

Exports, Energy, Food: The Multiple Functions of Brazilian Agriculture

Anna Ozorio de Almeida

Paper prepared for presentation at the 2009 LASA Congress
Rio de Janeiro, 11-14 June

July 2009

CONTENTS

| | |
|---|----|
| 1. Introduction..... | 3 |
| 2. The formation of the Brazilian agricultural model | 3 |
| 3. The three roles of Brazilian agriculture (2003-2008) | 7 |
| 3.1. The Food Security Function..... | 7 |
| 3.2. The Energy Function..... | 12 |
| 3.3. The Export Function | 15 |
| 4. Multiple Functions or Multi-functionality? | 18 |
| References..... | 20 |
| Annex 1 | 21 |

1. INTRODUCTION

The proposal for this paper was written in March 2008, at the height of the commodity boom. Brazil was riding on a cycle which saw the sustained growth of agricultural and mineral exports, directly fuelled by the impressive growth achieved by the world economy. At the time it was difficult to foresee the depth the financial crisis which was already in course.

Although the medium-term effects of the crisis on emerging countries are hard to estimate, it seems clear that the recent cycle has changed the face of Brazilian agriculture. Brazil has become a major agricultural exporter, second only to the United States of America and to the European Union, although government support to farmers is insignificant in comparison to that of OECD countries¹.

And yet it is not because of its dimension alone that the Brazilian agricultural sector has become increasingly important. Brazilian agriculture is playing simultaneous and sometimes conflicting roles within the country's development model: it has contributed to macroeconomic stability by guaranteeing valuable foreign currency inflows; it has been harnessed to poverty reduction efforts; and it has contributed (together with important hydrocarbon discoveries and a significant potential for the generation of hydroelectric power) to the country's energy security strategy, through the expansion of ethanol production.

These three roles have been attributed smaller or greater weight by successive Brazilian governments. During its electoral campaign the Workers' Party (*Partido dos Trabalhadores* - PT) underlined the need to combat hunger and improve food security, but under the Lula government Brazil has seen both a boom of agricultural exports and a revival of agro-fuel growth. With the expansion of the agricultural frontier towards the western borders of the country and the Amazon basin, it seems clear that the export, energy and food functions of Brazilian agriculture are, or may soon be, at conflict with each other.

The aim of this paper is to look at how the three functions of Brazilian agriculture have performed under the two Lula governments (2003-2008). The paper is divided into three sections. Section 2 presents some major traits of the Brazilian agricultural sector. Section 3 concentrates on the evolution of the export, energy and food functions of Brazilian agriculture under the PT Government. Section 4 discusses the interaction between the three functions.

2. THE FORMATION OF THE BRAZILIAN AGRICULTURAL MODEL

The production of commodities for external markets has historically been the most important role of Brazilian agriculture. As shown by Altafin (2005), from the early colonial period the primary function of agriculture, the production of food, was subordinated to the production of high-value exportable goods (sugar, cotton, tobacco and coffee). The production of food was relegated to a marginal portion of the large monoculture estates or to extremely poor subsistence agriculture.

It was only with the Vargas government (1930) and the promotion of the inward-looking development model that policy objectives were turned to ensuring the production of food for the growing urban population. Also in this period food security was not attributed intrinsic value, but rather considered an instrument subordinated to the import substitution (IS) project. The primitive accumulation of Brazilian industrialization originated in the agricultural (coffee) sector, and foreign currency obtained by agricultural exports were channelled into industrial imports, particularly

¹ OECD (2005), *Análise das Políticas Agrícolas- Brasil*, SPA/MAPA, Brasília, October. Brazilian support to farmers is equivalent to 3% of agricultural revenues, as compared to 34% in the European Union (EU) and 17% in the USA.

machinery and equipment. Urban labour markets were fed by the massive rural exodus generated by the mechanization of agriculture, and industrial wages were subsidized via price controls on agricultural products.

The military regime which took power in 1964 deepened the IS drive and created a series of programmes and institutions that were to leave a lasting imprint on the agricultural sector. The main instrument for promoting agriculture was the National System for Rural Credit (*Sistema Nacional de Crédito Rural* - SNCR), established in 1965, which offered farmers subsidized interest rates to finance operational costs and investments in mechanization, and partially compensated them for the unfavourable economic environment (high inflation, price controls on agricultural goods and a multiple exchange rate system which penalized agriculture in favour of manufacturing). Although specific credit lines were directed to small farmers, official credit programmes have been shown to have had a regressive effect on agricultural incomes², already skewed by the historically unequal the distribution of land.

Government support to agriculture also took the form of significant investments in the development of agricultural technology. The early 1970s saw the creation of the Brazilian Agricultural Research Company (*Empresa Brasileira de Pesquisa Agropecuária*- EMBRAPA), the core institution of a structured research system which included the leading Brazilian universities. One of the major lines of agricultural research was oriented to the creation of technology for the occupation of the Cerrado, the vast savanna of the Brazilian central plateau³.

Another initiative of the military regime which was to have significant consequences was the establishment, in 1975, of the National Alcohol Programme (*Programa Nacional do Alcool*- Pró-Alcool), which was to become the first step in the development of Brazilian agriculture's energy function. The Pró-Alcool created a nationwide ethanol production chain based on a system of government subsidies and tax rebates to sugar cane producers and distilleries, with the aim of reducing the country's dependence on oil imports. By 1985, 96 percent of automobiles sold in Brazil were ethanol-powered, although the ensuing period of low oil prices, together with the increasing fiscal difficulties of the federal government, led to the virtual collapse of the programme during the 1990s.

The return to civilian rule in 1985 coincided with the exhaustion of the import substitution process and the financial meltdown of the Brazilian State, under the weight of the external debt crisis. The second half of the 1980s was marked by increasing macroeconomic instability and accelerating inflation. Government attempts to combat hyperinflation through generalized price controls, together with dwindling capacity to support rural credit, had dramatic effects on agricultural production. Agricultural GDP diminished by approximately one third between 1980 and 1990, while agricultural credit was reduced by three quarters in the same period⁴.

The turning point for the Brazilian economy was the Real Plan (*Plano Real*) in 1994, which succeeded in curbing hyperinflation. The stabilisation of the economy was accompanied by a series of structural reforms which aimed at scrapping the import-substitution model and creating the basis for an open and competitive economy in which international capital flows would play a central role.

The transformations in the Brazilian economy in the 1990s basically affected agriculture in three ways. Firstly, the sector was affected by the changing macroeconomic scenario. During the 1980s and early '90s, farmers had benefited from the erosion of the real value of their debts, in spite of widespread indexation of financial assets. The end of high inflation meant that nominal values translated into real values virtually overnight, at very high interest rates. The magnitude of the rural debt problem led the government to implement an extensive debt rescheduling programme.

² Araújo, P.F.C., Barros, A.L.M., Barros, J.R.M., Shiota, R. (2007), "Política de crédito para a agricultura brasileira: Quarenta e cinco anos à procura do desenvolvimento", *Revista de Política Agrícola*, Ano XVI- N. 4, Out/ Nov/ Dez.

³ Barros, G. (2008), "Brazil: The challenges to become an agricultural superpower", Brookings Institution, Washington DC.

⁴ Araújo, P.F.C., Barros, A.L.M., Barros, J.R.M., Shiota, R. (2007).

The competitiveness of agriculture suffered from the pegging of the Real to the dollar. On the other hand, land prices fell by 50% between 1990 and 1998, because speculative demand for land as a hedge against inflation disappeared. This favoured the more competitive farmers whose cost of access to land was reduced⁵.

Secondly, agriculture was affected by the liberalisation of the economy, marked by the removal of quantitative restrictions and non-tariff barriers, as well as a generalized reduction of tariff barriers in the first half of the 1990s. The main effect of trade liberalisation was a significant reduction of the price of agricultural inputs. Some estimates show that the terms of trade in the agricultural sector improved by as much as 30% for the agricultural sector as a whole, between 1987 to 1995, due in particular to the improvements of terms of trades in crop production (46%)⁶.

Thirdly, agriculture was affected by sector-specific policies, in particular the elimination or substantial reduction of price controls, subsidies and state monopolies. These changes were mostly felt in the more regulated sectors such as coffee, wheat, sugar and ethanol. In the case of ethanol, government support was maintained in the form of legislation establishing the obligatory ethanol content of gasoline in a range between 22% and 25%. Minimum price guarantees were maintained solely for the purpose of price stabilisation and as parameters for rural credit policy⁷.

Another policy measure which was to have wide-reaching effects was the Lei Kandir, which exempted exports of primary and semi-manufactured products from the state collected value added tax, ICMS (*Imposto sobre a Circulação de Mercadorias e Serviços*).

This brief summary of Brazilian economic policy in the last decades shows that the competitiveness of the agricultural sector is not just the result of “natural” comparative advantages, such as fertile soils and a vast agricultural frontier, but of “constructed” advantages, such as a consolidated system of agricultural R&D, targeted at creating national technology for adapting different cultures to the Brazilian environment. The predominance of the export function over other functions, in turn, is a historical trait of Brazilian agriculture. Despite the relative success of the Brazilian import substitution process, industry was never able to compete with the agricultural sector’s capacity for capturing foreign currency.

