Potential Impacts of the Production of Liquid Biofuels on Food security in Botswana

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1.0 Introduction

Biofuels : fuels produced from biomass for the wide range of applications. They can be solid (fuelwood), liquid (bioethanol) or gaseous (biogas) (FAO, 2008). This paper focuses on the production and use of liquid biofuels: their impact on food security in Botswana. Drivers of biofuel development: Concerns about climate change, energy security and rural development.

According to FAO (2008), rapid growth of the production of biofuels is one of the factors which impact on food security. Effects are context specific, depending on country characteristics, biomass availability, and type of technology (FAO, 1998). Energy markets now determine agricultural prices.

Botswana has a high dependency on imports for its cereal requitrements. Production of major cereals account only for 15% of national food requirements (Modise, 2009; pers comm.).

2.0 Conceptual Framework

Definition of food Security

- FAO (1998) defines food security as a situation whereby "all people, at all times, have physical, social, and economic access to sufficient amounts of safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life**".**

Dimensions of Food Security and Biofuels (FAO, 1998).

- availability (productive resources of land, labour, water etc may be used for the production of biofuels instead of food.
- access (production of biofuels may increase food prices (3% to 30% and even higher) (FAO, 2008).
- Stability: **Biofuels are likey to increase pressure on food insecurity.**
- safe and healthy utilization of food: improved access to bionergy may improve utilization of food

Four dimensions of Food Security

3.0 Research Questions

4.1 Research Questions:

- **The following research questions are critical in understanding the relationship between bioenergy production and use and food security:**.

- What are the main ways in which adverse impacts of biofuel development on food availability could be reduced?

- How do the trends in national food prices compare with the global food prices; and to what extent could they be attributed to biofuel production?

- What is the potential impacts (ripple effects) of the national food prices on food security; in particular how does the rise in prices compare with the rise in incomes?

4.0 Background to Botswana

- Important Indicators

Table 4.1: Botswana: Important Indicators

Indicator	Magnitude	Comments
Land area	582 000 km^2	Land locked country; same size as Kenya or France
Mean annual rainfall	475mm	Semi-arid climate; rainfall ranges from 250 to 650mm
Population (2006)	1.9 (million)	
GNI per capita (2006)	5 900 USA $	Minerals account for 1/3 of GDP. Income inequality very high.
% Major Cereals Imported	85%	Economy very dependent and vulnerable to external factors

5.0 Methodology

5.1 Data Collection

- Collection of secondary data from libraries, internet and documentation Centres.

- Collection of data on consumer price indices and prices from CSO and Botswana Agricultural Marketing Board.

- Interviews with various policy makers in Government departments and parastatal organisations.

5.2 Data analysis: Consumer price and GDP indices used to deflate nominal prices. Data Summarised in the form of bar charts and line graphs to assess trends in prices.

6.0 Biofuels Dev in Botswana

5.3: Biofuels in Botswana

5.3.1 Feasibility study on biofuels

- A feasibility study was undertaken in 2007 on behalf of the Ministry of Minerals, Energy and Water Resources to assess the potential for the production and use of liquid biofuels for transport in Botswana.
- The study revealed that there is a potential for the growing of biofuel crops in Botswana: Jatropha and sweet sorghum recoomended as feedstocks
- The Government is still developing biofuels policy. However, there are a number of policy statements on biofuels in official documents which indicate the positive thinking of the Government on biofuels.
- The absence of the policy is holding back biofuel development

