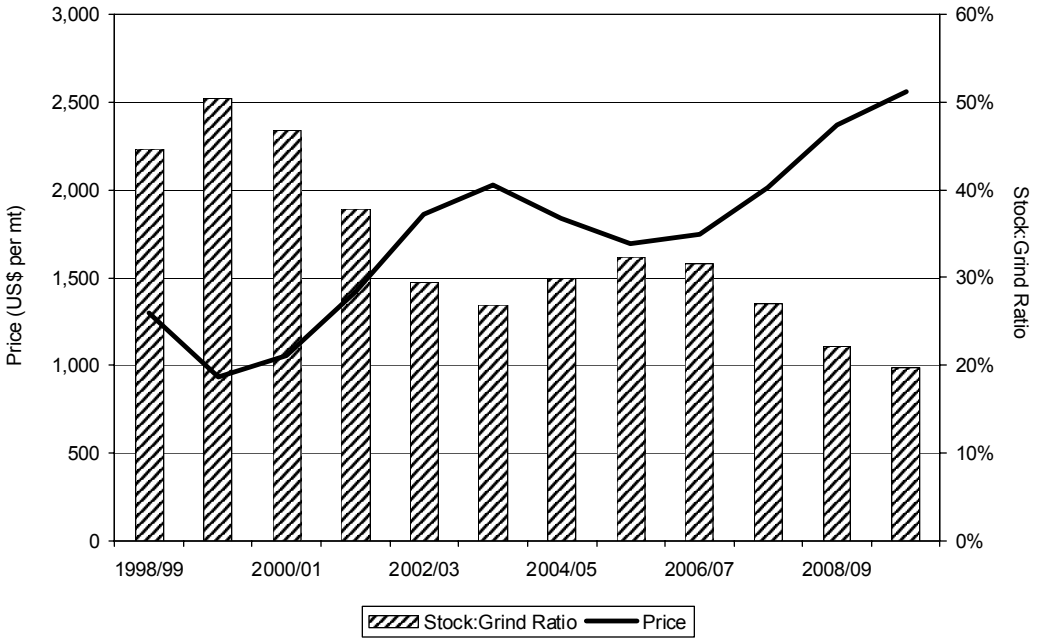
As a result of the rapid expansion in demand, LMC's model predicts that following the anticipated surplus in 1999/2000, seven of the next ten crop years will produce supply deficits (Diagram 19).

Diagram 18: Supply-Demand Balance Forecasts to 2010 Assuming Demand Growth of 4.5% per Annum



Consequently, global stock levels are expected to remain around one million tonnes, although given the rapid growth in consumption, the stock-grind ratio would fall to just 20% by 2010.

Diagram 19: Forecasts of Price and the Stock-Grind Ratio to 2010 Assuming Demand Growth of 4.5% per Annum



Under these assumptions, LMC would expect prices (in real terms) to increase from the 1999/00 level of around US$935 per tonne to over US$2,560 per tonne by 2010 (Diagram 20). By this time, production and consumption would have risen to just under 4.4 million tonnes, over 50% above current levels. As with our moderate demand growth scenario, growth in production is likely to be met by larger crops in West Africa (particularly Côte d'Ivoire and Ghana) although Asia is likely to see the fastest growth with output doubling from 531,000 tonnes to nearly one million tonnes during the period.

Table 3: Supply and Demand Balances to 2010 Assuming Demand Growth of 4.5% per Annum ('000 mt)

	Average Cocoa Price (US$)	Global Grindings	**TOTAL**	Global Production Africa	Americas	Asia	Surplus/ Deficit	Global Stocks	Stock:Grind Ratio
1998/99	1,298	2,726	**2,825**	1,931	*381*	*512*	70	1,217	44.7%
1999/00	935	2,832	**3,075**	2,137	*408*	*531*	213	1,430	50.5%
2000/01	1,054	2,959	**2,944**	2,063	*368*	*513*	-44	1,386	46.9%
2001/02	1,418	3,092	**2,904**	2,051	*345*	*508*	-217	1,170	37.8%
2002/03	1,863	3,231	**3,045**	2,150	*354*	*541*	-216	953	29.5%
2003/04	2,028	3,377	**3,366**	2,355	*399*	*612*	-44	909	26.9%
2004/05	1,837	3,529	**3,713**	2,578	*444*	*690*	147	1,056	29.9%
2005/06	1,694	3,687	**3,865**	2,674	*457*	*733*	139	1,195	32.4%
2006/07	1,744	3,853	**3,912**	2,699	*451*	*762*	19	1,214	31.5%
2007/08	2,016	4,027	**3,943**	2,701	*445*	*797*	-123	1,091	27.1%
2008/09	2,373	4,208	**4,089**	2,777	*457*	*855*	-160	932	22.1%
2009/10	2,562	4,397	**4,380**	2,942	*489*	*949*	-61	871	19.8%