As argued by Barros (2008), at the end of the 1990s the agricultural sector was ready to grow rapidly. Significant state support throughout the 1970s and early 80s had resulted in the diffusion of modern and frequently national agricultural technology in the large estates, while the microeconomic reforms of the 1990s had created a competitive environment, wiping out the less efficient farms. The strong devaluation of the Real in the beginning of the second Cardoso government in 1999 offered the sector the additional stimulus it need to set off on a path of sustained growth.

The other side of the success story of Brazilian agriculture is shown by data on poverty and inequality in rural areas, alongside massive rural exodus. As shown by OECD (2005), in the year 2000 the proportion of the Brazilian population living in poverty was 32%, with an incidence of 61% in rural areas.

⁵ Barros, G. (2008).

⁶ Araújo, P.F.C., Barros, A.L.M., Barros, J.R.M., Shirota, R. (2007).

⁷ OECD (2005).

Table 1- Income, Poverty and Inequality: total, urban and rural, 1991 and 2000

| | Per capita income | | | Inequity | | | Poverty ^(a) | | | Extreme Poverty ^(b) | | |
|--------|-------------------|------|-------------|----------|------|-------------|------------------------------|------|-------------|--------------------------------|------|-------------|
| | 1991 | 2000 | Variation % | 1991 | 2000 | Variation % | 1991 | 2000 | Variation % | 1991 | 2000 | Variation % |
| | R\$ January 2002 | | | Gini | | | Proportion of the Population | | | Proportion of the Population | | |
| Brazil | 255 | 330 | 29,1 | 0,63 | 0,65 | 1,9 | 0,40 | 0,32 | -21,0 | 0,20 | 0,15 | -23,3 |
| Urban | 308 | 379 | 23,1 | 0,61 | 0,63 | 3,3 | 0,30 | 0,25 | -16,6 | 0,12 | 0,11 | -14,1 |
| Rural | 90 | 119 | 32,2 | 0,58 | 0,62 | 7,3 | 0,72 | 0,61 | -15,9 | 0,45 | 0,36 | -18,7 |

Note: Data excludes state of Roraima

^(a) Income non exceeding 50% of the minimum wage.

^(b) Income not exceeding 25% of the minimum wage.

Source: OECD (2005), from Helfland and Levine 2004.

As shown in Table 1, there was a significant reduction in poverty levels during the 1990s. Falling poverty rates in rural areas were only to a slight degree associated with an increases in agricultural incomes, which totalled 2,5% in the period between 1991 and 2000. Increases in rural income can be attributed to the increase of 198% in government transfers, notably pensions. Increasing inequity is correlated to the fact that the extremely poor had no access to such transfers⁸.

At the same time, as emphasized by the OECD study, the reduction of rural poverty coincided with the continuation of mass exodus from rural areas towards the cities. The Brazilian rural population has been decreasing in absolute terms since 1970: 6.1% in the 1970s; 7.1% in the 1980s, and 11.1% in the 1990s. Therefore, part of the decline in rural poverty is simply the result of the “removal” of the poor from rural areas.

Finally, it is important to note that there are significant regional differences in the dynamics of rural income. In the North of Brazil the proportion of rural poor actually increased in the 1990s, whereas it decreased very slowly in the Northeast. In the Centre-West region which saw the greatest expansion of the agricultural frontier, agricultural incomes increased rapidly and lower poverty rates coincided with increasing inequity. In the South and South-East, both poverty and inequity fell⁹.

In the 1990s, Brazilian society was increasingly obliged to face up to the inequalities created by its development model. Land conflicts with often violent outcomes were given wider space by the media, and the massacre of 19 rural labours by the military police in Eldorado dos Carajás in 1996 drew the attention of the international community to the magnitude of the agrarian problem in Brazil. On the other hand, civil society set up wide-ranging initiatives social initiatives, of which the most significant was the Citizens’ Action against Hunger campaign (*Ação da Cidadania contra a Fome*), lead by the sociologist Herbert de Souza.

Land reform and food security found there way into the two Cardoso government’s policy agenda. Cardoso’s policies have widely been considered insufficient to make significant impact on either hunger¹⁰ or land distribution, but some initiatives, Program of Support for Family Agriculture (*Programa de Apoio à Agricultura Familiar- PRONAF*) were to become important stepping stones for the subsequent efforts of the Lula government.

⁸ The same report shows that the income of the lower two deciles decreased between 1991 and 2000.

⁹ OECD (2005).

¹⁰ The most effective social policy of the Cardoso Government, initiated by his predecessor Itamar Franco, was probably the end of hyperinflation, which had important effects both on poverty reduction and inequity.

3. THE THREE ROLES OF BRAZILIAN AGRICULTURE (2003-2008)

The PT was elected in 2002 with the promise of promoting social development in general and food security in particular. The Lula government's ambitious program to combat hunger seemed to have significant and immediate implications for the Brazilian agricultural model.

However, the government's instruments to achieve its social goals were limited by the macroeconomic conditions of the Brazilian economy, particularly by its need to balance foreign accounts and the national budget. Furthermore, rising oil prices coupled with the introduction of flex-fuel vehicles which can run both on ethanol and gasoline lead to a boom in sugar cane production.

This section looks at the performance of Brazilian agriculture in terms of food production, ethanol production, and exports, with the aim of assessing how (if at all) these roles changed during the Lula government.

3.1. The Food Security Function

Fome Zero was the original umbrella programme set up by the Lula government to coordinate efforts to combat hunger and was strongly publicized during the electoral campaign and the first months of the new government. *Fome Zero* was an extremely complex programme, resting on articulations between the different ministries involved (*Ministério Extraordinario da Segurança Alimentar*- MESA, Ministry of Health, Ministry of Education, Ministry of Agriculture and Ministry of Agrarian Development), and between different levels of government and civil society organisations, and its institutional format evolved quickly during the first months of its implementation¹¹.

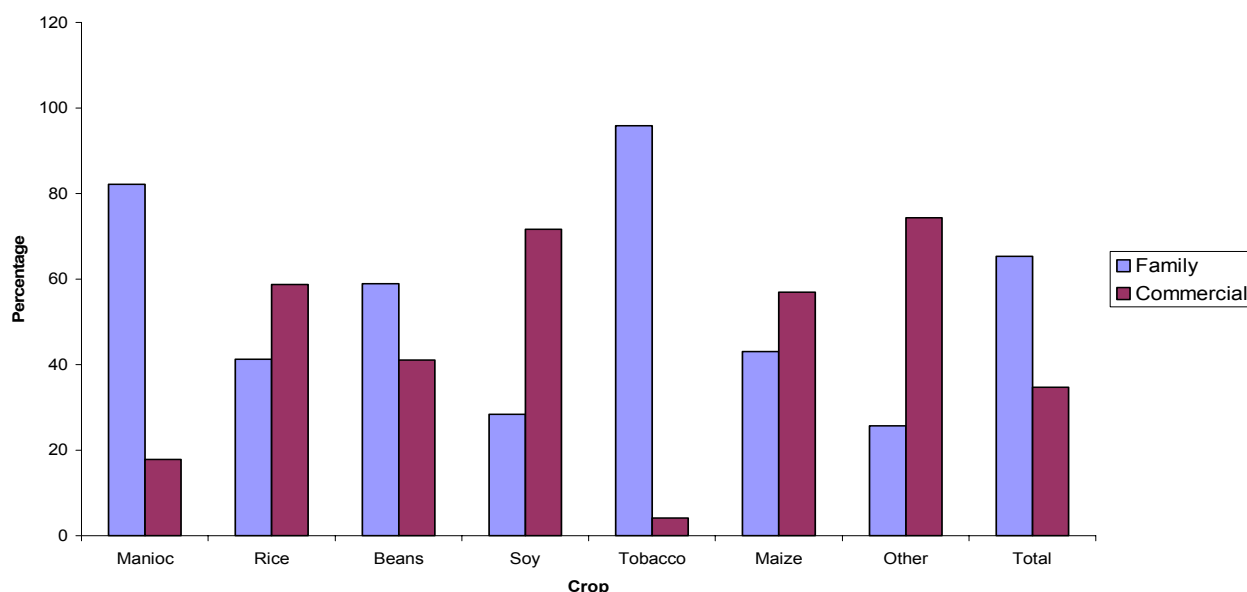
The improvement of food security rested on three different lines of action: a) increasing effective demand for food; b) increasing food production for the internal market and improving distribution systems; and c) implementing emergency programmes for sectors of the population excluded from the food market. Two central elements of the programme were the *Cartão Alimentação*, through which direct transfers were carried out from the government to the poorest families, tied to the acquisition of food supplies, and the PRONAF.