7.0 Potential impacts on Food Availability

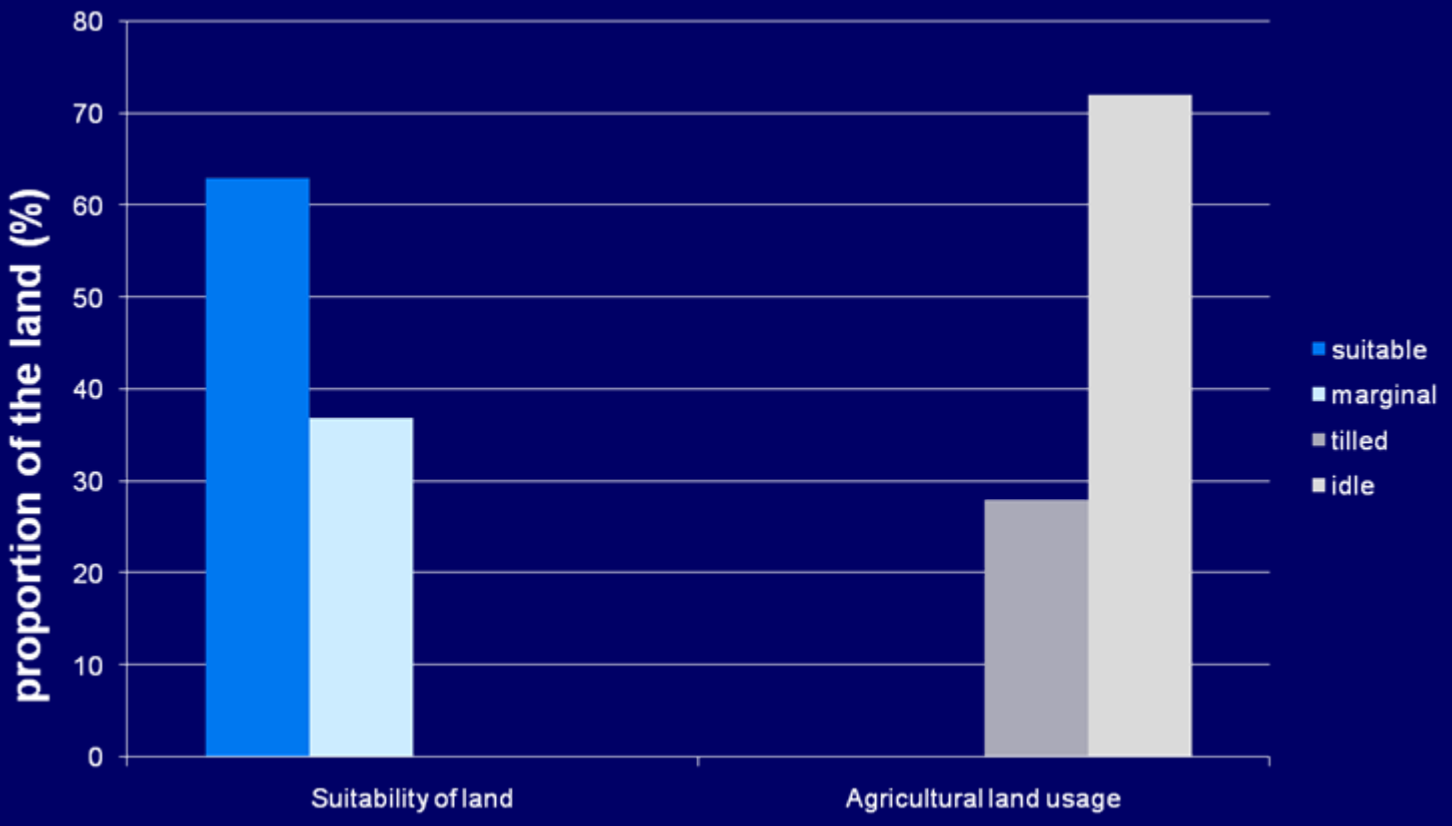
6.1 Three main ways for reducing adverse impacts on Food Availability in Botswana:

- Use of marginal lands. Out of a total of 682 000 ha of arable land in Eastern Botswana, about 200 000 ha (29%) is marginal land and the rest (71%) is suitable land. Marginal land: Land not suitable for cultivation of crops.

- Use of idle land. Out of 432 000 ha of suitable land in Botswana, only 120 000 ha (28%) is tilled; the rest (72%) is idle land (Modise, 2009). Idle land will be used for biofuel production. Idle land: former or current agricultural land not used for food production (Renewable Fuels Agency, 2008:33).

- Use of Jatropha curcas and Sweet sorghum as a feedstocks:

Fig 7.1 Suitability and Usage of Land in Eastern Botswana



7.2 Use of Jatropha as a Feedstock

6.2 Food Security

- The impact on food security may be limited as the feedstock of Jatropha will be grown on marginal land.
- Jatropha requires an average rainfall of 300 to 1000 mm per year (FAO, 2008).
- However, as the demand for biofuels increases, there might be pressure to use good land for biofuels.