Scenario 3: Low Demand Growth

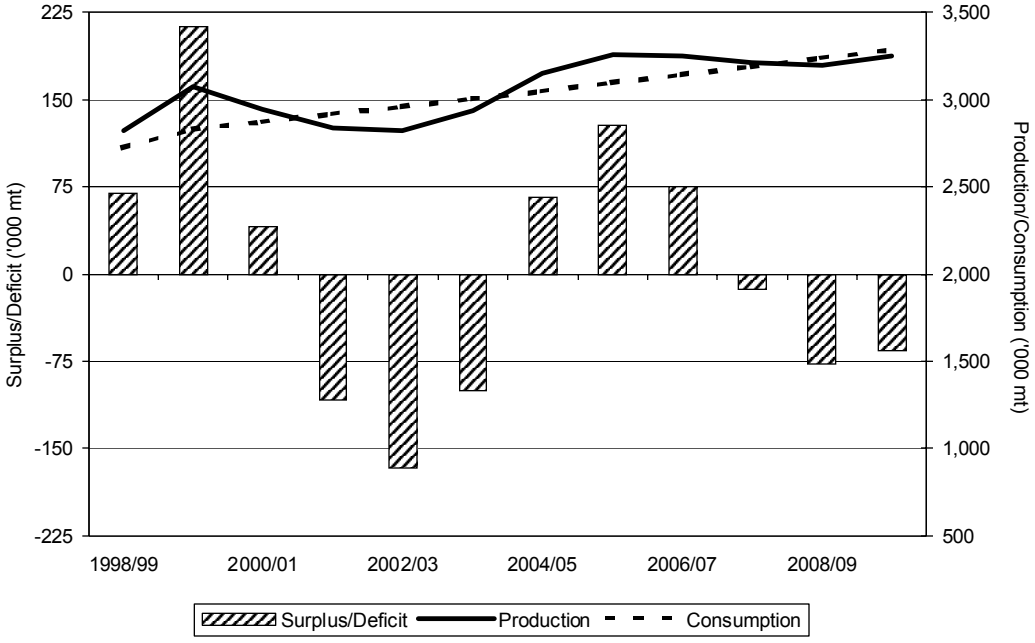
The lowest growth in demand witnessed in any ten year period during the previous fifty years took place between 1968/69 and 1977/78 when consumption grew at an annual average rate of just 0.4% (Diagram 16). However, we have chosen an annual average growth rate of 1.5% to best represent our low demand growth scenario. This historically low level of growth would require a stagnation in consumption in the major markets of Western Europe and North America and a slow take-off in growth in the emerging markets.

Two threats to the cocoa industry, which may slow consumption growth to 1.5% per annum, are the use of cocoa butter equivalents (CBEs) and health concerns. During the past three decades, a growing influence on the market potential of cocoa has been the existence of alternatives to cocoa products (mainly cocoa butter) in the manufacture of chocolate. This issue has become more pressing with following the decision in April by the EU to allow chocolate to be manufactured with up to 5% cocoa butter equivalents. Estimates of the impact of this on consumption vary, but consumption of cocoa butter could fall by as much as 180,000 tonnes (b.e.), 6.5% of current global consumption. However, the actual reduction is likely to be lower than this, given that not all manufacturers will replace cocoa butter with CBEs, and those that will are likely take time to do so.

While the antioxidant properties of chocolate may encourage consumption, these will be counteracted to some extent by adverse health aspects, mainly involving the fat and sugar content of chocolate. Health concerns over the use of certain chemicals to control pests and disease have also left to fears of residues in products. The use of the chemical Lindane, for example, has previously led to a threatened ban on exports from certain origins into the US.

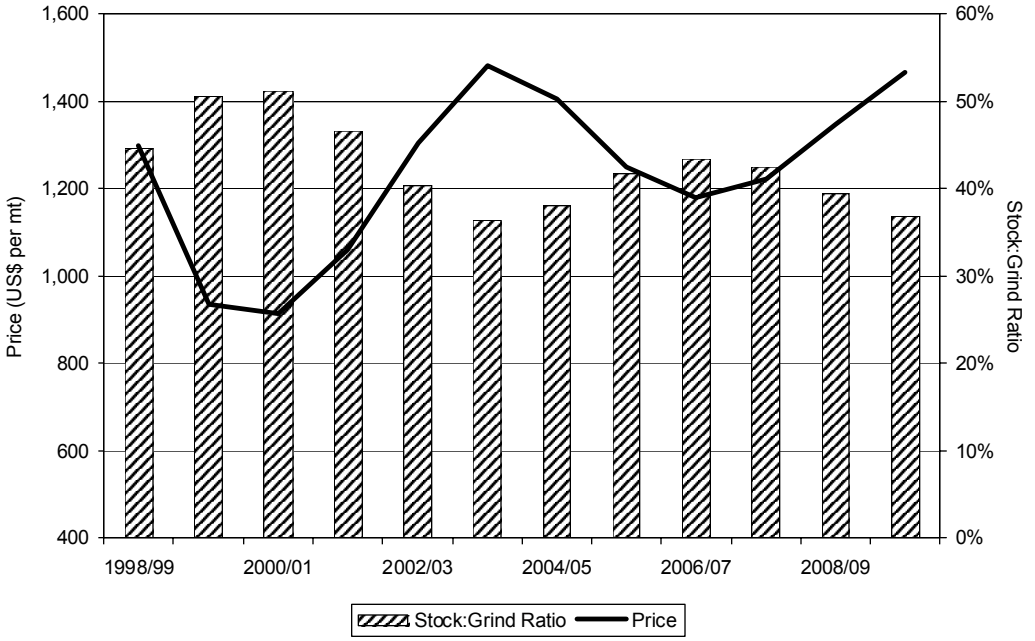
With a relatively low level of demand growth, the model predicts that following the anticipated surplus in 1999/2000 and 2000/01, falling prices will curtail production to the extent that supply deficits would be recorded in the three crop years 2001/02 to 2003/04. The resultant recovery in prices would enable a further four surpluses before the decade finishes with three years of deficit (Diagram 21).