The *Cartão Alimentação* was conceived as an instrument for transfers targeted to complement the income of families in a situation of extreme food insecurity. The institutionalization of this policy expressed the government's intention to treat hunger as a permanent emergency, whose immediate manifestations would be tackled together with its structural causes. The *Cartão Alimentação* was later incorporated into the *Bolsa Família* Program, in an attempt to unify the different existing income transfer programmes, and the MESA was extinguished. At the same time, the dimension of the programme increased considerably, and by the end of 2008 11 million Brazilian families were enrolled. Conditionality for access to the programme includes health checks and school attendance.

Support for family agriculture was considered a strategic element in the campaign against hunger. Family agriculture, in opposition to large-scale commercial agriculture, is considered to have a vocation for the production of food, as well a higher capacity for generating employment and for using environmentally sustainable production methods (Graph 1).

¹¹ Takagi, M. (2006), "A implantação da Política de Segurança Alimentar e Nutricional no Brasil: seus limites e desafios", Ph.D Doctorate thesis, Instituto de Economia Unicamp, Campinas, Brazil..

Graph 1- Distribution of the value of agricultural production by crop and type of producer



Source: Núcleo de Estudos Agrários e Desenvolvimento Rural- NEAD and Departamento Intersindical de Estatísticas e Estudos Econômicos- DIEESE.

The main policy instrument for supporting the development of family agriculture is PRONAF, which operates through technical assistance and favourable credit conditions, as well as coordinating public investments in infrastructure to improve small farmers' access to the market.. The programme is operated by the federal government in coordination with state governments and municipalities.

PRONAF was created by the Cardoso government in 1996, and became a key element in the Lula government's policies of support to land reform and small agriculture. The evolution of the government's allocations to PRONAF credit lines can be gauged in Table 2, below. Although credit to family agriculture has expanded significantly in the period covered, both in terms of volume and number of contracts, Table 2 shows that it is still dwarfed by credit commercial agriculture.

Table 2- Evolution of PRONAF

| | 2002/03 | 2003/04 | 2004/05 | 2005/06 | 2006/07 |
|---|---------|-----------|-----------|-----------|-----------|
| Pronaf Total Value (R\$ Millions) | 2.376 | 449 | 6.076 | 7.538 | 8.423 |
| Pronaf Number of Contracts | 904.214 | 1.390.168 | 1.631.796 | 1.908.437 | 1.691.919 |
| Total Rural Credit Brazil (R\$ billions)* | 32,5 | 36,7 | 43,6 | 42,7 | 43,8 |

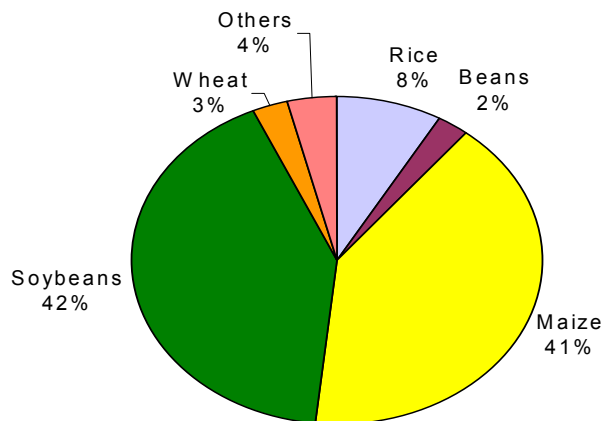
* Data refers to years 2002-2006

Sources: Ministerio do Desenvolvimento Agrario, Banco Central, DIEESE.

The aim of this section is to carry out a brief assessment of the results of the Lula government's efforts to support the production and consumption of agricultural food products in the period from 2003 to 2008, considering the strengthening of the food function of agriculture as an explicit objective of the Lula Government.

In 2007/2008, Brazil produced the largest cereal crop in its history: 143,8 millions of tonnes of cereal, from 47,4 million hectares of land. Graph 2 below shows the distribution of the 2007/2008 crop among different products.

Graph 2- Brazilian Cereal Crop Production 2007/2008



Source: Companhia Nacional de Abastecimento- CONAB Indicadores da Agropecuária Dez. 2008/ Jan 2009.

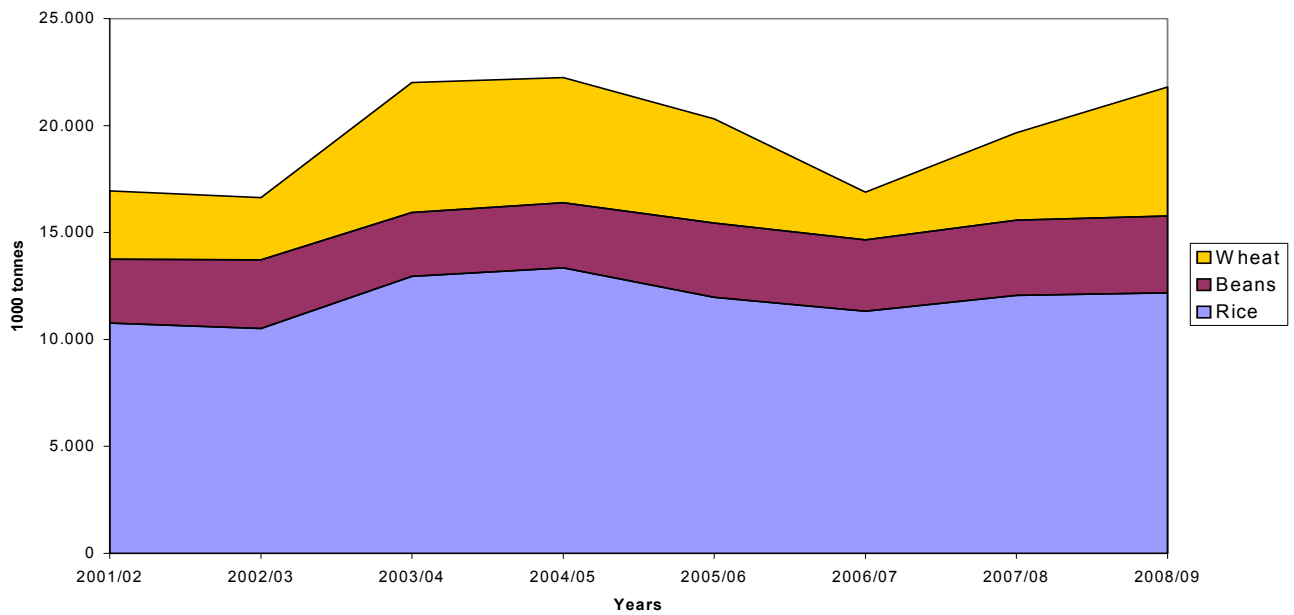
As shown in Graph 2, soybean and maize production together account for over 80% of production. Data for 2004/2005 shows that 90% of maize production was destined to animal consumption¹²; while for soybeans the proportion is approximately 80%¹³. For this reason, this section will concentrate on the production and consumption of rice, beans and wheat, which together with manioc constitute the staple foods of the Brazilian diet.

Graph 3 below shows the evolution of the rice, beans and wheat crops between 2001/2002 and 2008/2009. The total increase of the production of the three crops was 28% during the period considered, mostly due to the increase of wheat production which grew by close to 100%. However, wheat production fluctuated widely. The growth of rice and bean crops was much less impressive and registered a total growth of 14% for the whole period.

¹² Buainain, A.M. e Batalha, M.O. (coord.) (2007a) "Cadeia Produtiva do Milho", *Série Agronegócios vol. 1*, SPA/MAPA- IICA, Brasília.

¹³ According to the Brazilian Association of Soy Producers- APROSOJA, approximately 75% of soybeans destined to human consumption are processed as cooking oil. The Brazilian food industry is undertaking a significant effort to promote and diversify human consumption of soy. [www.aprosoja.com.br].