8.0 Potential Impacts on Access to Food.

- Trends in Consumer Price Indices
- Trends in Food Prices of Selected Commodities
- Food Prices and Income

10. Fig. 8.1 : Trends in Consumer Price Indices of Food Products, Botswana

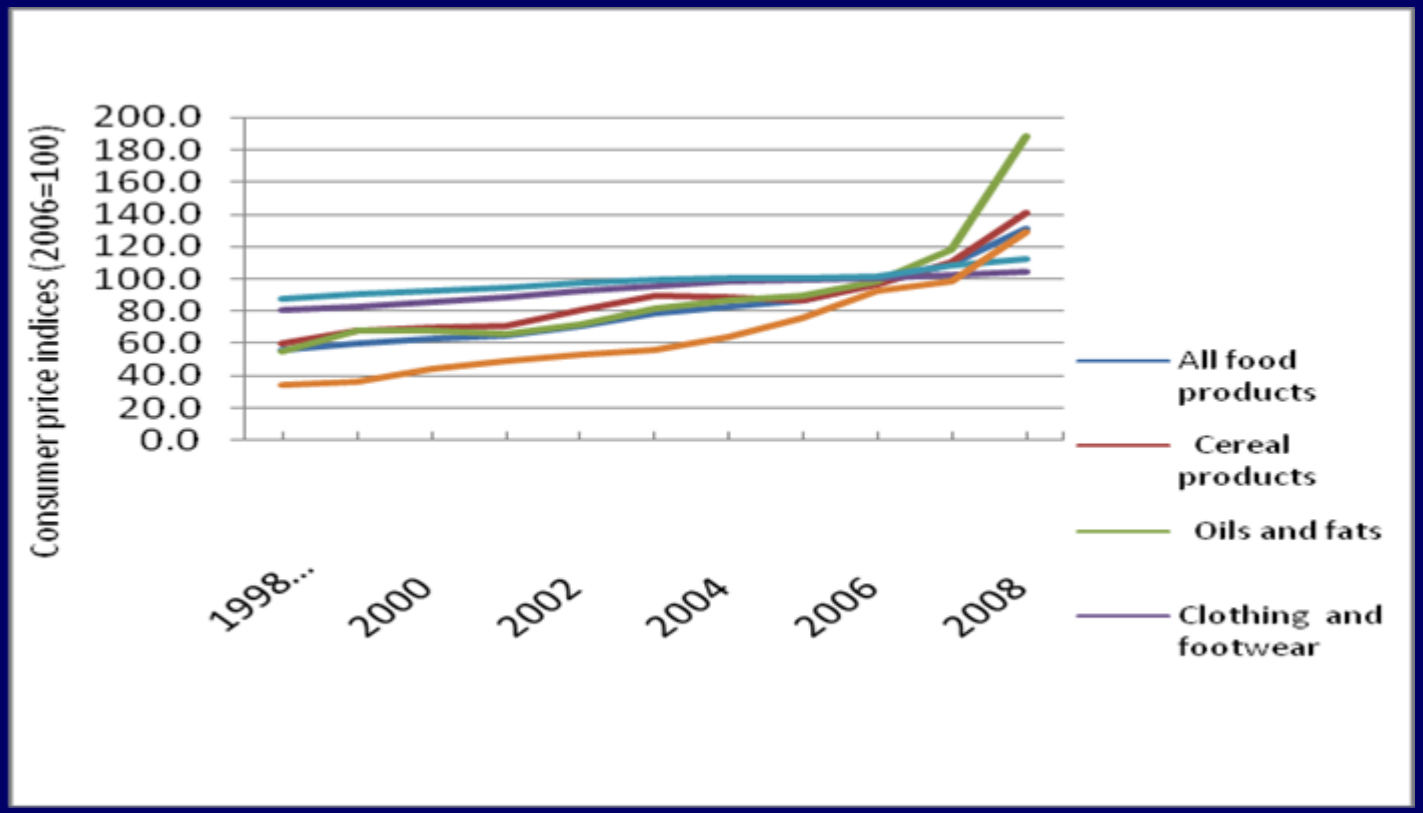


Fig 8.2: Increase in Commodity Prices.