Diagram 20: Supply-Demand Balance Forecasts to 2010 Assuming Demand Growth of 1.5% per Annum



Global stock levels would be expected to rise to around 1.2 million tonnes; again with rising consumption, the stock-grind ratio will fall to around 37% in 2010.

Diagram 21: Forecasts of Price and the Stock-Grind Ratio to 2010 Assuming Demand Growth of 1.5% per Annum



As Diagram 22 illustrates, with demand growth of 1.5% LMC would expect prices (in real terms) to increase from the 1999/00 level of US$935 per tonne to around US$1,460 per tonne by 2010. By this time, production and consumption will have risen to around 3.3 million tonnes, around half a million tonnes above current levels. Under this scenario, production in Latin America would be expected to decline by more than 10%, while production would continue to expand in West Africa and Asia.

Table 4: Supply and Demand Balances to 2010 Assuming Demand Growth of 1.5% per Annum ('000 mt)

	Average Cocoa Price (US$)	Global Grindings	**TOTAL**	Global Production Africa	Americas	Asia	Surplus/ Deficit	Global Stocks	Stock:Grind Ratio
1998/99	1,298	2,726	**2,825**	1,931	*381*	*512*	70	1,217	44.7%
1999/00	935	2,832	**3,075**	2,137	*408*	*531*	213	1,430	50.5%
2000/01	914	2,874	**2,944**	2,063	*368*	*513*	41	1,471	51.2%
2001/02	1,059	2,917	**2,837**	2,005	*336*	*496*	-109	1,363	46.7%
2002/03	1,304	2,961	**2,822**	2,001	*322*	*498*	-167	1,196	40.4%
2003/04	1,483	3,005	**2,935**	2,072	*336*	*527*	-100	1,095	36.5%
2004/05	1,406	3,050	**3,148**	2,210	*362*	*576*	67	1,162	38.1%
2005/06	1,250	3,096	**3,257**	2,279	*372*	*605*	128	1,290	41.7%
2006/07	1,179	3,143	**3,251**	2,274	*363*	*614*	75	1,365	43.4%
2007/08	1,220	3,190	**3,209**	2,246	*348*	*616*	-13	1,352	42.4%
2008/09	1,346	3,238	**3,193**	2,233	*337*	*623*	-76	1,276	39.4%
2009/10	1,466	3,286	**3,253**	2,270	*338*	*645*	-66	1,210	36.8%

As well as possibilities and threats arising from demand of cocoa, following a decade of low cocoa prices, some chocolate manufacturers are beginning to become concerned about the sustainability of global cocoa production. The rationalisation of cocoa production that has resulted in a dependence on just three countries for 70% of supply increase the impact on the world market of a supply shock in any one of these countries. The price rise that would follow such an event would slow or reduce the demand growth for cocoa as consumers change their eating habits to reduce cocoa consumption. This impact can continue for some time, even if prices fall again, since eating habits can take some time to respond to a fall in prices.

Summary Points

Table 5 summarises the effect on prices of the three scenarios, and shows that the range of prices reached by 2009/10 is between $1,466 per tonne and $2,562 per tonne.

Table 5: Summary of Prices under the Three Scenarios

		1998/99	1999/2000	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
High	(4.5%)	1,298	935	1,054	1,418	1,863	2,028	1,837	1,694	1,744	2,016	2,373	2,562
Medium	(3.0%)	1,298	935	983	1,230	1,574	1,756	1,618	1,459	1,434	1,566	1,807	1,979
Low	(1.5%)	1,298	935	914	1,059	1,304	1,483	1,406	1,250	1,179	1,220	1,346	1,466

- Under the scenario of moderate annual demand growth of 3%, there is a relatively balanced supply-demand outlook following the surplus during the 1999/00 crop.
- When we assume high demand growth of 4.5% per year, four years of deficit will follow the 1999/00 crop, and after three years of surplus, three years of deficit will again occur
- With a relatively low level of demand growth of 1.5% per annum, the surplus will continue into 2000/01, after which falling prices will curtail production to such an extent that three years of deficit will follow.