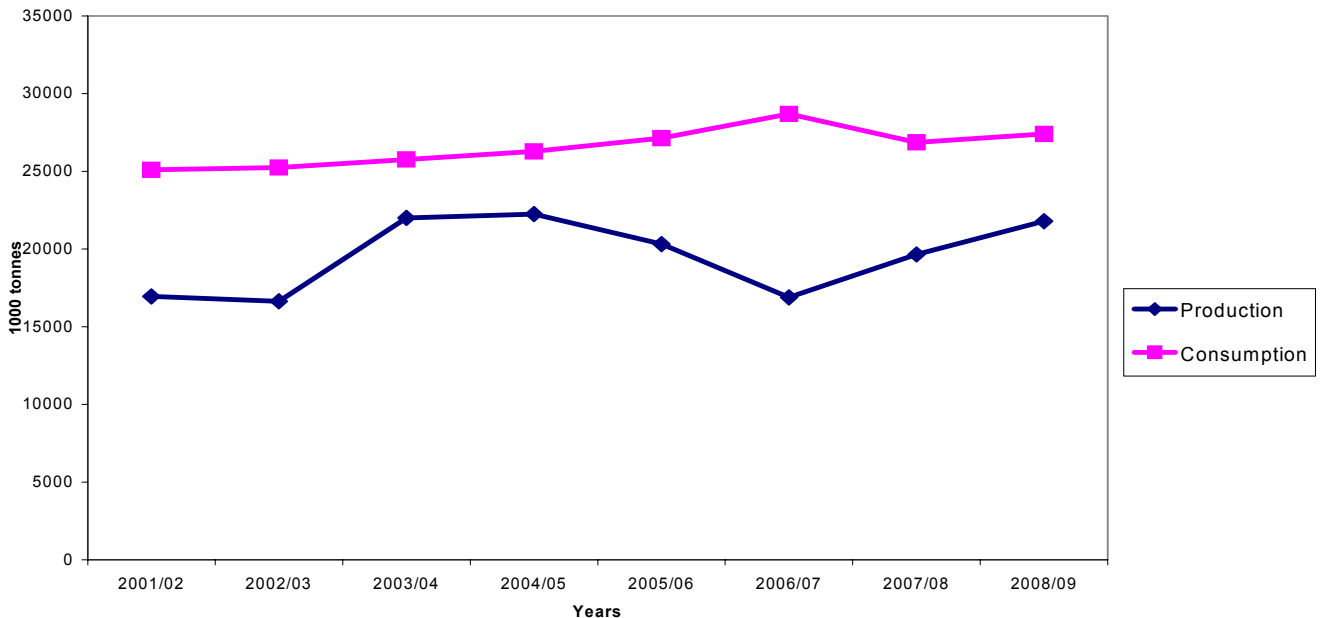
Graph 3- Production of Basic Food Staples



Source: Companhia Nacional de Abastecimento- CONAB Indicadores da Agropecuária Dez. 2008/ Jan. 2009.

Graph 4 shows the total production and consumption of rice, beans and wheat in the period 2001/2002- 2008/2009. The total increase in consumption of the three staples was of approximately 9%, equivalent to the increase in population in the same period. Production remained systematically below consumption, especially as regards wheat.

Graph 4- Total Production and Domestic Consumption of Rice, Beans and Wheat

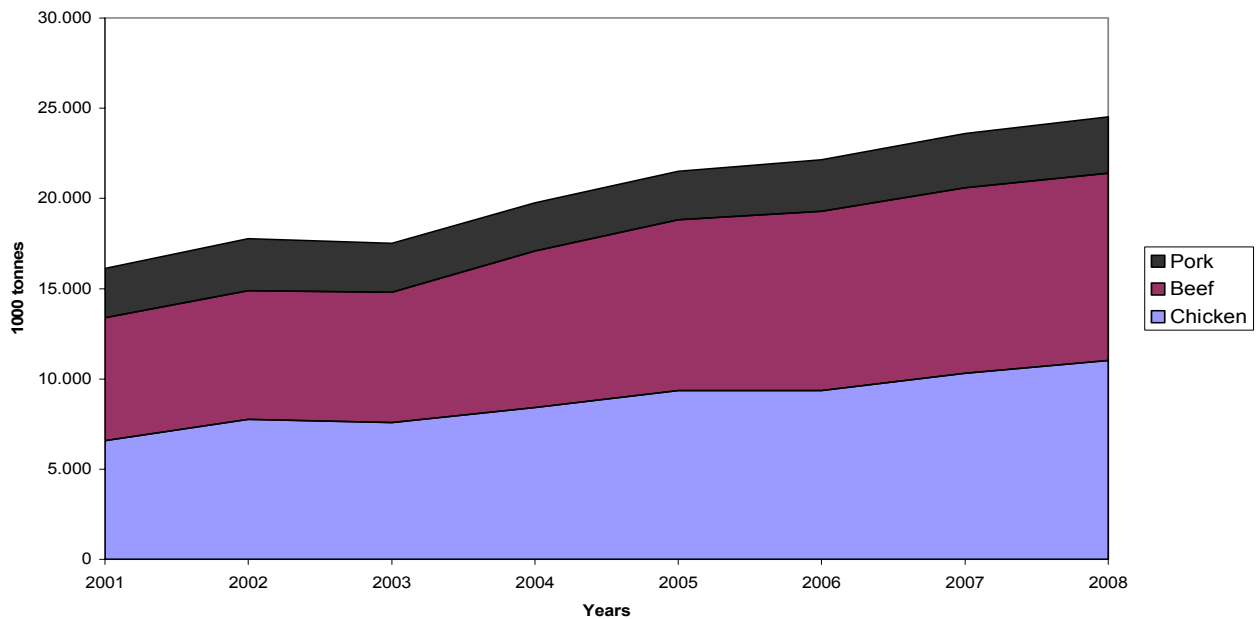


Source: Companhia Nacional de Abastecimento- CONAB Indicadores da Agropecuária Dez. 2008/ Jan. 2009.

The situation improves when the production of meat is considered. Graph 5 below shows that meat production grew in all sectors, achieving a 52% increase between 2001 and 2008. The production of

chicken meat grew by 67,7%, followed by beef (52%). The production of pork followed at a lower rate (13%).

Graph 5- Total Meat Production

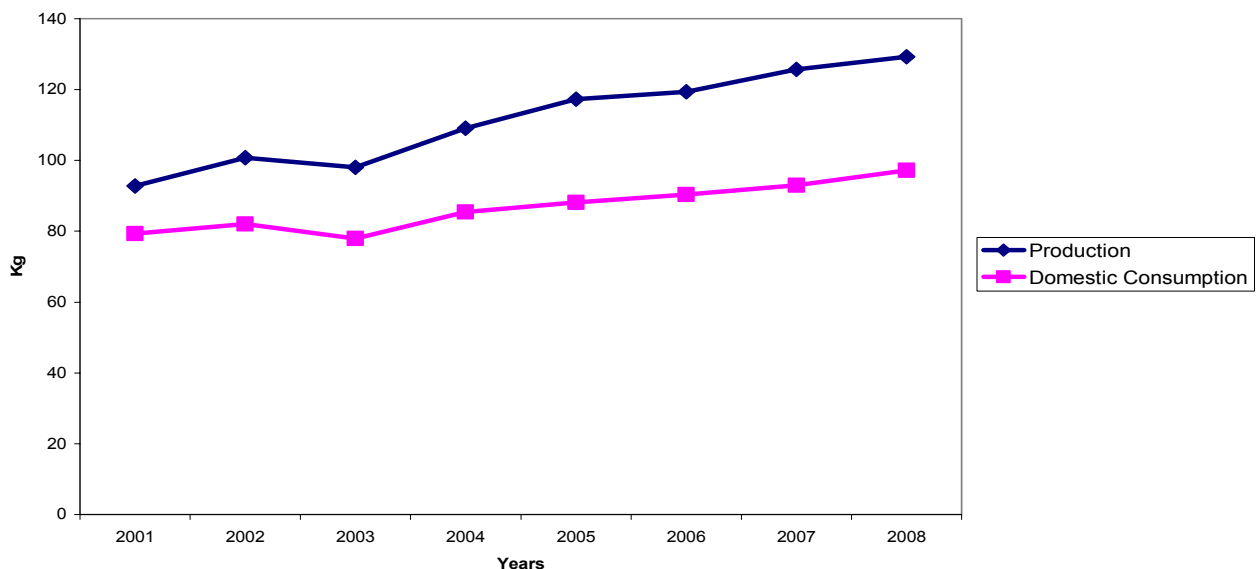


Source: Companhia Nacional de Abastecimento- CONAB Indicadores da Agropecuária Dez. 2008/ Jan. 2009.

Graph 6 confronts pro capita production and domestic consumption of meat. Pro capita consumption of meat increased steadily between 2001 and 2008, accumulating a 22% increase in the period. Total consumption of beef and chicken grew at similar rates, approximately 40% during the period, while pork consumption grew by only 5%.

Pro capita production of meat grew at even more impressive rates (40% in the period). Approximately half of this growth was absorbed by the external market, as will be discussed in section 3.3.

Graph 6- Production and Domestic Consumption of Meat
Kg pro capita



Source: Companhia Nacional de Abastecimento- CONAB Indicadores da Agropecuária Dez. 2008/ Jan. 2009, IBGE.

This brief assessment of food production and consumption during the PT government is far from exhaustive. It would be interesting, for instance, to consider how production and consumption of fresh fruit and vegetables performed. However, some interesting results do appear.

Firstly, as regards cereal crops, the production of food for the domestic market has been far from impressive. Consumption of the main Brazilian food staples seems to have followed population growth, although data on manioc consumption, an important staple with a high association with family agriculture (see Graph 1) would be useful to complement the analysis.

On the other hand, both production and consumption of meat have grown spectacularly. Increases in meat consumption are not restricted to chicken meat but to beef as well. This seems to be a clear indication of the higher level of greater food security achieved by the Brazilian population.