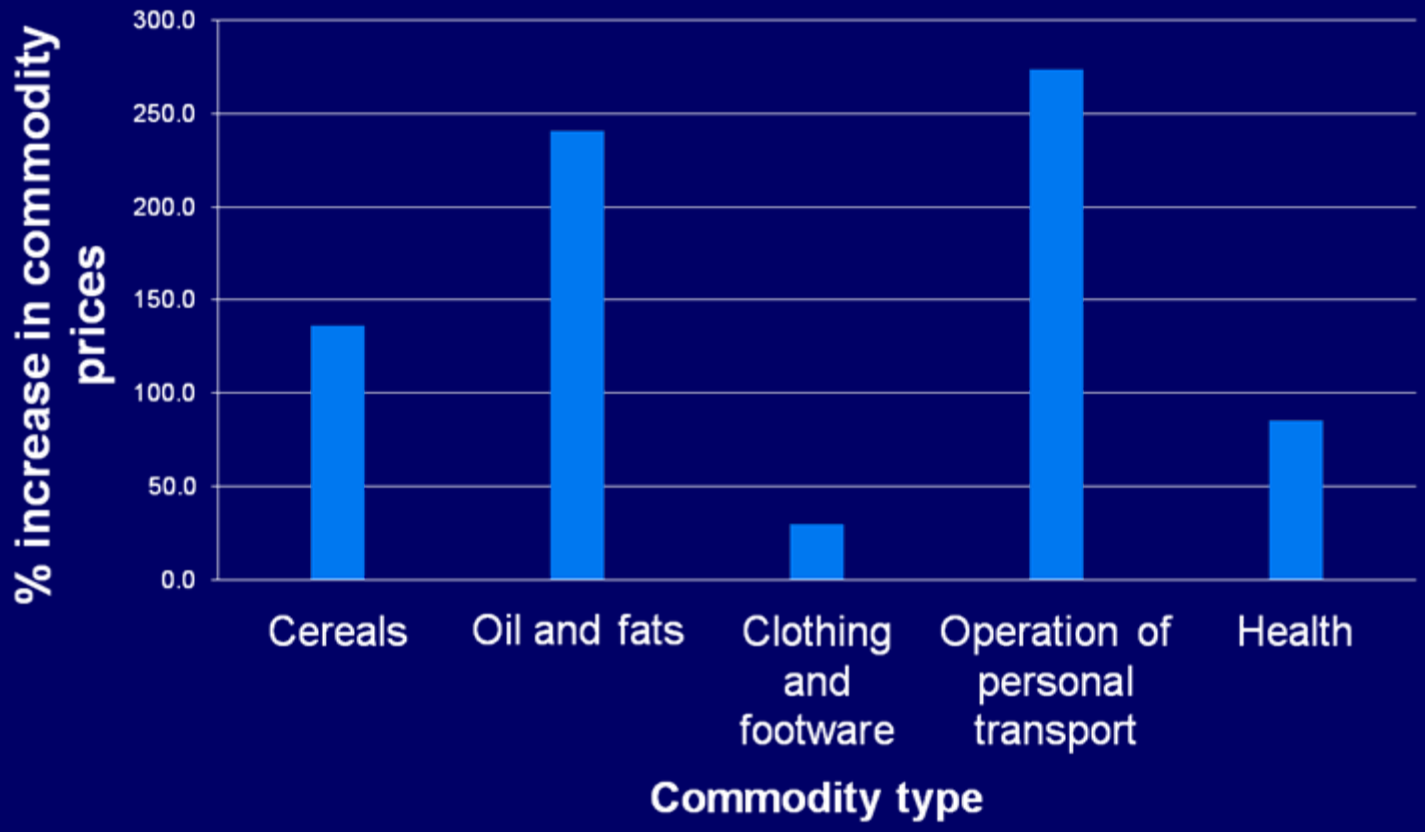


Fig 8.3: Increase in Food Commodity Prices, 2002-2008 and 2005-2008.