3.2. The Energy Function

Less than six months after the election of the Lula government, flex-fuel vehicles designed to run both on ethanol and gasoline were introduced in the Brazilian market. Brazilian flex-fuel vehicles were the result of national improvements on the original American model (E85, which can run on a blend containing 85% ethanol). The Brazilian automobile industry's experience with E100 vehicles was a determining factor in the capacity to produce "total flex" vehicles, which can run on any blend ranging from E25 to E100¹⁴.

Pursuit of energy security has been a central element in Brazil's development strategy for several decades, and the acceptance by the public of flex-fuel vehicles certainly built on the success of the Pró-Alcool programme.

As opposed to Pró-Alcool, the expansion of flex-fuel vehicles was the result of market innovation rather than government policy. Pró-Alcool had been substantially dismantled in the 1990s: sugar cane and ethanol prices were liberalized, controls on production and stocks were eliminated, and credit and subsidy policies re-dimensioned. Support to the sector was maintained through legislation establishing the proportion of anhydrous ethanol contained in gasoline at 25%, and in 2001 a cross-subsidy mechanism was introduced in the form of a tax on oil derivatives (*Contribuição de Intervenção no Domínio Econômico*- CIDE) which subsidized ethanol and other agrofuels.

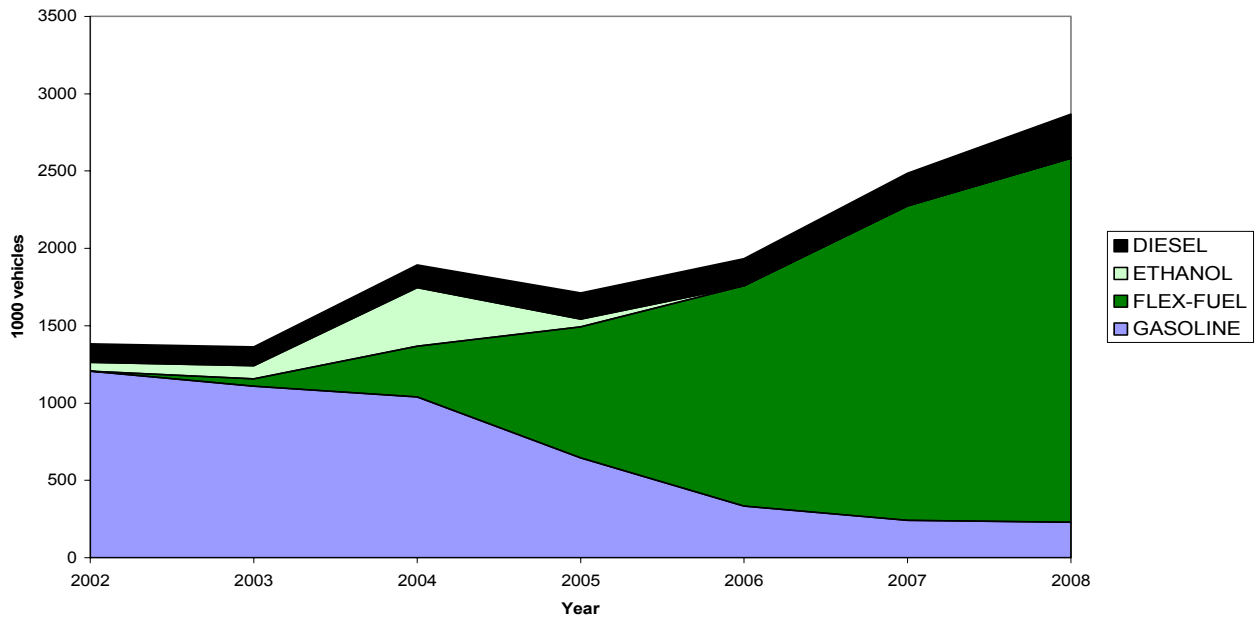
With regard to the earlier ethanol programme, flex-fuel vehicles offer additional attractions to consumers in the possibility of choosing the cheapest available fuel. Furthermore, environmental preoccupations have increased significantly since the 1980s, and the use of ethanol blends allows consumers to contribute to reduce greenhouse gases and other pollutants¹⁵.

For the reasons above, flex-fuel vehicles were an immediate success on the Brazilian market, as can be gauged from Graph 7 below.

¹⁴ Buainain, A.M. e Batalha, M.O. (coord.) (2007c) "Cadeia Produtiva da Agroenergia", *Série Agronegócios vol. 3*, SPA/MAPA- IICA, Brasília.

¹⁵ Brazil's Union of Sugar Cane Producers, UNICA, estimates that the use of Flex vehicles running on E100 avoids an average emission of 5,16 tonnes of CO₂ per year, as compared to cars running on pure gasoline. Cars running on E25, the blend containing the highest proportion of gasoline available in Brazil, avoid the emission of 1,08 tonnes of CO₂. See [www.unica.com.br].

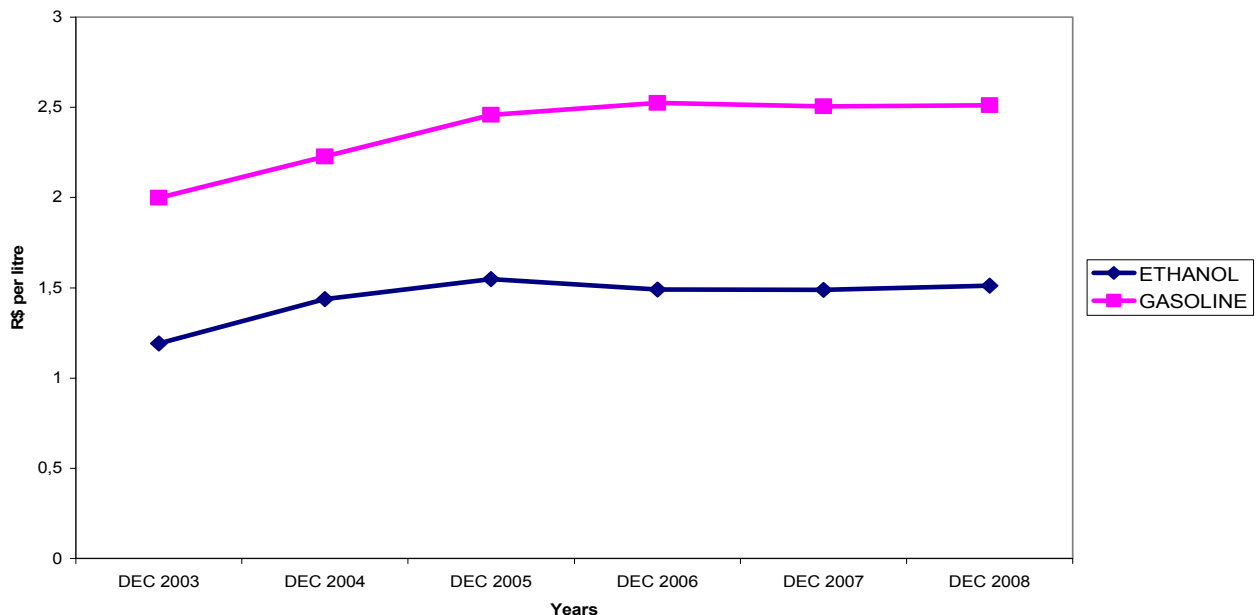
Graph 7- Sales of Motor Vehicles by Type of Fuel



Source: Associação Nacional dos Fabricantes de Veículos Automotores- ANFAVEA.

The introduction of flex vehicles met with a more fortunate timing compared to Pró-Alcool, which reached its apex in the mid- 1980s as world oil prices were collapsing. Oil prices had been rising since 1999 and increases accelerated from 2003, the year of the first sales of flex vehicles in Brazil.

Graph 8- Consumer Prices of Ethanol and Gasoline



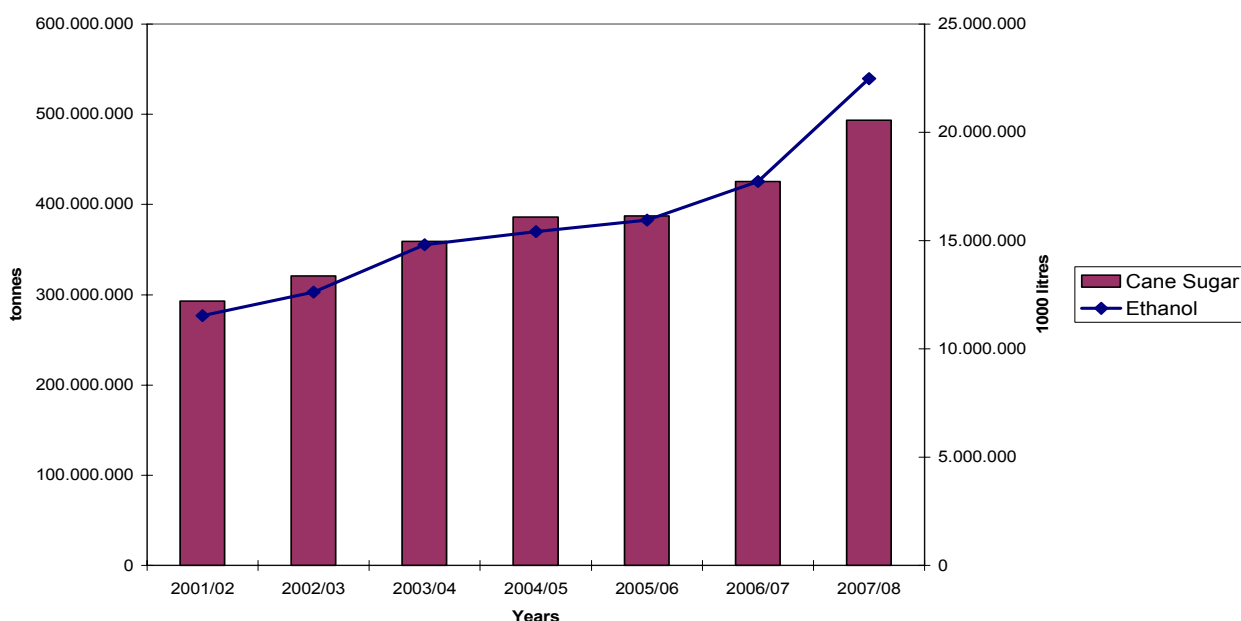
Source: Agência Nacional do Petróleo e Biocombutíveis- ANP.