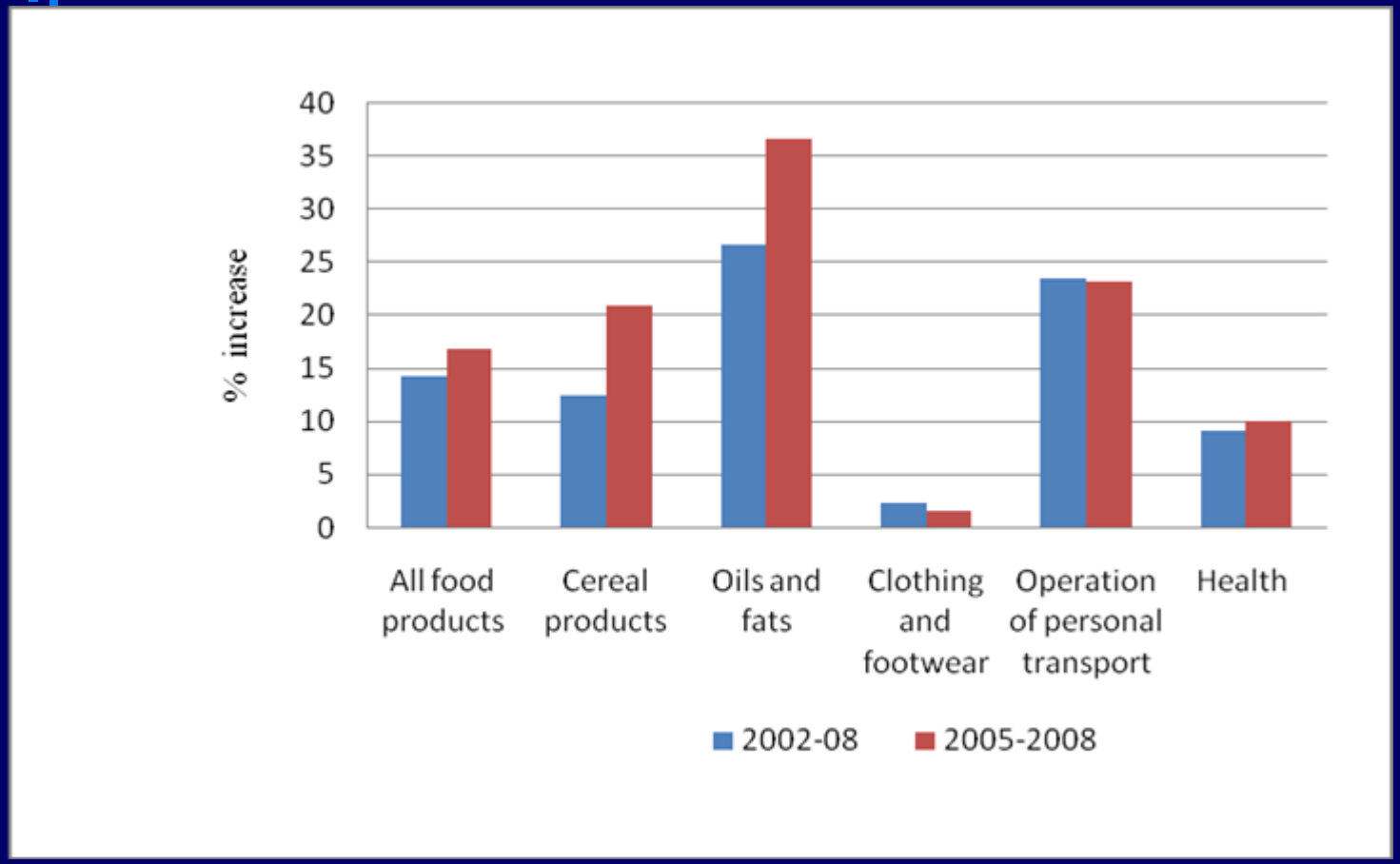


Fig. 8.4. Trends in Producer Prices of Selected Food Crops in Botswana.