As shown in Graph 8, gasoline prices remained significantly above ethanol prices between 2003 and 2008. Although the oil sector was substantially deregulated during the 1990s, the state-owned oil company Petrobrás avoided passing the increases of international prices on to the internal market,

and domestic oil prices remained stable between 2005 and 2008. However, even artificially low gasoline prices were unable to compete with ethanol, which benefited from CIDE subsidies.

The rapid diffusion of flex vehicles, associated with the favourable price conjuncture, lead to a boom in ethanol production. Although less than half the production of Brazilian sugar cane is allocated to ethanol production¹⁶, sugar cane production closely followed the trend in ethanol production, as shown in Graph 9.

Graph 9- Production of Cane Sugar and Ethanol



Source: União da Indústria de Cana de Açúcar- UNICA.

Brazil is currently the world's largest producer and consumer of ethanol. Between 2002/03, when flex vehicles were introduced, and 2007/08, the amount of sugar cane processed by the sugar/ethanol complex increased by 53%. In 2007/08, 63% of ethanol production corresponded to hydrated ethanol, while the remaining 37% regarded the anhydrous ethanol component of gasoline.

The competitiveness of Brazilian ethanol production is associated with a series of factors. Sugar cane has a higher energy content than maize, and the processes for converting sugar cane into ethanol are more efficient than the equivalent process for maize, because sugar and ethanol mills are powered by the energy generated from *bagasse*, the residue of ethanol production. Biomass power generators often sell remaining energy to electricity distribution networks, which is particularly useful as the sugar cane harvest coincides with the period in which hydroelectric energy is most vulnerable to drought¹⁷.

The deregulation of the sector in the 1990s, coupled with continuing state support, has led to a high level of technological and organizational efficiency in the sugar cane/ ethanol complex and increasing mechanization of the sugar cane harvest. Besides increasing productivity, mechanization has had two major effects on the sector: a reduction in employment levels, and the migration of production to areas which favour the use mechanized farming methods.

As regards the latter, the expansion of sugar cane production and processing has taken place mainly in the Southeast and Centre-West regions, with the Northeast reducing its traditional participation in production to 12% in 2007/2008, from 17% ten years earlier. The state of São Paulo alone answered

¹⁶ According to CONAB data, in 2008 approximately 45% of cane sugar was used for alcohol production.

¹⁷ Buainain, A.M. e Batalha, M.O. (2007c).

for approximately 60% of the total increase between 2002/03 and 2007/08, and 60% of total production in 2007/2008.

The reasons for the concentration of ethanol production in São Paulo are varied: proximity to main consumer markets, favourable conditions for the expansion of mechanized sugar cane production in the western areas of the state, and proximity to research centres and infrastructure¹⁸.

There is some controversy as to whether increases in sugar cane crops have encroached on areas previously allocated to food production. Data presented by EMBRAPA shows estimations of the area taken up by sugar cane production as 7,85 million hectares in 2007 (planted area). Considering data for harvested area alone (6,69 million hectares), productivity is estimated to have increased by approximately 7,5% between 2002 and 2008, implying the remaining increase in production has originated from the expansion of cultivated areas¹⁹. According to Buainain and Batalha (2007c), sugar cane is taking over land from maize, orange and soy production, as well as extensive cattle breeding, while Goes and Marra argue that cane sugar took over area from degraded pastures²⁰.

The reduction of employment in the sugar/ ethanol complex is a consequence of the mechanization of agriculture which eliminates the need for burning the sugar cane crop before harvest. In the state of São Paulo, enforcement of legislation to eliminate burning procedures for environmental reasons is contributing to accelerate the reduction of employment, particularly for day-labourers engaged for the harvest. Ramos (2007) estimates that total occupation in the sugar/ethanol complex will be reduced from close to 770 thousand workplaces in 2005/06 to approximately 521 thousand in 2015, while jobs for agricultural day labourers will be reduced from 565 thousand to 146 thousand workplaces. The author underlines that, although displaced workers should be sustained by state and federal governments, particularly through land reform initiatives, the elimination of this kind of job is not necessarily negative as “it is widely recognized that [...] harvesting burnt cane sugar is a last resource in the search for income and employment”²¹.

Finally, it is important to mention that the Brazilian government set up in 2004 the National Program for the Production and Use of Biodiesel (*Programa Nacional de Produção e Uso de Biodiesel-PNPB*). From January 2008 the proportion of 2% biodiesel (B2) to petroleum diesel has become obligatory, and is set to increase to 5% in 2013. Between 60 and 70% of Brazilian biodiesel is made from soybean oil, while castor bean and animal fat answer for an extra 10% each. The government is providing support to the biodiesel program through investments in research and tax exemptions. An important aspect of the program regards support for family agriculture in the production of biodiesel from castor oil and *dendê* palm, through specific PRONAF credit lines.

3.3. The Export Function

Under the PT Government, agriculture continued to play its historical role of guaranteeing Brazil's trade balance and inflow of hard currency. In 2008, agricultural exports accounted for 35% of total exports.

As shown in Graph 10 below, Brazil's trade balance in agricultural products has always been positive in the last 20 years. After a decade of relative stagnation, the last export boom began in 1999, and by 2008 the dollar value of agricultural exports had increased by 500%. Trade in non-agricultural sectors registered a less spectacular performance: the total trade balance was negative between 1995 and 2000, and has again been declining since 2006. The evolution of the trade balance shows that agriculture is the only sector which is competitive even when the exchange rate is over-valued.

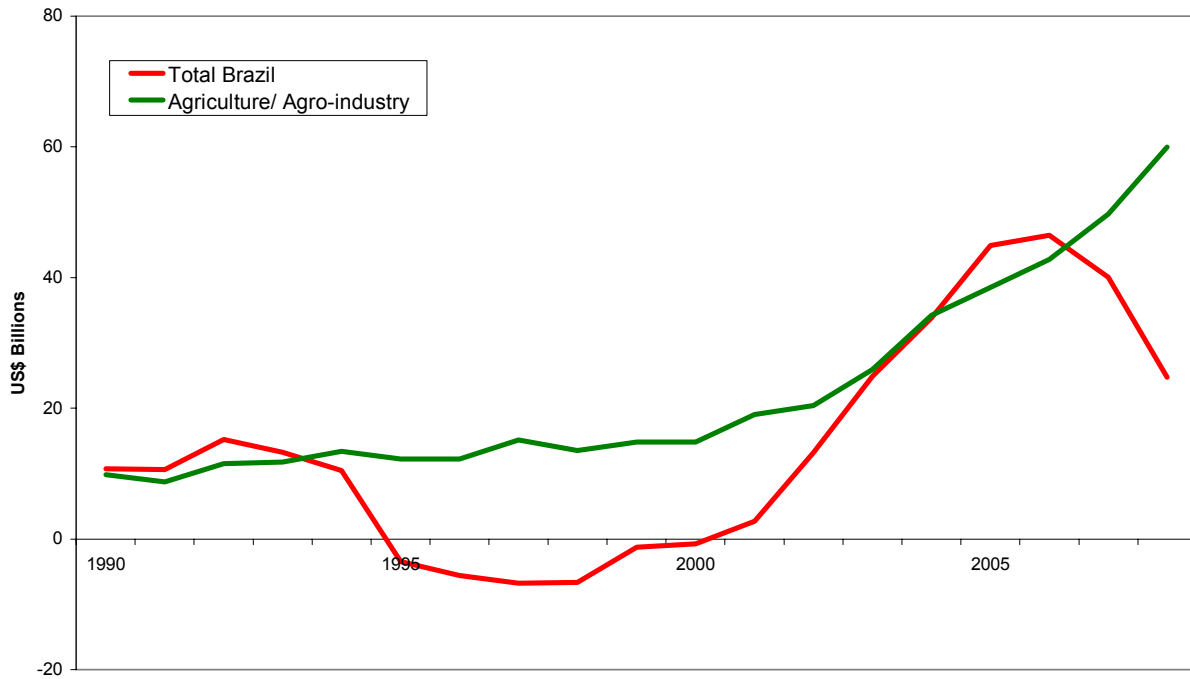
¹⁸ Buainain, A.M. e Batalha, M.O. (2007c).