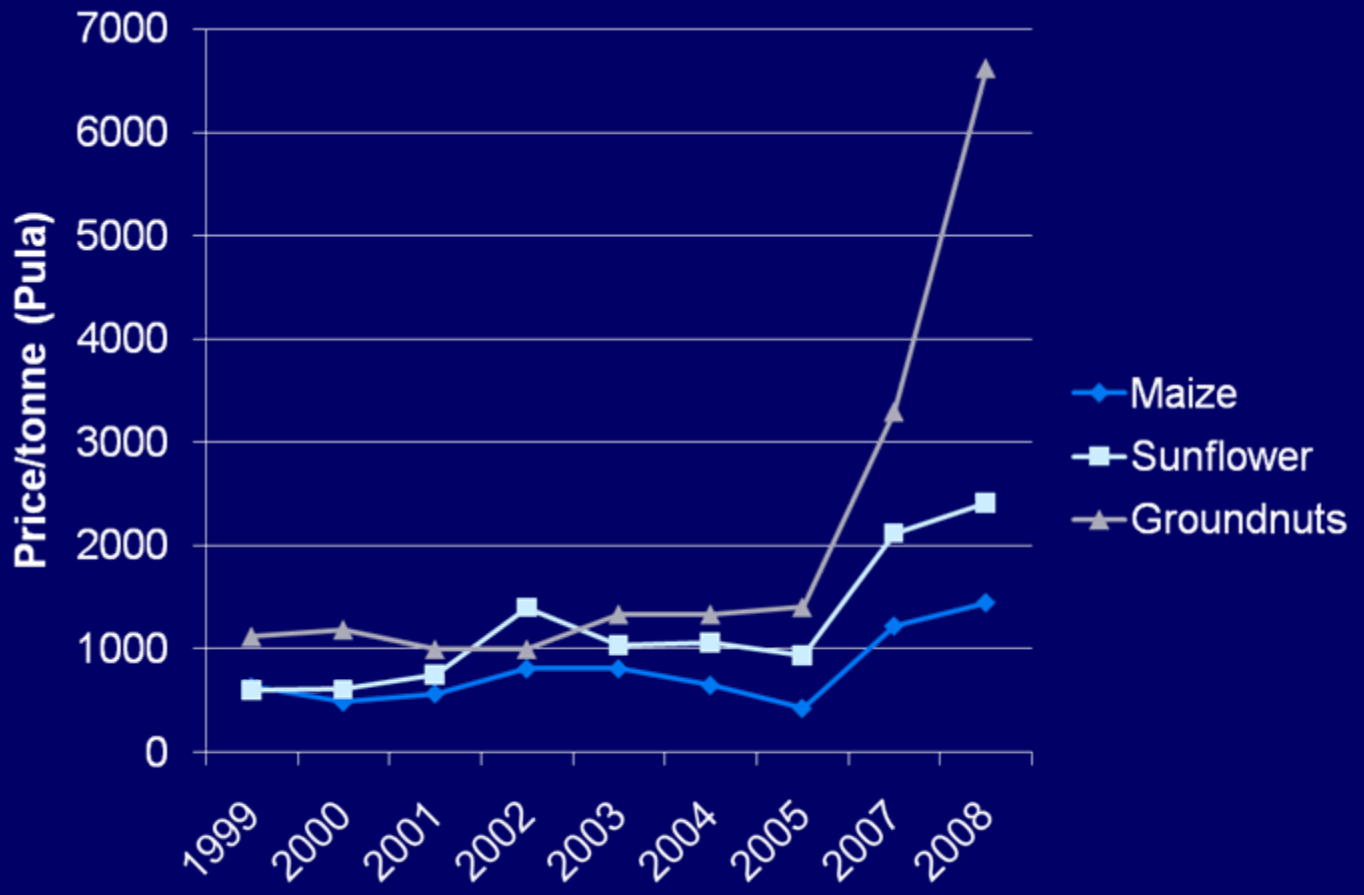


Fig. 8.5 : Trends in Real Prices of Selected Commodities in Botswana.

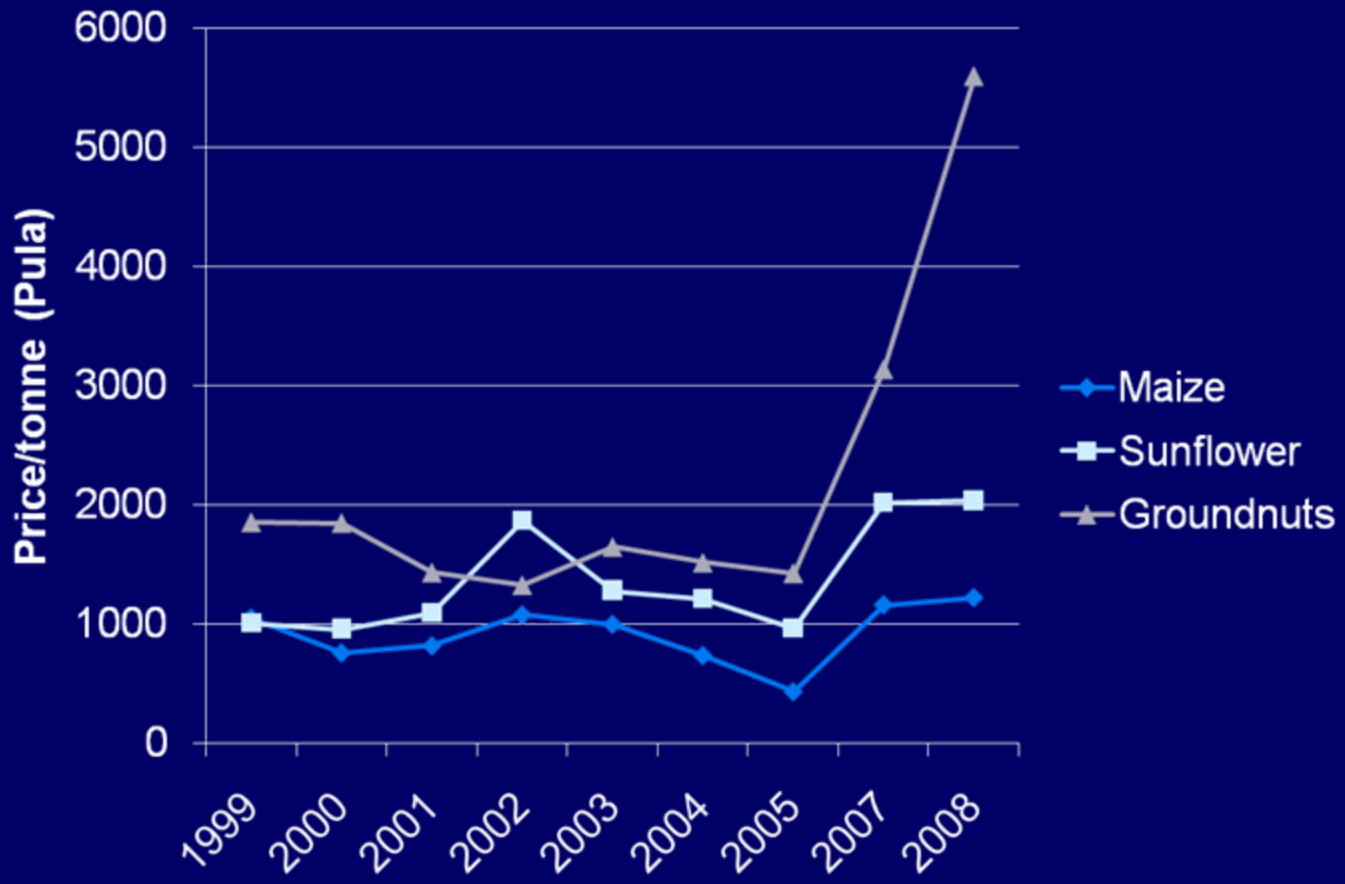
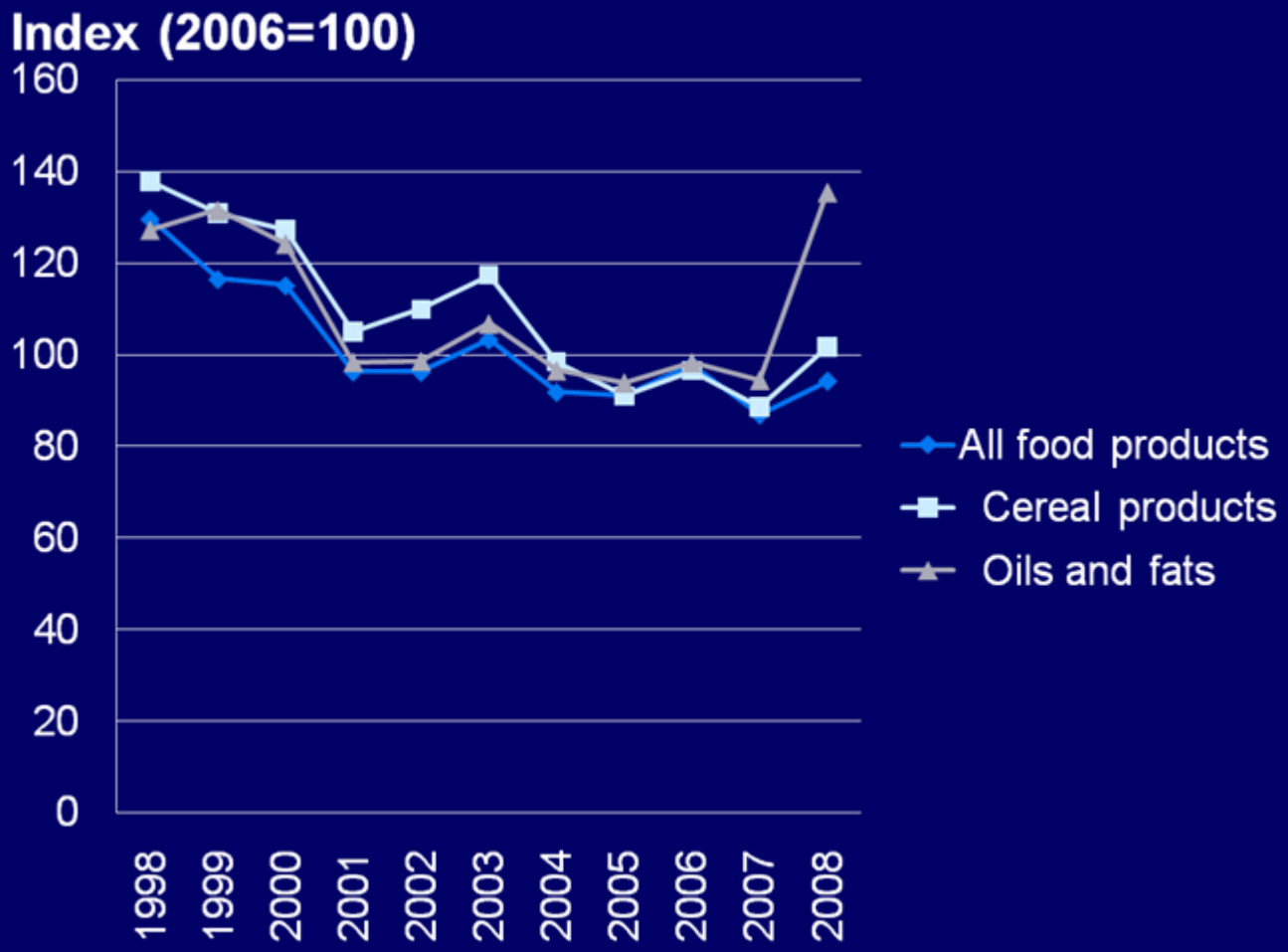