¹⁹ Data from EMBRAPA, consulted on the 28th of April 2009 at [http://www.agencia.cnptia.embrapa.br/gestor/cana-de-acucar/arvore/CONTAG01_66_711200516719.html].

²⁰ Goes, T. and Marra, R. (no date), “A expansão da cana de açúcar e a sua sustentabilidade”, consulted on the 28th of April 2009.

²¹ Ramos, P. (2007), “O Futuro da Ocupação Canavieira no Brasil: uma discussão dos trabalhos disponíveis e um exercício de estimação”, *Informações Econômicas*, IEA, SP, v. 37, n. 11, november. Author's translation.

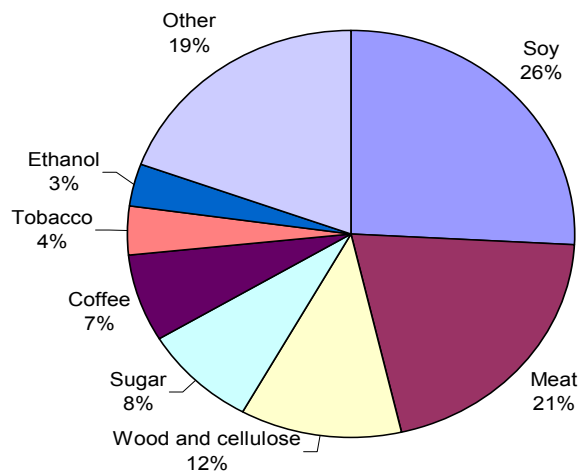
Graph 10- Total and Agricultural Trade Balance



Source: AgroStat and Secretaria de Comércio Exterior- SECEX.

Graph 11 shows the distribution of Brazilian agricultural exports in 2008. Exports are highly concentrated in a few products: soybeans and meat alone account for close to 50% of total export value.

Graph 11- Main Brazilian Agricultural Exports 2008



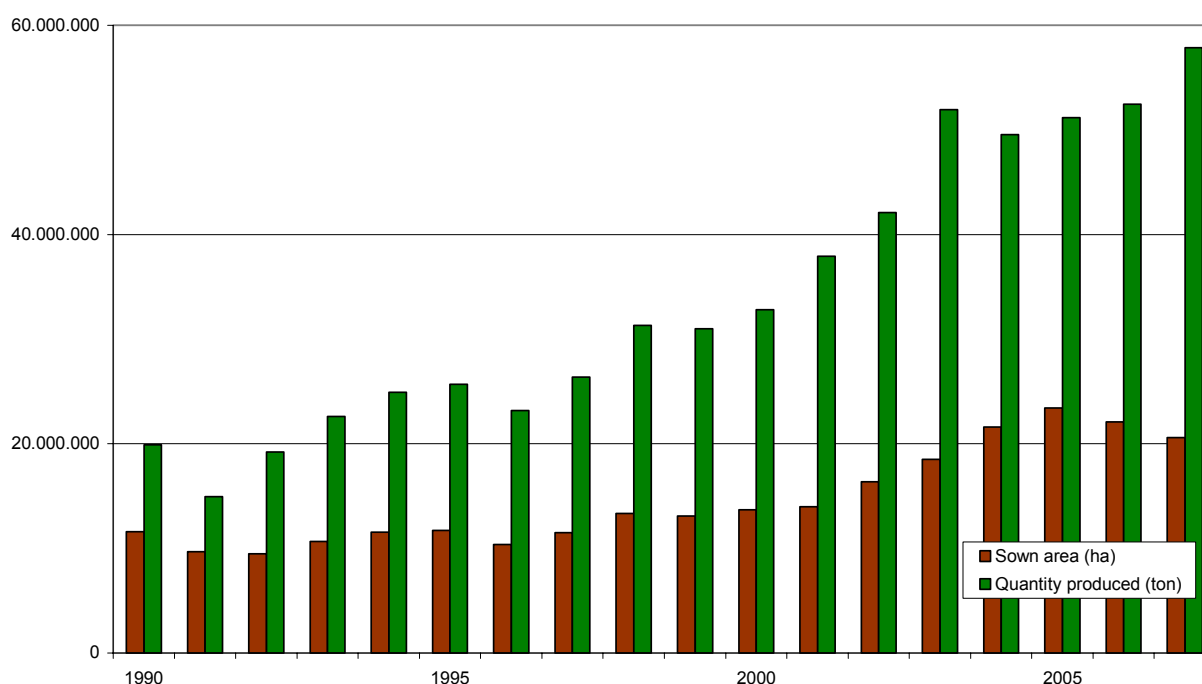
Source: CONAB.

Soybeans are the *par excellence* product of Brazilian export agriculture. In 2008, soybeans occupied 45% of the area cultivated for cereal; 65% of production was exported, generating 26% of agricultural export revenues(see Annex).

Graph 12 shows the evolution of the area sown with soybeans and relative levels of production between 1990 and 2007. Production increased by 190% in the whole period. However, it is interesting to note that the highest rates of growth production were registered in the decade between 1995 and 2005 (approximately 100%), while the planted area actually declined after 2005.

Genetically modified soybean has expanded rapidly in Brazil over the last years, and is estimated to have accounted for approximately 58% of all soy harvested in 2008.

Graph 12- Soybeans: Planted Area and Production



Source: Instituto Brasileiro de Geografia e Estatística- IBGE.

International price trends seem to have played an important role in the recent boom: between 2007 and 2008, soy exports in tonnes increased by 1,4%, while their dollar-value registered a 57% increase²². Since 2001, China has been the main export market for Brazilian soy.

Considering meat exports, poultry is the largest sector. Brazil is the world's largest exporter of poultry, with a participation in the world market of 45% in 2007. Poultry was one of the driving forces of the agricultural export boom: between 2003 and 2008, chicken exports increased by 350%. The main export markets for Brazilian chicken are in Asia (Japan and Hong Kong) and the EU (Netherlands and Germany), but export markets are extremely varied and include an expanding Middle Eastern market supplied with halal-prepared chicken for consumption by Muslims. Poultry production is intensive and concentrated in the South of Brazil²³.

Closely behind poultry come beef exports. As discussed in section 3.1., beef production expanded rapidly in the period between 2002 and 2008. The rise in production enabled Brazilian beef producers to supply the expanding domestic market and generate an increase in exports of 350% (in dollar-value). Brazilian beef exports benefited from the expanding agricultural frontier and from outbursts of BSE in the United States. However, Brazilian exports face sanitary barriers in some

²² CONAB, Indicadores da Agropecuária, Dez. 2008/ Jan. 2009.

²³ Brazilian Association of Poultry Producers- Associação Brasileira de Produtores de Frango- ABEP (2007).

markets due to incapacity to completely eradicate foot-and-mouth disease, and exports are concentrated in a lower value price range. Export markets are extremely diversified, the main destinations being the UK, Russia and Holland²⁴.

Together with cattle, soybeans are the main driver of the expansion of the agricultural frontier towards the west and the north of the country. However, as shown above, statistical data indicates that the boom in soy production took place in the first, rather than the second half of the 2000s. In the last years, the movement of the agricultural frontier seems to be associated with the relocation, rather than the expansion, of soy production, possibly as a result of the increase of cane sugar production in the South-East.

Furthermore, it is important to note that the dimension of the Brazilian agribusiness complex cannot be assessed by data on Brazilian production alone. Informal estimates suggest that over 20% of Uruguayan land has been sold to Brazilians and Argentines, and Brazilian meat processors account for approximately half of Uruguay's beef exports²⁵. Brazilian interests in Uruguay reside in the fact that the country is certified free of foot-and-mouth disease, and therefore has access to markets where Brazilian beef is banned.

A similar phenomenon has taken place with soy production in Paraguay. Since the Lei Kandir exonerated exports of primary products from the state-collected tax (ICMS) in 1996, it is often more convenient for soy processors in Brazil to import and re-export soybeans from neighbouring Paraguay than from neighbouring states²⁶. Informal estimates indicate that between 80% and 90% of Paraguayan soy is produced by Brazilian farmers living in the country²⁷.

4. MULTIPLE FUNCTIONS OR MULTI-FUNCTIONALITY?

The preceding section presented data on the evolution of the three functions of agriculture under the PT government, with the objective of assessing whether the new emphasis on food security had changed Brazilian agriculture and its function within the country's development strategy. Although far from exhaustive, the data presented indicates some answers to the questions set at the beginning of the paper.