Fig 8.6: Food Prices Relative to Income



8.7 Potential Impacts on Access to Food: Discussion

- Trends in local food prices similar to those of global food prices which also soared, particularly since 2005 because of the global expansion of biofuel production.
- This is not a coincidence, but suggests that there is a high degree of transmission of world food prices into local prices, mainly due to trade openess and the Botswana policy of import parity. Because USA accounts for 55-60% of the global trade of maize, it has a great influence on international prices of maize (Rosamond et al., 2007).
- According to FAO (2008), various authors estimate the contribution of biofuels to the recent global food prices to be 3% to 30% or higher.
- Other factors include high energy prices, fertilizer prices, dollar weakness, strong demand for food products in China and India etc.

8.7 cont. Potential Impacts on Access to Food: Discussion,

- This soaring commodity prices have caused civil unrest and sometimes violence in a number of developing countries (e.g. Mexico, Mauritania, Mozambique, Senegal and Cameron) and have also resulted in policies on restriction of food exports (Mitchell, 2008).
- In the medium to long term, agricultural production may be enhanced:

1. high food prices may give farmers an incentive to increase food production, if there are no market distortions

- However, the majority of people in Botswana will not benefit from the increase in commodity prices because the country is a net-food importer.

9.0 Potential Impacts of Utilization of Food.

1. Biofuel development in Botswana may lead to:
- access to energy in remote areas outside the electricity grid.
- This may lead to safe and healthy utilization of food.

10. Concluding Remarks

- Botswana should finalise its biofuel policy and go ahead with the implementation implementation of the production of biofuels.
- Although, land availability is currently not a problem, there is need to ensure that the growth of the production of biofuels does not have an adverse impact on food security.
- The on-going study on biofuel implementation guidelines should be used to design a sustainability criteria for the implementation of the production of biofuels in Botswana