As far as food security is concerned, data suggests that increases in food consumption are associated to improvements in the demand side, determined by massive government transfers to poor families, rather than to significant enhancement of the food security function of agriculture. Two factors seem to support this affirmation: a) production of basic food staples was systematically lower than consumption, notwithstanding the country's outstanding export capacity in other agricultural sectors; and b) credit to family agriculture, considered a key sector both for food production and the generation of employment in rural sectors, remains dwarfed by the volume of credit to commercial agriculture.

On the other hand, the export and energy functions have shown exceptional vitality as a result of the liberalisation of the agricultural sector in the 1990s, associated with the stimuli of the international commodity boom and the introduction of flex-fuel vehicles in the Brazilian market.

The predominant role of the export and energy functions of agriculture in the Brazilian development model are deeply tied with its status of a developing country with a colonial past, on the one hand, and its potential as an emerging economy, on the other. In particular, the export function of

²⁴ Buainain, A.M. e Batalha, M.O. (coord.) (2007d) "Cadeia Produtiva da Carne Bovina", *Série Agronegócios* vol. 8, SPA/MAPA- IICA, Brasília.

²⁵ Zibechi, R. (2009) "Is Brazil creating its own 'Backyard'?", *Americas Program Report*, February 3.

²⁶ Buainain, A.M. e Batalha, M.O. (coord.) (2007a).

²⁷ *Revista Valor* (2008) "Tranquilo, o rei da soja no Paraguai", 19 março..

agriculture attests to the incompleteness of the Brazilian industrialization process which has failed to offset dependence on the primary sector (where mining activities also play a significant role) for supply of foreign currency.

On the other hand, the importance of the energy function reflects Brazil's pioneering status in the development and widespread use of alternative energy sources. As shown in section 3.2., preoccupations with energy security date back to the military regime and the first energy crisis in the 1970s. Although the international debate on the effects of the diffusion of biofuels on food production is still raging, the Brazilian energy strategy seems set to maintain its course and to benefit by the growing interest in alternative energy sources and technology.

World growth has been an important driver of the expansion of agriculture in Brazil but, as shown in the previous sections, demand for agricultural goods has an important endogenous component in the expanding domestic food market and in the sugar/ethanol complex. The current international economic crisis could present an opportunity to re-dimension the weight of the export function and strengthen the supply aspects of food security policy.

The present analysis focused on the multiple functions of Brazilian agriculture but avoided the concept of multi-functionality because it does not represent, in any way, the model which has become a keystone of Brazilian development strategy. The primary function of agriculture, food production, is still being constructed in Brazil, while the predominance of large-estate monocultures has rendered the social and environmental functions of agriculture even more fragile.

Orienting Brazilian agriculture towards a more sustainable model involves strengthening the functions associated with the multi-functionality paradigm while declining each of these to the specific domestic context and the country's role as agricultural exporter and emerging economy.

However successful policies targeting land reform and family agriculture may be (and the evidence to the present moment does not seem particularly encouraging), the promotion of multi-functionality cannot be limited to peasants and small farmers, but should permeate government policy towards commercial agriculture as well. Only when family agriculture will become commercially viable, and large-scale agriculture will be socially and environmentally sustainable, will it be possible to minimize the trade-offs among the different functions, and talk of a single, multifunctional agricultural model in Brazil.

REFERENCES

- ABEF (2007) *Relatório Anual da Associação Brasileira de Produtores e Exportadores de Frango*, [www.abef.com.br].
- Altafin, I.G. (2005) “Reflexões sobre sustentabilidade e multifuncionalidade nas políticas para o desenvolvimento rural no Brasil”, XLIII Congresso da SOBER, Ribeirão Preto.
- Araújo, P.F.C., Barros, A.L.M., Barros, J.R.M., Shiota, R. (2007), “Política de crédito para a agricultura brasileira: Quarenta e cinco anos à procura do desenvolvimento”, *Revista de Política Agrícola*, Ano XVI- N. 4, Out/ Nov/ Dez.
- Barros, G. (2008), “Brazil: The challenges to become an agricultural superpower”, Brookings Institution, Washington DC, at [http://www.cepea.esalq.usp.br/pdf/BROOKINGS%20IV.pdf].
- Buainain, A.M. e Batalha, M.O. (coord.) (2007a) “Cadeia Produtiva do Milho”, *Série Agronegócios* vol. 1, SPA/MAPA- IICA, Brasília.
- Buainain, A.M. e Batalha, M.O. (coord.) (2007b) “Cadeia Produtiva da Soja”, *Série Agronegócios* vol. 2, SPA/MAPA- IICA, Brasília.
- Buainain, A.M. e Batalha, M.O. (coord.) (2007c) “Cadeia Produtiva da Agroenergia”, *Série Agronegócios* vol. 3, SPA/MAPA- IICA, Brasília.
- Buainain, A.M. e Batalha, M.O. (coord.) (2007d) “Cadeia Produtiva da Carne Bovina”, *Série Agronegócios* vol. 8, SPA/MAPA- IICA, Brasília.
- Goes, T. and Marra, R. (no date), “A expansão da cana de açúcar e a sua sustentabilidade”, consulted on the 28th of April 2009. [http://www.agencia.cnptia.embrapa.br/gestor/cana-de-acucar/arvore/CONTAG01_66_711200516719.html].
- OECD (2005), *Análise das Políticas Agrícolas- Brasil*, SPA/MAPA, Brasília, October.
- CONAB- Companhia Nacional de Abastecimento, *Indicadores da Agropecuária*, several editions, [www.conab.gov.br].
- Ramos, P. (2007), “O Futuro da Ocupação Canavieira no Brasil: uma discussão dos trabalhos disponíveis e um exercício de estimacão”, *Informações Econômicas*, IEA, SP, v. 37, n. 11, november.
- Revista Valor* (2008), “Tranquilo, o rei da soja no Paraguai”, 19 março [www.valoronline.com.br].
- Takagi, M. (2006), “A implantação da Política de Segurança Alimentar e Nutricional no Brasil: seus limites e desafios”, *PhD. thesis*, Instituto de Economia Unicamp, Campinas, Brazil.
- Weis, B. (2005) “Soybeans vs. Forest: understand the controversy about the IPEA’s study”, at [http://www.socioambiental.org/nsa/nsa/nsa/detalhe?id=1909], consulted 28/02/2009].
- Zibechi, R. (2009) “Is Brazil creating its own ‘Backyard’?”, *Americas Program Report*, February 3, [www.americaspolicy.org].

ANNEX 1

Main Indicators of Brazilian Agriculture 2008

| Produto/Sub-produto | Area plantada (1000 ha) | Production (1000 t) | Exports (1000 t) | Domestic Consumption (1000 t)* | Exports (US\$ 1000) |
|-----------------------------------|----------------------------|---------------------|-------------------|--------------------------------------|------------------------|
| Total Grain | 47.402,0 | 143.820,4 | 48.872,7 | 94.947,7 | 21.296.930,0 |
| Soy | 21.313,0 | 60.017,4 | 39.103,2 | 20.914,2 | 17.986.409,0 |
| Maize | 14.786,4 | 58.622,0 | 6.465,0 | 52.157,0 | 1.448.533,0 |
| Beans | 3.992,7 | 3.522,7 | 1.993,0 | 1.529,7 | 3.470,0 |
| Rice | 2.874,9 | 12.059,6 | 518,0 | 11.541,6 | 311.635,0 |
| Other** | 4.435,0 | 9.598,7 | 793,5 | 8.805,2 | 1.546.883,0 |
| Wood and Cellulose | 4.869.275,0 - | | 12.663,6 - | | 8.055.573,0 |
| Sugar Cane | 5.831,8 | 710.280,9 | - | - | - |
| Sugar | - | 240.894,7 | 19.654,0 | 221.240,7 | 5.695.703,0 |
| Ethanol | - | 317.823,0 | 4.100,1 | 313.722,9 | 2.400.654,0 |
| Coffee | 2.169,5 | 2.759,0 | 1.656,9 | 1.102,1 | 4.761.815,0 |
| Meat | | 24.507,9 | 6.102,1 | 18.436,4 | 14.237.542,0 |
| Beef and veal | | 10.382,0 | 1.919,5 | 8.492,7 | 5.081 |
| Poultry | | 11.018,9 | 3.645,5 | 7.373,4 | 6.359 |
| Pork | | 3.107,0 | 537,1 | 2.570,3 | 1.447 |
| Other | | - | 548,8 | - | 1.349 |
| Subtotal | | - | - | - | 56.448.217 |
| Total Agricultural Exports | | - | - | - | 69.317.667,0 |
| Total Exports | | - | - | - | 197.942.443,0 |

Source: Indicadores da Agropecuaria CONAB, UNICA, BRACELPA

* Includes variations in the level of domestic stocks

**Includes Cotton, Peanuts, Sunflour, Castor Beans, Sorghum, Oats and Wheat

***Planted area refers to paper and cellulose industry.

Note: Exports values refer to year 2008; Crop values to year 2008 or 2007/2008.